Preface to Part II

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The Part II contains English version of the summary of our research "Consideration on Organization-contextual Factors for Improvement of University Curriculum through Usage of Reference Points" and English versions of related official documents such as SCJ's reply to MEXT and reference points of seven disciplines.

We hope that these documents will give our oversea colleagues, working on quality assurance of university education, an idea what has been and now is going on in Japan along the same direction as theirs and we hope that this Part II will promote international collaboration for quality assurance of university education.

Contents

Summary of the project

Kazuo Kitahara

The aim of our project is to show concrete paths to the usage of disciplinary reference points, which have been proposed by Science Council of Japan since 2010, for the purpose of quality assurance of higher education.

1.. History of the reference points of Science Council of Japan

Science Council of Japan started formulating reference points for each discipline and up to 2019, reference points for 32 disciplines and now the formulation of reference points of education is under the process of completion. The reference points of these 33 disciplines may cover most of the fields of learning at higher education, or one should say, all fields, basically covered by Science Council of Japan, are covered in the reference points. However, if we compare similar reference points in other countries, we may immediately recognize that disciplines corresponding to fine arts, drama, dance sports etc. are still missing.

Still, it is quite meaningful that the core of learning of each field is clearly stated in our reference points because one may know what education of each field is aiming at. Then we may have collaboration of various disciplines and this would give rise to an innovation of knowledge.

We here first mention history how reference points have been introduced before going into the future prospective of reference points.

The formulation of reference points was initiated by the publication of the report "Towards the construction of undergraduate education" by Central Council of Ministry of Education, Culture, Science, Sports and technology (MEXT) in April, 2008.

http://www.mext.go.jp/b_menu/shingi/chukyo/chukyo4/houkoku/080410.htm

In the report, the following statement is mentioned:

"Since we are faced with global, knowledge-based and learning society, higher education of Japan should play the public role of upbringing citizens of the 21st century and respond to the expectation of the society. Therefore the government should actively support academic societies and university associations for the establishment of the basis for promoting university education of each discipline. Recently, movement of integration of academic societies is now undergoing so that the basis of promotion of university education is under the process of establishment. Expecting such roles of academic societies, MEXT considers it to be appropriate to ask Science Council of Japan SCJ) to deliberate about the frame of promotion of academic levels of each discipline and assurance of quality."

Responding to the demand of deliberation, which came to SCJ from MEXT in May 2008, SCJ organized committee of quality assurance of university education in June 2008 and three subcommittees for Quality Assurance Frame, General Education and Profession-University Connection. Final report "Reply to MEXT" was issued in July 2010.

「Reply to MEXT: On Quality Assurance of University Education」
(http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-21-k100-1.pdf)

The Reply consists of three parts: Part I is about the frame for quality assurance, Part II is about general education and Part III is university-profession connection.

Part I proposes formulation of reference points of each discipline for quality assurance. Since we have about 700 universities in Japan, which are quite of diversity, we should not make strictly uniform reference points but make statement about the core concepts of each discipline shared by diverse universities.

On the basis of these core concepts, each university will formulate its own curricula with regards to its own resources, quality of students and staff and dispositions. The reference points of each discipline consist of the following four statements; (1) The definition and specific properties of the discipline, (2) Basic

skills, which all students majoring the discipline should learn, (3) Basic concepts about evaluation of learning methods and learning outcomes of the discipline, (4) The relation between professional education and general education for cultivating the citizenship.

When one makes the statements on the definition and the specific properties of the discipline, one should be aware that each discipline has its own method of recognition of the world and its own method of participating in the world. The method of recognition of the world may be the academic method in the traditional sense. But it is not enough when we face with the ever-changing world. We then should participate in the world and play one's own role to manage the world. Then education should provide students with methods of active participation in the world. One should not simply be passive but active in collaboration with others in the resolution of problems in the world and also the recognition of the world, which would be promoted through the participation. We are now aware that recognition of the world and participation in the world compose the essence of human being. On the basis of this awareness, we looked into the prospect of higher education.

We are aware the diversity of disciplines is due to tha fact that each discipline has its own method of recognition of the world and its own method of participation in the world and they are different from those of each other disciplines. But if we think that recognition of the world and the participation in the world are the ultimate goals of each discipline, it is effective to express the characteristics of each discipline in terms of its specific methods of recognition of the world and participation in the world. This is what we consider the content of reference points. If these methods characterizing each discipline are stated in such a manner that experts in different disciplines may understand reference points of each other's reference points, then we may expect collaboration of experts of different disciplines for the resolution of the world's problems.

As any human does not live in isolation, any discipline is not completely independent from others. Thus each learner should learn how to collaborate with learners of other disciplines during the limited period of his or her studentship.

Part II proposes a new concept about general education. As the capacity of citizenship, students should have not simply "adaptability" to the ever-changing world but rather "responsibility" to it so that they may imagine the future and take action for the better world. Part III proposes that the improvement of university-profession connection leads to better recognition of professional implication of university education and to better evaluation of university education by the society.

2. Formulation of reference points of SCJ

After publication of the Reply to MEXT in 2010, SCJ started formulation of reference points of each subject in collaboration with related academic societies and by the end of 2019, the formulation of reference points for 32 subjects have been completed and the formulation of the reference points for education is now at the final stage. The following is the list of subjects whose reference points are completed. Here below are the list of disciplines, for which reference points are completed with the dates of completion (Year/Month/Day). Sections are the ones of SCJ.

Section I (Humanity and Social Science): management (2012/8/31), law (2012/11/30), language and literature (2012/11/30), politics (2013/9/10), economics (2014/8/29), history (2014/9/9), geography (2014/9/30), psychology (2014/9/30), cultural anthropology (2014/9/30), sociology (2014/9/30)、area studies (2014/9/30), sociological welfare studies (2015/6/19), philosophy (2016/3/23), service studies (2017/9/8)

Section II (Life science): home economics (2013/5/15), agriculture (2015/10/9), pharmacology (2017/8/17), nursing (2017/9/29), dentistry (2017/9/29), medicine (2017/9/30)

Section III (Science and engineering): mechanical engineering (2013/8/29), mathematical science (2013/9/18), biology (2013/10/9)、civil engineering and architecture (2014/3/19), electric and electronic engineering (2014/7/29), materials engineering (2014/9/1), earth and planet science (2014/9/30), statistics (2015/12/17), informatics (2016/3/23), physics and astronomy (2016/10/3), computational mechanics (2017/8/8), chemistry (2019/2/21)

Reference points of the following disciplines are translated into English:
Social welfare, Physics and astronomy (by this project)
Philosophy, Management, Civil engineering and architecture (by National Institute of Education Research)
Mechanical engineering, History (by Science Council of Japan)

3. Implication of Reference Points on Education Policies

On March 31, 2016 Central Education Council of MEXT published a report "Guideline for formulation and operation of Diploma Policy, Curriculum Policy and Admission Policy", stating the meaning of these policies as (1) promotion of internal quality assurance, (2) open to high schools, (3) visibility to society and referring to reference Points for the reference to learning outcomes.

On December 21, 2016, Central Education Council of MEXT published a report "Improvement and necessary strategy of National Curriculum of Primary, Secondary and Special Support Schools", stating the necessity of clarification of meaning of learning and proposing the improvement of the quality of the whole education, including higher education, by connecting the learning goals with those proposed in the reference points in terms of "the methods of recognition of the world" and "the method of participation in the world".

Thus Reference points may serve through Diploma Policy for the connection between universities and society and may connect primary and secondary education with higher education from the viewpoint of learning outcomes. We expect that these connection and collaboration will improve the whole education, namely from primary to higher education or even social life-long education.

Actually Kyushu University is now developing the curriculum reform referring to reference points of Science council of Japan.

Collaborative wisdom through reference points

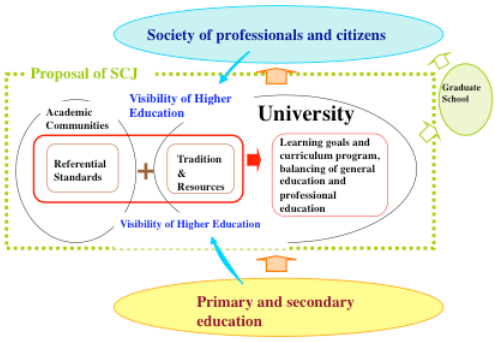
Although the reference points were originally formulated for the purpose of

quality assurance of each subject in university education, the complete sets of these reference points may be used for more general purposes. First of all, the set can be used for the overview of all fields of learning. The set gives the idea of reviewing each field of learning from the view points of "recognition of the world" as well as "participation of the world". We may even say that the diversity of disciplines of learning reflects the diversity of the ways of recognition of the world and of the ways of participating in the world. In other words, people involved in different disciplines may understand and collaborate with each other on the common basic concepts of recognition of the world and participation in the world. Thus we hope that the set of reference points would promote collaboration of different disciplines on the common issues of the world on the basis of various expertises.

The reference points may serve as the guidelines for middle school people to understand the core of learning in universities so that students of middle school may decide in what disciplines they should proceed after graduation from their schools. The reference points also serve as the tool for professional society to know what university students have studied before the society accept these students as professionals.

Thus reference points of a discipline will make it transparent to the people in other disciplines. The reference points will also make university education transparent to society. Thus people with various disciplines can work together for the better society and world.

The role of reference points may be shown in the figure below.



Summary of this project

(1) Awareness and interest of faculty about referential points

We visited department of management, department of physics and school of medicine to see how curriculum improvement proceeds in the organizational context and what is the implication of reference points in this context. We interviewed faculty and had workshop with them.

(2) Study of Curriculum reform of Kyushu University using reference points

(3) Survey about similar actions in other countries

a. visit to USA in 2017

b. visit to Europe in 2018

c. Case of McGill university, reported in the symposium held at International Christian University on September 24, 2018.

4. Conclusion

Collaborative wisdom through reference points

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The Implication of Reference Points: The Dawn of Innovation of University

When universities started in the 12th century, the learning was not much divided and the universities were "universitas", namely communities of learners. But as modern science was promoted in the following centuries, learning became divided into narrow disciplines. Nowadays, the world issues should be treated from different disciplines at the same time. Thus collaboration of different disciplines is inevitable. Thus "universitas" should be recovered in a modern sense. But it is not the whole story. "Universitas" nowadays is not limited within universities but should be extended to include society and middle or even primary schools to create collaboration of all with scientific conscience.

Appendix

1. QAA(Quality Assurance Agency)

QAA has now formulated, since 2010, Benchmark Statements for 61 disciplines and continuously revising them since then on the basis of opinions of students' unions and of people involved in business. Benchmark statement of each discipline involves the definition, specific properties, basic knowledge and capacity evaluation

Accounting (2016) Agriculture, Horticulture, Forestry, Food and Consumer Sciences (2016), Anthropology (2015), Archaeology (2014), Architectural technology (2014) Architecture (2010), Area Studies (2016), Art and Design (2016), Biomedical science (2015), Biosciences (2015), Business and Management (2015)、Chemistry (2014) , Classics and Ancient History (including Byzantine Studies and Modern Greek) (2014), Communication, Media, Film and Cultural Studies (2016) , Computing (2016), Counselling and psychotherapy (2013), Creative Writing (2016), Criminology (2014), Dance, Drama and Performance (2015), Dentistry (2002), Dietetics (pre-registration) (2017), Early childhood studies (2014), Earth sciences, environmental sciences and environmental studies (2014), Economics (2015) Education Studies (2015), Engineering (2015), English (2015), Events, Hospitality, Leisure, Sport and Tourism (2016), Finance (2016), Forensic science (2012), Geography (2014), Health Studies (2016), History (2014), History of Art, Architecture and Design (2016), Housing studies (2014), Landscape Architecture (2016), Land, Construction, Real Estate and Surveying (2016), Languages, Cultures and Societies (2015), Law (2015), Librarianship, Information, Knowledge, Records and Archives Management (2015), Linguistics (2015), Materials (2017), Mathematics, Statistics and Operational Research (2015) , Annex to Mathematics, statistics and operational research to cover integrated master's degrees (2009), Medicine (2002), Music (2016), Optometry (2015), Osteopathy (2015), Paramedics (2016), Philosophy(2015), Physics, Astronomy and Astrophysics (2016) Politics and International Relations (2015) Psychology (2016), Social Policy (2016), Social Work (2016), Sociology (2016),

Theology and Religious Studies (2014), Town and Country Planning (2016), Veterinary Nursing (2015), Veterinary science (2002), Welsh (2016), Youth and Community Work (2017).

2. Tuning in EU

In Europe, there is project called "Tuning" whose base is located at Groningen University. Guideline for each subject is called "Reference Points". Since In EU, there is mobility scheme of students called "ERASMUS" and "SOCRATES" so the standardization of each discipline is well required.
(https://www.calohee.eu/brochures/)
Agronomy, Architecture, Business, Chemistry, Civil Engineering, Earth Science, Ecology, Economics, Education, Environmental Engineering, European Studies, Foreign Languages, Gender Studies, History, Informatics, Interpreting and Translation, Laws, Linguistics, Library Studies, Mathematics, Medicine, Music, Nursing, Occupational Therapy, Physics, Psychology, Social Work, Theology and Religious Studies, Tourism

3. US and Canada

R. Arum, J. Roksa and A. Cook, "Improving Quality in American Higher Education: learning outcomes and assessments for the 21st century" (Jossey-Bass, 2016)

G. D. Kuh, S. O. Ikenberry, N. A. Jankowski, T. R. Cain, P. T. Ewell, P. Huntchings and J. Kinzie, "Using Evidence of Student Learning to Improve Higher Education" (Jossey-Bass, 2015)

J. G. Donald, "Improving the Environment for Learning: Academic leaders talk about what works" (Jossey-Bass, 1997), "Learning to Think: Disciplinary Perspectives"(Jossey-Bass, 2002)

Disciplinary Reference Points for Curriculum Design and Quality Assurance of University Education

Part 1. Introduction

I. The purpose of defining disciplinary reference points

At present, the number of students enrolled in universities around the world is growing, leading to the diversification of university education. This situation has resulted in greater demand for the maintenance and improvement of the quality of university education. Nevertheless, shared understanding among universities about the role of disciplinary education seems to be lacking.

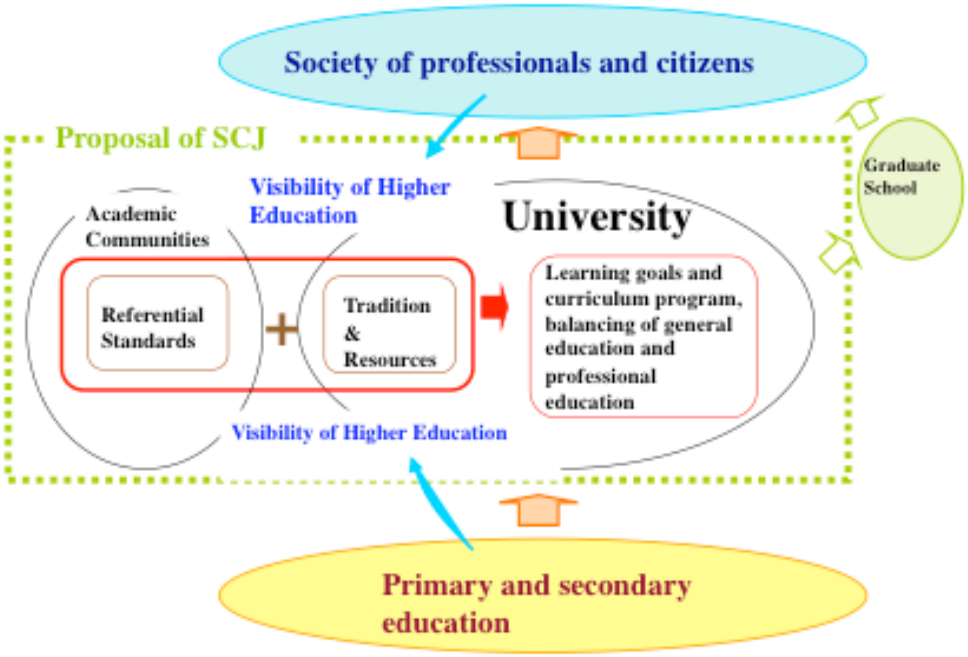
In 2008, the Science Council of Japan was requested by the Ministry of Education, Sports, Culture, Science and Technology (MEXT) to deliberate on a quality assurance framework for university education. Two years later, the Council had compiled the *Quality Assurance Framework for University Education* [1], which they delivered to MEXT on 22 July, 2010. It was at this point that the need to formulate *Disciplinary Reference Points for Curriculum Design and Quality Assurance of University Education* was suggested, which would prompt the creation of disciplinary reference points. By the end of 2019, the Science Council of Japan had put together disciplinary reference points for 32 disciplines [2]. Some individual academic societies also delivered their own disciplinary reference points, including those for physical education and sports.

These disciplinary reference points propose basic concepts that can be shared among disciplinary group members as representing the core concepts to be taught and learned in disciplinary education at the undergraduate level. The aim of these reference points is to contribute to assuring the quality of university education by serving as guiding principles for curriculum design.

In order to assure the quality of education from the students' standpoint, each university must consider the needs of their students and the resources they can allocate, while pursuing the unique mission of the university. In order to achieve this goal, it is important that universities make explicit the learning outcomes that they expect their students to acquire through their undergraduate educational programs, as well as design curricula that is best fit to achieve those learning outcomes. Based on this line of thought, the reference points for each discipline propose the 'basic knowledge and skills that students should acquire.' The reference points are meant to serve as guiding principles for individual universities when they define their own learning outcomes of undergraduate educational programs. The specific ways in which curriculum should be designed are not discussed in the reference points, from the standpoint that the details of curriculum should be decided by individual universities.

The Science Council of Japan hopes that these disciplinary reference points can assist universities in their independent and autonomous effort to assure the quality of their educational programs. Because disciplinary reference points specify and document the core concepts, or the knowledge and skills to be taught and learned in disciplinary educational programs, it is anticipated that they will enhance the collaboration between secondary and

tertiary education, the collaboration between higher education and the workplace and society, and intellectual collaboration amongst the disciplines.



Indeed, in 2016 Central Education Council of MEXT published a report "On the improvement of national guideline of primary, junior and senior high schools", in which the need of emphasis on the meaning of learning is mentioned and the bridge to higher education with respect to the meaning of learning is prospected in terms of "the way of recognizing the world" and "the way of participating in the world."

II. Concrete contents of the disciplinary reference points

The reference points for each discipline differ slightly from each other, but are in principle composed of the following four elements:

(1) Definition and distinctive features of the discipline

(2) Basic knowledge and skills that students should acquire

(3) Basic ideas guiding approaches to teaching & learning and assessment of learning outcomes

(4) The relevance of general and specialized studies in fostering active citizenship

(1) Definition and distinctive features of the discipline

Firstly, the definition and distinctive features of each academic discipline are discussed in-depth. Each discipline has its unique 'way of recognizing the world' and

its unique 'way of participating in the world', which form the foundation of the students' learning outcomes.

(2) Basic knowledge and skills that students should acquire

In order to take a student-centered approach to assuring the quality of university education, each university needs to make explicit the learning outcomes of their undergraduate education. The 'basic knowledge and skills that students should acquire' should serve as a guiding principle in this effort.

When suggesting 'basic knowledge and skills', we emphasize their connections to the "definition and distinctive features of each discipline," but do not provide a concrete listing of specific knowledge and skills. The 'basic knowledge and skills' are stated in abstract terms, representing the foundational concepts necessary to engage with society as professionals and citizens. There are variations in the disciplinary reference points in how abstractly/concretely they present their 'basic knowledge and skills.' Individual universities may choose what to pursue according to their own judgement.

The 'basic knowledge and skills' are divided into the following three categories. We have envisioned the "ideal" goal of education that should be pursued by all universities. However, taking into consideration the diversity of universities and their students across Japan, they are not meant to be minimum requirements that must always be achieved.

① Basic 'knowledge and understanding' attained through study of the discipline

② 'Discipline-specific skills' demonstrating an application of the basic knowledge and understanding

③ 'Generic skills' attained through discipline-specific intellectual training

(3) Basic ideas guiding approaches to teaching & learning and assessment of learning outcomes

In order to ensure that the acquisition of 'basic knowledge and skills' lead to 'proficiencies' that go beyond the superficial acquisition of disciplinary knowledge and skills, the approaches to teaching & learning and assessment of learning outcomes play important roles. This section suggests basic ideas meant to guide practice in universities.

(4) The relevance of general and specialized studies in fostering active citizenship

The fostering of active citizenship is a task shared by all undergraduate education regardless of discipline. We explain the relevance of general and specialised studies in fostering active citizenship within the context of each discipline, so that universities do not focus overly on teaching & learning of disciplinary education and dismiss the bird's-eye view of undergraduate education.

III. Reference material to be used freely by everyone concerned

The Science Council of Japan has taken initiative in compiling the disciplinary reference points based on its expertise and responsibility as the organization independent from the government, representing scientists in all disciplines. As such, the disciplinary reference points are not tied to governmental regulation or funding schemes. They are

proposed as guiding principles that can be used freely by anyone interested in university education (including universities, prospective university students and employers hiring university graduates).

This feature of the disciplinary reference points is well appreciated by the Central Council for Education of MEXT. The Science Council of Japans' disciplinary reference points are introduced as a 'reference' for formulating developing learning outcomes and curriculum in the MEXT Guidelines issued in March 2016.

[1] Science Council of Japan, 'Reply: The Quality Assurance Framework for University Education' (22 July, 2010)
[2] The homepage of the Science Council of Japan, www.scj.gp.jp, recommendations and reports column (reports)
[3] 'Guidelines for Formulating and Managing "Diploma Policy", "Curriculum Policy", and "Admission Policy"' (31 March, 2016, University Education Group, University Subcommittee, Central Council for Education)

Part 2. Outlines of the disciplinary reference points

We will show the summaries of the disciplinary reference points according to the sections of Science Council of Japan.

Section I (Human and social science)
Language and literature (November 30, 2012)
History (September 9, 2014)
Geography (September 30, 2014)
Philosophy (March 23, 2017)
Psychology (September 30, 2014)
Cultural anthropology (September 30, 2014)
Law (November 30, 2012)
Politics (September 10, 2014)
Economics (August 29, 2014)
Business administration (August 31, 2012)
Sociology（September 30, 2014）
Social Welfare (June 19, 2015)
Service Studies (September 8, 2017)
Area studies (September 30, 2014)

Section II (Applied life science)
Medicine (September 30, 2017)
Dentistry (September 29, 2017)
Pharmacy (August 17, 2017)
Nursing Science (September 29, 2017)
Home economics (May 15, 2013)
Agriculture (October 9, 2015)

Section III (Science and engineering)
Mathematical science (September 18, 2013)
Statistics (December 17, 2015)
Physics and astronomy (October 3, 2016)
Biology (October 9,2013)
Earth and planetary science (September 30, 2014)
Mechanical engineering (August 29, 2013)
Electric-electronic engineering (July 29, 2014)
Informatics (March 23, 2016)
Civil engineering and architecture (March 19, 2014)
Materials science (September 1, 2014)
Computational Mechanics (August 8, 2017)
Chemistry (February 21, 2019)

Section I

<u>Language and literature (November 30, 2012)</u>

1. The definition of language and literature

Language and literature plays an important role in university education today, but its scope is frequently unclear and lacks stability. Language and literature is at the root of human spiritual and social life, as well as forming the foundation upon which all scholarship and culture is created; yet, it is also a discipline in its own right, lending it the duality of straddling the line between specialized and liberal arts education. In fact, if we consider the situation before the deregulation of the Standards for the Establishment of Universities, language and literature did occupy a definite position in Master's education as a subject belonging to the humanities and foreign languages of general education; however, it lost that position following deregulation. Moreover, language and literature as specialized education has come to lose its contours and characteristics as a discipline due to the liberalization of the names of study areas attached to degrees, as well as a series of name changes and newly created programs. Even so, those engaged in researching and teaching this discipline at universities are confident that the study of language and literature continues to play an important role in universities today. It is on the basis of that confidence that we hope for these disciplinary reference points to serve as a helpful reference when designing curricula for this discipline at each university, by providing shared 'principles and philosophy' for language and literature. Additionally, the framework of language and literature is not a combination of the two disciplines of language and literature. According to the subject classification in the MEXT School Basic Survey, 'literature' is an intermediate category belonging to a greater category (humanities), yet this is not a narrow definition of literature but one that also includes the curricula of foreign languages, linguistics, language pedagogy, language and culture studies, etc. In this sense, when thinking about disciplinary reference points for literature, it is best to do so within the framework of language and literature, as language is an essential element of literature.

２. The distinctive features of language and literature

①Language and literature is the foundation of human creativity and solidarity

Language permeates and is an indispensable component of all aspects of human thinking and social endeavor. Etymologically, literature comprises the literacy of reading and writing letters and text, a definition that both facilitates the creation of scholarship and culture, as well as creating the platform upon which understanding is formed. Moreover, people have a fundamental desire to connect with others through words. Using the spoken and written word to appeal to others lies at the root of literature as language art. Language and literature are both the foundation of as well as an expression of human solidarity.

②Three aspects of language and literature: language, literature, and individual languages

The main objects of study in language and literature are language, literature, and individual languages. The reason for specifying individual languages is that language proficiency is necessarily realized through the acquisition of an individual language. The teaching and study of individual languages is broadly divided into 1) Japanese as a first language, 2)

foreign languages, and 3) English as a world language, based on a consideration of, on the one hand, the subject language and, on the other, the relationship between the learner and the subject language. English is, of course, an important foreign language, but it is good to separate English learning from the foreign-language category when it is a means for cooperating with people of other cultures and languages at a global level. Japanese as a second language also belongs to category 2.

③The study of language and literature has the significance of contributing to the fostering of humanity and active citizenship. It does this by developing and advancing public language skills through training in the advanced command of such skills, particularly literacy in individual languages, as well as allowing students to acquire a humanities education by studying literature as a linguistic art. It is also significant in that it not only fulfils a variety of roles in occupational life, but also makes important contributions, in particular to primary and secondary education as well as university liberal arts education.

3. Basic knowledge and skills that students of language and literature should aim to acquire

The basic skills that students should acquire through the study of language and literature can be summarised in the following four points:

1) Advanced literacy in Japanese as a first language; 2) advanced communication skills on the basis of literacy; 3) public language skills founded on literacy and education; and 4) the acquisition of an outlook on life that goes beyond practical living.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

We have narrowed down the focus to individual languages, which are at the core of language and literature education, divided them into Japanese as a first language and other individual languages (foreign languages and English as a world language), as well as discussed their basic learning principles. We have paid attention to the fact that learning motives and objectives differ, particularly when it comes to studying languages other than Japanese, such as those between world languages and foreign languages, emphasizing the importance of providing different learning principles as well as studying multiple second languages.

Evaluation relates to learning achievements and outcomes, but we also pointed out that it relates to the learning process and has the function of promoting student growth. As such, we presented some basic principles for evaluating, in particular, the command of an individual language.

５. Basic concepts related to approaches to assessment/evaluation

Evaluation relates to learning achievements and outcomes, but we have also pointed out that it relates to the learning process and has the function of promoting student growth. As such, we presented some basic principles for evaluation, in particular the command of an individual language.

History (September 9, 2014)

１． The definition of history

History is about pursuing the meaning of the various events that have taken place throughout the long history of humankind. In this report, history is a concept that comprises not only general history and archaeology, but also art history, the history of science, the history of technology, legal history, economic history, and political history, as well as all the fields specific to each of these.

２． The distinctive features of history

Historians select events that they themselves find meaningful from the limitless past and pursue the meaning of those events in accordance with their own values. As such, historical perception is subjective and cannot be separated from the subjectivity of the perceiver. Yet, at the same time, historical perceptions must be 'scientific'. There is a massive difference between being subjective and being 'personal' or 'arbitrary'. Historical perception must be founded on established 'historical facts' derived from strict empirical procedures and must be logical in its understanding of the correlation between events. Even so, as it is impossible to conduct follow-up experiments of the past, historical perception cannot be 'scientific' in the same sense as the natural sciences (experimental science).

3. Basic knowledge and skills that students of history should aim to acquire

A basic competency that students are expected to acquire is the understanding that the nation and society that surround us, as well as our individual lives, are neither phenomenological nor permanent, but are molded by history. Yet, even if we aspire to examine our present nation, society, and individual life historically, there are many possible perspectives, none of which is exclusively correct. Since each person establishes their subjectivity within their own environment, the perspectives on that history are as diverse as there are people. As such, students are expected both to have their own view on history as well as respecting the views of others. This has the potential for overcoming political conflicts rooted in differences in historical perception between nations and ethnic groups.

4. Basic concepts relating to approaches to learning and approaches to assessment/evaluation of learning outcomes

A precondition for teaching history is the diversity of views on history, so that it is not good if a teacher imposes their own perspective on history. It is necessary to present students with problems even in general lectures or practicums. It might be beneficial to attempt a teaching style that revolves around student debate. For example, we can imagine a lecture style where students are introduced to an historical topic (event or incident), presented with historical documents, literature, or objects, and are asked to report on and debate that topic. This report suggests concrete topics for and explains the methodological features of each of the areas of Japanese history, foreign history, archaeology, art history, the history of science, the history of technology, legal history, economic history, and political history. This should be a helpful reference when organizing debate-centered

lectures. Such lectures require adjustments to the evaluation of learning outcomes. The adjustment would primarily be concerned with the evaluation standard regarding how well students understand problems based on the quality of their reports and how active they are in the debate.

5. The fostering of active citizenship, liberal arts education, specialized education, and teacher training

Knowing about the politics, economy, culture, and environment of the past is indispensable for perceiving oneself and one's position in this ever-changing world. It has an essential significance for one's active participation in democratic society (i.e. active citizenship) and for developing skills for contributing to the maintenance and development of that society. In this report, the focus was on history in liberal arts and common education, but students who specialize in history are also expected to deepen their study of history in their specialties. Yet, even then, it is desirable that they do not simply become engrossed in their specialized field but pay attention to the diverse range of historical approaches. Lastly, it is important that we reaffirm how, in particular, the training of primary and secondary education teachers comes with a great responsibility for the fostering of active citizenship through the study of history. It is the responsibility of university lecturers to provide aspiring teachers with a history education that gives them a broad-sighted and global historical perception. This is a task shared by all faculties.

Geography (September 30, 2014)

1. The definition of geography

Geography is a discipline that studies various natural and manmade phenomena on the earth's surface as well as their relationships from a composite, comprehensive perspective. It can broadly be divided into natural geography, human geography, and topography (regional geography), depending on whether the priority is natural phenomena, manmade phenomena, or the regionality of specific regions. Geography has since ancient times collected, organized, described, analyzed, interpreted, and expressed information about various regions and places on the earth's surface from a variety of perspectives, and conveyed this information to society. In modern times, an important aim for geography research and education is for geographic insights gained in this way to be made useful for environmental protection, disaster prevention and reduction, regional sustainable development, social justice, etc.

２. The distinctive features of geography

A distinctive perspective of geography is its concern with the diverse phenomena taking place above the earth's surface as it tries to explain their causes. Furthermore, as it seeks to understand various regional phenomena at pluralistic spatial scales and explain the causes of regional diversity, geography leads the way in terms of explicating how human society and the space of the earth's surface are entangled. As such, geography has traditionally emphasized bottom-up approaches based on fieldwork, and approaches that visualize

phenomena on the earth's surface, and today makes use of geographic information systems (GIS). A large variety of approaches are also used to explain the phenomena observed in this way.

3. Basic knowledge and skills that students of geography should aim to acquire

The field of geography is vast, but there are two basic types of knowledge and skills that students should acquire. One is knowledge about the concepts and characteristics (place, space, environment, scenery, etc.) of regions. This consists of 1) knowledge about the concepts and principles of regions, 2) general knowledge about the natural and cultural characteristics of regions, and 3) knowledge about the regional characteristics of locations around the world, starting with Japan. The other is regional survey methods. This includes 1) methods of observation, surveying, questioning, questionnaires, and measurements gleaned from field practice and methods for collecting data from public offices and businesses, 2) methods of statistical processing gleaned from the practicum analysis of regional statistics, and 3) methods of cartographic and spatial analysis gleaned from using and applying cartography, land surveys, and open data in GIS.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

The study of geography makes possible the acquisition of basic knowledge at various scales, from the earth's environment to regional society, and is made up of lectures, practice and practicums, readings, fieldwork, graduation thesis, etc. For the evaluation, it is important to apply a method that is versatile and flexible, taking into account how much has been accomplished in the stepwise learning process toward the acquisition of broad knowledge and systematic understanding.

5. The relevance of specialized education in geography, which has a wide range of related disciplines. and liberal arts education

Geography has thus far benefitted from being a discipline that integrates the humanities, the social sciences, and the natural sciences, and has developed by referencing related disciplines on a foundation of acquiring the geography-specific skills to relativize spatial differences. In the future, the discipline should expand its scope to include other practical education and technical skills that make use of geography in diverse ways, such as the acquisition of basic knowledge about social institutions through practice in the local field, skills for organizing, processing, and analyzing information using GIS and other systems relevant to the information society, as well as presentation skills for accurately conveying that information. At the same time, geography education as liberal arts or citizenship education has remained highly useful for developing practical problem-solving skills, including regional understanding at various spatial scales, the fostering of active citizenship, and open data using and applying GIS. As such, there is a common need for basic knowledge in the form of an understanding of regional concepts and regional diversity, technical skills related to fieldwork, maps, and GIS, as well as skills to relativize spatial differences in terms of spatial scale and regionality that allow basic knowledge and technical skills to be put to sufficient use.

6. Geography and teacher training

Since the dawn of modern education, geography education has made great contributions towards the accomplishment of the aims of school education. What made this possible were the teachers who sufficiently understood and studied the fruits of geographical research, and their contributions continue to this day. In order to provide teacher training that optimizes geography's integration of the humanities, social sciences, and natural sciences, that training needs to be able to go beyond the restrictions of school types. This includes imparting educational contents and teaching methods for realizing an education for sustainable development (ESD) at the university level, the nurturing of skills for developing teaching materials for effectively teaching 'the relationship between nature and humans', including materials about the earth's environment, views on nature and the environment, and the reality and prevention of natural disasters, as well as the nurturing of technical skills related to GIS using regional surveys and open data, which are indispensable for the fostering of the other skills.

Philosophy (March 23, 2016)

1. The definition of philosophy

There exist a great variety of definitions of 'philosophy', but here we shall define it as 'the construction of a reference framework for understanding the world we live in as a whole'. This definition takes into account that the philosophy covered in these disciplinary reference points is not philosophy in a narrow sense (traditional Western philosophy), but includes a total of eight related areas (philosophy of science, ethics, aesthetics and the arts, Japanese intellectual history, Chinese philosophy, Indian philosophy and Buddhism, and religious studies). The definition is applicable to all those areas, and it also emphasizes the constructive dimension of philosophical reasoning, which goes beyond analysis and criticism. Compared to American and European universities where the focus is almost exclusively on Western philosophy, philosophy education at Japanese universities has always included Asian philosophies and ideologies as well as aesthetics and the arts and religious studies, which are also linked with empirical science. This tradition provides Japanese students with diverse educational contents as well as allowing them to compare Western philosophy with ideological and intellectual practices in other regions. This makes it possible to create an educational environment where students can relativize different philosophies, can reflect on their own foundation, and are encouraged to be more rigorous in their philosophical reasoning.

２. The definition and distinctive features of philosophical disciplines

The philosophical disciplines, namely the eight abovementioned areas, function to stimulate each other and each have their own academic tradition in Japan, which is also reflected in the academic societies. Each of the eight areas possesses their own unique self-understanding or disciplinary identity.

３. Basic knowledge and skills that students of philosophical disciplines should aim to acquire

The goal of studying philosophical disciplines is to acquire skills, knowledge, and attitudes. Students acquire 'skills' to deepen their own thinking, whilst drawing inspiration from the ideas of their predecessors, in the form of 'knowledge' about the ideas put forth by philosophers, ideologues, authors, artists, and religious teachers from all ages and countries. The results of that are then compared and connected with the new perspectives and values of the current age, so that students can question their own foundation and acquire an 'attitude' that can fuel their practical endeavors. The cornerstone of all philosophical skills is 'the ability to think'. Logical thinking is one of the 'technical skills of generic utility' that make up 'academic ability', and many universities include critical thinking as part of their liberal arts education. The study of philosophical disciplines improves such generic skills related to thinking, while specialized study also develops skills for understanding various issues at a deeper level of principles, value systems, and worldviews, for thinking about them using relevant philosophical knowledge and concepts, and for acquiring perspectives and pathways that allow one to solve them.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

The skills acquired through the study of philosophical disciplines are both of generic and basic utility. As such, the approaches to learning are characterized by 'gradual progress', which is not always compatible with standardized learning element-by-element or in order of difficulty. Moreover, the study of philosophical disciplines is conducted via a bidirectional process that emphasizes learner proactiveness, where a deepening of independent study with teacher support is desirable. As for approaches to assessment/evaluation, although essay exams and written assignments were traditionally the standard, it has become necessary to combine these with oral presentations and discussions in response to the present demand for the cultivation of generic skills.

5. The relevance of psychology education and specialized education in psychology in fostering active citizenship

Citizenship is a basic attitude required to operate a democratic community together with others. Specialized and liberal arts education in the philosophical disciplines can fulfil a uniquely important function when it comes to the fostering of active citizenship, for the following reasons. 1) Philosophy can become the core of the liberal arts, which harmoniously develops specialized knowledge and civil society by connecting the knowledge of various disciplines. 2) Philosophical debate can train citizens' discernment, which is the foundation of democracy. 3) Philosophy education can instruct each citizen about their responsibility with regard to the important issues of today's world and especially those in the sphere of ethics.

6. The training of educators in the philosophical disciplines

As stated above, the philosophical disciplines play an important role in higher education. Moreover, it is recognized both in Japan and abroad that an education in philosophical disciplines is also required in secondary education to develop a fundamental ability to think, going beyond the conventional rote learning subject of 'civics' ('ethics'). The teachers in charge of such teaching need to have specialized in philosophical disciplines, making it extremely important that specialized courses for philosophical disciplines exist at both the undergraduate and graduate levels of university.

Psychology (September 30, 2014)

1. The definition of psychology

Psychology is a discipline that asks what the mind is and seeks to elucidate its functions. As such, it aims to clarify the process by which humans take in information from the outside world, understand that information, and finally act on it as appropriate. This is done phenomenally and functionally as well as by going all the way back to the brain's function, which rests behind it all. Moreover, psychology is deeply related to the social sciences. Whilst it is a basic discipline, it also has the dimension of being a practical discipline that seeks to apply the various insights it has gained when pursuing its fundamental questions and seeks to do so in diverse settings, including education, welfare, clinical treatment, industry, and information technology

2. The distinctive features of psychology

Psychology has a unique vantage point in pursuing both matters of pure science and the challenges faced by people living in modern society. It can be divided into 1) the perspective of scientifically pursuing the human mind, 2) the perspective of bidirectionally pursuing academic and field knowledge, and 3) the perspective of responding to the various social challenges faced by psychology. Moreover, psychology has established its own unique methods compared to the other sciences, fulfilling 1) the role of being a cornerstone discipline that aims to balance academic rigor with human happiness, 2) the role of developing research methods for discovering universal truths about all kinds of actions that are taken in response to the circumstances, and 3) the role of grasping the complex aspects of the human traits that differ between each and every individual.

3. Basic knowledge and skills that students of psychology should aim to acquire

When studying psychology at the undergraduate level, the knowledge and understanding that should be acquired differ both qualitatively and quantitatively between general students who study psychology as part of their liberal arts education and department students who major in psychology. The most basic knowledge and skills that general students should acquire are 1) an understanding of how the mind works based on evidence, 2) an understanding of the universal aspects of the mind and behavior from the functions of the mind and behavioral patterns that are common to all people, 3) an understanding of the diversity and plasticity of minds and behaviors, and 4) an understanding of the social role of psychology. Students majoring in psychology should also acquire 5) an accurate

understanding of the workings (mechanisms) that give rise to the mind and other psychological theories as well as learning about 6) methods for psychological measurement, psychological assessments, and psychological experiments. Moreover, they should go beyond the acquisition of subject-specific knowledge and also learn about how psychology intersects with related disciplines. Furthermore, amongst those basic skills that should be acquired through the study of psychology are the following subject-specific skills: a) skills for objectively understanding a person as a whole, b) skills for understanding the diversity and universality of the mind, c) skills for understanding the interactions between people and their environment, and d) skills for making social contributions as a specialized professional working with people. There are also the following generic skills: a) skills for seeing people from multiple vantage points, b) a critical and evidentiary attitude, c) discovering skills to solve problems, and d) communication skills. These are useful for anyone active in society and are not limited to the psychological specialist.

4. Basic concepts related to approaches to learning and methods of evaluating learning outcomes

Approaches to learning in psychology education can be divided into 1) lectures whose aim is a basic understanding of trends in psychology and initiatives in the science of the mind, 2) practicums and seminars for understanding the bidirectionality of academic and field knowledge when studying the mind, 3) practical subjects in the form of experiments and practical exercises whose aim is the technical acquisition of research methods, and 4) the conversion of one's learning outcomes into a graduation research thesis, which comprises the fruition of research activities conducted by oneself. The methods for evaluating the outcomes of such approaches to learning fulfil an important function of assuring the quality of academic ability. Moreover, the evaluation of learning outcomes forms the basis of the learner's own accountability with regard to academic ability, for which reason the teacher needs to show the concrete steps to take to achieve the objectives set in accordance with each course's learning objectives. The learner will evaluate their own outcomes with reference to those objectives, thus becoming accountable for what is learnt and what can be performed in psychology education.

6. The relevance of psychology education and specialized education in psychology in fostering active citizenship

The acquisition of a certain level of knowledge and skills in psychology through an undergraduate liberal arts education is an important part of coming to know oneself and becoming able to contribute to society. Moreover, the study of psychology as part of a liberal arts education is meaningful in that it increases students' understanding of the benefits of psychology and fulfils an important function for fostering active citizenship as a discipline. Turning out experts and specialized professionals who demonstrate knowledge and technical skills through the specialized education of psychology is important for establishing a correct understanding of psychology in society and for advancing the social contributions of psychology.

Cultural anthropology (September 30, 2014)

1. The definition of cultural anthropology

Anthropology is a discipline concerned with humans as biological and social beings who possess language and symbolizing abilities. It deals with the diversity and commonalities of humanity, starting out from a holistic perspective of understanding and comparison whilst also aiming to conduct critical and introspective research. Cultural anthropology studies the characteristics of humans as social beings from the perspectives of diverse cultures. The first wheel of cultural anthropological research comprises ethnographic research, which is a qualitative approach that seeks to gain a comprehensive understanding of people's lives in one society, through fieldwork that uses the method of 'participant observation'. The second wheel is intercultural comparison, which compares individual societies on a global scale to discover their common and unique elements.

2. The distinctive features of cultural anthropology

Cultural anthropology studies almost all facets of human social behavior, ranging from kinship to material culture, cognition, economy, politics, and religion. To this end, cultural anthropologists focus on interactions between people, as well as between people and animals, gods, or machines and other artificial objects. They also investigate all aspects of social life from small provincial communities to metropolises, and study everything from personal histories to networks across ethnic groups, nations, and states. Furthermore, cultural anthropology is interdisciplinary in that it looks at the mutual relations between phenomena that appear unrelated, such as literary works, gift exchanges, gender, and bureaucracies. Cultural anthropology has the ability to re-examine the common sense facets of society due to its holistic vantage point, its broad bird's-eye perspective on the world's cultures and societies, and its interest in diversity.

3. Basic knowledge and skills that students of cultural anthropology should aim to acquire

It is important to foster a deep understanding of and sensitivity to humanity's social and cultural diversity as well as to deepen the understanding that each different culture and society has its own worldview and mode of cognition. In order to achieve this, we must understand cultural anthropology as the comparative research of human societies, understand fieldwork, and familiarize ourselves with other types of data collection method. On this basis, we should aim to acquire the theories and knowledge of cultural anthropology. As a result, we will be able to understand how humans are formed by their social, cultural, and natural environment and live in relation to each of them. We will also foster skills for recognizing the diversity of societies, cultures, and nature, skills for writing and analyzing ethnographies, and skills for interacting with people of different cultures without prejudice.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

The goal is not simply to impart knowledge, but to raise students who actively learn with an independent mindset by stimulating their intellectual curiosity. It is necessary to guide the student to learn for their own enrichment through lectures and seminars using varied

study materials. Moreover, a large part of teaching and studying cultural anthropology is practical activities, such as museum and art gallery visits, watching performances, and attending cultural festivals, as well as conducting fieldwork and writing reports about it.

5. The relevance of specialized education and liberal arts education in fostering active citizenship

By studying cultural anthropology, one gains not only diverse interdisciplinary knowledge but opportunities to study and acquire knowledge in a broad range of areas, such as nationalism, multicultural coexistence, gender, and globalization. Students can interact with real society through practical learning experiences, gain communication skills, and acquire skills for adapting to multicultural civil society and working internationally. Cultural anthropology nurtures sensitivity and respect for cultural differences, as well as instructing students on how to approach different cultures, also making it an excellent subject for fostering active citizenship. It is also very much a necessary subject for students who are going abroad, as a way to introduce the skills and sensitivity necessary for understanding different cultures, which are crucial for global talent today.

6. Teacher training and cultural anthropology

The high-school subjects 'Geography and History' and 'Civics' require an understanding of international affairs and other cultures as well as adaptation to globalization. Hence, students aspiring to be teachers in these subjects need to study 'cultural anthropology'.

Law (November 30, 2012)

1. The definition of law

Law is a discipline concerned with laws. Laws are part of the normative order of human society, consist of norms related to how society should operate, the protection of human rights, social safety, economic order, conflict resolution, etc., are indispensable for the operation of social life, and affect all areas of society. Law is a discipline that is mainly concerned with elucidating these various functions of laws, as well as studying the norms that regulate the most basic interactions between people that are necessary for the operation of social life from a variety of perspectives.

2. The distinctive features of law

① The general character of law

Law is concerned with the norms that make up the foundation of human social life. As people's spheres of life are extremely diverse, these legal norms are similarly multifaceted. Legal norms are important for the operation of human social life and are always related to prescribed value principles. Our society has various value principles, such as freedom, equality, and democracy, as well as positive laws for their realization, and legal principles and institutions that form their basis. These are studied in law, along with what makes a rational decision-making process acceptable to a society with diverse value systems.

② The distinctive character of law in Japan

Law in Japan has been strongly influenced by continental European 'law as scholarship'. Furthermore, our positive laws are in the form of statutes while jurisprudence has conventionally centered on interpreting statutes. Yet, in a rapidly changing society, law for the sake of 'legislation' becomes extremely important. Moreover, positive laws must be applied to concrete cases, which makes the analysis and settlement of interests for concrete court cases indispensable.

③ Today's challenges and tomorrow's direction for legal education

In Japanese society today, we are seeing a considerable 'legalization phenomenon', which is the expanding necessity to find legal solutions to a variety of issues. This has led to the founding of law schools with the goal of increasing the lawyer population. Moreover, while the most desired of legal professionals have been those who handle legal proceedings, primarily in the courtroom, the legal needs of society are exceedingly diverse, requiring people with legal training who can act in all kinds of situations in society, including outside of the courtroom. The training of such people has conventionally been provided by the specialized education in law at universities and this will not change in the future. Legal education in Japan has traditionally focused on the practice of law with a tendency to subsume various adjacent disciplines. Such legal education is extremely important when considering the role of law in a rapidly changing society. At the same time, legal research in Japan is becoming increasingly segmentalized. This trend is also reflected in the legal education. The trend of segmentalization makes it difficult for students of law to gain a comprehensive bird's-eye view, risking a loss of meaning and motivation for studying law. It is a fact that the recent major increase in university entrance rates has caused a great variation in students' academic ability. Even so, we should not simply evaluate this situation in negative terms. It is exceedingly beneficial for society if there are professionals and citizens with a specialized education in law at all levels of society.

3. Basic knowledge and skills that students of law should aim to acquire

① The universalization of higher education and legal education

As the objectives of legal education are diverse, it is not simply legal knowledge that should be acquired, but it is rather the way of thinking and legal competencies that make up its foundation.

② Possible contents of basic knowledge and skills

The following are the possible basic knowledge and skills that students of law may acquire: a) an understanding of the structure of the state norms at the heart of Japan's constitution, as well as respect, particularly for national democracy, the separation of powers, and basic human rights, b) an understanding of statutes as well as of the various value systems and legal principles such as constitutionalism, due processes, *nulla poena sine lege*, the protection of property, and freedom of contract that lie at its foundation, c) an understanding of the various mechanisms for legal operations, d) an understanding of the distinctiveness of legal judgements, e) an understanding of the importance of 'persuasion' in the process of legal judgement, f) the fostering of analytical skills of various ways of thinking and reconciliatory skills for achieving consensus, g) an

understanding of the various legal problems that accompany globalization and the cultural diversity that lies at their root.

③ Knowledge and skills that can be gained from deeply studying a specific legal field

Law has included education in the specific fields of public law, civil law, criminal law, social law, international law, basic law, and new areas. Each of these fields provide different knowledge and skills depending on their characteristics.

④ Generic skills

Through the study of law, aside from specialized knowledge, students may acquire a feeling for human rights, an awareness of public and private, reconciliatory skills, argumentative skills, negotiation skills, organizational management skills, crisis management skills, etc.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

With the universalization of higher education, the demand for legal education is becoming more diverse, the interests of its recipients differ from before, and the teaching methods must adapt accordingly. Moreover, those methods should not be limited to legal knowledge, but it is important to develop a diverse range of methods for improving problem-solving skills, reading comprehension, and written composition and, most of all, for enhancing the incentives for studying law.

5. The relevance of specialized education and liberal arts education in fostering active citizenship

Law is concerned with the norms of civil life and so the foundation of its study comprises the fostering of active citizenship. From this perspective, a basic education in law also serves to improve specialized education.

6. The challenges of law teachers

It is not possible to realize a new form of legal education without fostering teachers with broad perspectives and teaching skills.

Political science (September 10, 2014)

1. The definition of political science

Political science is a discipline concerned with political phenomena. Political phenomena signify activities conducted by groups of people for the continuance and management of those groups, consisting of decisions that affect the whole of the groups and the implementation of such decisions.

2. The distinctive features of political science

Political science is a discipline in the social sciences, but it differs from other disciplines in that it is characterized by what can be called internal conflict. That is, it is deemed impossible to perceive the relevant phenomena from a single perspective or indicator.

Rather, the political scientific method is characterized by a multilateral approach to phenomena, measuring them in relation to two poles.

Specifically, human diversity is taken as a precondition, and political science focusses on the confrontations and conflicts that occur over the various types of value systems, identities, and interests as well as questioning how conflicts can be resolved and social integration achieved. Most important to bear in mind here is the issue of the rivalry between individuality and totality, the question of how free individuals can make up a total order. This is the tension between liberalism and democracy in modern societies and is one of the most important themes in political science. Political science is an intellectual framework for discussing individuality with universality in mind, and of realizing integration on the basis of diversity.

3. Basic knowledge and skills that students of political science should aim to acquire

The core significance of studying political science as a discipline concerned with political phenomena is becoming able to study and make decisions on politics more rationally. As opposed to the skills required by politicians and bureaucrats, central to the study of political science is the acquisition of the ability to think and decide as a citizen who observes and actively participates in politics. A central task of political science education at universities is to better foster active citizenship. While this goal should, of course, be heeded not only in political science but in undergraduate education as a whole, political science particularly forms the core of citizenship education as it is concerned with politics as an activity that considers, maintains, and reforms the total public space made up of citizens. Specifically, students are expected to understand what kind of political system democracy is and what principles are derived from it, to understand the significance of citizens' participation in politics based on knowledge about the historical process through which it came about, as well as to improve their ability to make decisions about real politics by knowing how domestic and international politics operate in reality.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes in political science

Approaches to learning center around lectures and practicums, but students can also gain experience-based political knowledge and skills through internships at actual sites of political decision-making and policy implementation.

5. The relevance of specialized education and liberal arts education in fostering active citizenship in political science

Political science forms the core of citizenship education and so can serve as an organic link between specialized and liberal arts education with the goal of fostering active citizenship.

6. Responding to contemporary challenges

The preconditions of politics are changing greatly with the globalization of our economy, etc. The sovereign-state system that has served as a precondition for political science thus

far is showing signs of instability; the limitations of democracy, which have been preconditioned on the unit of the nation, have become apparent; and domestic politics are tasked with drastically reforming inequality measures and government organizations, as well as numerous other challenges. As such, the importance of possessing knowledge and skills in political science seems to be increasing as we need to identify new conflicts and seek to resolve them.

Economics (August 29, 2014)

1. The definition of economics

Economics is a discipline that studies economic activities in society. It is an academic field devoted to analyzing individual and social activities related to the distribution of the use of and rights to the goods (things) and labor (services) necessary for people to achieve happiness. It also examines the meaning of that happiness and the institutional mechanisms for realizing it, as well as considering what policy responses are desirable.

2. The distinctive features of economics

Economic approaches are diverse, but most involve the extraction of essential elements from economic problems, the construction of configurable models, and analyzing those models in order to identify clues for solving the problems. As most economic variables are expressed as numeric data, it is common to take the approach of formulating and verifying a theoretical or mathematical hypothesis. The subjects of economic research are constantly changing, which means that it is helpful to adopt institutional and historical approaches to understand the history and social institutions that figure as the backdrop of the problems studied.

3. Basic knowledge and skills that students of economics should aim to acquire

① The basic knowledge and understandings that students should acquire through the study of economics

Almost all members of society perform economic activities in their daily lives, so it is necessary for us to understand the mechanisms of economic activities and the role of the market as well as being able to decide which economic policies and institutions are good and which are bad. Moreover, as professionals who are expected to be active in society, it is beneficial for us to understand the significance and historical background of the mechanisms, economic institutions, and economic policies of our economic society as it relates to our own work, as this understanding will enable us to make correct work decisions. The basic concept of economics not only concerns the economy, but has a general application in benefitting our everyday decision-making and professional activities.

② Basic skills that students should acquire through the study of economics

By studying economics, we develop subject-specific skills such as abstract thinking, deductive and inductive reasoning, and quantitative skills, as well as general skills such as logical and critical thinking, information-gathering skills, skills for understanding and using numerical data, and communication skills.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

There is a great deal of variety when it comes to the academic ability of economics students and their future life course. It is necessary to provide students with teaching and goal awareness in accordance with their abilities, on top of the basic education that ensures that students acquire the minimum requirement of knowledge. Teaching methods that combine lectures, practicums, graduation thesis, and graduation research are the most common, but it is beneficial to provide students with diverse methods of learning and evaluation as well as to combine those.

5. The relevance of specialized education and liberal arts education in fostering active citizenship

Starting with globalization and computerization, modern societies have both diverse and extensive social issues. In order to ascertain the full extent of these issues and respond to them, it is vital for people who have studied various specialized disciplines in the humanities, the social sciences, and the natural sciences to collaborate. To achieve this, economics graduates require communication skills and the ability to explain the relevant knowledge and understanding to those who do not share such competencies. At the same time, for students of other disciplines who study economics as part of their liberal arts education, it is important to help them understand the meaning and limitations of market mechanisms, as well as the role and limitations of economic policies, as a way to foster active citizenship.

6. Mathematics and statistics in undergraduate economics

Mathematics and statistics are frequently used in economics, yet as economics is classified as a humanities and social science subject, many universities do not include mathematics in the entrance examination. The result is that many students have not studied mathematics in high school, revealing a major challenge in the handling of mathematics and statistics. The reason for the frequent use of mathematics in economics is that mathematics is useful for abstracting complex problems and detecting fixed principles. Even so, needlessly increasing the weight of mathematics and statistics in economics education comes with the risk of losing students who might otherwise have taken an interest in economics. The level of mathematics and statistics used should be decided on depending on student ability, student interest, subject quality, etc.

Business administration (August 31, 2012)

1. The definition of business administration

Business administration is a system of scientific knowledge related to the planning and administration of organized activity in for-profit and non-profit ‘continuous business entities’. Not only private enterprises, but states, local governments, schools, hospitals, NPOs, families, etc., are all either for-profit or non-profit continuous business entities. Moreover, organizational activities related to planning and administration include the planning of new projects, the management of business entities, the checking and

improvement of their results, the diversification of existing projects, and the various duties within organizations. All these activities taken together are referred to as business administration.

2. The distinctive features of business administration

Business administration was traditionally a subject belonging to the social sciences, but today it is increasingly taking on the character of an integrated science as it utilizes the fruits of natural science. Here, some perspectives unique to business administration are taking hold. The first perspective is a bird's-eye view of for-profit and non-profit continuous business entities, which is what is called the 'manager's perspective' or the 'managerial subject's perspective'. The second perspective is the perspective of the supervisor of each function that makes up the organization, which works to efficiently solve every problem at the level of each occupational function. The third perspective is one that links the activities of the for-profit or non-profit continuous business entity with the developments of society as a whole, as well as inspecting those activities. Any for-profit or non-profit continuous business entity needs to develop in concert with the society that surrounds it and needs to inspect its own consistency with the social order as a whole.

3. Basic knowledge and skills that students of business administration should aim to acquire

Those who study business administration can understand and explain the logic and intentions behind decisions made by for-profit and non-profit continuous business entities as well as the results of those decisions. Furthermore, they can analyze the structure of the problems that continuous business entities face and suggest the most appropriate measures to deal with them. They have acquired the knowledge needed for actually managing a continuous business entity and possess the skills to put this knowledge into practice. Examples of specialist skills that students of business administration acquire include skills for planning and administrating a continuous business entity, grasping the flow of its funds, measuring the results of its activities in monetary terms, understanding customer needs, and developing products on demand.

4. Basic concepts relating to approaches to learning and approaches to assessment/evaluation of learning outcomes

The approaches to learning consist of a diverse repertoire of lectures, readings, practicums, practical training, and on-site teaching. Lectures are the basic learning method for studying classical knowledge about business administration, as well as the latest theories. Even so, as business administration is a discipline very much concerned with practice, practical training and on-site teaching, which provide knowledge from experience, are also effective approaches to learning.

5. The relevance of specialized education and liberal arts education in fostering active citizenship

Business administration is a discipline that regulates the consistency between all for-profit and non-profit continuous business entities and society, and so requires deep insights into natural laws, the essence of humanity, social justice, etc., as much as possible. Thus, whilst business administration is founded on liberal arts subjects, it holds the significance of itself being a liberal arts subject by virtue of its reconstitution of the insights gained from those subjects by taking the perspective of for-profit and non-profit continuous business entities.

Sociology (September 30, 2014)

1. The definition of sociology

Sociology is 'scholarship about society' and has developed in response to the question 'What is society?' Society is made up by people, a space created through the accumulation of individual acts. Sociology is a positivist discipline that empirically elucidates such man-made social phenomena on the basis of facts gathered through surveys. At the same time, it is a theoretical discipline that seeks to explain various social phenomena using key concepts such as social action, social relations, social groups, social structure, social change, and total society. Furthermore, sociological research consists of both an analytical level and a normative level. It is a practical and policy-oriented discipline that envisions ways to improve, reform, or transform any social phenomenon that we find undesirable. The discipline of sociology itself seeks to influence society and is a subjective, self-questioning discipline that exists in society as it seeks to influence it.

2. The distinctive features of sociology

Sociology has the following distinctive features:

① The discovery of 'society': relativization and distanciation

The discipline of sociology derives its distinctiveness from an attitude of temporarily distancing oneself from society, of which one is an invested member, in order to objectivize and relativize it. One can distance oneself from 'society' either temporally or spatially. One can move along the temporal axis to view the present from an historical perspective. That is, one studies and perceives the social changes in which one is ensconced from a temporal distance. Moreover, one can compare one's own society to another contemporary society by relying on the spatial axis, thus shutting off the self-evident assumptions that are shared in one's own society and using one's imagination to observe one's own society from the vantage point of another, which can facilitate new perspectives on one's society.

② Surveys and theories: the two tools of sociology

Sociology has emphasized both qualitative surveys of individual cases and quantitative surveys in the form of empirical generalizations based on mass observations. Sociological theories are logically and coherently constructed using strictly defined concepts, and take the form of frameworks and models for understanding empirical facts gained from qualitative and quantitative surveys. As it were, surveys and theories are the two wheels of the sociological vehicle that are used to understand social reality.

③ The presentness of sociology: sociology as practice

Sociology starts out by questioning the society to which one currently belongs and is about acquiring an awareness of society. In other words, the social awareness that one gains by distancing oneself in various ways is always related to thinking about 'issues in contemporary society'. Sociology has a practical and self-questioning character, as the self who has acquired an awareness of society continuously asks how to engage with the present site and issues.

④ Differences from and collaborations with other subject areas

Sociology is positioned in-between the other social sciences, humanities, and natural sciences. It has commonalities and differences with them, and is open to various forms of collaboration. Sociology, which seeks to comprehensively understand 'society' by starting out from human actions, as well as its survey methodology, become especially relevant when solving cross-disciplinary problems related to social phenomena, such as complex and large-scale disasters and incidents.

⑤ The duality of society: specialization and citizenship

Sociology needs to be deepened as a discipline through institutionalization and specialization, but it also needs to repeatedly reclaim its keen sense of citizenship. A prominent feature of sociology is its constant dual focus on specializing as a discipline and on deepening the relativity of real individual lives and values as well as the self-questioning of one's own social position.

3. Basic knowledge and skills that students of sociology should aim to acquire

① Basic knowledge and understandings that students should acquire through the study of sociology

The foundation of sociology is having basic knowledge and understanding of the concepts, theoretical frameworks, and methods for empirically investigating social phenomena that have accumulated through all past sociological work. By this means, students can acquire concrete knowledge about a diverse range of areas of society. In short, these areas include the economic and human activities such as interactions, family and kinship, gender and sexuality, and labor and consumption, as well as the natural environment, medicine, welfare, education, deviant behavior, hierarchies, class, regional societies like cities and farm villages, globalization and ethnicity, culture, representation, religion, the media, information, communication, social movements, states, politics, and power.

② Basic skills that students should acquire through the study of sociology

Subject-specific skills in sociology include skills for discovering problems, skills for understanding diversity, skills for conducting empirical surveys, skills for theoretical reasoning, and skills for imagining and giving advice to society. Generic skills include skills for understanding oneself as a member of society, skills for becoming tolerant of others, skills for persuading others with evidence-based logical arguments, skills for and commitment to group work, information literacy and presentation skills, and skills for reflecting and relativizing one's own knowledge and values.

4. Basic concepts related to approaches to learning and approaches to assessment/evaluation of learning outcomes

The approaches to learning used in sociology faculties, sociology departments, and other educational organizations focused on sociology should differ from those used when sociology is taught as a liberal arts subject or in a non-sociology department. In regard to evaluation, a combination of several areas and methods of evaluation should be considered in accordance with the basic skills. Specific examples include essay and multiple-choice written exams, essay assignments, discussions, survey reports, and survey report essays.

5. The relevance of specialized education and liberal arts education in fostering active citizenship

With regard to sociology and the fostering of active citizenship, sociology as specialized education provided by sociology faculties and departments and sociology for students with other majors each has its own distinctive features. Even so, either of them fosters tolerance for others through the understanding that social diversity and norms are not absolute, but are, rather, relative concepts that change in accordance with their historical and social context.

Social Welfare (June 19, 2015)

1. Definition of Social Welfare Studies

As the subject of social welfare studies, 'social welfare' focuses on the subset of life problems faced by people for whom social support is necessary. It consists of measures such as concrete improvement plans and operational organizations; the securing of social resources to solve those problems, as well as the 'social welfare policies' (hereinafter 'policies') within which these are implicit; the 'social welfare practices' (hereinafter 'practices') of performing specific personalized outreach to individuals and families who are facing problems; and developmental outreach to communities and society as a whole. On this basis, social welfare studies is a discipline that (1) focuses on the 'reality (substance)' of social welfare policy and practices, and systematically investigates the background reasons for the existence of this reality, including its inherent contradictions, and (2) proposes ways of pursuing social well-being that make life easier for everyone, supporting the pursuit of well-being by diverse individuals.

2. Distinctive Features of Social Welfare Studies

Perspectives unique to social welfare studies include (1) dividing social welfare substantively into policies and practices and seeing these in systemic relation to one another, and (2) grasping social welfare substantively as a relational system of policies and practices, together with their inherent values and norms. The uniqueness of social welfare studies as a discipline is that it rests on the multiple perspectives of the two-stage structure of grasping the relational system of policies and practices and pursuing the relationship of substance to

values. The multifaceted perspective of social welfare studies was historically given shape in the context of debates over the essence of social welfare studies. Social welfare studies is not limited to research and education concerning the ethics, knowledge, and technology necessary for social welfare professions, but also plays a role in pointing out directions for problem-solving, including new values, as a basis for data generation and the academic elucidation of the interrelated system of policies and practices in the context of affected individuals, agencies, and groups, as well as general citizens with diverse interests and senses of value. In particular, the discipline of social welfare studies is keenly concerned with serious life problems and has responsibility not only for raising the spectrum of these issues in society, but also for clarifying the path by which the pursuit of well-being by individuals facing these issues can be linked to the pursuit of social well-being.

3. Basic Knowledge and Skills to Be Acquired by Students of Social Welfare Studies

Students of social welfare studies are expected to acquire a 'welfare mindset', which entails the ability to pursue and explain individual and social well-being on the basis of their interrelationships with each other. While the welfare mindset tends to be conceived of as the 'gentle mindset' or 'considerate mindset', in this context it refers to those elements necessary for students to independently perform a social role based on human dignity and similar values. The abilities specific to social welfare studies to be acquired through social welfare studies education can be summarized as 1) the ability to emphasize and support respect for personal dignity, 2) the ability to discover and generalize life problems, 3) the ability to coordinate and develop social resources, 4) the ability to contribute to the operation of social welfare, 5) the ability to defend rights, and 6) the ability to enhance personal power and further social development. Furthermore, the generic skills to be acquired include 1) placing an emphasis on the lives of individuals in society and accepting their diverse senses of value; 2) adopting a human rights perspective and noticing instances of discrimination and social exclusion; 3) listening to the stories of other people and recognizing the challenges they face, and regarding these as social problems; 4) demonstrating citizenship by fulfilling one's civic duty in the context of daily life; 5) participating actively in the various activities of civil society and contributing to the improvement of the quality of life for a broad spectrum of people; and 6) playing a role in building a better and more convivial society through collaboration with others.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Through the use of diverse approaches to learning in social welfare studies education and their provision with organic relevance, it will be possible to acquire a welfare mindset that includes knowledge and skills related to values, ethics, and theory, and methods related to the pursuit of individual and social well-being. Moreover, as well as working towards a close collaboration not only with universities but also the communities and agencies concerned, it will also be important to work with adjacent disciplines such as health science, medicine, nursing, and educational studies. The fruits of a specialized education in social welfare studies developed by such diverse approaches to learning will include many elements that cannot be measured solely in terms of the total amount of knowledge, and in

the context of assessment will entail the setting of individual learning targets tailored to specific settings and the adoption of approaches to assessment/evaluation using diverse indicators and approaches.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

In the context of a contemporary society characterized by an increasing number of public issues, including the realization of a convivial society, social welfare studies also plays an important role in the context of liberal arts education for fostering citizenship. Furthermore, as a basis for a liberal arts education that provides knowledge and techniques that are commonly required beyond academic disciplinary boundaries, specialized education in social welfare studies will be expected to cultivate those who will serve as facilitators to support the development and organization in a society of actual citizenship.

6. Future Challenges for Social Welfare Studies Education

Within social welfare studies education, progress in terms of a universal diversification of the process of career advancement and employment will be required at the domestic Japanese level, while globalization that aspires to educational standardization and transparency and securing compatibility for qualifications will be required in relations with other countries. Social welfare studies education must take these two trends into account in the confirmation of its educational content.

Service Studies (September 8, 2017)

1. Definition of Service Studies

In these reference points, 'service' is defined as 'actions through which value is created jointly by providers and recipients. The production, provision, and consumption of service takes place in a sustained and dynamic fashion in systems that include human beings'. Moreover, the 'comprehensive academic system related to service' that has such properties is called service studies. Specifically, service studies broadly adopts practices from the service sector and provides theory and practical methods related to systems that include the joint creation of value between the providers and receivers of services.

2. Distinctive Features of Service Studies

Service studies seeks to understand problems conceptualized principally around the production, exchange, and consumption of goods from a different point of view in order to generate a new system of knowledge that still encompasses existing theories and practices. Features of services such as 'recipients' participation in the production process' and the 'simultaneity of production and consumption' are already shared by various existing disciplines. The theories and practices produced in service studies can influence other disciplines that are attempting to address these features, and by learning the aspects thereof, can deepen our understanding of contemporary socioeconomic systems.

3. Basic Knowledge and Skills to Be Acquired by Students of Service Studies

The essential significance of learning service studies lies in understanding not only the issues arising from the features of service described above, but also difficulties associated with the management of service quality, as well as approaches to learning for responding to these issues. However, since target expectations differ by academic discipline, it is necessary to think separately about the learning content of the requisite knowledge and techniques. In addition, among the specialized abilities and generic skills to be acquired will be abilities that enable accurate decision-making on the basis of the diverse characteristics of services and the ability to set and think in abstract terms about relevant issues.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Since service studies is closely related to practices, and practical education is essential at the same time as theoretical knowledge, learning needs to be carried out through diverse education methods such as lectures, reading assignments, seminars, exercises, and field-based teaching. In addition, the importance of collaboration with other fields requires that service studies should also be assigned for learning not only as a specialist subject, but also as a minor or elective subject in the context of liberal arts education. Problem-discovery and problem-solving skills, the ability to communicate with parties involved in the provision and receipt of services, and diverse comprehension abilities are also subject to evaluation, and diverse evaluation techniques and scales for each of these have been prepared accordingly. In addition, learning in the context of service studies will vary in accordance with educational targets, knowledge level, and educational methods.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

In most daily life settings, citizens will also be actively and passively involved in the services covered by these reference points, either as recipients or providers. Accordingly, the judgement cultivated through learning service studies and its associated knowledge base will be indispensable in the performance of a life of healthy citizenship.

6. The Service Studies Education System as Lifelong Learning

These reference points are for undergraduate courses. However, given the nature of service and the depth of the relevance to civic life, service studies education should be required to begin from elementary and secondary education on the premise of lifelong education and to be learned repeatedly through opportunities for social education even after the completion of higher education. It will be necessary to systematize undergraduate service studies education in keeping with this idea of spiral-style education.

Area Studies (September 3, 2014)

1. Definition of Area Studies

Area studies is a specialized academic field that studies the diverse regions that make up global society and by aspiring to a comprehensive grasp of their uniqueness and specificity, attempts to understand the diverse potential of global society. By achieving a composite grasp of the dynamics of the worlds of nature and humanity as they are interwoven in specific areas, area studies is an indispensable discipline for deepening our awareness and knowledge about our rapidly globalizing contemporary world and promoting intercultural understanding and coexistence. Through cross-sectional, multidisciplinary, and interdisciplinary research, it aims to develop contemporary academic knowledge beyond the silos and subdivisions of modern knowledge.

2. Distinctive Features of Area Studies

①Academic and Educational Characteristics

This demonstrates that area studies possesses three important academic and educational characteristics. The first is the ability to relativize universal generalities and aim at the construction of regionally characteristic systems for individual regions based on a recognition that regional societies are formed by diverse attitudes, values, customs, orders, institutions, and environments. Second is the ability to hone problem-solving and practices by embracing diversity and difference based on mutual understanding between different cultures, values, institutions, and regions in the global world. Third, because it is difficult to explain global diversity by drawing solely on a single discipline, is the ability to attempt the analysis and investigation of contemporary issues from various perspectives using practices developed through collaboration and cooperation between different fields that bring together both science and the humanities.

②From Strategic Research to Area Studies

Area studies (also known as regional studies) was originally developed in the modern West as a strategic academic discipline that sought to incorporate information about unknown areas as part of global recognition and global strategy, through the comprehensive recognition of spheres that included politics, the economy, society, culture, and customs. In contrast, area studies in Japan has developed as a uniquely diverse area studies discipline that has avoided the pitfalls of research that essentializes other nations on the premise of the superiority of domestic civilization and society. As a result, it has contributed to the construction of equitable and amicable relationships with other countries and the development of external relations.

③Relativizing the Universal, Tolerance of Diversity and Difference, and Problem-Solving Skills

The recognition of regional diversity explores truth while accepting and embracing, rather than excluding, that which differs from the universal or the general – that is, it has the important significance of relativizing what was once understood as universal or general and reconstituting it in the context of global diversity. The distinctive features of area studies – namely, a recognition of diversity, the search for regionally specific systems based on new values that cast doubt on universals, problem-solving and practical abilities

that embrace diversity and difference based on mutual understanding between different cultures, values, institutions, and regions in the global world, and furthermore analysis and investigation of contemporary issues from various perspectives, using practices developed through collaboration and cooperation between different fields that bring together both science and the humanities – are discussed in detail in Chapter 2.

3. Basic Knowledge and Skills to Be Acquired by Students of Area Studies

As basic elements of its education, area studies calls for knowledge and understanding related to the unique meaning of the area in question, knowledge and understanding related to the necessary language and communicative abilities for intrinsically understanding the life and awareness of people in the area in question, knowledge and understanding of disciplines, and, furthermore, the effort needed to continue to hone the wide-ranging abilities required to learn these, including an understanding of international society, occupational significance, and significance in civic life. In addition, through their education in area studies, students will be able to acquire wide-ranging abilities, such as communication abilities, commentary and critical abilities, and a comparative perspective, as well as to acquire generic skills for intrinsically understanding other cultures.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

More than anything else, the cultivation of a wide-ranging interest in the contemporary world constitutes the foundation of area studies learning. By deepening our understanding of specific regional structures and dynamics, area studies provides an opportunity to rethink the world, including Japan. By actively engaging with regional problems, it is expected that students will come to view the contemporary world differently than they did before. To that end, in addition to acquiring foundational knowledge, students will need to heighten their own practical abilities. Thus, personal experience and fluency in the languages used in the areas in question are recommended. In area studies learning, alongside the ability to think freely, processes that deepen students' awareness of problems are also important, and the appropriate evaluation of reports and exercises has considerable significance. Evaluation in this case should be carried out to foster students' ability to think independently.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

Learning area studies leads to engagement with actual issues with a heightened understanding of those issues. In university undergraduate education, a specialized education in area studies that involves learning about specific areas from diverse perspectives and thinking about their problems play an important role in fostering citizenship. Taking advantage of the breadth of knowledge and expertise of area studies to survey global realities from a local perspective and, conversely, to reconsider local problems in a relative manner from a global perspective will themselves provide important methods for nurturing positive citizens living in the contemporary world.

Section II

Medicine (September 30, 2017)

1. Definition of Medicine

'Medicine' is an academic discipline that elucidates the structure and function of the human body with the objective of sustaining and promoting human health through the scientific study of the diagnosis, treatment, and prevention of mental and physical illness. In general, the discipline is systematized into the three fields of basic medicine, clinical medicine, and social medicine. Basic medicine, which concerns subfields such as anatomy, physiology, and pathology, is tasked with clarifying the structure and function of the human body in its healthy and diseased states. Clinical medicine, which concerns subfields such as internal medicine, surgery, paediatrics, and obstetrics and gynaecology, relates to the acquisition of the knowledge, attitudes, and skills necessary for medical treatment. Social medicine, which concerns subfields such as hygiene, public health, and forensic medicine, entails the study of the relationship between health, illness, and society. Medicine is a field of study that, while being closely related to various other spheres of the natural sciences, has studied the structure, function, and diseases of the human body while making full use of scientific methodologies to develop and expand methods for diagnosing, treating, and preventing disease. On the other hand, medical treatment, as a set of activities that seeks to maintain, restore, and promote human health on the basis of medicine, concerns all people suffering from illness as a whole.

2. Distinctive Features of Medicine

Although medicine is positioned as a scientific field, it differs considerably from other scientific fields in that it concerns human beings who are engaged in physical and mental activities. Particularly in medical treatment, which deals with people suffering from illness, consideration must be given not only to aspects of the natural sciences, but also to aspects of the human sciences such as ethics and sociology. While medicine has made significant advances, and has become increasingly specialized as science has progressed, emphasis has also been placed on the integration of its various fields and being able to conduct holistic medical treatment. In light of these background factors, general liberal arts education, basic medical education, clinical medical education, and social medical education must be performed organically in the context of medical school education. It is also important for medicine and medical treatment to address the various needs of society, which include responses to demographic aging and the falling birth rate, community medicine, and international contributions. Moreover, it is also closely related to other medical occupations such as pharmacy and nursing. It will be necessary to educate physicians to have professionalism and a sense of mission, in order to train personnel who will contribute to the maintenance and promotion of public health.

3. Basic Knowledge and Skills to Be Acquired by Students of Medicine

Students of medicine are required to understand and acquire knowledge related to medicine in general, including vital phenomena, the structure and function of the human

body, pathology, diagnosis, treatment, and prevention. Ways of thinking about health and illness, professionalism and a sense of mission as a professional, and a deep understanding of the ethics of life are all important. Based on such medical knowledge, as physicians, students will master basic medical examination abilities such as basic examination techniques, judgement regarding test results, diagnosis-oriented clinical reasoning, and informed consent. Furthermore, basic knowledge and understanding of medical safety, collaboration with other medical professionals, community medicine, and welfare systems are also important. Through medicine-related learning, other skills considered to be socially necessary are also fostered, including scientific and logical thinking skills, problem-solving skills, communication skills, crisis management skills, information gathering and processing abilities, leadership skills, medical economics, and intellectual property and patent-related skills.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

In medical school education, it is important to facilitate the acquisition of knowledge, attitudes, and techniques related to medicine and medical treatment. To this end, schools are required to do more than simply offer conventional lectures; they must also enhance tutorial education, independent learning focused on problem-solving, and clinical training, as well as fostering the ability to practice the best level of medical care after graduation and pursue lifelong independent learning. In clinical learning, it is recommended that medical students participate in medical care teams as ‘student doctors’ and learn to provide practical medical care. On the other hand, the cultivation of a research-oriented mindset is also important for contributing to the development of medicine and medical treatment and the promotion of student assignments to laboratories is also necessary. Evaluation of learning outcomes is also important, and diverse approaches to assessment/evaluation that include not only asking about medical knowledge on written examinations but also objective clinical ability examinations and learning portfolios reflect the aim to objectively evaluate the acquisition of the attitudes and techniques that are actually necessary for medical treatment and to train high-quality physicians.

5. Fostering Citizenship, Lifelong Learning, and University-Based Medical Education

By conferring a perspective that is able to discuss social development as a whole as well as various economic and global issues through undergraduate learning, a medical education can contribute to a truly public civility. For a medical education, human formation and basic academic ability in elementary and secondary education represent an important foundation. At the university level, along with a specialized medical education, the integration of medical ethics specialized for medical treatment, medical economics, and medical statistics into medical education is also required, in addition to a liberal arts education that cultivates students’ human potential and contributes to their fulfilment as medical professionals. It is also important to train medical researchers and educators who will train the next generation, while the development of abilities that will enable students to become active in fields such as administration, drug discovery, and equipment development is also anticipated. Given the current state of affairs, in which medicine is always plumbing

new depths and medical treatment is constantly advancing, physicians will need to continue learning independently throughout their lives.

Dentistry (September 29, 2017)

1. Definition of Dentistry

Dentistry, in the broad sense, is a field of medicine, as well as a life science specializing in the study of the oral cavity. At the same time, in addition to investigating the genesis and differentiation and physiological function of the oral cavity and its surrounding tissues and organs, as an academic discipline, it is concerned with clarifying the nature, aetiology, and development process of diseases that occur in the oral cavity and establishing effective methods of treatment and prevention.

2. Distinctive Features of Dentistry

Dentistry students become eligible to sit the National Board Dental Examination upon their graduation from a university dentistry course and become dentists when they pass the examination. For this reason, it is required that students be provided with qualities and abilities that would be suited to dentists by the time they graduate from university. Dentistry education, as well as being a form of higher education, also characteristically includes combined aspects of vocational education for dentists.

3. Basic Knowledge and Skills to Be Acquired by Students of Dentistry

By the time they graduate, dentistry students need to have acquired the basic examination abilities and attitudes befitting a dentist. Moreover, in order to contribute to the promotion and improvement of dental medicine and dental medical treatment, they will need to have acquired research motivation and the fundamentals of education through clinical study. It is also necessary that they be able to explain such matters as professionalism and ethics, medical safety, team-based medicine, social security, community-based integrated care systems, medical visits, and disaster medicine.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

As approaches to learning, it will be effective to work towards securing basic medical treatment skills prior to beginning clinical training by conducting practical training involving the use of models and simulators in skills and IT laboratories, as well as mutual practical training exercises. Regarding participatory clinical training in treatment, extracurricular clinical practice and hands-on practice may be considered extremely important educational stages for cultivating dentists who are able to practice high-quality dental education and from whom citizens can seek treatment with a sense of confidence.

With regard to learning outcomes and especially approaches to assessment/evaluation for clinical training, while the completion of the requisite number of empirical cases, attendance record, portfolio contents, and evaluation of the attitudes and techniques upon

the completion of clinical practical training are regarded as basic requirements, the evaluation of the emotional register of a sense of responsibility toward patients and the acquisition of the ethical sensibility befitting of a dentist should also be included among the completion requirements.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

In dentistry education as a liberal arts education, what is required is education that cultivates a rich humanity and intelligence for basic character formation as an individual citizen prior to being a medical professional. Moreover, it is also necessary to conduct professional awareness education, including medical ethics and medical communication. In dentistry education as a form of specialized education, as well as cultivating dentistry as a professional occupation, it is anticipated that dentistry education will also cultivate personnel who can contribute to society by presenting solutions based in the field of dentistry to problems in civic life, from a dental perspective.

6. Future Challenges for Dentistry Education

While Japan's dental care is reliant on other countries for dental materials and raw materials, Japan is a global frontrunner in terms of the level of its dental medical technology, while its development standards for advanced dental care equipment are also world-leading. In future, dentistry education will need to train dental researchers and dental educators who will be able to respond to a globalizing world. The promotion of globalization in the context of dental research and education, as well as the strengthening of collaboration with overseas research and educational institutions, will also require the active promotion of international exchanges focused on young researchers and educators. In order to realize the consistent globalization of dental education through undergraduate and postgraduate education, it will be necessary to examine ways to address international certifications, such as by introducing field-specific dental education and certification assessments.

The composition of dental diseases has changed markedly as a result of changes in social structure and living environments. An urgent need exists to train dentists who, in addition to responding to the 'super-aged society' and contributing to the improvement of elderly quality of life, are also able to sustain and improve oral health, and provide safe and secure dental care at all stages of life, from childhood to old age. In addition, it is also necessary to train dentists who can respond to the diverse needs of a society of healthy longevity, including ethical sensibilities, medical safety, team-based medicine, and community-based integrated care systems.

Pharmacy (August 17, 2017)

1. Definition of Pharmacy

Pharmacy is a comprehensive science that aims to contribute to medical treatment and the preservation of human health through the creation, production, and appropriate use of

pharmaceuticals. The mission of pharmacy is to contribute to medical care to benefit patients in all fields, from basic research-oriented study to the development and provision of pharmaceuticals and medical equipment to monitoring for adverse reactions and providing patient guidance after drugs come to market. Since pharmaceuticals and medical equipment contribute directly to human health and medical care, pharmacy also entails important social significance and responsibility. Within pharmacy, it is also important to train personnel who will be active in the area of hygienic medicine, who it is anticipated will play a major role in the maintenance and promotion of human health.

2. Distinctive Features of Pharmacy (4-year)

Pharmacy is a field that stands in particularly close proximity to the sites of advanced research and commercial application, and involves conducting research that will lead to innovative drug development. In addition, in the latest advanced medical research, opportunities for translational research conducted in clinical settings are increasing for basic researchers in the field of pharmacy. For this reason, it is requested that systems be established to secure a keen sense of ethics in the field of pharmaceutical science. Furthermore, because medicines are associated with risk as well as effectiveness, the development of comprehensive regulatory science(1) from basic research through post-marketing research is indispensable for the development of pharmaceuticals and medical equipment, and the comprehensive knowledge and abilities of pharmaceutical graduates are also required at the sites of development. An additional feature of pharmacy is that, as pharmaceuticals and medical equipment are a property shared by humanity, their development and supply occur in the context of a global environment that entails international regulation and its harmonization and cooperation, such as in the international harmonization of regulatory administration systems and pharmaceutical regulations, the establishment of medical care systems in advanced countries experiencing demographic aging, and the construction of systems to eliminate the uneven distribution of pharmaceutical resources between states and providing good-quality medical care to developing countries.

3. Basic Knowledge and Skills to Be Acquired by Students of Pharmacy (4-year)

In the field of pharmacy, it is important to foster a sense of ethics as it relates to human health and medical care, and it is also necessary to acquire basic familiarity with various matters such as languages related to the collection and transmission of global information and information communication technologies. Core specialized subjects such as drug discovery foundation physics, drug discovery foundation chemistry, and drug discovery foundation biology represent the basic knowledge required to understand applied specialist subjects, through which students will learn the basic matters that are indispensable to drug discovery research. Furthermore, as subjects with a deeper level of expertise, students will learn hygienic medicine, pharmacology and pharmaceutical science, and academic systems that pertain to pharmaceutical development.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Achieving learning targets will require the selection of approaches to learning, such as lectures, practical training, and graduation research projects, that are devised in such a way as to facilitate independent learning. In addition, students should understand the position of research within the context of pharmacy and carry out graduation research in order to foster the motivation to conduct research as well as problem discovery and problem-solving skills. Opportunities will be provided for the presentation and discussion of research outcomes, and content should be summarized as a report or dissertation. From an assessment perspective, approaches to assessment/evaluation will be selected that are suited to learning targets and approaches to learning, and, in addition to general evaluation, formative evaluation will also be actively carried out to promote student growth.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

People concerned with pharmaceuticals, food, cosmetics, and environmental chemicals, as well as being required to have a strong ethical sensibility and sense of mission, will in many cases also require an understanding grounded in the social sciences and humanities, such as knowledge related to research design and statistical analysis in the context of pharmaceutical development, issues related to global manufacture, distribution, and sales, medical economics, the harmful effects of medicines, and environmental problems. Liberal arts education, as well as fostering citizenship, is also thought to be useful in forming a human foundation for occupations in the field of pharmacy. The investigation of the causes of various diseases and the development of medicines for the treatment of disease are progressing daily, and in pharmacy-related fields, the cultivation of a positive motivation for lifelong learning is required for both pharmacists and drug discovery scientists. In recent years, in particular, comprehension and problem-solving skills have become necessary in relation to problems related to pharmaceuticals and medical equipment. It is desirable that universities should provide sites for lifelong education and continue to disseminate information in relation to these issues.

Nursing (September 29, 2017)

1. Definition and Scope of Nursing

Nursing is an academic discipline that has elements of both the natural sciences and human sciences, and involves exploring the meaning of reactions shown by people in relation to health, as well as the provision of specialized support for disease recovery, disease prevention, and the maintenance and promotion of health as a foundation for human life. Nursing assistance is provided on the basis of mutual interaction with people, and its scope extends to all developmental stages, and the health issues faced by people, families, and communities at all stages of health.

2. Distinctive Features of Nursing

The following four points may be identified as distinctive features of nursing.

①Perspective on Humans and Health

Nursing conceives of human beings as integrated biological and psychosocial entities and regards health as a continuum. It regards human beings as entities with dynamic abilities for living a healthy life and latent abilities for recovering health.

②Uniqueness of Methodological Approach

Nursing has its own methodological approach of promoting comprehension on the part of others while being involved through aid. This is why it has developed as a science-based discipline that retains characteristics of both science and art. In addition, when engaging with others, nursing has its own unique methodology in that it makes instrumental use of its very existence.

③Links with Related Disciplines

Nursing is influenced by many other disciplines such as biology and other life sciences, psychology, behavioural studies, sociology, cultural anthropology, and educational studies, and incorporates these into its own methodologies.

④Nursing Roles and Nursing in Society

In society, nursing provides services through itself as an occupation. It has the characteristic of being an academic discipline that is closely linked with an occupation and is involved in people's health problems in a variety of daily life settings.

3. Basic Knowledge and Skills to Be Acquired by Students in the Nursing Course

While the basic skills to be acquired by students through undergraduate nursing education were classified into five skill groups in the 2010 Research Report, another group was added by the Japan Association of Nursing Programs in Universities in 2016, and the following six skill groups are now being examined. These reference points shall be described in conformity with these six categories.

①Basic skills for conceiving of people holistically

②Basic skills required to provide human care

③Basic skills required for the development of evidence-based nursing

④Basic skills required for the development of nursing that addresses health issues

⑤Basic skills required for the development of nursing by improving care environments and team-based systems

⑥Basic skills for continuing to learn as a lifelong professional

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Various educational methods have been incorporated in order to learn knowledge systems in a theoretical manner, with particular emphasis on collaboration between lectures, exercises, and practical training. In lectures, students learn the philosophy of the subject and the elements to be learned, while in exercises, they integrate knowledge and technology with simulation equipment or the cooperation of mock patients. In practical training, which is the core of nursing education, students learn through nursing practice at sites such as medical facilities and patients' homes, communities, workplaces, and schools. Evaluation is required that is suited to learning outcomes, educational contents and methods (e.g., lectures, exercises, and practical training), while the evaluation of abilities to be acquired as professionals and educational assessment for nursing training are also necessary.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

Nursing has assimilated the knowledge of various related sciences into its inherent academic mission to form and develop an identity as a unique discipline. In forming the academic foundation of nursing, it is essential to learn the sciences as part of a general education.

6. Main Qualifications and Abilities that Can Be Acquired by Learning Nursing

The mission of nursing education is to train personnel who will function as professionals in society. By completing the course of education indicated by the Designated Regulations and Standards for Public Health Nurse, Midwife, and Nurse Schools and Training Schools (hereinafter Designated Regulations)[(7)] nursing graduates are entitled to sit the National Examination and, if they pass, obtain their nursing license. As an undergraduate course, nursing education is expected to incorporate content that reflects the uniqueness and creativity of individual universities as education becomes oriented toward the expansion of the discipline.

Home Economics (May 15, 2013)

1. Definition of Home Economics

①Definition of Home Economics

Home economics is a practical integrated field of study that studies the human and material aspects of interactions between people and their environment in the context of human life, and contributes to improving the quality of life and welfare of humanity. In other words, because people's lives and lifestyles constitute the most fundamental component of society, it seeks to consider and make proposals about methods that will enable all people to sustain high-quality lives marked by a sense of spiritual fulfilment and lead lives of meaning and purpose by adopting the perspective of those who live them.

②Areas of Home Economics

Home economics consists of a broad range of fields that include areas related to (1) eating, (2) wearing clothing, (3) living, (4) bearing and raising children, and (5) running a household and living in society, among others. With a broad range of subjects related to humans' day-to-day lives, home economics is based on various adjacent and underlying fields in the humanities and natural and social sciences. People's day-to-day lives, while combining daily activities that fall under each of the five areas listed above, are carried out within the limited time of a single day and repeated over extended periods of months and years. For this reason, it is important to conceptualize the wide range of actions belonging to each area, using proper judgement and in an integrated manner.

2. Distinctive Features of Home Economics

Home economics is concerned with interactions between people and their environment in the context of human life. Normally, people and environments are not stationary; rather, humans and their surrounding environments fluctuate in complex and mutual relationships. Humans are born, grow up, learn, work, play, create, nurture the next generation, and live in society until they expire. Home economics is a field of study concerned with researching and making proposals about knowledge and technologies to enable all people to form the spaces of life that constitute the smallest units of society and to live independently as human beings while coexisting in a shared natural and social environment. Its unique perspectives can be summarized in the following three points of view. The first is the view that home economics concerns the ever-changing relationship between people and their environment. The second is the view that the intrinsic value of human life is universal in the context of its relationship with the ephemeral. The third is the view toward adopting the viewpoint of people themselves to improve quality of life and realize a sustainable society.

①Methodological Uniqueness

Interdisciplinary methods and practical methods can be mentioned as unique methodologies that characterize home economics, which adopts an integrated viewpoint. The fields of research that make up home economics as a system are extensive and are moreover adjacent to, or underpinned by, other disciplines in the humanities, social sciences, and natural sciences. Interdisciplinary methods are necessary for considering and making proposals about the many diverse aspects of life and getting to know and deepening the latest research results in conjunction with developments in multiple and diverse disciplinary fields. Moreover, through demonstrations involving practical methods such as fact-finding surveys, epidemiological surveys, and experimental interventions concerning issues, home economics research will be able to become a living theory that can actually contribute to a high quality of life and contribute to the improvement of lives for families and communities.

②The Role of Home Economics

The integrated nature of home economics, which recognizes life in a holistic manner and undertakes the synoptic study of human environments while drawing on research results from diverse fields that concern humans and their environments, coupled with its purpose of achieving an optimally sustainable lifestyle, also has the potential to influence

many aspects of society. The fact that the results of home economics research are also applied and widely practiced in other fields of study will contribute to improving the quality of life for society as a whole. Thus, the roles of home economics may be summarized as (1) generating practices and proposals that aim to improve quality of life, (2) contributing to the improvement of education and welfare, and (3) realizing high-quality and sustainable social structures.

3. Basic Knowledge and Skills to Be Acquired by Students of Home Economics

①Basic Knowledge and Understanding to be Acquired through Learning in the Field of Home Economics

The areas studied by home economics consist of food, clothing, housing, children, and household management. Understanding human life calls for a comprehensive grasp of wide-ranging knowledge. For this reason, the basic knowledge and understanding to be learned by students studying home economics at the undergraduate level include, firstly, learning the five areas of basic knowledge and understanding the basic matters and structures of human life from a global perspective that integrates these. Secondly, it is required that students develop this understanding by deepening their specialized knowledge of each individual area. By doing so, students will learn to understand ways of life at a deeper level and will be able to link this knowledge to professional career paths. In addition, since home economics is a practical integrated field of study, by learning in a practical and hands-on manner, students will be able to understand technologies that embody this knowledge, and at the same time, through their experiences, develop a motivation for practice in everyday life contexts.

②Basic Skills to be Acquired through Learning in the Field of Home Economics

Students who have learned home economics understand the various relationships between people, between people and objects, and between people and their surrounding environment that constitute human life from individual, community, and global perspectives, and learn to think about and explain how these relate to improving quality of life and the welfare of humanity. Therefore, the basic skills to be acquired are the ability to choose a life, the ability to put together a lifestyle that corresponds to social changes, the ability to support the lives of others, including the next generation, and the ability to find employment in a lifestyle-related career. In home economics, students deal with everyday life problems, and learn skills that allow them to identify challenges and consider the surrounding conditions to find solutions in a scientific manner. Students also learn life advice on achieving harmonious interpersonal relationships with others. Accordingly, the generic skills for social life that are learned in home economics may be considered to include: being able to exercise the ability to build harmonious interpersonal relationships and to cooperate and coordinate with others, being able to identify social problems and develop insights on how they might be solved, and being able to understand and exercise judgement about various types of diverse information in an objective and theoretical manner.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Since home economics is an academic discipline concerned with human life, educational methods, theoretical education, and practical education occupy equivalent positions. In order to generate learning outcomes in the various fields concerned with topics such as food, clothing, housing, children, and household management, a variety of educational methods are pursued, including (1) lecture formats, (2) exercise formats, (3) experimental and practical training formats (including educational training and clinical practice), and (4) graduation research and the writing of a graduation thesis. Since approaches to assessment/evaluation for learning outcomes in home economics vary according to factors that include educational targets, knowledge level, and educational methods in each area, it is important to adopt flexible and diverse methods of evaluation.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

By learning home economics, we can contribute to improving the quality of life for individuals who constitute the foundation of society, as well as consider global problems and the development of society as a whole from a point of view that is grounded in daily life experience. Since broad-based knowledge and humanity are regarded to be necessary as the foundation of home economics, it is particularly important that those studying home economics in the context of a liberal arts education learn basic knowledge in a wide range of fields, including the natural sciences, social sciences, and humanities. On the other hand, in universities where home economics is not established as a specialized field, it is desirable that, in future, liberal arts subjects related to home economics – and which moreover include the perspectives of the creation of high-quality lives, the cultivation of communication abilities in the household and in social life, the coexistence of human life with nature, and the understanding of social systems pertaining to everyday life – should be introduced to liberal arts education at the university level as an opportunity for thinking about everyday life.

6. Main Qualifications and Abilities that Can Be Acquired by Learning Home Economics

By learning home economics and deepening their knowledge of its individual areas of study, it will be possible for students to acquire various types of qualification (including national qualifications, public qualifications, job-related qualifications, and private qualifications). The main national qualifications that can be acquired (or that students become eligible to acquire) by deepening their knowledge in each area include the respective accreditations for careers as a home economics teacher (junior high and high school), elementary school teacher, kindergarten teacher, nursery caregiver, nutritionist, registered dietician, nutrition educator, and architect, among others.

Agricultural Science (October 9, 2015)

1. Definition of Agricultural Science

Although studies have been conducted in the past about how to define agricultural science and possibilities for agricultural science education, these have consistently been premised on the idea that agricultural science is an academic discipline that seeks practical value (an 'applied science') and is an 'integrated science' that falls within the domain of life sciences. Therefore, in this report, in line with the reports thus far, and based on the idea of the new scientific system* of 'knowledge sciences' and 'design sciences' proposed by the Science Council of Japan, we have defined agricultural science as an 'integrated science' in the life sciences that is concerned with food, daily life materials, life, and the environment that, as a 'design science' in collaboration with 'knowledge sciences', seeks to 'explore, develop, utilize, and preserve biological resources', 'improve production infrastructure systems in the fields of agriculture, forestry, and fisheries', and 'conserve and utilize the multifaceted functionalities in the fields of agriculture, forestry, and fisheries'. Although agricultural science, at its core, consists of the seven basic fields of agricultural chemistry, agricultural production, livestock and veterinary medicine, fisheries science, forestry and forest production, agricultural economics, and agricultural engineering, in order for these basic fields to respond to contemporary issues, they have not only developed individually, but have also led to new developments in combination and collaboration with each other, and to the birth of new areas of study.

2. Distinctive Features of Agricultural Science

While it is firmly entrenched in the life sciences, agricultural science has the further parallel aspect of being an 'integrated science' that is also based in the humanities and social sciences and, from the utilization of biological and environmental resources, of being a problem-solving type of 'applied science' that aims to ameliorate or eliminate problems related directly to the survival of humanity. Moreover, within the context of the classification of 'knowledge sciences' and 'design sciences', although agricultural science corresponds to a 'design science' that seeks to create and improve its subject phenomena, in the process of achieving its values and objectives, it often also functions as a 'knowledge science' that aims to understand phenomena. From this perspective, it can be said that agricultural science is positioned as a 'design science' that is closely associated with the 'knowledge sciences'. Because the agriculture, forestry, and fisheries industries normally target biological and environmental resources that are prescribed by regionally specific conditions (locality), it is also important to consider regional characteristics in the context of agricultural science. On the other hand, the problems that agricultural science is tasked with solving do not exist solely within regional frameworks but can also extend to the global scale. For this reason, agricultural science may be said to be an academic discipline that seeks set value targets and solves problems by striking a balance between global and local perspectives. A further characteristic of agricultural science is its inherent diversity in terms of the types of biological and environmental resources with which it is concerned, the temporal and spatial scales on which it operates, as well as in terms of its research techniques.

3. Basic Knowledge and Skills to Be Acquired by Students of Agricultural Science

①Basic Knowledge and Understanding to be Acquired through Learning in the Field of Agricultural Science

Students of agricultural science, as well as acquiring knowledge related to the broad range of basic sciences that supports agricultural science as an 'integrated science', also need to cultivate an agricultural scientific perspective through their understanding of the issues that must be addressed. In addition, they will acquire the knowledge and techniques necessary for problem-solving. Although what needs to be learned varies in each basic field, the acquisition of a broad base of knowledge is important for forming the foundation of agricultural science.

②Basic Skills to be Acquired through Learning in the Field of Agricultural Science

The skills to be acquired through learning in agricultural science include the ability to promote intellectual and creative activities for solving problems related to food, basic life materials, life, and the environment – in other words, the ability to identify the issues to be solved by agricultural science, and to engage in providing solutions by thinking flexibly and logically based on a wide array of knowledge from the standpoint of its respective fields of specialization (the ability to apply agricultural science in practice).

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Within the acquisition of knowledge that forms the basis of agricultural science, it will be useful to (1) set a curriculum that will enable students to learn a broad spectrum basic scientific knowledge that complements a liberal arts education, (2) set subjects that take a synoptic approach to the issues to be addressed by agricultural science, and (3) set learning subjects in which students learn applied scientific knowledge and techniques according to the specialized fields. Although the applied scientific fields that will be emphasized will vary for each basic field, it will be important to provide opportunities for broad-based learning in relation to the diverse techniques of agricultural science. From this perspective, the significance of graduation research that engages with the search for as-yet-unknown solutions will be great. In terms of approaches to assessment/evaluation, it will be necessary to conduct comprehensive evaluations in lecture subjects of the level of comprehension of the knowledge acquired, in practical training and exercise subjects of the ability to apply knowledge and the level of proficiency with specialized technology and techniques, and in graduation research of practical abilities to identify, analyze, and solve problems.

5. The Relevance of General and specialized studies in Fostering Active Citizenship

A liberal arts education, by which students acquire knowledge of a broad range of sciences as liberal arts and a specialized education in agricultural science, which aims to cultivate the ability to use scientific knowledge and technology to solve problems related to food, basic life materials, life, and the environment, by acting in a complementary manner, will contribute to fostering citizenship in the form of civic insight into the sciences and a civic intellectual approach to various problems in contemporary life.

Section III

Mathematical Science (September 18, 2013)

1. Definition of Mathematical Science

Mathematics as a discipline has a history of a few thousand years, and in the modern period its progress has accelerated to produce new disciplines, such as statistics, applied mathematics, and computer science. Here, we summarize chronologically the conditions surrounding the birth of mathematics and how the discipline has expanded its scope. While the field of mathematical science discussed in the current report is centred on mathematics, statistics, and applied mathematics, and includes border fields such as mathematical education and the history of mathematics, it does not include information science.

2. Distinctive Features of Mathematical Science

This report describes the distinctive features of mathematics, statistics, and applied mathematics as major sub-fields of mathematical science after first establishing that mathematical science is the basis for science and technology and that the study of mathematical science is useful in developing logic, comprehension, and inventiveness. Furthermore, after discussing teachers of mathematical science in Japan with reference to the history and current situation of the discipline, the report points out that there is insufficient awareness in Japan that mathematical science is the basis for science and technology, that there is a shortage of researchers in the field of mathematical science, and that there is currently no Department of Statistics.

3. Basic Knowledge and Skills that students are Expected to Acquire in the Field of Mathematical Science

Taking into account the distinctive features of mathematical science, this report describes the basic knowledge/understanding to be acquired through the study of mathematical science, the expertise and generic skills to be acquired through mastering mathematical science, and the professional implications of these skills.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Mathematical science is learned through three methods: lectures to obtain knowledge, exercises (or practical work) to concretize the acquired knowledge, and small-group seminars. This report discusses the learning and approaches to assessment/evaluation of these according to the three stages: specialized basic education, specialized education to acquire basic knowledge, and specialised education to gain in-depth knowledge about a particular area. In order to avoid duplication, the details of specialized basic education are discussed in Chapter 7.

5. The Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

In order for citizens to make correct judgements, it is essential for them to grasp issues in a quantitative manner based on data. Mathematical science plays an important role in

cultivating such abilities. In addition, mathematical science is important for citizens to cultivate logical thinking, inventiveness, and comprehension, which are indispensable for making correct judgements. The report discusses these from two perspectives: cultivation of citizenship and mathematical science education, and mathematical education and liberal arts education.

6. Mathematical Education as Specialized Basic Education and Liberal Arts Education

In light of the current situation in which mathematical education is implemented in many fields, this report discusses the learning and approaches to assessment/evaluation of mathematical science, for mathematical science education as preparation for using mathematical science in specialized fields and for mathematical science education that separately cultivates a sense of mathematics. Regarding specialized basic education, the report points out the necessity not only of comprehending lectures largely correctly, but also the ability to perform calculations. It also notes that practice with problems is essential to concretize what has been learned in the lecture. Evaluation is best carried out in the form of paper-based exams. The report also points out the necessity of statistical education in the humanities and social sciences.

Statistics (December 17, 2015)

1. Definition of Statistics

Statistics is a methodology used to describe phenomena based on data and to build models of those phenomena in order to acquire knowledge. Statistics is characterized by a variety of grouping axes, including versatility and particularity, induction and deduction, confirmatory data analysis and exploratory data analysis, and theory and calculation. In the age where a diverse range and vast amount of data are available, the role of statistics is also changing, and methods of data analysis and modelling are becoming increasingly important as a methodology to obtain useful information from data.

2. Distinctive Features of Statistics

The essence of the distinctive features of statistics is that they bring about a scientific conclusion by introducing processes of deductive logic to inductive inference. In recent years, due to the necessity of appropriately processing complex data in vast quantities, the importance of statistics has been increasing. Furthermore, because statistics comprises a meta-science that offers a versatile methodology for problem-solving and that draws from quantitative thinking based on data, it needs to collaborate with almost all other sciences. Statistical education in Japan has much to improve in reference to human resource development due to the absence of the Department of Statistics; it is not currently meeting societal needs.

3. Basic Knowledge and Skills that students are Expected to Acquire in the Field of Statistics

The fundamental significance of learning statistics is to achieve understanding of uncertainty in nature and human society, to learn how to deal with this uncertainty, and to

acquire a thinking capacity which is attuned to problem solving. The knowledge and understanding that should be acquired through learning statistics should be divided into tertiary basic education and specialised education (when specialising in the humanities, social sciences, life sciences, sciences and engineering, and statistics). We also need to consider the disciplinary knowledge and generic skills to be acquired and, in this regard, what is important is the acquisition of the ability to carry out optimal decision-making while taking risks into consideration, drawing from quantitative/logical inference based on data, and the acquisition of the skills required to set problems and to think abstractly and inductively/deductively. Furthermore, human resources with a statistical background, such as data scientists, are now required in many professions.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Statistics is learned via lectures to acquire knowledge, via exercises, via practical work to apply the knowledge gained to data analysis, and via small-group seminars. For each method, we need to consider the learning and approaches to assessment/evaluation of basic education and specialised education separately. We also need to consider approaches to learning in the sub-specialism and main-specialism. In statistics education, it is important to have both knowledge of statistical methods in tandem with the understanding of the subject.

5. The Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

In order for citizens to make correct judgements, it is essential for them to grasp issues in a quantitative manner based on data. In addition, in liberal arts education at university, it is important to achieve understanding of the basic principle of scientific inference.

6. The Statistics Education System as Life-Long Learning

Statistics education should start in primary/secondary school and should be systematically delivered from the perspective of life-long learning, which encompasses undergraduate and postgraduate levels as well as the retraining of workers. Since not much improvement has been made in training teachers who support statistics education, it is imperative to provide effective opportunities for retraining.

Physics/Astronomy (October 3, 2016)

1. Definition of Physics/Astronomy

We can define physics/astronomy as ‘a disciplinary field which explores the mechanism of phenomena happening in the natural world that surrounds us and the laws behind them based on facts obtained from experiments and observation. By this means, understanding may be gained of the diversity of the world, which is wider than the natural world, narrowly defined based on insights obtained through exploration’. The results of physics not only satisfy the human desire for knowledge but also encourage the development of technology to enrich our lives. Astronomy expands its focus to ‘the space up to the edge of the universe’

and ‘time up to the beginning of the universe’ and exerts a huge influence on our worldview as ‘a discipline which tries to understand various phenomena in the universe and the structure of the universe itself’.

2. Distinctive Features of Physics/Astronomy

The basic constitutive elements and distinctive features of physics/astronomy include (i) an attempt to understand the natural world based on basic laws; (ii) basic laws written in the language of mathematics; (iii) providing quantitative prediction by modelling natural phenomena; (iv) because experiments and observation occupy important positions, the skills required for experiments and observation also constitute an important part of the discipline, and (v) there is a division of labor between theory and experiments.

With reference to understanding nature in physics/astronomy, the hierarchy of matter from elementary particles to the universe constitutes a main concept. In this regard, an important understanding of nature is that basic laws have a different scope for application according to the stratum. Astronomy is deemed one of the oldest disciplines in which humankind has engaged, and astronomical phenomena and discussions thereof have exercised much influence on the formation of human intellect as well as the development of civilization and technology through myths, legends, politics, philosophy, religion, worldviews, customs, agriculture, calendars, clocks, navigation, and artificial satellites. Consequently, in the field of astronomy, interaction with other disciplines and society is particularly active.

3. Basic Knowledge and Skills that students are Expected to Acquire in the Field of Physics/Astronomy

The basic knowledge that undergraduate students should acquire through the study of physics/astronomy comprises the main concepts and skills required for experiments/calculation in basic subjects such as mechanics, thermal mechanics, statistics, electromagnetics, special relativity, quantum physics, and experiments/observation. In addition, students will choose from amongst the topics of elemental particles, atomic nuclei, physical properties, optics, fluids, elastic bodies, plasmas, and biophysics. In astronomy, students also study the hierarchical structure of the universe, the origin of elements and matter, the history of astronomy, and changes in views of the universe.

Students will acquire skills that are unique to various fields, such as the skill to translate a physics problem into a mathematical formula and to plan/carry out experiments/observations and to write up findings as a report through learning. They will further acquire generic skills including the abilities to extract problems, to maintain an objective/relative perspective, to solve problems, to communicate, to gather information, to use ICT, to learn as independent learners, to learn in a group, and to make ethical value judgements.

These acquired skills are useful in many corners of society with major professional implications. Consequently, students of physics/astronomy are successful in many different professions.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Just like mathematics, physics is a discipline where accumulation counts. Consequently, in order to acquire knowledge, it is necessary to design classes in an orderly and systematic manner. In addition, since, unlike mathematics, physics/astronomy explores natural phenomena based on experiments, observation, and measurements, it is necessary to understand natural phenomena by linking theoretical examination with findings from experiments/observation. Typically, teaching is delivered with a combination of 'lectures', classes 'to practice problems' associated with the lectures, 'experiments/observation' classes, and 'dissertations'.

The most basic methods of evaluating students' achievement are exams, including mid-term and end-of-term exams. In addition, ad-hoc tests and reports, and notes on experiments could comprise effective methods of evaluation.

5. The Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

By learning physics/astronomy as part of their general education subjects, students learning sciences apart from physics/astronomy and humanities/social sciences can acquire the skills to think critically, to confront nature sincerely, to think from a universe-wide perspective, and to respect autonomy and other students through collaborative work in experiments and seminars.

On the other hand, students who have studied physics-related subjects are aware that they are weak in communication, and that knowledge of other scientific fields other than physics and law/economics and an understanding of emotions and liberal arts education is also indispensable to complement their studies.

Biology (October 9, 2013)

1. Definition of Biology

Biology is a science about nature, with which all organisms and life phenomena as well as many living creatures are involved. In more detail, biology is a vast discipline that aims to understand and explain the structures and functions of individuals, organs, organizations, cells, organelles and biopolymers, organisms' inheritance, physiology, morphology, development, classification, phylogeny, life history, environmental response, behavior, ecology, evolution, the origin and history of life, and the dynamics of various groups made up of organisms (populations, crowds, and society). Biology investigates complex systems that are made up of a vast number of elements in many layers, from molecules to the Earth's eco-system. In short, biology is a discipline that explains the mechanisms of life, and the history and life cycle of organisms from diverse layers and perspectives ranging from molecules to groups of organisms on Earth.

2. Distinctive Features of Biology

Organisms are ruled by the laws of physics/chemistry, which are shared with inanimate objects, but also have distinctive features that clearly differentiate them from inanimate

objects. The basic features shared by all organisms include that they are made up of cells, engage in self-copying through genes, engage with matter/energy metabolism, and respond in an adaptable manner to environmental stimuli. Furthermore, the fact that all organisms found on the Earth's surface today have a shared history of development from common ancestral cells via complex processes of evolution, which is influenced by both chance and inevitability, to create extremely diverse forms, life, structures, and functions, clearly distinguishes organisms from inanimate objects. The objects and systems of biology studies are characterised by a many-layered hierarchy ranging from the molecular level to the eco-system/Earth level. Since complex interaction occurs in a multi-layered manner between strata, there are many emergent phenomena that are difficult to explain and predict by reductive methods. Due to the emergent nature of life phenomena, biology, which seeks to explain life phenomena, characteristically uses not only reductive methods, which are shared with physics/chemistry, but also diverse approaches, including integrative methods. Because of its use of integrative methods, biology makes an important contribution to our understanding of the nature of the area that constitutes the totality of life phenomena.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Biology

Drawing from distinctive features of biology, the basic knowledge and skills that students learning biology are expected to acquire is not limited to short-term/direct usability and applicability but includes the meaning of the history of life in the timescale beyond generations, the existential value of life, the value of bio-diversity, life ethics, and environmental ethics. Since biology is a scientific discipline whose gaze is directed towards various elements and systems of biological hierarchy, characterized by a multiple nest structure, and towards the vastly diverse biological world, the concrete skills to be acquired through the learning process of biology are diverse. Regardless of whether students are studying sciences or arts, a basic understanding of the wide discipline of biology is essential for the formation of ethics in relation to life and the environment. The wide perspective of biology contributes to the development of human resources that are not constrained by specialist perspectives through the study of biology.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

In the study of biology, observation, experiments, and practical work are extremely important. Going beyond imparting knowledge and understanding, it is important to provide learning together with experience, in order to cultivate the ability to use knowledge and understanding in a real life situation. Therefore, in designing a biology curriculum, it is desirable to include experiments and fieldwork in addition to lectures, classes, and seminars. In the process of pursuing universal truth in life phenomena, it is important to learn the methods that are common to all sciences: to observe organisms carefully, to build hypotheses, to conduct experiments, and to test the hypotheses based on statistical analysis of the results. In order to understand the eco-system, which is a complex system in which diverse organisms are involved, fieldwork is essential.

5. The Formation of a Basis for Life-long Learning

Since biology is rapidly developing, even the latest findings inevitably become obsolete within a short period of time. It is important to acquire active motivation and attitudes towards biology to continue acquiring new knowledge and new ways of understanding throughout one's life so as to update one's knowledge as a whole in biology education at the university. To achieve this aim, it is necessary for teachers to continue making efforts to absorb wide-ranging and the latest findings in biology.

Earth and Planetary Sciences (September 30, 2014)

1. Definition of Earth and Planetary Sciences

Earth and planetary sciences is a discipline that explores the formation and evolution of Earth as well as the planets both within and outside of the solar system, and which predicts changes in the Earth and planetary systems. It comprises a comprehensive scientific discipline that investigates the origin of humanity by studying Earth's structure, tectonics, chemical and material evolution, and biological evolution. It also examines the workings of the environment in which humanity is situated through research activities on the atmosphere, oceans, deep earth, earth surface, electromagnetic fields, and planets, and considers the relationship between them and humankind to provide guidelines and prospects for the future of humanity.

2. Distinctive Features of Earth and Planetary Sciences

The distinctive features of earth and planetary sciences are that the discipline focuses on various irreproducible earthly and planetary phenomena that occur in diverse time and space scales. While earth and planetary sciences is based on all natural sciences, it is a field that has its own concepts and perspectives that are not shared by other fields. Among the concepts that are unique to the earth and planetary sciences are 'origin', 'evolution', 'spatial structure', and 'prediction/forecasting', and among its unique perspectives are 'time' and 'time change', and 'space' and 'space change'. The rich diversity of research subjects has produced a diverse methodology, and the methodology used by the earth and planetary sciences constantly produces a unique methodology while also incorporating a methodology that is shared by all natural sciences. In addition, earth and planetary sciences is a discipline that is vital to society in many ways. A typical example would be resource/energy problems and earth environmental issues, and, in this regard, the earth and planetary sciences play an important role in mitigating/predicting natural disaster as a form of disaster science.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Earth and Planetary Sciences

Those who have studied earth and planetary sciences have the latest knowledge about the process of the creation of Earth and the planets and their current state of being, and have acquired correct knowledge about the history of evolution in which life and humanity were born and have developed on Earth. Furthermore, they are likely to be aware of the importance of deepening their scientific understanding of and thinking about a variety of

problems that are currently on-going on Earth, including environmental and energy problems and natural disasters, and of contributing to the efforts to solve these problems. The specialist skills of those who have studied earth and planetary sciences include the ability to think about many challenges related to the global environment that our society is now facing, from the viewpoint of harmony between natural phenomena and human activities based on correct scientific insights into the natural workings of the Earth and planets, to consider what direction to take, what appropriate measures to take, and what action to take.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

In the earth and planetary sciences, observation and survey are important, while fieldwork to conduct such observation and survey constitutes a vital learning method. In addition, just as in other natural sciences, experiments, practical work, and exercises are also important approaches to learning. The importance of cutting-edge chemical analyses and high-temperature high-pressure experiments using various equipment, data development and analysis using computers, as well as exercises in numerical simulation are increasing. The writing of dissertations or equivalent exercises are important in developing students' capacity to design the whole process from establishing the research question to writing up the dissertation (report). This dramatically improves students' capacity for and attitudes towards research.

5. Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

Since the earth and planetary sciences address problems that are directly linked to people's lives, including global environmental problems, it is one of the disciplines that can contribute to the fostering of active citizenship. As earth and planetary sciences constitute a comprehensive natural scientific discipline built on the basis of almost all fields of natural sciences, it is necessary for students to learn solid basics, such as mathematics, physics, chemistry, and biology in liberal arts education. Furthermore, in relation to disaster prevention and the problems of the global environment/energy, it is important for students to acquire a basic knowledge of the humanities/social sciences. Needless to say, the earth and planetary sciences themselves carry major significance as a subject of liberal arts education.

Mechanical Engineering (August 19, 2013)

1. Definition of Mechanical Engineering

Mechanical engineering is a discipline comprising natural sciences in relation to machines that convert externally-given energy and information into useful functions (movement, force, information, and so on) and the sciences related to their design. The basic discipline of mechanical engineering as cognitive science is 'mechanics', and design science is necessary to integrate individual elements to produce a coordinated faction as a whole. In addition, since mechanical engineering studies diverse functions, it has a close relationship

with many fields of natural science; it is also important to collaborate with all fields, including the humanities and social sciences, as it is a discipline that serves as basic knowledge/wisdom in human life and society.

2. Distinctive Roles and Features of Mechanical Engineering

The roles of mechanical engineering are to acquire a systematic knowledge of mechanics, which is part of the basic laws that constitute nature, and to suggest safe, secure, and concrete plans of mechanical technology to meet human dreams and wishes based on that knowledge, while taking into consideration environmental/resource constraints and economy. It is also the role of mechanical engineering to supply wisdom about the feasibility and safety of design/manufacturing to engineers based on current knowledge. 'Mechanics', on which mechanical engineering as a cognitive science is based, covers diverse scales and phenomena. Traditionally, there are basic disciplines including point mass, movement of solids, strengths of solids, fluid mechanics, and thermal mechanics. Design sciences, such as system control, effect optimization, and production planning, are included in mechanical engineering as an important basis for the methodology used to build cognitive science into concrete design. As for mechanical engineering education, several approaches are used: an approach centred on cognitive science, which proceeds to the understanding of design science; an approach centred on design science, which proceeds to the understanding of cognitive science; and an approach centred on practical skills, which proceeds to the understanding of the whole of the academic basis of mechanical engineering.

3. Basic Knowledge and Skills that students are Expected to Acquire in the Field of Mechanical Engineering

①Basic Knowledge and Understanding to be Acquired through the Study of Mechanical Engineering

Those studying mechanical engineering are required to acquire a basic knowledge and understanding of mechanics, the design/controls that have been systematized according to the purpose of mechanical engineering, in addition to the basics of natural sciences related to machines (basic knowledge of physics and mathematics). Furthermore, it is desirable that students take an interest in related basic scientific and interdisciplinary fields, and that they comprehend the core wisdom of these from a comprehensive and overall perspective. Here, what is important is the motivation to learn from a subjective perspective in order to actively acquire knowledge from the discipline. Incidentally, since machines are deeply involved in modern society and how individuals live their lives, those who learn machine science must be aware that machine technology has a major responsibility in terms of sustainability, the development of society, and individual life.

②Basic Skills to be Acquired through the Study of Mechanical Engineering

The functions of machines, which is the subject of mechanical engineering, are diverse and the learning content and methods thereof are also diverse. Nevertheless, there are basic commonalities in the concrete skills to be acquired through the study of mechanical engineering. These can be summarized as the ability to set logical problems based on

systematic knowledge of mechanical engineering, the ability to solve problems analytically based on the systematic knowledge of mechanical engineering, the ability to understand other fields based on inference drawing from the systematic knowledge of mechanical engineering, the ability to realize set functions under constraints by applying/integrating knowledge, and the ability to explain concepts logically and without ambiguity, based on the systematic knowledge of mechanical engineering. Furthermore, students can master scientific thinking through the process of studying mechanical engineering.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

The main approaches to learning of mechanical engineering include lectures, experiments, exercises, practical work, and task-oriented research. Since its content is diverse, it is beneficial to combine these organically by introducing choice and weighting according to the aim. The aspects to be evaluated include deductive thinking, inductive thinking, literacy of basic knowledge, the ability to find/analyze/solve problems, and communication skills. It is also necessary to design diverse and flexible approaches to assessment/evaluation according to the learning content/methods and individual learners' situations.

5. Relevance of Specialized Education and Liberal Arts Education to Fostering Active Citizenship

Machines do not simply make our lives more convenient but have a deep connection with society and its values. It is also important to analyze/recognize the risks and benefits of large-scale technology, which are also becoming more complex. Acquiring specialist knowledge as well as a wide-ranging general education leads to accurate insight into technological/social problems and to the ability to solve those problems.

Electrical and Electronic Engineering (July 29, 2015)

1. Definition of Electrical and Electronic Engineering

Electrical and electronic engineering is a discipline based on physics and mathematics that freely manipulates electromagnetic phenomena, the behavior of electrons, electromagnetic/light waves, and quanta, using electromagnetic and quantum mechanics. These quanta express information mathematically and engage with a high level of information transmission and processing, as well as realizing the expected functions of information by modelling and controlling vast systems. This is a discipline that produces wide-ranging engineering outcomes by deepening collaboration with neighboring disciplines, enriches people's lives, and plays a core role in enabling humanity to develop in a sustainable manner. The main 'subjects' of the field are 'energy' and 'information', while the 'means' to manipulate them freely include materials centered on 'electronics', devices, and software. It is a discipline that covers a vast area in which these 'subjects' and 'means' are intertwined and fused.

2. Distinctive Features of Electrical and Electronic Engineering

Using physics, including electromagnetic and quantum mechanics and mathematics, electrical and electronic engineering systematizes and provides the optimal design of scientific methods according to the performance/distinctive features that need to be realized in devices and systems. It engages with simplification/abstraction at various levels and its main feature is that simplification/abstraction are conducted under strict systematization, based on theory that is solidly built from the principles of physics and mathematics. As a result, each design method is easy to use despite using highly academic techniques. Electrical and electronic engineering comprises an academic system that uses physics and mathematics to create the 'things' and 'events' that society requires. Therefore, in the future, it will be necessary to keep contributing to the creation of a new discipline at the border/fused areas.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Electrical and Electronic Engineering

①Basic Knowledge and Understanding

A knowledge and understanding that can explain the following is required: electric/magnetic phenomena, including the relationship between separate phenomena and the methods to control/apply these; methods of mathematically expressing information and of approaches to assessment/evaluation of converting mathematically expressed information into electric/magnetic phenomena and of processing this information; and methods of comprehending the situation of the system and of realizing the expected system functions by controlling these; methods to abstract each piece of knowledge and understanding and to realise system functions on a larger scale; basic items related to mathematics and physics and the role and responsibility of electrical and electronic engineering in society; communication; the finding and solving of problems that are required by society and acquired through the experience of solving comprehensive and complex problems. In designing undergraduate courses, each university autonomously and voluntarily sets the optimal amount of learning by giving optimal weight to the knowledge and understanding to be acquired according to its mission and size.

②Basic Skills

The subject-specific skills induced by the knowledge and understanding acquired in undergraduate courses will enable students to do the following: devise, design, develop, and practically apply materials, devices, and equipment that have specific functions, using electrical/magnetic phenomena and knowledge and the understanding obtained by abstracting these, as well as methods to control/apply these; they can also realize expected system functions while comprehending and controlling the system status; they can devise, design, develop, and practically apply devices, equipment, systems, and services that show new functions by using methods to express information mathematically, methods to evaluate that information, and methods to convert mathematically expressed information into electrical/magnetic phenomena and process it; they understand the public nature of technology and can make judgements as to whether the services, systems, equipment, devices, and materials to be provided are appropriate for society; they can find answers to and solve the comprehensive and complex problems to which society does not have a clear

answer. The basic skills to be acquired through the learning of electrical and electronic engineering, that is, the ability to simplify/abstract and system thinking skills, are to be developed into generic skills to be applied generally/universally through their combination with communication skills and teamwork, which are developed through problem finding/solving and the experiments/exercises that occur in the process of writing a dissertation. The field of electrical and electronic engineering deals with a wide range of subjects, from materials and devices to systems and social infrastructure. Therefore, by giving optimal weight to each element and by experimenting in the structure of liberal arts education for those who are engaged with engineering whose mission is to implement technology in society, we can enhance sensitivity to both 'what it is important to create' in future society and 'how to make it'.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

It is desirable to combine lectures to acquire knowledge and to develop thinking skills, to use exercises/experiments and practical work to digest knowledge and thinking skills, and to engage in task-oriented research to develop the necessary spirit to take on problem finding/analysis/solving. It is important to introduce a transparent and fair system of evaluation.

5. Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

In addition to the understanding of the breadth and depth of electrical and electronic engineering, a wide grounding is essential to contribute to society. The ability to collaborate with a variety of fields, to use the first language effectively, to use international languages, and to engage with bi-directional communication are also important.

Informatics (March 23, 2016)

1. Definition of Informatics

Informatics aims to bring meaning and order to the world by means of information as well as to create social values. It is a discipline that explores the principles and technology related to the creation, exploration, expression, accumulation, management, recognition, analysis, conversion, and transmission of information. The various fields that constitute informatics not only deal with information but explore the meaning and order of information by investigating the relationship between information and the subject, as well as among information items. These fields further aim to create values, in particular social values, by means of information. Informatics is constantly producing new applied fields at the borders with other sciences, and if we follow the aforementioned definition, these applied fields are also included in informatics. However, as of now, it is extremely important to systematically learn the most basic core of informatics in order to become specialists in the field. This is because the stream of disciplines from computation theory to social informatics is not made up of independent elements; rather, these elements are closely interrelated. Consequently, the current reference points describe informatics,

focusing on its most fundamental core parts, including social informatics. In other words, informatics as defined by the current reference points is not informatics as it is widely defined, which includes applied fields, but is, rather, the core part of informatics.

2. Distinctive Features of Informatics

Even when focusing on the core part, informatics is made up of many fields, and, in particular, spreads to both the arts and sciences. In order to investigate and build a better information society, universal principles are necessary to achieve shared understanding and to control information that is processed by computers and information that is used in communication in society. Therefore, it is appropriate to define the core part of informatics by situating the principles of information in general in the upper layer of these disciplines. In terms of the current reference points, the core part of informatics is systematized according to the five classifications (a-e) as described below.

a. Principles of information in general
b. Principles of computer-processed information
c. Technology to design and realise machines and mechanisms to deal with information
d. Understanding of human society that deals with information
e. Technology/institutions/organizations to build and use systems to deal with information in society

One of the views of informatics and its application (applied informatics) is that the core part of informatics is a 'meta-science' of various sciences. Meta-science implies a science that covers the entirety of the various sciences.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Informatics

The basic knowledge to be acquired by those who study informatics is described in detail according to the aforementioned classification from a to e. Informatics-specific skills are summarized from the viewpoints of information-processing/computation/data analysis, systematization, and information ethics/information society. The generic skills to be acquired through the learning of informatics are summarized in reference to creativity, logical/computational thinking, problem finding/solving, communication, teamwork/leadership/use of opportunities, and development of the field/self-development.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Among the approaches to learning of informatics, in addition to programming exercises, there are lectures, experiments, exercises, practical work, seminars, and project-based learning as in other sciences. Among these various exercises, those on programming are situated at the centre of the learning of informatics and as such they must be experienced by those learning informatics.

5. The Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

The general education that should be acquired by those who specialize in informatics is here described. In order for informatics to continue creating new applied informatics at the border with other sciences, those who study informatics need to be grounded widely in a number of sciences so as to venture into the site of applied informatics without hesitation. A basic grounding in the neighboring sciences is also important for those learning informatics to contribute to the formation of democratic society as good citizens.

6. Informatics as Specialized Basic Education and Liberal Arts Education

The basic education for those in specialized courses other than informatics, and informatics in curricula from primary/secondary education to liberal arts education at university, is here described. As a meta-science, informatics is considered one of the foundations for various sciences. Consequently, informatics is not limited to those who specialize in it but also forms part of a wide grounding that citizens should have. Also, in order to solve various problems that are newly created due to progress in information technology and to develop an information society, it is important for each citizen to have a view of the institutions of information society and information ethics based on knowledge about information technology.

Civil Engineering/Architecture (March 19, 2014)

1. Definition of Civil Engineering/Architecture

Civil engineering/architecture is a discipline that plans/designs, builds, maintains, and manages the built environment, which is essential for human survival. It involves learning the theory, application, and technology required to create harmony with the natural environment. The built environment refers to the environment on which human beings have worked and includes buildings such as houses, schools, and hospitals, construction works such as roads, embankments, bridges, tunnels, railways, ports, and airports, facilities such as water supply and sewage, lifelines such as electricity and gas, and facilities for various production activities and the urban and community spaces that these make up. Therefore, it is required that they are safe, healthy, comfortable, convenient, and efficient. The built environment must enable people to live a rich social life, be protected from natural disaster, attempt to co-exist with the natural environment, and contribute to the development of humanity. Furthermore, because the built environment is closely related to the climate and natural features, as well as the culture and social environment of the place, it needs to be equipped with a form that is in harmony with the place, structural strengths, and environmental performances. As such, collaboration with all fields, from engineering, physics, and agriculture to humanities/social sciences, is important.

2. Distinctive Features of Civil Engineering/Architecture

For most humans who live in contemporary society, they largely inhabit the built environment that was built on Earth by themselves. To learn civil engineering as well as architecture is to learn about the environment constructed by civil engineering, while architecture is a very familiar subject for citizens who feel and enjoy it in their daily lives before specializing in it, always bearing in mind its relation to actual society and its ideal

forms. Furthermore, the shared features of civil engineering/architecture are in dealing with a wide range of sciences, including the humanities and social and natural sciences, while it is also a discipline that integrates aesthetics/scenery. Civil engineering is the technology engaged in the formation of social foundation, including disaster prevention, transport, energy supply, water resources, and urban planning, and its buildings have a strong public character; as such, it is an important discipline that is related to the very basis of life/the survival environment of humanity and all organisms, in a global sense that goes beyond the mere state. Architecture attempts to harmonize the function, structure, and facilities of spaces that are close to our daily lives through inhabiting vessels called buildings; it is also a discipline that produces the beauty and comfort of the space and as such works directly on human sensitivity. At the same time, it is strongly related to the natural environment and the history/climate surrounding the place and, as such, it is closely related to our lives in society. In civil engineering/architecture, it is necessary not only to learn individual technological systems but to develop the ability to 'design' in order to create diverse solutions for problems without a single answer. This is achieved by integrating technology and the applications of natural science, under given conditions and by taking into account various related perspectives. Its curriculum therefore contains 'design', 'exercises', and/or 'diploma design'.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Civil Engineering/Architecture

①Basic Knowledge and Understanding to be Acquired Through the Study of Civil Engineering/Architecture

Those who study civil engineering/architecture are required to acquire, in addition to basic knowledge of mathematics, which is the basis of engineering and natural sciences such as mechanics, knowledge of natural science, which has been systematized in response to societal needs to civil engineering/architecture, knowledge of humanities/social sciences, understanding of basic items related to mechanics, understanding of basic items related to planning and design, understanding of basic items related to information processing, and a basic knowledge and understanding of ethics as an engineer. Furthermore, students are required to develop abilities to integrate separate items of basic knowledge and to plan/design/realize concrete social infrastructure and buildings in accordance with the diverse aims put forward by society. In order to acquire these skills, it is necessary to achieve a comprehensive understanding of the inter-relationship among various individual elements that constitute urban/local systems, and this ability must be developed through fieldwork and project-based learning.

②Basic Skills to be Acquired Through the Study of Civil Engineering/Architecture

The technology of civil engineering/architecture is an implementation method of providing houses/public facilities and urban infrastructure systems which have low impact on the environment and which are safe and secure, while civil engineering/architecture is the system of theory and technology that underpins this. The basic skills of civil engineering/architecture students at the undergraduate level differ slightly depending on the level at which they will engage with civil engineering/architecture as professionals.

However, there is a commonality in that students are required not only to make comprehensive judgements and to communicate in order to find the best solution but also to contribute to improving society as social pioneers. The aim of civil engineering/architecture study is to acquire general knowledge/skills and specialist knowledge/skills to plan, design, construct, and manage by working on subjects of diverse human scales, from individual buildings to the totality of urban/local systems in diverse natural and social environments. In the process of learning, it is necessary to understand the mechanism through which physical phenomena occur correctly and to learn to solve problems rationally, based on accurate analysis and comprehensive judgement, as in other engineering fields; it is also necessary to deepen one's understanding of actual society/humanity as in the humanities/social sciences.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

It is effective in civil engineering/architecture education to combine diverse and varied approaches to learning such as lectures, experiments, design, exercises, practical work, and task-oriented research (including dissertations, diploma design, and diploma plans) in an organic manner by introducing choice and weighting according to the aims. What is evaluated includes the level of comprehension of basic and specialized knowledge, the ability to integrate knowledge, the ability to find/analyze/solve problems, communication skills, management skills, and the ability to make judgements about ethical issues. Accordingly, diverse and flexible approaches to assessment/evaluation should be adopted according to the educational content/methods and the situation of each learner.

5. Relevance of Specialised Education and Liberal Arts Education in Fostering Active Citizenship

Civil engineering/architecture is a discipline that builds the foundation of spaces which support people's lives and industry. Consequently, in learning civil engineering/architecture, it is essential to have an enhanced level of awareness of citizenship as a living person in addition to specialised knowledge and perspectives. It is extremely important in civil engineering/architecture education to teach about the organic relationships among various disciplines, including engineering, design, and a wide range of liberal arts education subjects. It is also necessary to cultivate imagination and a sense of responsibility towards all humanity on Earth, as well as all organisms in the natural world, including animals and plants, so that students' awareness to contribute to the coexistence/symbiosis of them all is developed. Specialists in civil engineering/architecture are required to have the skills to communicate with many people from different opinions and backgrounds, which suggests, in addition to linguistic skills and languages, that imagination and understanding of different cultures and idiosyncrasies are required. Furthermore, it is even more important to cultivate rich citizenship through these means.

6. Relationship between Civil Engineering/Architecture and Society

Among the many engineering fields, civil engineering/architecture has particularly close relationships with society and nature. The built environment produced by civil

engineering/architecture has historically protected human life and its properties from the threats of nature and has formed a social infrastructure that is indispensable for the development/maintenance of human society as the basis of productive activities, as well as preventing disaster. There is a close relationship between these built environments and human society. Human society becomes possible because it places deep trust in the formed built environment and, as such, civil engineering/architecture has a major responsibility to engage with the trust given and to exercise strong ethics in applying its technology.

Materials Engineering (September 1, 2014)

1. Definition of Materials Engineering

This chapter provides the definition of materials engineering in respect to the current reference points. Materials have evolved while maintaining complementary/synergistic relationships with science and technology as well as industrial development. Materials have evolved to respond to diverse needs on a global scale and to encourage the development of technology and industry on a global scale. Materials are required, in addition to the realisation of intended functions, to be compatible with various social values such as the economy, supply stability, and environmental performance, and as such, materials engineering is required to develop highly trained materials engineers to carry this out. Against this background, the current reference points define materials engineering as 'engineering that creates materials and pursues high functionality'. Here, 'materials' is a generic term to refer to raw materials made up of various types of matter to the diverse constitutive elements of a structure with a specific usage purpose. 'Creation of materials' implies the creation of non-existent materials or devising materials that have a better fit with the intended usage purpose. 'Pursuit of high functionality of materials' means improving the various functions of materials, including their social value, or adding new functions.

2. Distinctive Features of Materials Engineering

This chapter describes the distinctive features of materials engineering. The unique point at which materials engineering differs from other sciences that deal most with matter is the purposeful action called 'materialization'. 'Materialization' comprises bringing various types of matter to a higher order of constitutive elements of a structure, and it is realized through the materials process. Materials engineering realizes the materials process and system under given conditions while containing the orientation to seek new materials and being aware of the constraints of 'materialization'. Diversity in functions and approaches related to materials and the fact that materials engineering constitutes part of the basic foundation of all engineering fields also constitute the distinctive features of materials engineering.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Materials Engineering

①Basic Knowledge and Understanding to be Acquired through the Study of Materials Engineering

This section describes the importance of the three basics of 'materials literacy', which is the basic system of materials based on physics and chemistry, 'materials process engineering', which is the system of the mechanism of materialization, and 'materials system engineering', which is the system of methods of creation of materials systems. It also describes the history and current situation of materials engineering, the potentials and limitations of materials, the social role of materials engineering, and the importance of knowledge and understanding of each.

②Basic Skills to be Acquired through the Study of Materials Engineering

In addition to the ability to deal with actual problems acquired through the study of materials engineering and professional skills, as well as the ability to respond to changes in the discipline/society, the intellectual training required to respond to complex problems and generic skills related to communication and ethics is important.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

The basic concepts comprise the approaches to learning, including lectures, exercises, practical work, experiments, and dissertations, as well as the necessity for flexible evaluation according to learning outcomes and content, and for evaluating the understanding of the relationship with society, industry, and the environment, in addition to knowledge and understanding of the basic sciences.

5. The Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

Materials engineering has a role in linking the results of basic science to social values by responding to citizens' requests and expectations through materials. It is therefore important to cultivate citizenship, to recognize social responsibility by considering the impact that the selection/use of materials has on industry, economy, society, and the environment, to improve accountability to society, and to have the necessary skills to collaborate and exchange views with other fields.

6. Development into Higher Education/Research

This chapter discusses the development into higher education/research after the undergraduate level in reference to the importance of education and research at the higher level at graduate school, development into cutting-edge research, the cultivation of internationality, and continuous education.

Computational Mechanics (August 8, 2017)

1. Definition of Computational Mechanics

Computational mechanics has begun to build its position as the third science following theory and experiments due to the development/success of vehicle crash simulation

technology by means of the finite element method. It formulates/models natural phenomena including a) solid/structural mechanics, b) fluid mechanics/engineering; compressive/incompressive flow, c) fracture mechanics, d) transport phenomena and heat transfer, and e) variational methods in mechanics by using appropriate governing equations and seeking numerical answers on the computer through discretization. Recently, it has covered not only various engineering fields such as mechanical engineering, electrical and electronic engineering, chemical engineering, and civil engineering/architecture but also the need to find new knowledge by using data effectively. As such, computational mechanics is expanding the disciplines that solve problems in the humanities and society, such as life, traffic congestion, and evacuation behavior at times of disaster, by using computers.

2. Distinctive Features of Computational Mechanics

As seen in its contribution to the drastic shortening of the development time of an industrial product, computational mechanics is an essential discipline in creating values that have never before existed and in building a safe and secure society. However, in order to realize this, a wide-ranging knowledge of biology, chemistry, mechanical engineering, civil engineering/architecture, and electrical engineering is required. Furthermore, in order to choose an appropriate approach from the diverse approaches that are available, and to improve efficiency, collaboration with mathematical sciences and informatics is necessary. Following this, the current reference points describe diverse approaches, the role of computational mechanics, and collaboration with other sciences.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Computational Mechanics

Taking into account the distinctive features of computational mechanics, the basic knowledge/understanding to be acquired are as follows: the study of engineering and sciences in order to obtain appropriate modelling; the study of numerical analysis to improve computing speed; the study of informatics for pre- or post-processing and communication; the study of specialist and generic skills to be acquired through the study of computational mechanics; and the professional implications of these skills.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

The main approaches to learning of computational mechanics include lectures, numerical experiments, exercises, practical work, and task-oriented research. Due to its diverse content, it is beneficial to combine methods organically by introducing choice or weighting according to the aim. Aspects to be evaluated include the deductive ability to model and simulate, the inductive ability to analyze results and sum them up, literacy of basic knowledge, the ability to find/analyze/solve problems, and communication skills. It is necessary to adopt diverse and flexible approaches to assessment/evaluation depending on the learning content/approaches to learning and the situation of each learner.

5. Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

Computational mechanics does not simply bring convenience to life. The method of large-scale computational mechanics, which has been established as the parallelizing method, and High Performance Computing (HPC), which processes a vast amount of input/output data, has a deep connection with society and its values in the age in which the Internet of Things (IoT) will connect all machines to the network and produce/accumulate a vast amount of data. It is also important to analyze/recognize the risks and benefits of technology, which deals with systems and models on a larger scale and which are more complex. Acquiring specialist knowledge at the same time as a wide grounding leads to accurate insight into and the ability to solve technological/social problems.

6. Computational Mechanics as Specialized Basic Education and Liberal Arts Education

Computational mechanics is part of the basis of all sciences as the third science following theory and experiments, and as a meta-science which starts new disciplines by adding 'computational' to the names of conventional disciplines, as seen in computational acoustics. Consequently, computational mechanics is not limited to those who specialize in it, but is now forming part of a culture in which citizens should widely participate. Furthermore, in order to solve various problems that occur due to progress in science/technology and to develop society, each citizen requires a view of social institutions and ethics against the background of knowledge about computational mechanics.

As for specialized basic education, it is necessary not only to comprehend the majority of lecture contents but also to model and analyze concrete problems. In order to concretize what is learned from the lectures, practical work on computational mechanics is indispensable and evaluation should be conducted through exams and task-oriented practical work.

Chemistry (February 21, 2019)

1. Definition of Chemistry

Chemistry is one field of the natural science, to understand structures, properties and reactions of materials on the atomic and molecular levels and to process molecules to transform materials and to create new materials. It has been developed by understanding of properties and characteristics of atoms and by clarifying chemical bonds, molecular structure and reactivity. Chemistry deals not only with isolated atoms or molecules but also with assemblies of atoms and molecules, which exhibit macroscopic phases, such as gas, liquid and solid, including solutions. Chemistry clarifies structures, properties and interrelations and tries to give unified and systematic views. Chemistry is interrelated not only with other fields of science, engineering, medicine, pharmacology, agriculture and so no but also with various aspects of our society so that our life in modern era is gifted from chemistry in many respects. So it is required for chemistry to develop further to give evaluation of safety and influence of materials to environment and to develop technology for protection of environment influence of materials and further technology for sustainability of mankind and environment.

2. Distinctive Features of Chemistry

The materials, which chemistry covers, are very diverse; gas molecules, functional organic and inorganic materials, semiconductor, nano-particles, proteins and nucleic acids. For the functional emergence and creation of materials, it is important to control not only basic molecular structures but also intermolecular interactions and states of assembly of molecules.

3. Basic Knowledge and Skills that Students are Expected to Acquire in the Field of Chemistry

The basic skill acquired through chemistry learning is to look materials from scientific view points; to understand the diversity of materials inclusively by basic frame of forms and behaviors of materials, to understand the methods of measurement and analysis on the basic principles so that one may use them for the clarification of structure and function of materials, to learn the basic knowledge and technique for using materials effectively and safely and to learn practical capacity of designing, synthesis and functional evaluation of materials. Thus the basic knowledge and skills to be acquired are as follows; (1) Scientific view on types, forms and properties of materials, (2)View on life on the basis of molecules and ions, (3) Relation with other fields of natural science, such as physics, biology, geology, astronomy, (4) Chemical reactions for designing and creating artificial materials, (5) Relation between human history and chemistry, (6) Chemistry for the future of mankind such as environment, energy, resources, medicine, informatics and so on.

4. Basic Concepts Related to Approaches to learning and Approaches to assessment/evaluation of Learning Outcomes

Learning chemistry is not just to acquire knowledge and understanding through lectures and books, but through experiment, field work and exercise. Through active learning, such as topical studies, students acquire ability to extract issues, to think logically, to resolve issues, to collect information, to analyze, to judge, to create, to present, to debate and so no. The evaluation of learning outcomes should be done according to the characteristics of each methods.

5. Relevance of Specialized Education and Liberal Arts Education in Fostering Active Citizenship

Historically chemistry has given influence to the society and now support our everyday life. On the other hand, pollution of environment may be an example of negative consequence of chemistry. Such negative consequence may be effectively resolved by the knowledge and technology on the basis of chemistry as well. In the liberal arts education of universities, it is desirable to learn that chemical phenomena, including thermodynamics and chemical kinetics, can be qualitatively explained by electronic structure. For those who will major chemistry it is required to be able to read document carefully in order to understand its contents logically and to express their own opinion. To learn how to handle social issues, it is also desirable to study liberal arts other than natural science as well interdisciplinary areas.

Quality Assurance Framework for University Education

July 22, 2010

Science Council of Japan

Preface

In May 2008, the Science Council of Japan (SCJ) received a letter from the Director-General of the Higher Education Bureau of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The letter, addressed to the SCJ President, was a request for "Consultations on a quality assurance framework for specialized education in universities". The specific request was as follows: "In the context of promoting the involvement of scholarly societies and other groups in the enhancement of education and its evaluation including self-evaluation by universities and external evaluations, MEXT wishes to solicit the opinions of SCJ comprised as it is of scholars in all academic fields with respect to a quality assurance framework for specialized education in universities. This will entail, for example, processes for the maintenance and improvement of Japan's undergraduate education standards". The request was based on the proposals contained in the report, *Towards the Enhancement of Undergraduate Degree Programs*, issued by the Central Council for Education of MEXT in December 2008.

In response to this request, SCJ established a taskforce committee in June 2008 called the Review Committee for a Quality Assurance Framework for Specialized Education in Universities. It held its first meeting in September 2008. After four committee meetings were held thru December 2008, the committee decided to establish three subcommittees to move forward with more focused deliberations. When the quality assurance framework for specialized education has been reviewed, the focus has been generally on specialized education in each subject area. However, such discussions tend to be one-sided because liberal arts/general education is also an indispensable element of university education along with specialized education. Furthermore, in Japan, when students make the transition to the workplace, the outcomes of university education are almost entirely neglected especially for humanities graduates. Moreover, the early start and extensiveness of the job-hunting process have made it increasingly difficult for students to maintain their usual academic lives regardless of the subject area. These realities cannot be overlooked if worthwhile discussions are to be conducted.

Thus, to carry out a detailed review as requested by MEXT, SCJ formed a Quality Assurance Framework Assessment Subcommittee. In addition, it formed a subcommittee to review the status of liberal/general education, and another to review issues relating to the links between universities and the workplace. From 2009, these three subcommittees maintained close mutual coordination while pursuing their respective reviews. Consequently, this report is divided into three sections, one for each committee. All of the deliberations were conducted with a uniform purpose.

Summary

Background

In May 2008, the Science Council of Japan (SCJ) received a letter from the Director-General of the Higher Education Bureau of the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The letter, addressed to the SCJ President, was a request for "Consultations on a quality assurance framework for specialized education in universities". In response this request, SCJ established a taskforce committee in June 2008 called the Review Committee for Quality Assurance Framework for Specialized Education in Universities that held its first meeting in September 2008. After four committee meetings were held thru December 2008, the committee decided to establish three subcommittees to move forward with more focused deliberations for the following reasons.

Heretofore, when the quality assurance framework for specialized education was reviewed, the focus was generally on specialized education in each subject area. However, such discussions were inevitably one-sided because liberal arts/general education is also an indispensable element of university education along with specialized education. Furthermore, in Japan, when students make the transition to the workplace, the outcomes of university education are almost entirely neglected especially for humanities graduates. Further, the early start and length of the job-hunting process have made it increasingly difficult for students to maintain their usual academic lives regardless of the subject area. These realities cannot be overlooked if worthwhile discussions are to be conducted.

Thus, to carry out a detailed review as requested by MEXT, SCJ formed a Quality Assurance Framework Assessment Subcommittee. In addition, it formed a subcommittee to review the status of liberal/general education, and another to review issues relating to the links between universities and the workplace. From 2009, these three subcommittees maintained close mutual coordination while pursuing their respective reviews.

Consequently, this report is divided into three sections, one for each committee.

Part 1 Quality Assurance Framework for Specialized Education

1. Current situation and challenges

In considering the issues of how to make Japanese university education internationally competitive in the context of advancing globalization and the importance of cultivating human resources that will promote the sustainable development of industry, a report of the Central Council for Education, noted that while further improvement in the quality of university education is required the quality assurance function of universities at the entry stage through entrance examinations has declined. The report also pointed out that effective reform was needed in order to maintain and improve the quality of university education.

This same report stated that "Japanese universities today are unable to provide a clear answer to questions asked within Japan and overseas as to what skills are assured by Japanese undergraduate degrees. Moreover,

the government has not necessarily been actively involved [in answering these questions].” In order to support and encourage the initiatives of each university, the report called for “typical graduate attributes to be fostered through each subject major” as a reference guideline relating to the common learning outcome of undergraduate programs.

The call for “typical graduate attributes” in this report can be acknowledged as having considerable significance. Yet, considering that most of the undergraduate degree programs in Japan have been offered by specific departments or faculties in specialized subject fields, the call for “typical graduate attributes” confronts limits imposed by the need to adapt to actual curriculums. As such, a new framework must be built that aims to assure the quality of undergraduate degree programs in each subject area.

2. Recommendations

The core challenge of subject-specific quality assurance can be found in providing an answer to the question of what exactly students are expected to learn in an undergraduate program from the perspective of education for specialized subjects. When examining this challenge sufficient attention should be paid to the following points:

- Maintaining a framework that respects the independence and autonomy of each university with respect to its organization of curriculum and that does not detract from the diversity of university education.
- Consciously aiming to provide relevant and meaningful basic tools to students for them to become contributing members of society and the workforce.
- Clearly specifying educational content rooted in an essential understanding of the intrinsic characteristics of each subject.

Based on the above, and as a framework for subject-specific quality assurance, we have summarized its vision for “subject benchmark statements for curriculum design” as detailed below.

1) Intrinsic characteristics of each discipline

Identify from an academic perspective the distinctive methods of cognition and contribution intrinsic to each subject area, points that have heretofore have been generally considered implicit knowledge that has been taken for granted.

2) Basic knowledge and skills that all students should acquire

Narrow down the basic knowledge and skills that students should acquire from the perspective of their real usefulness to peoples’ lives (not only short-term and direct but also values and ethics, etc.), with consideration for the characteristics intrinsic to the subject in question and describe them in a form that offers a certain degree of abstractness and inclusiveness.

3) Basic concepts relating to learning methods and evaluation methods of learning outcomes

Because of the importance of study methods that do not simply confer but cultivate the capacity to actually apply knowledge and because of the importance of methods to evaluate the results of such study, state a basic formulation for each of these.

Moving forward, we will steadily develop benchmark statements for each subject. It is important for each university to refer to these benchmark statements and define in sufficient detail respective study goals for the

curricula of all the faculties and departments; design curricula to effectively reach those goals; and improve the quality of its bachelor's degree programs.

Part II Reform of Liberal Arts Education in Undergraduate Programs

1. Current situation and challenges

The debate over liberal arts education has continued ever since "general education courses" and related courses were introduced in universities under the new post-war system but to this day there is a lack of clarity about the purpose of liberal education and of its essential components.

The historical origin of liberal arts education in Japan that was introduced and systematized under the new post-war system of universities is the liberal arts curriculum of U.S. universities – the core philosophy of which was to prepare citizens for participation in a democratic society. And, at U.S. universities, while liberal arts education and specialized education have different fundamental purposes, they are loosely coupled in the context of allowing students to gradually decide on their majors and minors while learning a broad range of subjects. It is this arrangement that forms the basis of their relationship.

The debate over liberal arts education in Japan from its inception has paid little attention to the philosophy of fostering citizenship in people. Moreover, it has been ambivalent about the structural problem of requiring students to learn a broad range of subjects despite the fact that students decide their subject of specialization from the beginning of their programs. As a result of failing to clarify the meaning of the ambiguous Japanese word kyōyō that has been taken to correspond to "liberal arts", primary attention was directed to the question of how to get this "liberal arts education" to function as preparatory education for specialized education under the old rule of MEXT that had divided undergraduate degree programs into two periods (first half and second half) with liberal arts education situated in the first half. This is the reason why the debate has been stalled for a long time.

2. Recommendations

First, while recognizing the diversity of liberal arts education being offered in universities today, its original philosophy of cultivating citizens who will support a democratic society needs to be reconfirmed. Universities should define the learning goals of their undergraduate degree programs in each subject taking into account the balance between the education visions of specialized education and liberal arts education and design curriculums for achieving the learning goals. How specialized education and liberal arts education courses are combined is expected to be varied and how this is done should be determined from the perspective of promoting the most optimal combination for achieving the learning goals. It is not necessary for liberal arts education to always precede specialized education.

Meanwhile, the concept of active citizenship has changed significantly amid the developments that have taken place from the end of World War II to the present. In an age that has witnessed the universalization of higher education, the notion of liberal arts education as a passport to a "prosperous life" has lost validity. Now the essential function of liberal arts education is to foster student imagination and prepare them for

dealing with present day challenges and future difficulties with the expectation that improvement is both needed and possible under the assumption that citizenship has been redefined to include a readiness to take action to tackle the issues facing society by working with people who have different positions and backgrounds.

In relation to creating a new common platform of knowledge to serve as a backbone of citizen solidarity, some activities have particular significance. These activities include, for example, those that encourage students to think thoroughly about how to address difficult issues confronting today's society, issues that do not have a single correct solution and activities that contribute to bridging "The Two Cultures" of the sciences and the humanities by creating a new scientific literacy that can be shared by both.

For the development of communication skills, priority should be placed on "dialogue" that is not a one-sided transmission of one's opinion. The task will be to develop skills to meet and "listen" to people with different opinions and views from one's own. At the same time, we must not forget to cultivate the "wisdom" to find ways to cooperate even if agreement cannot be reached and to make a decision while a conflict of opinion remains. In regard to language skills in particular, we should recognize that the basis for all educational activities is the development of skills for the proper use of Japanese in the public realm and to these end efforts should be enhanced including the development of instructional techniques.

In addition, this report will discuss the methods of English and foreign language education, the potentials and problems of the Internet, the significance of arts and physical education, and will raise alarm over the critical situation that threatens the qualification of faculty who are responsible for liberal arts education. Finally, this report will point out that the existence of universities as a social space plays an important role in the personal growth of students through the "hidden curriculum".

Part III Challenges of the Linkages between Universities and Workplaces

1. Current situation and challenges

Since the collapse of the 1980s bubble economy, a growing number of university graduates are unable to obtain stable employment upon graduation and have been forced to engage in temporary jobs. Persons who were previously engaged in temporary jobs or experienced periods of unemployment face difficulties obtaining full-time and permanent employment. This distinct behaviour of the Japanese labour market has made the employment situation even worse for young people.

Because of this background, the job-hunting and recruitment process for students has been starting earlier and lasting longer. This has, however, raised considerable questions over efficiency with the job-hunting and recruitment process exhausting many students' energy as well as generating a sense of futility among companies. Furthermore, while companies demand a higher level of skills from students, proper attention has not necessarily been paid towards the gaps between what companies are requiring in terms of skills and the skills that students are learning in university especially in the humanities subjects.

The structural factor underlying the situation is the following. While full-time and permanent employment has decreased in the on going low-growth economy, university enrolment has continued to increase causing the demand-supply balance of the labour market to change. To date, however, none of the activities of universities, companies, and business associations, or the government have gone so far as to

take into account this fundamental change and transform the conventional methods that have linked university graduates to employment...

2. Recommendations

In Japanese society, a clear path used to exist for young people to make a smooth transition from schools to the workplace. This is already a thing of the past. Japan needs to squarely face the current situation in which "transition" is persistently accompanied by significant difficulties and to fundamentally establish a roadmap aimed at breaking free from the current situation.

An essential part of this agenda is to reform the "linkages between universities and workplaces" -- specifically improving the vocational relevance of university education in a manner that will be socially accepted. We believe that the development of subject benchmark statements discussed in Part I will play an important role in assisting each university in making educational improvements through integrating the skills required of professionals and the philosophy and principles of subjects. Because the vocational relevance of each subject will vary, it is important to define these accurately when developing the benchmarks so that students will have a good understanding of this.

In view of how industrial society may be reshaped in the future, it is of course important to meet the needs of economic globalization. It is also important to make Japan a country where everyone has an opportunity to have decent work regardless of age, sex, sector, region or employment status, where everyone has an opportunity to increase his/her skills through work and learning. To this end the government is urged to take a variety of measures including the development of a labour market that treats permanent and temporary employees equally based on their professional expertise in order to address the social deadlock created between the two categories. Universities will have a large role to play in these efforts. Moving forward, universities are expected to take active steps, including the creation of new subjects and the transformation of existing subjects as well as coordinating with non-university education and training bodies.

Finally, regarding the methods of job-hunting and recruitment activities, it is important to first significantly broaden the framework of improvement measures. While the current ways of job-hunting and recruitment activities that are starting earlier and lasting longer should be enhanced, opportunities to learn about the "outside world" including about companies should be provided early on. Career guidance of universities should not focus only on the development of job-hunting skills. In coordination with specialized education, career guidance should also give priority to assisting students in making proactive preparations to achieve vocational independence. Companies are also encouraged to consider their recruitment methods. It has been a long-standing tradition of Japanese companies to prefer applicants with "generalist" rather than specific skills. However, we think that new recruitment methods will reflect more directly the needs of the actual "work" that the students will be engaging in. The introduction of job category-based recruitment may be one such option. At the same time, the government is urged to develop public safety nets for young people who cannot find employment. Companies are also urged to ease their implicit criteria that exclude "recent graduates" (those who failed to be recruited during their final year of university and have since graduated from university) from applying to positions that are open to bachelor's degree candidates.

We hope universities, companies and businesses, the government, the career support industry, and the people at large will have an increased interest in this issue and join hands to make further progress.

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Part I Quality Assurance Framework for Specialized Education

1. Quality assurance for specialized education

(1) Issues raised by the Undergraduate Program Report

In 2008 the Central Council for Education submitted a report titled *Towards the Enhancement of Undergraduate Degree Programs* (referred to as the "Undergraduate Program Report") to the Minister of Education, Culture, Sports, Science and Technology. The report states that "Japanese universities today are unable to provide a clear answer to questions asked within Japan and overseas on what skills are assured by Japanese undergraduate degrees. Moreover, the government has not necessarily been actively involved (in answering these questions)." The report goes on to point out that "By easing the regulations on the establishment of universities and promoting their differentiation by function, the Government of Japan has actively promoted the individualization and increased distinctiveness of each university that in turn led to a significant diversification of universities as a whole. However, priority was not necessarily placed on maintaining minimum coherence among the undergraduate programs or the various fields of study".

The same report notes that "By presenting reference guidelines on the competences of *21st century citizens* to be cultivated in undergraduate programs (the abilities a student is assured to acquire after completion of Japanese university education), the Government of Japan intends to promote and assist universities in the formulation of policies for the award of degrees and other matters as well as the establishment of a quality assurance framework for specialized education". To this end, the report lists "Typical Graduate Attributes to be Fostered through Each Subject Major: Reference Guidelines Concerning Learning Outcomes Common to All Undergraduate Programs".

Specifically, the "typical graduate attributes" presented in the report consist of four pillars: "1. Knowledge and understanding"; "2. Generic skills"; "3. Morale and motivation"; and "4. Coherent learning experience and capacity for creative thinking". While they are intended only to serve as reference guidelines, they provide a single and direct answer to the question of what a student is expected to acquire in undergraduate programs. This is a major step forward from "the government has not necessarily been actively involved" in university education programs.

Needless to say, the government must give maximum respect to freedoms of education and research in universities. Educational and research freedoms have intrinsic importance to creative scholarly activities that in turn are most effective if left up to the wisdom and conscience of faculty and the sincere response of students. Nevertheless, in view of the present circumstances surrounding Japanese university education as set forth in the Undergraduate Program Report, it must be admitted that quality assurance of university programs can no longer be entrusted entirely and only to the "implicit knowledge" of faculty. The proposal of "typical graduate attributes" in the report of the Central Council for Education is believed to be appropriate, from the perspective that certain abilities should be assured by the bachelor's degrees awarded by Japanese universities, irrespective of subject area.

(2) Why quality assurance of specialized education?

"Typical graduate attributes" are assumed to be "fostered through each subject major". Yet, considering most of the undergraduate programs in Japan have been offered under specific departments or faculties of

specialized subject fields, the proposal may be confronted with great restrictions in its ability to adapt to actual curriculums.

The concept of "typical graduate attributes" tries to answer the question of "what skills are assured by Japanese undergraduate degrees". In this light, it is clear that fostering these competences is the objective of not only liberal arts education and general education. Specialized education also needs to assume the role of fostering universal skills common to all people who have bachelor's degrees as represented by "typical graduate attributes" rather than cultivating abilities and skills within the closed and narrow logic of individual subject areas. Therefore, policies and measures must be considered for this purpose.

Meanwhile, the Undergraduate Program Report, as already quoted notes that "priority was not necessarily placed on maintaining minimum coherence among the undergraduate programs or among the various fields of study" while recognizing that we face the challenge of ensuring "minimum coherence among the various fields of study". In more concrete terms, this suggests that individual fields of study have distinctive features that differentiate them from other fields of study and that their core elements should be clarified and firmly maintained.

In summary, in order to ensure the "quality assurance of specialized education", we have to address the question of what a student is expected to acquire in undergraduate programs. To this end, we need to establish a common framework for proposing certain standards for specialized education and propose these standards one after another while bearing in mind both the universality sought by "typical graduate attributes" and the intrinsic characteristics of each field of study.

2. Issues to consider

(1) Respect for independence and autonomy of university education

As also requested in the Undergraduate Program Report, i.e., "to make considerations to ensure the diversity of education that accompanies the individualization and increased distinctiveness of universities", it is essential that the quality assurance framework of specialized education that is to be newly established fully respects the independence and autonomy of all universities.

On this matter, the Subject Benchmark Statement of the United Kingdom (UK) is an invaluable reference for our considerations of similar standards as a foregoing case study. The Subject Benchmark Statement sets out certain standards in terms of the knowledge and skills a student is expected to acquire through the study of specialized fields while respecting the independence and autonomy of universities. For the following reasons, however, it should be kept in mind that greater diversity needs to be permitted in Japan than the UK:

A. In the UK, undergraduate programs of universities were set up to provide specialized education whereas in Japan they were set up to allow for flexibility in combining both specialized education and liberal arts education.
B. The responsibility for funding universities in the UK strongly rests with the government and nearly all universities have a public character whereas universities in Japan consist of both public and

private universities including many are private universities that have their own unique founding principles.

(2) Issues raised by Undergraduate Program Report

The Undergraduate Program Report points out a variety of issues pertaining to the current undergraduate degree programs of Japan including the following:

- The compartmentalization of departments and faculties hinders the development of student-centred educational activities.
- While graduate schools play a larger role in specialized education, undergraduate degree programs emphasize the basic education needed to pursue specialized studies and the development of universal and basic abilities that cut across disciplines. Curriculums of specialized education should be developed not only to foster knowledge about a range of disciplines but also from the perspective of enabling students' acquisition of learning outcomes that are in harmony with the educational philosophy of each university.
- As individual faculty member prioritizes research activities and specialized education less attention is undeniably paid to basic education and general education especially after the deregulation of the Standards for Establishment of Universities.
- Curriculums give priority to the interests of individual faculty members and do not take into account their coherence from the perspective of students.
- The segmentation of courses that tears apart the integrity of learning, should be reviewed from the standpoint of increasing the substantiality of the credit system.

As highlighted by the underlines that we added, the Undergraduate Program Report makes note of a fundamental problem with university education in Japan, namely it expresses concerns that university education does not give full consideration to the fact that students are learners, that they are not the focus of university teaching.

Taking these factors into consideration we should strive not to needlessly list the many detailed knowledge and skills a student is expected to acquire in his/her area of expertise but to develop a vision that will enable the student to firmly acquire the fundamental and basic ones needed for his/her future.

(3) Diverse career tracks of students and multiple meanings of societal demands

This report noted that in order to assure the quality of university education in subject majors, we need to establish a framework for proposing a set of ideas on specialized education in response to the question of what a student is expected to acquire in undergraduate programs.

However, even within the same subject major a diverse range of career tracks often exists and varies greatly by university. Along with this, societal demands on specialized education are very diverse or rather unclear. It might be possible to make rigid model curriculums for certain subjects directly linked to a particular profession such as medicine because there is a social consensus regarding the qualifications a person who has studied that subject is expected to have. But such cases are exceptional. When we design the quality assurance frameworks for specialized education, we must face the fact that students have a

diverse option of career tracks and that society's requests are unclear. Although some say that specialized education needs to be regulated by rigid model curriculums or by uniform target goals (minimum/average levels of knowledge that students are expected to acquire), there is no concrete evidence we can use for the specification of them. After all, it is up to each university to address specifically the question of what a student will aspire to learn and to what extent they learn.

3. Formulation of benchmark statements for curriculum design – The role to be fulfilled by SCJ

A summary of the above discussion is as follows:

- In order to assure the quality of specialized education, we need to establish a framework in response to the question of what a student is expected to acquire in undergraduate programs while bearing in mind both the intrinsic characteristics of each area of study and the universality sought by "typical graduates attributes".
- In doing so, we should not needlessly list the many detailed knowledge and skills a student is expected to acquire in his/her area of expertise but to prioritize the acquisition of fundamental and basic ones needed for his/her future role in the world as a business professional or citizen.
- The independence and autonomy of universities should also be fully respected. Besides, we must not forget the diversity of linkages between specialized education and liberal arts education and the diversity of the legal status of universities. Even from a practical point of view, it is up to each university to determine specifically what a student will aspire to learn and to what extent.

Based on the above, we believe that the quality assurance framework for specialized education to be newly created should have the fundamental role of identifying the core knowledge and skills that all students should acquire at a fundamental level and it should be provided to each university in the form of benchmark statements for curriculum design.

This could have a major impact on university education programs. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Central Council for Education have not directly carried out the studies of quality assurance frameworks; they have instead asked SCJ to conduct these deliberations. This decision is welcomed from the view of restricting government interference in university education programs. The SCJ is a governmental organization but a non-partisan body with expertise in all subject areas of the humanities, social sciences, and natural sciences and thus is able to conduct the studies appropriately. In this connection, the Undergraduate Program Report expressed its expectations for SCJ as follows. It is important that the SCJ, for its part, fulfils its active role in order to meet these expectations.

"In the context of promoting the efforts of organizations consisting of universities and academics and their actions that are based on a common understanding, with expectations that these bodies will play key roles, in May this year, MEXT requested SCJ to deliberate on a quality assurance framework for specialized education of universities. SCJ is thus urged to advance proactive initiatives with a view to developing a quality assurance framework for improving the knowledge and skill levels of graduates in each subject area. It is expected that the deliberations will take into account the need to ensure diverse

educational opportunities that emerge from the individualization and differentiation of universities. It is also hoped that the definition of subject areas will be considered, including the titles of subject majors referenced in the bachelor's degree."

4. Description of benchmark statements for curriculum design

(1) What are benchmark statements for curriculum design?

What are the benchmark statements for curriculum design?[1] Will their creation allow their users to "know" what courses to establish in precise detail? The answer is of course no. Each university and its faculty are responsible for curriculum design and needless to say their unique efforts to this end are required more than ever in today's university education.

In designing the curriculum, it is desirable that each university follow the following steps: (1) In accordance with the education philosophy of each university and their circumstances (e.g., academic resources, level of students and their career path); (2) Identify specific learning goals, i.e., what kind of knowledge and skills a student will develop; (3) To this end consider in detail what a student should learn (learning content), through what sort of method (learning method), and how the learning outcomes will be evaluated; (4) At the end, incorporate them in the actual curriculums; and (5) Based on the above, monitor the overall outcomes to verify problematic areas and make further improvements to the curriculums[2]. (See Figure 1)

As will be described in the next section regarding the specific components of the benchmark statements, it is understood that curriculums will be designed according to the process set out above. The standards are presented to serve as a reference for use in the entire curriculum design process and are not intended to serve as straightforward guidelines for the establishment of individual courses.

The benchmark statements are proposed as a "starting point" that identifies only the principles and philosophy of each subject as well as their core elements. It must be up to each university to build on the benchmark statements and tailor them to their needs.

Furthermore, it is acceptable for universities with a highly distinctive education philosophy to reject the use of the benchmark statements if they can justify their curriculum to society and students with sufficient certainty as being unique but having academic legitimacy.

(2) Key components of benchmark statements

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[1] "Statements" here are not the statements/standards normally associated with a "model" for promoting standardization nor the standards for establishing minimum and average levels to verify the "pass-fail" status. As the discussions so far indicate, the benchmark statements are not regulatory in nature.

[2] A diverse range of methods may be chosen and used as necessary to monitor the outcomes, including surveys of graduates and surveys of where they are employed, surveys of current university students, and scores on relevant certification exams and competency tests. However, the importance of exam scores is to fundamentally draw on them to verify areas which need improvement, etc. in achieving the learning goals. The intent of the quality assurance methodology is not to equate exam scores with "learning goals".

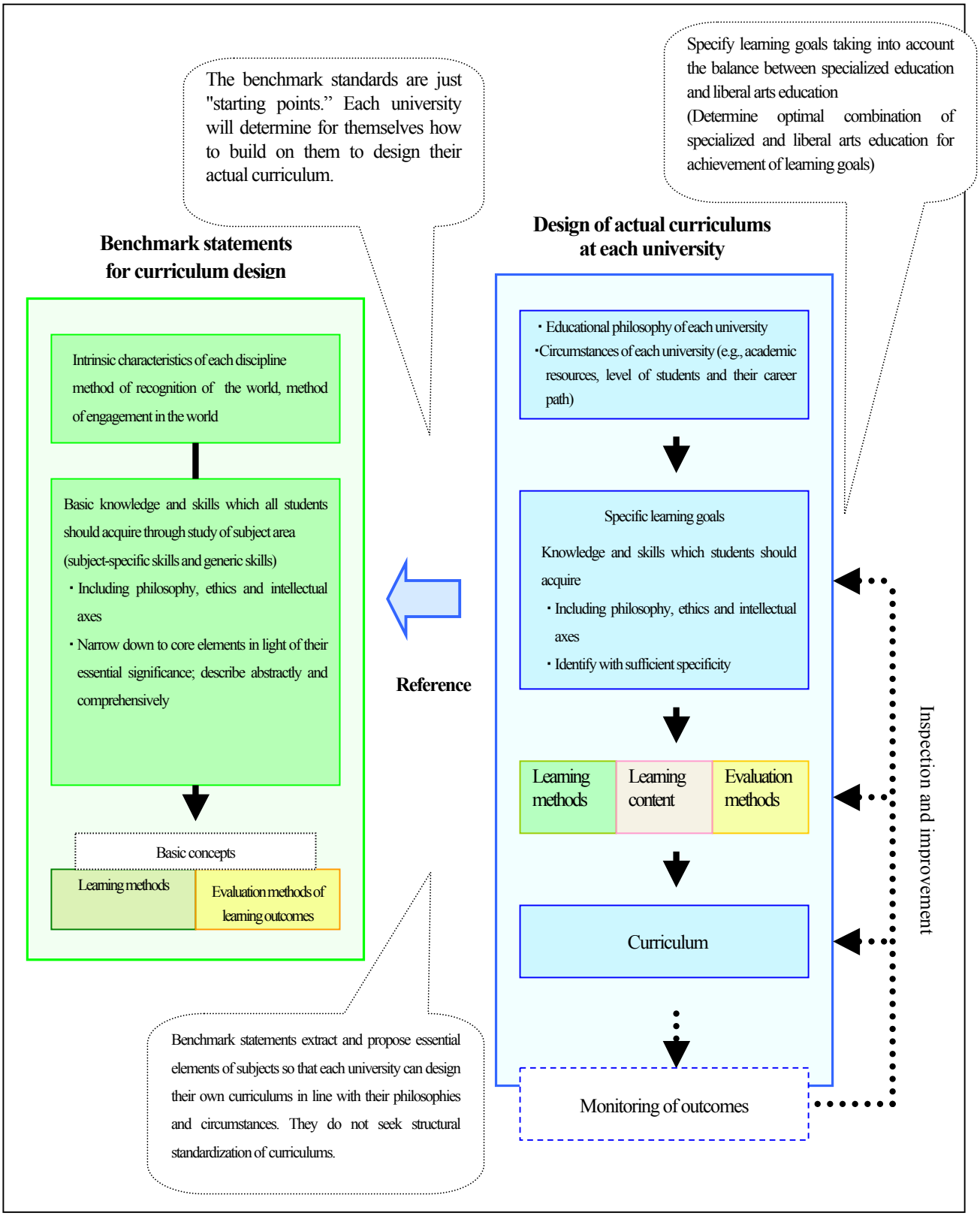
1) Intrinsic characteristics of each discipline

The core focus of the benchmark statements for curriculum design is to identify the knowledge and skills that all students should acquire at a fundamental level in undergraduate degree programs from the standpoint of specialized education. And it is important that these abilities and skills are firmly rooted in the most intrinsic characteristics of the discipline that are both central to the discipline and cannot become easily outdated.

Academic studies and their intellectual outcomes are intellectual public goods of humankind. They are activities to recognize the world (human beings, society, and nature) and to engage in the world. Each discipline has its distinctive philosophy and methodology. They are in other words "method of recognition of the world and "method of engagement in the world" that are specific to the discipline. They are the "foundation" and "essence" that should be shared by all curriculums relevant to the discipline and serve as a "starting point". We believe that an emphasis of this point will also lead to increasing the universal significance of education in each discipline.

It is of critical importance to clearly, and from an academic perspective, identify the intrinsic characteristics of each discipline that have been implicit knowledge in many cases, as they form the basis for ensuring the relevance of the benchmark statements as a whole. One of the most important elements to consider for the quality assurance of university education is whether the curriculum has sufficient consistency so that students can gain the necessary knowledge and skills expected of a bachelor's degree. The Undergraduate Program Report points out those curriculums of specialized education should be designed by considering not only the knowledge required in each discipline, but also how students can achieve the learning outcomes that are in line with the educational philosophy of each university. We completely share the same view found in this report. However, if the learning outcomes to be achieved are not rooted in the characteristics of the discipline, the curriculum will lose its rationale for the consistency of itself. Describing the intrinsic characteristics of each discipline serves as a premise for identifying the basic knowledge and skills that all students should obtain as explained in the next paragraph.

Figure 1 Linkage between "Benchmark Statements for Curriculum Design" and Design of Actual Curriculums at Each University



* The benchmark statements formulated by SCJ do not determine the curriculum design of each university. The important point is that a process like the one shown above is effectively functioning at each university.

2) Basic competencies that all students should acquire

In light of the distinctive features of each discipline described in 1), a set of "basic competencies" are identified on the basis of these features to be acquired by all undergraduate students studying the discipline.

It is important that "basic competencies" constitute not only knowledge and understanding of disciplines but also comprise skills acquired through learning that will play an important role over the course of a person's life. In some instances specialized knowledge and understanding of individual subjects will have direct applications in the workplace as specialized skills. In other instances, for example, subject-specific intellectual training will contribute to the development of generic skills that have a universal dimension and can be applied to various uses. Such skills include the ability to take initiative in making decisions and actively solve problems as required. Even if the situation differs by discipline it is important that basic competencies are identified in reference to the basic knowledge, understanding, and skills that should be attained through a student's study of a subject and can be fostered in a way that are useful to students. Further they need to be narrowed down to a core set of skills that will be obtained in undergraduate degree programs and whose significance can be clearly understood.

A number of items to keep in mind are listed below as a reference for making specific considerations on each subject:

A. The fact that the word "application" refers not only to short-term and direct applications should be underscored. Values, ethics, and intellectual axes that support an understanding of the world also have major applications as lifelong skills. Deliberations on each subject should include discussions on a wide range of issues including the above.

B. As discussed in 1(2), the "basic competencies" that students should acquire are not intended to be cultivated within the closed and narrow logic of individual subject areas. "Specialized education" can also contribute broadly to the development of so-called generic skills as well as function like liberal arts education in terms of contributing to fostering citizenship in people including the development of communication skills. As represented by the "competences of graduates", deliberations need to sufficiently take into account the perspective of fostering universal skills common to all people who have bachelor's degrees.

C. When considering "basic competencies" it is extremely important to take note of their relevance to the work place. It is desired that deliberations on each subject will assume concrete examples of relevant work places to sufficiently give consideration to primarily how to develop basic skills that will support a person's professional career over the long-term including specialized knowledge and ethics with which professionals should be equipped.
(For a detailed description of university education's significance to employment, see Part III, "3. Enhancement of university education's significance to employment" (paragraph 46) and "4. Towards a new form of linkage between universities and employment" (paragraph 48).

D. It is desired that the "basic competencies" are acquired by all students. It is furthermore appropriate if each university identifies them based on their respective philosophies and situations in a way that allows for flexibility. While it is expected that several bullet points will be required to describe the competencies with sufficient specificity, it is desirable that the number of bullet points be kept to a minimum as much as possible and that each item be discussed as a broad and universal concept.

E. Students include both students who enter the workforce, etc. upon the completion of undergraduate studies as well as those who continue their studies at graduate schools. In some cases, the latter comprise a majority in some subjects and some universities.

However, this report does not consider undergraduate degree programs only as a learning step in preparation for graduate studies. Nor does it restrict each university from designing curriculums that facilitate the smooth linkage between undergraduate and graduate programs and that increase the learning impact synergistically as a whole. Nevertheless, it believes that the central tenet of undergraduate degree programs should be understood in the context of the opportunities they offer through their unique curriculums for acquiring important lifelong abilities and skills (graduate schools are expected to accept a variety of students, including graduates of a range of other universities and other subjects as well as those from the workforce). It follows that the benchmark standards to be created should be formulated in accordance with these ideas.

3) Basic concepts relating to learning methods and evaluation methods of learning outcomes

A. Learning methods

The issue of learning methods in university education was not necessarily given priority in the past. The interest was focused on the question of "what to teach", i.e., the learning content. Learning methods, it seems, were prioritized in terms of knowing how to "best" teach and ensure that students understand the learning content and were more or less considered a subsidiary item.

However, in 2), it was stated that it was important that students, through learning, acquire not only "knowledge" and "understanding" of a discipline, but also lifelong skills to contribute to business and society. Therefore, learning methods are an essential part of curriculum design not only to facilitate "best" teaching practices but also to ensure that students attain the ability to actually apply the knowledge and understanding and to acquire a set of skills through the learning content itself (treated as a teaching material).

Learning methods are thus as important as the learning content itself. The benchmark standards illustrate only those learning methods that have fundamental importance to the studies of the aforementioned disciplines.

The notion of fostering a set of skills using the learning content as a teaching material is extremely important. In principle, however, these skills should also be considered as distinctive skills specific to the aforementioned disciplines. Furthermore, the term "transferable skills" is interpreted to mean skills that are specific to a discipline but which can also be applied to other areas unrelated to the discipline.

In conclusion, while the said report intends not to deny opportunities to acquire generic skills, it believes the distinctive significance inherent to individual disciplines should not be fully neglected as a result of the initial emphasis on generic skills.

B. Evaluation methods of learning outcomes

Lastly, it should be pointed out that the importance of learning methods in today's university education has immediate relevance to the importance of the evaluation methods of learning outcomes achieved by students.

Learning methods may be devised and deployed in creative ways to enable students to acquire abilities and skills other than solely knowledge and passive understanding. However, if the evaluation methods of learning outcomes only examines knowledge and understanding, this will not be an appropriate evaluation and may even decrease students' motivation for learning. Therefore, the benchmark standards also discuss basic ideas on the evaluation methods of learning outcomes in each subject area. Each university needs to recognize that learning methods and the evaluation methods of learning outcomes are closely interlinked, and that both must be employed in creative and innovative ways.

(3) Relationship with liberal arts education: Quality assurance of undergraduate degree programs as a whole

The subject-specific benchmark standards are a framework that is intended to contribute to assuring the quality of education in specialized subjects. At the same time, however, undergraduate degree programs of Japanese universities have another important component -- liberal arts education. Quality assurance frameworks for undergraduate degree programs as a whole cannot be envisaged without taking liberal arts education into account. Each university can neither identify only the learning goals of specialized education irrespective of liberal arts education without likely damaging the balance and causing confusion.

Quality assurance of undergraduate degree programs needs to be conducted by examining undergraduate programs as a whole, including liberal arts education. Please refer to Part II, "3. The relationship between specialized education and liberal arts education" (paragraph 24) for a discussion of the basic points concerning this topic.

(4) Guidance for preparing benchmark standards

Up to this point, the key components of the benchmark standards have been discussed. Based on this discussion, an annex to the report titled, **"About the Benchmark Standards for Curriculum Design for Subject-Specific Quality Assurance in University Education: Explanation of Objectives and Guidance for Preparation"**, has been created and attached at the end of Part I. The aim of this document is to provide specific guidance on the actual process of preparing benchmark standards for each subject.

Bearing in mind the objectives of the main text of this report, the appendix offers more specific explanations on the ways of organizing items and various concepts and also covers matters related to liberal arts education discussed in Part II. Please refer to it in conjunction with the main text.

5. Role and status of benchmark standards

(1) Basic role of benchmark standards

The Subject Benchmark Statements of the UK noted earlier are intended to assist those involved in the design and other phases of education programs and to serve the role of providing information to prospective students and employers to promote understanding about the nature of awards in a subject area.

The "Japanese version" of the benchmark statements discussed in this report will basically have the same role as the UK version.

(2) Relationship to quality assurance of professional training programs

Regarding subject-specific quality assurance of education programs, it is well known that the Japan Accreditation Board for Engineering Education (JABEE) has an accreditation system for engineering education[3] and that in such subjects as medicine, dentistry, pharmacy, and nursing, core curriculums are established with government involvement.

How are these different from the benchmark standards? In short, it is the difference between quality assurance of specific professional training programs and general quality assurance of undergraduate degree programs. Established professional certifications naturally set out clear and specific requirements on the level of knowledge, understanding, and skills with which a certified person must be equipped and are directly responsible to society for assuring quality. In these subjects, there is a well understood need to accredit programs based on certain standards as well as to standardize programs to a certain extent through the development of core curriculums.

Meanwhile, in the many other subjects, academic tracks are diverse and educational priorities vary by university. However, what can be said about all of these subjects is that it is important that students acquire abilities and skills that will have significance for them and furthermore that the abilities and skills are rooted in the subject's features. The benchmark standards are indeed based on this concept.

In engineering, for example, while it is important to assure quality as a specialized profession on the one hand, in subjects with diverse academic tracks on the other hand, it is possible to formulate subject-specific benchmark standards for curriculum design even if the accreditation system of JABEE exists. In this case, it should be properly understood that both schemes have their own objectives that do not compete with each other's, and each university should independently choose and utilize either scheme.[4]

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[3] The majority of subject accreditations in the U.S. are conducted by professional associations that accredit the quality of university education programs based on their professional training programs. At the same time, it is the people who completed the aforementioned education programs who accredit whether the programs meet the criteria for inclusion in the association. The same applies to regional accreditation that differs from subject accreditation. In other words, regional accreditation determines whether all universities subject to the accreditation are qualified to serve as members of the associations. This point contrasts with the nature of the accreditation and evaluation system in Japan.

[4] In the UK, in addition to the Subject Benchmark Statements set forth by the Quality Assurance Agency for Higher Education (QAA), various organizations including the British Psychological Society, Nutrition Society,

(3) Formal framework to be provided for use by all stakeholders

Although internal regulations existed in the past that publicly stipulated the nature of university education in each subject and were used by MEXT to screen universities for their establishment, all were abolished along with the recent moves to ease regulations and increase the transparency of administrative procedures (2003). Currently, no official document exists that stipulates in one form or another the nature of university education in each subject.

The benchmark standards for curriculum design in each subject to be formulated in the coming years should be provided for use by all stakeholders in Japan and overseas, including universities, university institutions, accreditation and evaluation associations, scholarly and professional societies, as well as students, companies, and national and local public bodies. It is hoped that the benchmark standards will fulfil their role as one type of social infrastructure that can be applied by the diverse actors in society for their respective uses, and through this, contribute to achieving a common understanding among everyone. It is expected that SCJ's involvement in the formulation of the benchmark standards will enable these benchmarks to take on a public character and fulfil these various roles.[5]

It remains the case that the benchmark standards should respect the independence and autonomy of universities as much as possible while aiming to ensure "minimum coherence among the various fields of study" as stated in this report. Relevant organizations, beginning with MEXT, are strongly urged to keep this point fully in mind.

(4) Relationship to self-evaluations and accreditations

In discussing quality assurance, its relationship to university establishment screenings conducted by the government, self-evaluations conducted by universities set forth in the School Education Act, and university evaluations conducted by accreditation bodies should also be described.

These are basically organization-based quality assurance schemes and primarily should be thought of separately from quality assurances of educational programs. (Although university establishment screenings include individual curriculum screenings, these quality assurances differ from other quality assurance frameworks in that the former are basically quality assurances that are kept to a minimum.). However, on closer inspection, it appears that self-evaluations and evaluations conducted by accreditation bodies may naturally examine the same dimensions as subject-specific quality assurance schemes. It is thus important that the quality assurance schemes are properly delineated taking into consideration their respective characteristics and the efforts required. How should the relationship between self-evaluations or accreditations and subject-specific quality assurances of educational programs be delineated? While this is a matter that requires further consideration, it is believed that the following two items have important

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the Royal Statistical Society, and the Royal Aeronautical Society conduct accreditations of university education programs based on their own standards.
Naturally, when formulating benchmark standards, due attention should be paid to avoid contradictory content between the two schemes.

[5] "Public character" implies the benchmark standards shall be given due respect by national and local public bodies and other public organizations. It does not mean the benchmark standards will have any direct binding powers on universities (including national universities), university faculty, and other private groups and individuals.

implications for this issue:

1) The notion that accreditations should prioritize the internal quality assurances of each university, instead of accreditation bodies directly conducting evaluations involving detailed matters is increasingly being emphasized; and
2) The notion that quality assurances of university education in general should prioritize increasing the learning outcomes of students is increasingly being emphasized.

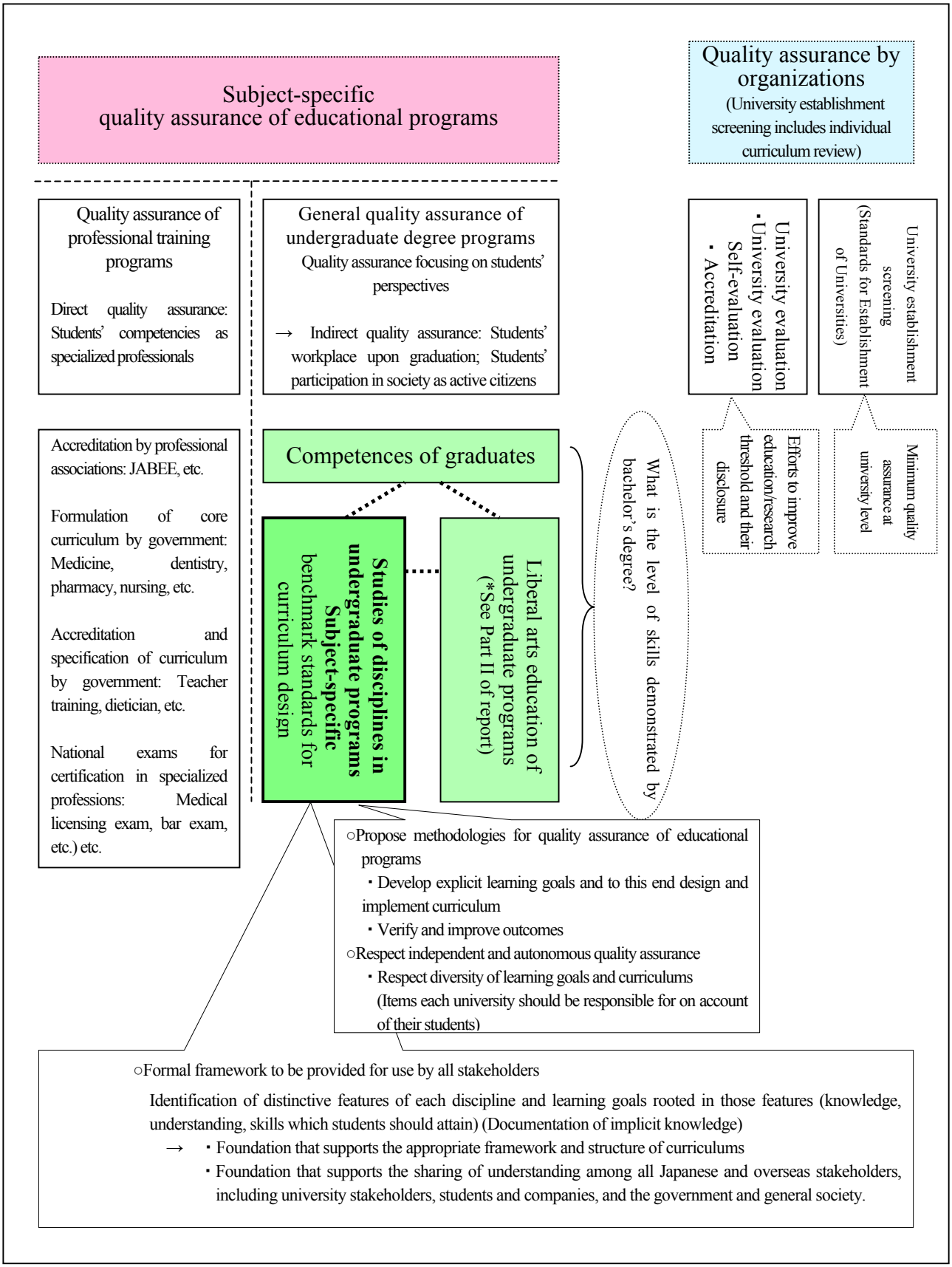
Given that subject-specific benchmark standards for curriculum design are intended to assist each university in developing more concrete learning goals and also designing and implementing curriculums to achieve those goals they are consistent with the notion described in 2). Furthermore, given that the benchmark standards seek to monitor the outcomes to verify problematic areas and make improvements, they also overlap with the notion of internal quality assurances of universities described in 1). Meanwhile, regarding the identification of learning goals, given the notion that the diversity of each university should be recognized, care should be taken when accreditation bodies directly conduct evaluations to measure the learning outcomes of each university according to uniform indicators.

Taking the above into consideration, and furthermore, if self-evaluations and accreditations are not to be restricted to quality assurances at the minimum level, i.e., verification of conformity with the Standards for Establishment of Universities but also aim to improve the quality of education, the following is proposed as one idea for delineating the quality assurance schemes. This is a matter that will have a major impact on the specific initiatives of universities and is an important agenda item for the future.

1) Each university will as a way to internally assure the quality of education, utilize the benchmark standards in taking steps to improve the learning outcomes whose basic units are curriculums of each subject;
2) Accreditation bodies instead of directly evaluating the learning outcomes of each university will evaluate whether the internal quality assurances of each university that aim to improve learning outcomes are functioning appropriately. (In consideration of the evaluation burden it may be appropriate if individual curriculum evaluations are conducted first on a pilot basis).

Based on the discussion so far and other considerations, the frameworks associated with quality assurances of university education may be delineated as illustrated in Figure 2. Moving forward, it is hoped that discussions on this issue will be further developed.

Figure 2 Frameworks Associated with Quality Assurance in University Education



6. Identification of subjects and ways of advancing deliberations

(1) Basic concept for identifying subjects

When formulating the subject-specific benchmark standards for quality assurance of subjects, an important question to ask is how the "subjects" will be identified. If every subdivision of subjects is included, the number of "subjects" in university education is likely to be immense. Our initial goal will be to formulate benchmark standards for roughly 30 of the major subjects over three years.

The process for identifying subjects is basically envisaged as follows: first, subjects will be grouped together as broadly as possible; then the more finite subjects will be incorporated as necessary. While subjects may be divided into an endless number of smaller and smaller groups, the essential point is that the subjects are subdivided to a level that has significance for the design of independent and systematic curriculums in undergraduate degree programs. A rational approach would be not to develop a scheme for individual subjects that have already been subdivided at the outset, but to first group subjects that share universal principles and philosophy as much as possible and then incorporate more finite subjects as necessary.

(2) Interdisciplinary and multiple curriculums

Curriculums continuously evolve in order to address the development of disciplines and changes in societal needs through the addition and elimination of subjects. Even those curriculums that do not fit in with the traditional classification of disciplines need to be respected for their positive potential.

Nonetheless, it is realistically impossible to identify the diverse range of interdisciplinary and multiple curriculums as "subjects" one by one and formulate their benchmark standards. On the contrary, this has the risk of fixating what were originally flexible curriculums. For this reason, interdisciplinary and multiple curriculums will not be treated as subjects except when the curriculums are already recognized as actual and established subjects to some extent and it can be assumed that educational programs will be designed for these curriculums.

As these curriculums are comprised of a set of multiple "originally existing subjects", it is appropriate when designing the curriculums to flexibly combine and draw on the benchmark standards for those subjects. That is to say, it is believed that even for interdisciplinary and multiple curriculums that will not be treated as subjects, it is important that the originally existing subjects that comprise the curriculums maintain their distinctive intellectual training functions and that they have unique effects on education through their proper combination.

The policy described in (1) to initially group together subjects as broadly as possible will enable the creation of benchmark standards that can be used to design curriculums that are interdisciplinary and multiple combinations of more finite subjects within the framework. The policy also has significance for assisting with the range of activities related to curriculum design.

(3) Way forward for subject-specific deliberations

To conduct deliberations of the subjects, it is important to establish an appropriate deliberative

mechanism for each subject. Specifically, measures must be in place to ensure that the deliberations procedures and composition of the deliberative teams are appropriate. This includes ensuring the participation of relevant scholarly and professional societies, the proper representation of the diverse range of universities, and that opinions are received from the younger generation and professionals and those specializing in other adjoining subjects as well as completely different subjects.

In addition, it is important to properly collect and draw on relevant basic information such as the circumstances surrounding existing curriculums at each university, the situation in other countries, and the efforts of relevant student associations.

7. Mid- to long-term administration of benchmark standards

(1) Review of benchmark standards

The benchmark standards are intended to serve as basic reference materials for each university in designing curriculums. Any changes such as the review of their content or the addition of subjects after the development of the standards needs to be administered under the auspices of a body with semi-permanent responsibility. In this context, it is proper that SCJ assumes this role provided that major changes are not made to the present conditions surrounding university education in Japan.

SCJ will initiate a review of each benchmark standard regularly, i.e., about once every few years. Assuming preparations for introducing curriculums at each university take one year and the completion of a curriculum five years inclusive of the one year of preparations, it will be appropriate to initiate a review of benchmark standards about five to six years after they were originally developed.

The review should, while sufficiently taking into account the stability of the curriculum, appropriately verify new trends in Japan and overseas regarding education in the relevant subjects as well as properly collect information on the use of benchmark standards at various universities.

(2) Addition of new subjects

Today, a multitude of subjects are offered by undergraduate degree programs of universities and the benchmark standards should not be restricted to some 30 subjects exclusive of the diverse range of interdisciplinary and multiple curriculums. Additional benchmark standards should be developed for new subjects as necessary.

The question is on what basis should subjects be added? The addition of new subjects should be considered from primarily two perspectives. The first is the academic perspective; the other is the relationship to society, or more to the point, the perspective of developing specialized professional skills. The former, the academic perspective may be understood in the sense that generally speaking it is quite rare for new subjects to be developed such as the development of new distinctive ways of knowing about the world and ways of engaging in the world[6]. On the other hand, new subjects may be identified more flexibly under the latter perspective, at least compared with the former perspective.

[6] Examples include the rapid development of molecular biology that bridged the barriers between biology and chemistry, and the introduction of cultural studies that transformed the traditional ways of learning about the humanities and social sciences.

(3) Establishment of coordination mechanisms with range of relevant bodies

In order for the benchmark standards to make an effective contribution to quality assurance in undergraduate degree programs, they need to be firmly rooted in Japan's university education. The participation of scholarly and professional societies in developing the benchmark standards was discussed in 6(3). For benchmark standards that have been developed in terms of actually utilizing them and assisting with the faculty development (FD) activities and other initiatives of each university, it is important to establish coordination mechanisms with a diverse range of bodies including relevant scholarly and professional societies and FD groups across universities, public and private university associations, and accreditation bodies.

8. Importance of considering quality assurance in university education as a whole

In Part I, we proposed and discussed the concept of developing subject-specific benchmark standards for curriculum design that will serve as a framework for conducting subject-specific quality assurance. On this basis, it was explained that the benchmark standards are simply a framework, and should specify the "basic competencies that all students should acquire" in light of their utility and application to students, taking into account the distinctive features of each discipline.

That said, in considering what basic competencies are useful to students, there is in fact not necessarily a diverse list of items that need to be taken into account. Excluding the satisfaction of genuine intellectual curiosity and achievement of personal growth in the most general sense, there are basically two key items that need to be accounted for: the development of one's faculties and professional skills development. This is more or less the same for all subject areas.

However, "liberal arts education" exists for the development of one's faculties as is already known. How should specialized education and liberal arts education be interlinked? What is liberal arts education? What sort of meaning should be ascribed to the term "liberal arts"? With respect to professional skills development, there is also the reality that while there are subjects that are directly linked to specific professions such as the faculty of medicine and teacher training courses under the faculty of education, the abilities and skills acquired through university education in many subjects in mostly of the humanities fields are little recognized as professional skills in society.

The framework for "subject-specific quality assurance" is naturally part of a larger framework for considering how to assure the quality of university education as a whole and the discussion cannot be contained within this topic. Thus, to follow on the discussion in Part I, Part II will discuss liberal arts education and Part III will discuss the linkage between university and employment. We hope that Part I of this report is carefully read in conjunction with Parts II and III when making considering the development of benchmark standards in each subject and when each university engages in education enhancement initiatives in light of the benchmark standards that are developed.

Appendix

About the Benchmark standards for curriculum design for Subject-Specific Quality Assurance in University Education - Explanation of Objectives and Guidance for Preparation -

I. Explanation of objectives

1. Subject-specific quality assurance

(1) What is subject-specific quality assurance?

Subject-specific quality assurance as stated in this report refers to quality assurance in undergraduate degree programs of each discipline. To this purpose, it is important that each university engages in autonomous and organized activities for enhancing their programs, notably the enhancement of curriculum design.

(2) Basic concept for subject-specific quality assurance

1) Curriculum design in light of specific learning goals

The core of quality assurance in each subject is the identification of "learning goals" for the curriculums of each subject (e.g., departments, faculties, courses) with sufficient specificity and the design of actual curriculums taking into account the effective achievement of the learning goals.

Learning goals articulate which specific abilities and skills of significance a student as a learner will be able to acquire through learning.

2) Consensus about significance and organizational enhancement activities

Through 1), all faculty and students are able to understand and reach a consensus about the specific significance of the education activities they are in charge of and the learning activities that they participate in. In addition, it enables the concrete verification of whether learning outcomes are actually increasing and allows universities to engage in organizational enhancement measures.

2. "Benchmark standards" to be developed by SCJ

(1) Point of reference for each university in setting specific learning goals

The subject-specific benchmark standards for curriculum design to be developed by SCJ provide each university with a point of reference in identifying specific learning goals for the curriculums of each subject (e.g., departments, faculties).

In that sense they are a template for subject-specific learning goals. However, benchmark standards propose no more than a set of abstract and comprehensive ideas. Taking these as a point of reference, each university will independently and autonomously set out more detailed goals in line with their philosophies and realities.

(2) Difference from other approaches

While benchmark standards incorporate the word "standards", they do not set minimum or average academic performance thresholds as noted in (1). Nor are they core curriculums that seek the structural standardization of curriculums.

Benchmark standards are intended to promote subject-specific quality assurance by each university

based on the most fundamental understanding that universities should strive to enhance education in each subject with a view to enabling students to acquire abilities and skills of significance through learning.

II Guidance on preparation of benchmark standards in each subject

Benchmark standards are comprised of the following basic components. According to the situation of each subject, a sixth item may be individually added as well as appropriate reference matter.

1. Definition of the discipline
2. Distinctive features of the discipline
3. Basic competencies that all students learning the discipline should aspire to acquire
4. Basic concepts relating to learning methods and evaluation methods of learning outcomes
5. The relevance of specialized education and liberal arts education in fostering active citizenship

In preparing the benchmark standards, measures must be in place to ensure that the deliberations procedures and composition of the deliberative team are appropriate. This includes ensuring the participation of relevant scholarly and professional societies, the proper representation of the diverse range of universities, and that opinions are received from the younger generation and professionals and those specializing in other adjoining subjects as well as completely different subjects.

In addition, it is important to properly collect and draw on relevant basic information such as the circumstances surrounding existing curriculums at each university, the situation in other countries, and the efforts of relevant student associations.

1. Definition of discipline

A brief definition of the discipline will be provided. Since a substantive description of the discipline will be set forth in the next item, 2, a simple description is sufficient for disciplines that have a clear line drawn between them and other subjects. Where necessary its relationship with adjoining subjects will be noted as appropriate. (This should be limited to about 1 page A4-size paper [40 characters × 40 rows])

2. Distinctive features of discipline

Learning is an intellectual activity for knowing about the world (people, society, nature) and engaging in the world. Each discipline has its distinctive ways of knowing about the world and ways of engaging with the world. Whatever the goal is in relation to the abilities and skills a student is expected to acquire, if it is not rooted in the distinctive features of the discipline the curriculum will not have a reasonable foundation on which to stand in terms of having an appropriate framework and structure.

The clear identification from an academic perspective of the distinctive features of each discipline that has tended to be conventionally understood implicitly forms the basis for supporting the relevance of the benchmark standards as a whole and the relevance of the curriculums of each university that are designed in reference to the benchmark standards. An in-depth discussion will be given, incorporating basic knowledge and understanding of the discipline into concrete examples as necessary. (About 2-3 pages

A4-size paper)

3. Basic competencies that all students learning the discipline should aspire to acquire

Based on the distinctive features of the discipline discussed in 2, the basic competencies that all students learning the discipline should aspire to acquire will be identified in line with the following items.

(1) Basic knowledge and understanding that should be attained through learning of discipline

(2) Basic skills that should be attained through learning of discipline

a. Subject-specific skills

b. Generic skills

When identifying the basic competencies under each item, a list will be compiled from the standpoint of the skills that will be fostered in undergraduate degree programs through the learning of the discipline and which will be fundamental to students in their future personal growths. The list will not include many items and be narrowed down to the core competencies. (Each item about 1-3 pages A4-size paper)

(1) Basic knowledge and understanding that should be attained through learning of discipline

1) In identifying "basic knowledge and understanding" as basic competencies, in principle, they will be described in the form of knowledge and understanding in the discipline that "enable one to explain something".
2) When listing items of "basic knowledge and understanding", items will be selected pursuant to the following two criteria:

i. The item respects the independence and autonomy of each university's education and preserves the diversity of curriculums. The learning content and scope of each discipline identified as "basic knowledge and understanding" will thus be restricted to the core pillars that comprise the discipline. At the same time, the list will be abstract to some extent so as to not preclude the establishment of specific courses.

ii. The list will be restricted to those items considered essential for fostering the "the subject-specific skills" listed in the next section. The important thing is to foster the "skills" of students. The attainment of knowledge and understanding is considered as a means to this end.

(4) Basic skills that should be attained through learning of discipline

1) In identifying "basic skills" as basic competencies, in principle, they will be described in the form of skills that "enable one to do something" and classified according to the following categorization:

a. Subject-specific skills: Skills that enable one to do something using specialized knowledge and understanding

b. Generic skills: Skills that may be attained through subject-specific intellectual training but do not rely on subject-specific knowledge and understanding and which enable one to do something that has general and generic utility

2) In identifying "basic skills", this section needs to explain specifically what sort of significance the skills will have in a person's lifetime.

Taking into account that "skills" are interpreted broadly under each of the following items and in line with the features of each discipline, this section will discuss, in a clearly understandable way what sort of skills students will be expected to acquire, what sort of significance the skills will have, and in what sort of dimensions.

i. It will be borne in mind that there may be diverse dimensions in which "skills" will have significance including dimensions of the workplace, dimensions of livelihood as a citizen engaged in public issues, and dimensions of life not considering any of its attributes.

ii. The skills will not only be direct and value-neutral "skills". A wide range of "skills" will be considered including those related to the development of sense of value and ethics and intellectual axes such as, for example, the "Ability to make appropriate decisions on …" or the "ability to appropriately understand in accordance with…"

iii. Regarding professional "skills", it will be borne in mind that the following diverse dimensions may be conceived:

iii-1. Ability to draw on subject-specific knowledge and understanding that will become specialized skills for a specific profession

iii-2. Ability to draw on subject-specific knowledge and understanding including viewpoints and ways of thinking has professional utility and application in loose form

iii-3. Skills that are attained through subject-specific intellectual training but do not rely on subject-specific knowledge and understanding have professional utility and application generally and generically (generic skills)

* Regarding the "skills" of citizens, it is believed that even if iii-1 is not realized, skills may have different dimensions of utility and application as noted in iii-2 and iii-3. Therefore, skills will be classified appropriately into a and b.

3) With regard to all skills, the list will be narrowed down to the core skills based on the perspective of fostering fundamental skills that will support one's livelihood over the long-term. Discussion will be abstract and comprehensive to a certain level.

* When identifying "basic competencies" of each subject, appropriate reference will be made to the "Competences of Graduates to be Fostered through Each Subject Major: Reference Guidelines Concerning Learning Outcomes Common to All Undergraduate Programs" listed in the Central Council for Education's *Towards the Enhancement of Undergraduate Degree Programs (Report)*.

* Balance between specialized education and liberal arts education

In preparing (1) and (2), it will be fully kept in mind that Part II urges the specification of learning goals of undergraduate programs as a whole that take into account the balance between the education philosophies of specialized education and liberal arts education. Attention should be give to not excessively describing the perspectives of specialized education.

4. Basic concepts relating to learning methods and evaluation methods of learning outcomes

3 discussed the importance of fostering skills and postulated that the attainment of knowledge and understanding was a means to this end. As for how students actually become capable of drawing on

knowledge and understanding, learning methods (education methods) have a large role to play. It is important to attract the interest of students as well as to improve instruction methods for providing skilful explanations that allow students to understand the content. However, this alone will not necessarily allow students to step beyond mere knowledge accumulation and passive understanding and to develop the ability to actually draw on the knowledge and understanding. This section will present basic concepts, including concrete examples, on what sort of creativity is required for learning methods to foster the skills listed as basic competencies.

The importance of learning methods has immediate relevance to the importance of the evaluation methods of learning outcomes. Even if learning methods are devised and deployed in creative ways, if the evaluation methods of learning outcomes only examine knowledge and understanding, this will not be an appropriate evaluation. The presentation of appropriate evaluation methods of learning outcomes will also play an important role in students improving their own learning methods. This section will also present basic concepts, including concrete examples, on the evaluation methods of learning outcomes. (Each about 1 page A4-size paper)

5. The relevance of specialized education and liberal arts education in fostering active citizenship

Part II discussed the historical background of the need for civic education aimed at fostering active citizenship, on the grounds that "the trend towards excessive specialization poses the risk of eroding the foundation for the common values shared by the people who support a democratic society" (paragraph 23).

As noted in Part II, the origin of liberal arts education is the philosophy of fostering active citizenship and it is believed to have diverse relevance to specialized education depending on the subject matter. A certain level of active citizenship as discussed in this report may be fostered in some subjects of specialized education while in other subjects much of this role may have to be delegated to liberal arts education that is distinguished from specialized education.

For each of the subjects, this section will discuss the basic concepts related to fostering active citizenship and methods to this end in relation to specialized education and liberal arts education appropriately taking into account the discussion in Part II. (About 1-2 pages A4-size paper) The discussion will refer to the following three items listed in Part II (paragraph 38) regarding the objectives of liberal arts education in terms of its relationship to specialized education:

- Be able to explain the content of one's field of study in a way that is comprehensible to non-experts
- Be able to think about and understand the social and public significance of the discipline
- Be able to tell the limits of the discipline and think about it in relative terms

Part II Reform of Liberal Arts Education in Undergraduate Programs[7]

[7] This report summarizes in as much detail as possible the results of discussions regarding the method of liberal arts education in undergraduate university curriculum conducted by the Subcommittee for the Review of Liberal Arts and General Education established under the Review Committee for Methods of Assuring the Quality of University Education per Academic Subject. This is intended as a reference for universities when reviewing the methods of liberal arts education. In parallel with the discussions of this report, the Subcommittee for Knowledge Generation established under the Japan Vision of the Future Committee, and consisting of the same members, discussed themes concerning the methods of culture and liberal arts education in more general and modern terms. The results of these discussions are summarized in the report entitled "Recommendation – 21st Century Culture and Liberal Arts Education." We recommend that readers refer to this report in order to broaden their understanding of the following report. http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-21-tsoukai-4.pdf

1. Introduction

A review of liberal arts education is required as one phase of considering the methods for assuring the quality of university education by academic field. This is because the problem arises of how to utilize liberal arts education in higher education when the benchmark statement for organizing academic curriculum by subject area is viewed from the relationship between specialized and liberal arts education. This issue, however, brings to light the more fundamental problems of what is liberal arts education and how should it be utilized.

Most university officials tend to feel that the term "liberal arts education" represents a concept for which a clear definition is difficult to achieve. One reason for this originates from the historical evolution of the Japanese education system. When stating a view regarding liberal arts education for the purposes of this report, we believe that the verification of liberal arts education in Japan based on historical facts cannot be avoided.

As a result, this report first conducts a historical examination of the issues surrounding liberal arts education in Japan. Following on this discussion, the report then reviews the concept of liberal arts education and provides a perspective on the relation between specialized education and liberal arts education concluding with a specific proposal for liberal arts education in Japan today.

2. Verification of Issues Associated with Liberal Arts Education in Japan

(1) Liberal Arts Education – First Introduced in Post War Japanese Universities

Today, the background behind the introduction of liberal arts education[8] in Japanese universities is relatively well known as the facts are in general not in dispute.

The postwar Japanese university system was launched in 1949 as part of the school system reform implemented under the United States occupation following the end of World War II. On this occasion, a curriculum was stipulated for general physical education and general liberal arts courses that included a three-pronged system of the humanities (including foreign languages), social science and natural science as it was thought that "the first two years of university instruction must be organized according to broad and basic courses from these three academic fields[9]." In 1950, foreign languages were split from humanities, and in 1956, the Standards for the Establishment of Universities promulgated by the Ministry of Education, Science, Sports and Culture established a new curriculum that required a total of 36 credits of general education courses consisting of the humanities, social science and natural science, more than 8 credits of foreign language courses, and 4 credits of health and physical education courses. These guidelines were in place from 1956 until the Deregulation of the Universities Act in 1991. In addition to this government policy related background, it is also a well-known fact that instructors of liberal arts education initially were teachers from prewar high schools and normal schools who were incorporated into the new university education system to assume roles as liberal arts instructors.

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[8] Here, the term "liberal arts education" includes the previous "general education course," "foreign language course" and "health and physical education course" for convenience purposes.

In the 1950s, however, first instructors from industrial circles or those with engineering backgrounds began to assert the need for liberal arts education to be re-examined in order to further advance engineering-related specialized education. Again, in 1956, when the curriculum guidelines for higher education curriculum were revised as a means to advance educational content, voices were raised that liberal arts courses in universities were "nothing more than a repeat of the high school curriculum[10]." Furthermore, as instructors at national universities who had initially taught liberal arts in prewar high schools reached the compulsory retirement age, the "discontent" of these instructors also became recognized as an issue. In the 1960s, in-depth discussions regarding liberal arts education in Japan began to take place at the Central Education Council and other organizations.

(2) The Origin of Liberal Arts Education

Although this report reviews the reasons behind why liberal arts education was introduced to postwar Japanese universities as well as the issues that were raised regarding the method of liberal arts education that arose in the comparatively short period after its introduction, here it is important to confirm the origin of liberal arts education provided in postwar Japan.

The direct model for the general education courses consisting of the three-pronged system of humanities, social science and natural science that form the core of liberal arts education used in postwar Japanese universities was the curriculum of liberal arts departments from universities in the United States. Additionally, the reason behind introducing this course group was to remediate specialized content that was "thought to be provided too early, in too narrow a format, and to be over focused on occupational training[11]" and to cultivate good citizens who would be responsible for running the newly created democratic society of postwar Japan.

The above history is not particularly exceptionable. However, nearly 60 years have passed since then. When re-examining the implementation process and purpose objectively from a current perspective, the design of splicing the prewar universities of Japan that were once were the key actors of specialized education with the curriculum of liberal arts departments from United States universities was bound to lead to multiple issues that could not be overlooked.

First is the relationship with specialized education. Liberal arts colleges in the United States are structured where undergraduate students first select a major and minor from among a wide range of coursework with this forming a baccalaureate degree program (late specialization). On top of this, specialized education begins in earnest at the graduate school level meaning that essentially no issues have arisen concerning the relationship between liberal arts and specialized education. This educational format, however, is not found in Japan. As a result, the relationship between specialized and liberal arts education became a target for debate.

Second is the relationship with high school education. In the United States, the quality of education is diverse until the end of high school meaning that liberal arts at the university level completes or follows primary and secondary education. In Japan, however, curriculum guidelines were used to enhance the

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9 "Reorganization of Higher Education in Japan" (Ministry of Education, Science, Sports and Culture; 1948)

10 "Report: Improvements to University Education" (Central Education Council; 1963)

11 "Report of the United States Education Mission to Japan" (March 1946)

homogeneous nature of high school education. This resulted in the criticism that "liberal arts at the university level were a repeat of high school curriculum[12]." From this perspective, the point of liberal arts education became unclear.

Finally there is the concept of cultivating citizens responsible for managing Japan's new democratic society. This concept was the basic premise running through the report entitled "General Education in a Free Society" (1945) released by a Harvard University committee. This report had a large impact on United States liberal arts education at the university level. The report strongly perceived the significance of Western ideological traditions regarding the point of why general education contributes to cultivating citizens who support democratic society. Perhaps it was assumed that this point would be difficult to use in Japan without modification. Actually, starting with the views stated in the "Reorganization of Higher Education in Japan" released by the Ministry of Education, Science, Sports and Culture at the time in 1948, and even in later reports from the Central Education Council as well, consideration from the perspective that general education cultivates citizens was never covered as an important theme.

As is described in the following section, the method of liberal arts education was repeatedly discussed after the 1960s, but it is important to point out here that the above issues were present in the base of these discussions.

(3) The Debate concerning Liberal Arts Education until Recently

Liberal arts education that had faced institutional issues since it was first instituted in postwar Japanese universities was the subject of an extremely large number of discussions until recently. These discussions were initiated by a report issued by the Central Education Council in 1963.

The first issue that arose was the relationship between liberal arts education and specialized education. The fact that the definition of liberal arts education was unclear was consistently found to be a problem. The 1986 Ad Hoc Council on Education released the "Secondary Report on Education Reform" that promulgated a vision to "demolish the generally-accepted notion to consider general education and liberal arts education as opposite in nature, closely link both, as well as seek to make the two consistent in the undergraduate curriculum. Japan must give sufficient consideration to the connection and relationship of the two with high school education. In addition, without automatically adhering to an equal curriculum of the three fields of humanities, social science and natural science, it is important to organize a dynamic curriculum that is complemented by interdisciplinary learning." In 1991, the University Council report based on this recommendation proposed that the course category of general education be eliminated and in this same year the Deregulation of the University Act was issued.

However, this begs the question of what type of relationship existed between general education and specialized education in the first place. Considering the United States liberal arts education that became the model for Japan, it can be said that the concept of an "organic linkages between specialized education" that had been stated as a goal in several reports had not in fact developed. The aforementioned "General Education in a Free Society" argues that there was a need to provide ample general education precisely because of the concern that the trend in education to excessively focus on specialized education eats away at the shared values of people who support a democratic society. Here, even if the belief that both general

[12] "Report: Improvements to University Education" (Central Education Council; 1963)

education and specialized education are important in their own respects was demonstrated to some, the belief that the two education types could be organically linked was not. Moving on to specialized education after completing general education was not because the former is preparatory education for the latter but rather because general education was simply positioned as a curriculum that all students should be required to follow because it possesses a distinct purpose, that of cultivating the citizens that support a free society.

In Japan, however, liberal arts education was not clearly associated with the concept of cultivating citizens., Positioning the liberal arts education as a mandatory requirement in the first half of university prior to advancing to specialized education despite it being part of the same undergraduate program became the single biggest factor that brought about the charge that liberal arts education did not converge with specialized education.

This is not to deny the many important points that were made by these discussions, but we cannot help but say that no shared and clear understanding has been developed to date regarding the most fundamental question of what is liberal arts education. Additionally, while debate concentrates on liberal arts education, it is can be thought that adequate discussions have yet to take place on specialized education as there appears to be a fear that the government might intervene in the content of university education. As long as the basic structure of undergraduate degree programs at universities in Japan is formed by both liberal arts education and specialized education, it should be noted that there is a limit to debate targeting only one of the two[13].

3. Relationship between Specialized Education and Liberal Arts Education

(1) What is Liberal Arts Education

1) Origin as Civic Education

The model for the liberal arts education installed in postwar Japanese universities can be found in the general education of United States universities that held up the concept of cultivating citizens who support democratic society. In Japan, the basic concept of liberal arts education in this sense has never clearly been established. In undergraduate curriculum, however, when differentiating liberal arts from specialized education and considering the purpose of offering education that is relativistic, it is important to once again recognize that the origin is civic education and not simply unfocused preparatory education.

At the same time, however, we should note that "civic education" is nothing more than an educational ideal and not a concept that identities a specific course group (as stated in section (2) ①, we need to consider differentiating the educational principle and working level course category). Additionally, regarding what type of education assumes the role of civic education, we should consider the interpretation of the content that means civic-mindedness or the transitions occurring with the changing

[13]Beginning with the Central Education Council in 2002 a vision was advocated for "the acquisition of knowledge and skills, such as commonly required thinking and knowledge that transcend specialized subject areas." However, the specific characteristics of the phrase "knowledge and skills" referred to here is not necessarily explicit while the methodology to acquire these characteristics is also difficult to ascertain. Perhaps verification is required once again for the independent academic skills shouldered by liberal arts education that are believed to be somewhat excessively emphasized including the undervaluing of the role that specialized education should essentially play.

times. Today, when discussing civic education we must consider how to regenerate this theme in the contemporary situation.

2) Diversity of Real Liberal Arts Education

In the general education courses of the past, foreign language as well as health and physical education courses were combined with courses from the three fields of the humanities, social science and natural sciences as the "first half curriculum." Today, a much more diverse version of general education is being offered under various objectives such as first-year education including literacy education and other content, remedial education, basic specialized education, and career education.

Although it is believed that the concept of civic education and the role that these diverse education types play overlap in many instances, the two do not completely align. Even if the origin of liberal arts education can be found in civic education, the existence of education based on other objectives should not be denied while the classification of civic education as part of the course category of liberal arts should also not be denied. The important thing is that the objective of education be clearly recognized and that learning objectives be made clear. (While using the above as a hypothesis, in order to simplify the argument this report will focus attention below on the review of civic education as it forms the starting point of liberal arts education.)

(2) Relationship between Specialized Education and Liberal Arts Education

1) Distinction between Educational Principle and Course Category

When considering specialized education and liberal arts education, these terms are easily understood as embodying educational principles and course categories as non-divisible parts but we cannot help but say this treatment is too simplified. First, we should be aware that the principle and purpose of education and the course category names of specialized education and liberal arts education are not one and the same.

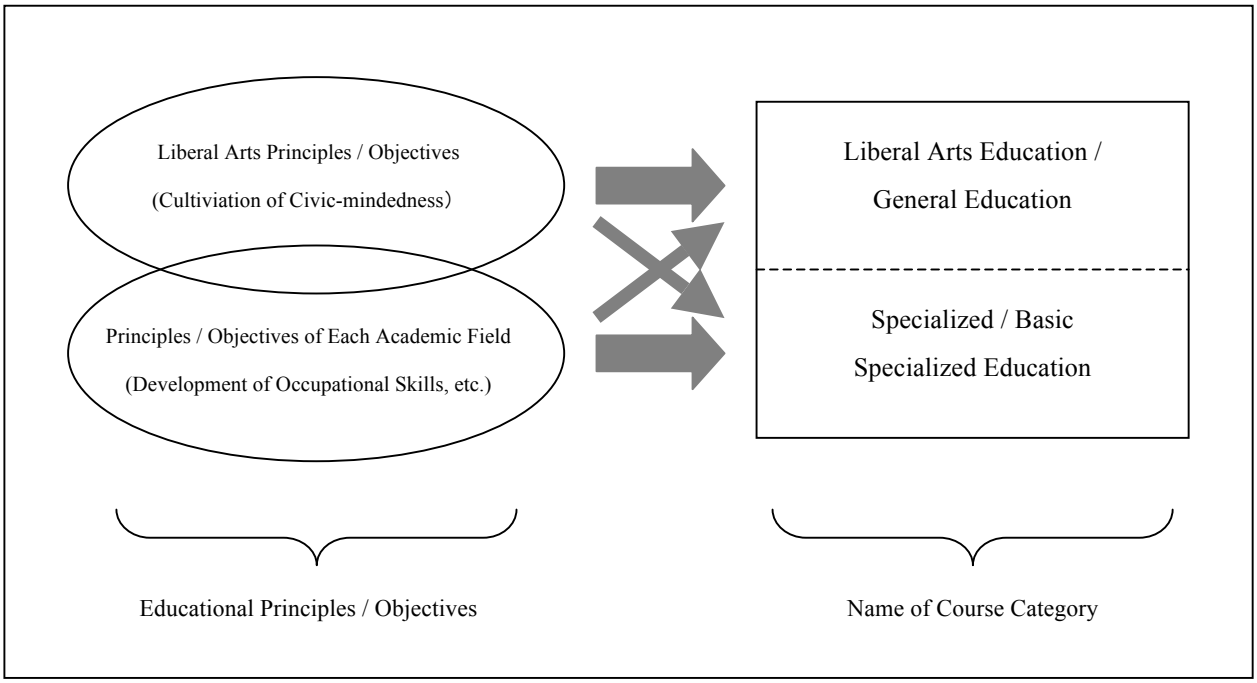
For example, the principle of even subjects of the same name will also naturally differ due to being established within the overall curriculum and specific educational content (for example, today we cannot simply call something civic education if it is similar to learning the three subjects of humanities, social science and natural science) while it is possible for one subject to cover multiple educational ideals.

Furthermore, for example, when holding up the cultivation of civic-mindedness as an principle and objective of liberal arts education or the development of occupational skills as an ideal and objective of specialized education (of course, this is not just limited to this example), we cannot say that the relationship between the two educational ideals is completely mutually exclusive for the development of certain generic skills and moral values as these are important issues for both citizens and employees. Similarly, in order to achieve broad knowledge that is not limited to a single specialized subject or in order to achieve the educational objective of teaching cognition, it is possible to utilize subjects from basic specialized education or specialized education in other subject fields. When pursuing specific educational objectives the distinction between liberal arts education and specialized education as a course category will thus often be relative.

Figure 3 below illustrates the aforementioned relationship. As it were, this forms the framework for the

grand design of overall undergraduate curriculum.

Figure 3 Conceptual Diagram of the Relationship between Educational Ideal and Course Category



2) Optimizing the Combination of Specialized Education and Liberal Arts Education

Through formulating the benchmark statement for organizing curriculum by academic field, the first part of this report identified the basic elements that all students should aspire to acquire when learning a specific academic field, described how universities should refer to these elements to specify learning objectives, and finally proposed how to organize the curriculum in order to achieve this.

On this basis, in the light of the statements made above in section ①, universities should stipulate specific learning objectives for each subject area curriculum based on a balance of liberal arts education with the subject area education and using a method thought to be optimal to realize this organize a curriculum that accordingly combines liberal arts education and specialized education as a course category.

(When doing so, the educational ideal of liberal arts education as well as each academic subject, while not in a completely exclusive relationship from one another, do vary comparatively, and should not be integrated and identified easily as the same. Additionally, we need to caution that the objective of one should not be considered higher than the other, while one should not be understood as dependent upon the other.)

(3) Interconnection between Typical Graduate Attributes and the Autonomy of Universities with Respect to Liberal Arts Education

1) The Autonomy of Universities with regards to Liberal Arts Education

In the past the Standards for Establishment of Universities required that when studying the liberal arts students take subjects that were separated into specific types. This requirement, however, no longer exists

and we believe that it is unreasonable today to bring back the general education of the past that focused on the educational principle of civic-mindedness used in the United States more than half a century ago. Seen internationally, undergraduate degree programs focused on liberal arts in the United States and specialized education in Europe exist side by side. (Postwar Japanese universities can be said to occupy a place somewhere in the middle.)

Given this, it is clear that for liberal arts education as well it is not valid to compile a "benchmark statement for organizing the curriculum" using the same approach as used for each specialized academic subject area. We feel that the questions of how to formulate the content of liberal arts education and how to determine the relationship between liberal arts education and specialized education should be left to the independence and autonomy of each university[14]. This is because narrowing "basic elements" found in the subject benchmark statements to the most core element not only respects the autonomy of specialized education but is also considered a measure required to maintain room to exercise maximum flexibility in the relationship between specialized education and liberal arts education.

2) Relationship with Typical Graduate Attributes

The report "Efforts in Establishing Undergraduate Education," released by the Central Education Council in December 2008, advocated the cultivation of typical graduate attributes through studies in each major field. The term "typical graduate attribute" in this sense is obviously something that needs to be cultivated through studies in both liberal arts education and specialized education.

However, it is also clear that the broad rubric "typical graduate attributes" does not cover all of the learning objectives of actual undergraduate curricula. The learning objectives should reflect the characteristics of each academic field or the university's unique educational principles. Moreover, there should be many different ways of organizing the curriculum in order to attain such objectives. It is important for each university to make efforts to incorporate ways for their students to acquire these "typical graduate attributes."

The following section will cover our explicit opinion on the method of today's liberal arts education. The points discussed are intended only as suggestions that we hope will serve as a reference for each university in formulating the method of a liberal arts education program that best suits their needs.

4. Social Change and the Transformation of Civic Education

The discussions in this report so far have examined mainly the role of liberal arts education in the undergraduate curriculum. It is also important to pay attention to changes in society that are largely connected to the method of liberal arts education as a type of civic education. In other words, this means addressing problems for which there is no fixed and uniform interpretation through discussions on contemporary history as it affects us living in the present day.

However, prior to specifically discussing the method of liberal arts education in the present day, it is necessary to first go over the following five fixed concepts of civic-mindedness, or the purpose of liberal arts education, or the appearance of today's civic education. Given the order of discussion, points 4 and 5 are organically related. Together they serve as one recommendation regarding civic education in the

[14] The independence and autonomy of student learners is also essential.

modern society in which a diverse array of opinions can found.

(1) Demise of the Concept of Liberal Arts Education as a Passport to an "Affluent Life"

In the ideal of general education introduced shortly after World War II behind the mandatory training in the "three steps to human intelligence" that are inherent in becoming a "democratic citizen," there was clearly a sense of "liberal arts being something that fosters an independent citizen." Such education was probably largely intended as "liberal arts" for the elites who entered a society that at the time was marked by a specific model of modernity. More precisely, the liberal arts were likely something that allowed someone to acquire the appropriate cultural attitudes and understanding of the rules suitable for living in a modern industrial and civil society that followed the previous hierarchical society.

In this sense, the "liberal arts" were expected to serve as an important passport to an affluent lifestyle where one could become active in an industrial and civil society by landing a stable job that promised an outcome in which the individual became a bourgeois citizen who had both "fixed assets and culture." The fact that most people in post-war Japan obliged themselves to educate their children with the aim of entering a university in order to acquire such "liberal arts" was because this result had a compelling force in a context where the economy was growing rapidly compared to what had been until then a relatively impoverished situation.

By the 1970s, however, Japan's rapid economic growth had gradually reduced the disparities between rural villages and cities in terms of living standards as well as those between Japan and its Western counterparts that had once supported "liberal arts" for the elites. This disparity in itself was the original driving force behind idealizing the "liberal arts" in post-war Japan. Moreover, as the rate of students advancing to university rose, the function of graduating from a university served less and less as a passport to a fulfilling an "affluent lifestyle and career." The broadening of university access from elite to the masses (15% or higher of the applicable population) as described by Martin Trow was evident from the late 1960s.

After this period there were more university graduates than compulsory education graduates in the pool of new hires and it is no surprise that university graduates were working as regular salaried workers instead of management track employees of corporations. Among the student protests that arose during this period, argument on the meaning of academics in a university and the relentless debate over the dissolution of universities could, in a way, perhaps be explained as a consequential result from the loss of a normal citizen's passport to elite status[15].

(2) Formation of a New Civic Society based on Diverse Participation

On the other hand, the fact that student protests around 1970 were not only a phenomenon seen in Japan but also took place in developed nations around the world must not be forgotten. After this period, as the development of a mass consumer society continued, much criticism was placed on the negative aspects of the spread of privatism and the deterioration of public morality and political apathy. However, it should also be noted that people had begun to demonstrate an awareness of the factors that hand led to the current age such as questioning the value of pursuing material wealth and paying attention to environmental

issues, human rights issues and feminism. Critical awareness of the rapidly developing industrial society was formed in both Western countries as well as Japan where people began to voice their objections to various issues and to take part in the policymaking and decision-making process through activities open to the public such as consumer movements or NPO activities. Perhaps people of the time were also looking to try out social participation and solidarity that could not be condensed into the Marxist system selection theory or revolutionary view. However, alternative concepts including this type of social inquiry and activities intended to realize such goals were not necessarily encouraged in Japan but rather these activities were often seen as anti-social behaviour that was to be suppressed as seen in the realm of education.

As a result, while submissive students that possess no critical social or political awareness were produced after the 1970s, the affluence and comfort of a stabilized employment environment produced by Japan's asset-price bubble ("bubble economy") probably resulted in a delay in the development of the civil society that was gradually gaining momentum in other developed countries. Within the confines of university education, student associations almost disappeared in this period, a trend that continues. In recent years, while there are some students who find no awkwardness in calling themselves "*seito* (pupil)," it may also be true that the students themselves have lost the sense of being part of one of the key components in the collective that makes a university. If a civic society is defined as a society in which members possess the civic-mindedness that allows them to address public issues present in society by working collaboratively with those of different stance and background, then Japan may not be called a success in cultivating the actors of such a society.

(3) Liberal Arts in Society after the 1990s

Following the collapse of the bubble economy, Japanese society became caught up in the wave of global change as the economy continued to falter. The increased mobility of human resources, materials, and money as a result of globalization, computerization, and change in industrial structure in accordance with the growth of emerging countries has widened the gap between different regions and ranks. While at the same time, the university entrance rate has risen further and now exceeds 50% of the population by age. Given this, long established givens dwindled in all parts of society as even those who had university level education were not guaranteed a long-term stable job. It became clear that graduates would be faced with an unstable life with harsh conditions.

When contemplating a modern form of liberal arts education, it is crucial to take such social change into consideration as the approach to liberal arts education needed now is essentially different from the cultivation that was a passport to an affluent life over half a century ago. For this reason, in terms of the "could be" potential in Japanese society seen around the 1970s, a critical perspective in examining conditions pertaining to the formation of civil society in present day Japan should be of considerable significance.

For example, most people would suggest that the readiness for the changes in industrial structural accompanying globalization or global social change as a result of the media's transformation are the key to "civic education" suitable for modern society. However, it is crucial to recognize that the concept of

[15] Takeuchi, Yo. "Kyoikushugi no Botsuraku (The Downfall of Educational Principles". Chuokoron-Shinsha Inc. 2003. Epilogue.

"readiness" should not be reduced to the "adaptability" of each individual to their current situation. To adapt means to change one's own behaviour according to the given situation and represents an essential element for one to survive in a society. However, endless adaptation will lead one to subconsciously ratify the current condition with the result that one may become a selfish person who looks to maximizing his or her own benefits.

What is important for today's youth, who will build a tomorrow for us, is to understand the set of conditions that gave rise to global social change and the growing disparity that has resulted and to possess the ability to see that the current situation is not a unique historic event that cannot be avoided. In other words, they must recognize that the current situation is no more than a specific reality that arose from one of the many other alternative possibilities. Therefore, the term "readiness" in this sense should refer to the quality of possessing a vision and creative thinking that allow youth to make changes in the future to address any problems that arise in the current situation. Consequently, the task of current liberal arts education should be the cultivation of skills that enable students to create new possibilities in the present based on lessons from the past and to create potential in the future through a deep understanding of the present.

(4) The Citizen as a Goal

With this, we have completed our discussion on civic education in modern society. However, the questions of "Why cultivate citizens?" and "What is a citizen?" still remain, and so we need to address these.

In recent years, a call has been made to redefine the "monopolization of the public" in Japan by the bureaucracy and that citizens should become the new bearers of the public good. From the standpoint of re-examining the role of the government in light of changes in the global economic environment, even if this new direction is somewhat unavoidable we should state that the reasons usually given are only superficial[16].

What is it like to live as a citizen? Here, the following can be said when summarizing the belief that is noted as the ideal of Western civilization.

i. A spirit that esteems the verbal, taking action and independence
ii. Equal relationships with others that are not controlled by nor controlling of others
iii. Freedom from individual interest in motives

It can be said that this way of living, rather than a means (for example, to resolve social issues), in itself becomes the point of "living" and an ideal that transcends the search for history to form the foundation of society. This requires advanced intellectual faculties of reason that support independence as well as the courage to speak and act. Therefore, the issue of cultivating civic-mindedness is believed to occupy an important position in university education as it is said to be the "highest institution of learning."

While taking the above assumptions as a foundation, we must recognize that there are constraints to the responsiveness of individuals in face of the diversification and increasingly complexity of modern society. As citizens each individual must join forces, work together and cooperate. In university education, each

individual must be deeply aware of their own expertise, know their limitations as well as engage and unite in cross-sectoral dialogue with people from different fields and positions. In order to accomplish this, the "liberal arts" must be shared among all students.

5. Liberal Arts in Modern Undergraduate Degree Programs

In light of the discussion above, this section will present several specific proposals regarding liberal arts education at the university level in Japan. However, the scope and fields for which liberal arts education in universities is able to cover is extremely diverse. Some may be concerned that exhaustively discussing this fact may blur the focus of the discussion itself. The following proposals represent a focused statement on the points in question thought to have a strong relationship with the core discussion of "civic education" taken up by this Committee. We ask for prior understanding that these proposals in no way negate other alternative attempts at discussion.

(1) Formation of a Common Basis of Modern Knowledge

What shape should the common basis of knowledge formed through liberal arts education take when viewed against the perspective of cultivating civic-mindedness in modern society? While diversified education can probably address this issue, this report in particular will cover two types of education methods: first, education that uses the variety of problems facing modern society as learning materials, and second, education that surmounts the decoupling of the deeply coupled branches of knowledge known as the humanities and sciences.

1) Various Problems in Modern Society

There are a profound number of problems facing modern society including the impending global environmental crisis, the prosperity and problems brought about by economic globalization, radical changes in the media environment resulting from the development of information technologies, the unstable nature of international society post 9.11, friction concerning human as well as gender rights, ethical and social issues regarding the development of medical and biological technologies, as well as the progression of an aging society and declining birth rate in developed nations and explosive population growth in emerging nations.

Most of these problems are closely related to the lives of each and every student. Actually, it is no surprise that many universities have organized course groups with themes and subjects related to these modern problems as the main element of liberal arts education. Moving forward, it will be important for each university to make efforts to be aware of social trends and flexibly reflect these trends in educational content.

It remains difficult to adequately understand the entire picture for all or one of these social problems using only the knowledge of a single academic discipline. In addition, differing interests and differing values possess a conflicting character that causes conflict now and will do so in the future. When covering the problems of modern society as learning material in liberal arts education, we need to be constantly subjective in understanding that these problems will require creative thinking. Through liberal arts classes,

[16] Work cited: Arendt, Hannah. "The Human Condition". 1958.

students should have the opportunity to consider problems for which no unambiguous correct answer exists using an interdisciplinary approach and the opportunity to develop their own thinking through dialogue involving others who have diverse opinions. In addition, on occasion students must be brought face to face with the contradictions found within the reality of society and the lifestyles of people and be allowed to work out not only what contradictions exist in the world today but also be encouraged to find out why these contradictions exist. In this regard, it will be meaningful to utilize the Internet to learn about contrasting situations outside of Japan as well as the gift that transcends space and time known as Japanese classic literature to learn about humankind's quest for universal values.

In the previous section, we mentioned that Japanese universities should cultivate "skills that enable students to create today's possibility based on lessons from the past and create potential in the future through a deep understanding of the present." In this regard, it will be essential for students to develop the critical reasoning to question prevailing givens coupled to intellectual integrity as well as the ability to determine things for themselves without being influenced by others. Using the problems of modern society as learning materials, it will hold significant meaning for instructors to both share and respond to the question of "Why is the current situation like it is?" or as a facilitator support student research and mutual discussions to thoroughly make students consider the question of "How should we change the current situation?"

While in most instances liberal arts classes are generally conducted in a lecture format, it will be important to innovate and improve these classes that make students think on their own by offering a seminar format with smaller class-size.

2) Problems with the Humanities and Sciences

Through the separation between the humanities and sciences a decoupling is occurring between the "two cultures" that form the intellectual culture of students. This division is a significant barrier to considering the various problems of modern society from an interdisciplinary view and impairs the common knowledge that is the base supporting human solidarity. Although there is a need to reconsider education based on the separation of the humanities and sciences from the high school level, importance is also growing for liberal arts education at the university level to be a bridge between both. As such, what is needed today is a "new science and technology literacy" common across the humanities and sciences.

First, with regard to humanities students, needless to say these students must have a certain amount of mathematical and natural science elements in their curriculum. It will be critical for students, regardless of whether they specialize in the humanities or the sciences, to understand the various phenomena in modern society using data analysis methods with a statistical approach and to learn the methods used to interpret indicators. It will also be desirable to enhance this faculty as well.

However, natural science education for humanities students should not be confined to the content of a basic course for science and technology professionals that is part of the program for conventional science students; rather it is important to provide education based on the idea of fostering science and technology literacy for citizens. Specifically, for example, this includes education in carefully selected science topics, teaching the attributes of scientific thinking, learning the dynamic quality of scientific research,

understanding the relationship between science and technology and examining the role of science and technology society[17].

In modern society, science and technology possesses an overwhelming power that exerts an enormous influence on the nature of society and people's lifestyles. Scientific thinking has rationalized our understanding of the world and indeed science and technology has made the affluent lifestyle of developed countries a reality. On the other hand, however, problems related to the permissive nature of the rapid advancement of science and technology such as problems that threaten the earth's environment, have raised new issues that cannot be answered by the values and morals consciously developed by humans throughout our history (for instance, bioethical issues). As science and technology play an extremely crucial role in modern society, its method cannot be left solely up to professionals in the field. Training of citizens with the ability to consider questions such as how science and technology should be best utilized for the public goals of society and how should scientific technology be managed in the future, should be an important goal for liberal arts education while natural science education targeting liberal arts students should be conducted with an emphasis on this type of perspective.

At the same time, natural science education for students of the sciences should also be examined from the perspective of liberal arts education. In addition to conventional natural science courses as fundamental subjects in specialized education for science students, an education with an approach from a humanities and social science perspective on topics such as the role that scientific technology plays in society, social responsibility and ethical issues for professionals in science and technology field, and the relationship between science, technology, politics and the economy, is necessary in order to instil a civic culture. It is desirable to actively include such education in the learning curriculum, especially since the learning content of specialized education rarely touches upon the relationship between science and society[18].

Another aspect of education for science students that should be looked at is that the categorization of "physics," "chemistry," "biology" and "geology" at the secondary education level is no longer appropriate and that current society requires an understanding of modern science as a whole from a new perspective. The long criticized segmentation of the sciences in specialized education also suggests that a comprehensive knowledge of modern sciences should be taught in liberal arts education[19].

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[17] For more information we recommend referring to the report from the "Science for all Japanese Project" that reviewed science literary as "a fundamental science, mathematics, technology related knowledge, skills and awareness of the world that should be acquired by all."(http://www.science-for-all.jp/minutes/index5.html)

[18] According to Japanese College Student Survey (JCSS) (an ongoing survey of Japanese college students conducted by a research group of Doshisha University's Higher Education and Student Research Centre of Doshisha University), results based on changes in knowledge and skills after enrolment indicated that humanities students scored higher than science students on their modern liberal arts knowledge (issues directly facing local communities and citizens as well as understanding of global issues) and cross-cultural literacy (knowledge of peoples from different cultures and proficiency in a foreign language, etc.) while science students scored higher in terms of specialized knowledge.

[19] Here, the details of "Science for all Japanese Project" report cited in footnote 17 that conducts a review of modern science using the seven categories of "information science," "space, earth and environment science," "human science / social science," "material science," "mathematical science," "life science" and "technology," represents one reference point.

(2) Cultivation of Communication Skills

1) What is Communication?

Communication skills represent an important element for considering a "civic culture" that is appropriate to the modern era. This is because the purpose of communication education is to enhance students' capacities to cooperate with others. In unearthing and resolving public issues, students require the ability to understand the perspectives and values of others and the capacity to work together and cooperate when encountering others who have different values and perspectives. At the same time, students must also be able to logically organize their opinion and cultivate the ability to generate a consensus through negotiation. Moving forward, the number of opportunities for students to cooperate with others with differing values and perspectives is expected to increase both in Japan and overseas. The fostering of communication skills in advance of these opportunities represents an important issue for liberal arts education.

Communication education is often prone to being an exercise for helping students to be more expressive. However, communication education is not simply limited to improving students' ability to articulate ideas orally or to give presentations. This is because communication is not a one-sided approach to conveying information. Students must have listening skills when encountering people who possess differing opinions and values. Listening skills will empower students to hold dialogue in the truest sense. Dialogue is an activity that carries with it the latent potential to transform one's own opinions and values. The start of dialogue can be found in encounters with others and experiences that clash with one's own values and experiences. In this sense, dialogue should be understood to differ from debate. Debate carries with it a meaning as an exercise at confrontation on a certain theme in a game format. Debate, however, does not necessarily require one to change his or her point of view from before and after the debate itself. Conversely, there is no winner or loser in dialogue. Dialogue represents a deepening of understanding, soul-searching, and empathy for others.

Additionally, communication education is not limited to the acquisition of consensus building techniques. In recent years, a wide range of consensus building techniques have been developed and are being practiced. We believe that education must be provided in these techniques. However, the pillar of communication education is not to always reach a consensus. Rather, in reality it is more important to realize the difficulty of consensus building or that on occasion communication with the purpose of consensus building adds to pressures to synchronize one's point of view with others and inhibits mutual understanding. Students need to understand diversity and complexity and practice true communication such as reaching a decision within a difference of opinions after seeking to cooperate and deciding that a consensus is not required and cannot be achieved. In a sense, this is also polite consideration of the ideas of others.

In the past, children had opportunities to play with other children of differing age groups and interact more with grandparents or older persons in the neighbourhood and local community. As such, children were expected to acquire related skills to a certain extent naturally. However, opportunities like these in the environment for students today have declined rapidly meaning that society needs to consciously provide more of these opportunities from the time of primary and secondary education. Communication

education at the university level as well must incorporate to every extent possible discussions and cooperation with peoples of differing background values and perspectives. Accordingly, universities need to establish opportunities for participation-oriented learning involving a wide range of actors including students from other faculties and other universities, members of society at large, and international students.

2) Japanese Language Skills

Language is the most basic cultural environment for humankind. All humans are equipped with the ability to acquire their first language (native language) through interaction and personal relationships with their family and neighbourhood. However, this ability is not based exclusively on environment as it represents a tool for humans to form their core values and cooperate with their surrounding environment. This ability also enables humans to question and respond to the self, others, groups and society as well as practice based on these questions and responses. Accordingly, exercises to publicly use language in daily and intellectual life should be considered the foundation for education at the university level. The acquisition of spoken content and fostering the ability to speak and write in Japanese in line with the particular situation should be provided throughout the undergraduate curriculum while liberal arts education should play an especially important role in this. It also should be noted that the acquisition of English language skills as the international lingua franca is made possible only through the acquisition of Japanese language skills that enable a student to accomplish the above.

Literacy understood in the narrow meaning of writing literacy has already been achieved in developed nations and as such has never been consciously considered as issue facing higher education. However, reading and writing form the foundation for the public use of language while for the spoken word students must be seasoned to develop their discourse skills based on this literacy when speaking in public settings (exchange of opinions, negotiations, education, public speaking, etc.). In this regard, traditional education in Europe positions rhetoric (debate skills and persuasion skills) as a core of liberal arts and common education. This should be used as reference when seeking to develop students' abilities to use language in public settings. Literacy opens the door for citizens and public society to professional activities (employment, research) and at the same time represents the key to accessing the professional from the side of citizens and society. Through literacy, each specialized field is provided with a mechanism for finding its appropriate place in society and for building culture. Literacy is also essential for citizens to lead a life of culture and character.

In this regard, the Programme for International Student Assessment (PISA) represents one reference point[20] although it targets only secondary education. PISA defines reading literacy as "the ability to understand, use and reflect on written text in order to participate effectively in society and develop personal knowledge and potential and achieve one's goals." As commentary for this definition, the PISA gives as examples the fact that reading literacy can achieve the individual desires of people (including clear desires such as attending university or finding employment to living a continuously fulfilling lifestyle) and that reading literacy enables people to participate in making contributions to society. Here,

PISA points out that the term "participate" includes the steps toward acquiring individual freedom, liberation, and rights. These steps roughly overlap with the ability to use language publically as noted earlier.

The PISA test was established as something of a goal at the completion of compulsory education and does not necessarily become a goal of literacy education at the university level. However, this raises the question of whether school education in Japan has adequately enabled students to acquire reading literacy. The practice of composing written text is inherently a social activity with a presumed reader in mind. There is always a purpose and intended audience in written text whether it be verifying, negotiating, persuading or writing letters to friends. Based on this, people compose separate written text for each situation. The basics of reading and composition of written text as a social activity based on each situation should first be taught to students. Then, when remembering that this forms the basis for advanced reading and writing composition at the university level it will also be desirable to enhance efforts at the primary and secondary school levels.

Today, Japanese language literacy education is conducted at the university level under several different names (basic practice, knowledge techniques, academic learning, etc.), but it remains difficult to say that the ideals stated above have become widespread as the development of teaching and learning methodology are still in the developmental stage. Considering that language forms the core of all academic learning, regardless of whether its natural science, the humanities or social science, the collaboration of language research and education including foreign languages with each academic discipline is absolutely imperative for the development and practice of literacy education.

3) English Education as the Global Lingua Franca

As globalization progresses, English has become more than just a mother tongue for the United Kingdom or the United States. It is now a global lingua franca widely used throughout the world. English has risen to become the lingua franca of the world as a result of the political, economic, and military superiority of the United States. When concerned with distribution and interaction, rather than composition, of business or information, scientific research, especially in the natural sciences, is one field that experiences the most problems. In such fields where standardized methods and tools—with the international standard for measurement being the symbol—are used for research activities conducted by a community of scientists around the world, the use of a common language provides convenience in communication, and so familiarity with such a language is a must.

Given this perspective, English targeted for education and learning purposes is not the language used in the United Kingdom or United States, but rather the English used as an intermediary language for communication. In line with this goal, guidelines on the structure of English education and learning also need to be established based on the following principles.

- Distinguish between a language and its cultural background—in this case, American and British

[20] National Institute for Educational Policy Research. "Knowledge and Skills for Life 3". Gyosei. 2007.

culture, and minimize the cultural stress associated with a language to the greatest extent possible.

ii English is not intended to be learned as a native language, therefore do not emphasize native-level language acquisition as a learning model; namely, do not use native speaking ability as a universal goal.

iii In terms of communication in a global society, also coupled with the development of information communication technology, written language is just as important as spoken language, or may be even more important than spoken language. Therefore, in addition to spoken language, the learning of written language (reading and writing) should also be emphasized.

The aforementioned English education should be categorized in a separate category from existing foreign language education. In order to cultivate the ability for an individual to communicate mutually with another of a different language and cultural background in a global setting, it is necessary to envisage an "English-based Literacy Education" that focuses on academic reading, academic writing and presentation skills. In this regard, in considering the importance of being able to explain and make others understand one's own culture and stance to a person of a different culture, Japanese affairs and culture should be included as an important element of the learning content.

4) Foreign Language Education for Cross-Cultural Understanding

The learning of English as an international language represents a means to address globalization. However, it should be noted that globalization is different from internationalization. Globalization refers to the equalization of the diversity in systems and culture that encourages all processes to be carried out following a single standard while internationalization refers to the mutual understanding between people of different countries (regions) who share different systems, customs, languages, and cultures, and their mutual respect given such understanding.

In internationalization, the education and learning of foreign languages outside of English is extremely important. Learning a foreign language not only expands one's appreciation for the diversity that exists in the world, it enhances respect and understanding for different cultures. A foreign language serves as a mirror for one to reflect on their own language, culture and characteristics, and represents a way to foster an even more refined and sophisticated outlook. Foreign language education is not only important but also beneficial in promoting international understanding by opening the students' eyes to the world's cultural diversity and by paving the way to a greater future for the Japanese language and culture.

Based on the above view, it is desirable to create educational and learning guidelines for foreign language education based on the following principles:

i Place emphasis on the culture that is the bedrock of the language, teach and learn the inherent culture, society, and history of the language without separating them from the language itself.

ii Place emphasis on the cultivation of literacy, in particular essay comprehension skills, in addition to oral communication skills. So-called oral translation allows students to appropriately understand a foreign culture and is by far still the most effective method for students to digest a foreign culture in their own language culture.

iii English is not only an international language, but also an influential foreign language, thus it occupies an important position in foreign language education. However, while learning English as a foreign language cannot be avoided as a result its global position it is desirable that another foreign language be learned at the same time.

(3) Knowledge and the Internet

The progress of information communication technologies, primarily the Internet, has greatly impacted the method of university education. Some universities have allowed the use of the Internet as a simple information gathering tool, a fact that has lead to phenomena that could damage higher education in its truest sense. However, there are also those who say we should utilize Internet technology proactively in order to cultivate "civic culture" and as a new basis for developing knowledge. In fact, with the further spread of the Internet globally, our knowledge base is in the process of migrating from books in a library to a new knowledge production system based on the Internet.

At present, there exists extreme optimism and extreme pessimism regarding the relationship between knowledge production over the Internet and university education. On the one hand, there is the optimistic outlook that people can have educational opportunities throughout their life anywhere including in the home or at work and not just at college campuses, thanks to the development of information technologies enabling universal access to higher education. On the other hand, there is also the pessimistic outlook that suggests universities will become obsolete because knowledge can be found over the Internet instantaneously.

However, seeing the Internet as something that without modification will make university education universal is far too optimistic while the thought that the Internet will make universities obsolete is also far too pessimistic. In a society with widespread Internet usage, the old framework for knowledge production at the university level features many inherent traits and possibilities that can never be offered over the Internet.

First is the authorship of knowledge. In most cases, there is an actor that conveys knowledge as the author for university lectures or the books lining the shelves of the university library. We listen to a lecture from a certain teacher and read books for which we know the name of the author. In most instances, teachers as well as authors prepare lectures or publish books on their own responsibility fully aware the work may be a success or failure. Compared to this, the creator of knowledge found on the Internet tends to be anonymous in most cases. In contrast to a university lecture or library book that is considered "someone's knowledge," a hit from an Internet search is "everyone's knowledge." The Internet weakens the concept of the authorship of knowledge and strengthens the feeling that knowledge is created by "everyone."

At the same time, this indicates the potential and problems of the Internet. While today it has been liberated from authoritarianism, in the future knowledge will become something that anyone can freely participate in and continually modify and rewrite. On the other hand, when it becomes "everyone's knowledge," knowledge does not identify the specific writer who produced it. In other words, the person responsible for this knowledge is becoming more obscure. Teachers are prepared to be criticized by

students at anytime, while if the content of a book is wrong the responsibility lies with the author. However, the responsibility for an incorrect statement on the Internet remains obscure until the very end.

Second is the systematic nature of knowledge. Knowledge is not a broken collection of information and data. Knowledge is the mutual connection of content of various concepts and written events and is in a state where everything is informed by a system. Naturally, there are pieces of important and unimportant information mixed in with knowledge. However, without respect to this mutually interconnected structure of concepts, Internet search systems provide the user with the search content instantaneously. Even if the relationship between the trunk and branches of knowledge is not understood, an Internet user can obtain detailed information on the matter they wish to know about. This is actually quite convenient but the user remains oblivious to what type of knowledge structure they are using until the very end.

Third is the historical nature of knowledge. Today's knowledge is never born in an instant. A system of knowledge controlled by certain time period was established based on the accumulation of systems from the past and the resulting conflict with one another. Knowledge is also not the sum of information added together even if it is unchanging and fixed. Knowledge is a systematic framework for understanding the world that is constantly remade based on the accumulation of the infinite number of our thoughts and realizations happening on a daily basis. That is, the practice of dialogue with past knowledge. Universities have acted as an intermediary enabling dialogue between us and the knowledge of the past. Universities provide us with the platform to not simply acquire new information but to hold dialogue with the voices of the past that have been amassed over history.

The above three traits demonstrate that the Internet cannot easily replace universities. If during the Internet era universities simply become institutions that bestow degrees upon students, we will need to use all of our efforts to develop a framework that will foster the authorship, systematic nature and historical nature of knowledge. In order for universities of the future, as users of information technology, to continue to be platforms for creative dialogues of knowledge amid the new media environment focused on the Internet, we will need to cultivate the authorship, systematic nature and historical nature of knowledge still further. In providing this type of education, new methods must be developed beyond the conventional format of lecture classes to include smaller seminar type classes.

(4) Significance of the Arts and Physical Education

Viewing artistic works from all ages and cultures and experiencing the creation process of these artistic works breaks through the fixed concepts of daily life and can provide new and fresh thoughts and observations. The viewing or creation of various artistic works, together with travel, reading and writing, has been recommended since ancient times. Additionally, interaction with the arts is a required practice to maintain equilibrium of the mind and foster the mental fortitude needed to overcome failure or difficulties. The essential power of the arts can be found here.

The fact that education is the well-balanced cultivation of the head (intellectual education), body (physical education) and mind (moral education) has been mentioned in all discourses on education since Plato. Japanese universities, however, focus solely on intellectual education and only offer a token form of physical education while rarely dipping into religion or the arts under the realm of moral education. Even today, there is little awareness that intellectual education that is overwhelmingly slanted toward language

and logic is education that lacks balance in the process of human development. This same educational behaviour can even be said to be a critical failure when considering the function of universities to produce independent citizens.

In this regard, we must also think about this coupled with the problems associated with changes in industrial structure. Today, nearly 70% of the workforce is employed in tertiary or service industries. Today, however, we cannot help but note that Japan's education system is locked in a position focused on Japan's status as manufacturing power. As such, at one time it may have been the responsibility of universities to cultivate those perfect industrial soldiers who loyally followed the orders of their superiors. However, the service industry-focused consumption society in which we live today requires fresh ideas, flexible thinking and communication skills. It also needs cross-cultural communication skills for use in international society, skills to overcome the communication gap between different generations at companies and dialogue skills to revitalize communities through ties beyond those defined by kinship or geography. Either of these represents the ability to recognize in the context of personal relations that others differ in culture and values and to find solutions through persuasion and assent.

The arts and culture are required coursework for acquiring the aforementioned skills. This is because the arts will always play an important role as a cue to understanding the background of differing cultures and values. In the future, primary and secondary industries will require a service industry like approach. Therefore, this coursework should be required learning for all students regardless of whether they specialize in the humanities or sciences.

In addition, arts that involve groups such as music, theatre and dance, have been essential events and customs for humankind performed throughout the ages during religious and cultural rites in order to maintain the community. In the past, youth acquired the communication skills to maintain the community by participating in these rites but today higher education institutions need to provide some form of curriculum that replaces these rites since local communities in Japan are breaking down.

(5) Specialized Education and Liberal Arts Education

1) Implementation Period of Liberal Arts Education

The discussion in this report thus far has taken the root of liberal arts education to be civic education that is clearly different from preparatory learning for specialized education. In addition, there are further diverse types of education with various purposes being offered today. Moreover, this report has also discussed how the principles of civic education and liberal arts education and the course category for these are two different things. The question of how to integrate the course category of liberal arts into specialized education should be based on what optimizes the attainment of learning objectives.

Based on the above logic, simply put, the First Year Experience (FYE) should be implemented in the first year while basic specialized education should take place prior to specialized education. However, there is no reason to say that liberal arts as civic education must be provided before specialized education.

Nonetheless, it may be true that it is more beneficial to implement liberal arts education in the first half and specialized education in the second half as this method fits into a well defined structure. However, if the aim is to have each individual integrate the results of liberal arts and specialized education, the two

categories of education are anything but mutually unrelated. The idea that the intellectual thirst for liberal arts education in fact rises most rapidly in someone who has learned specialized knowledge to an extent and who is considering their own social role is also highly valid. It is important to recall the fact that "general education," that has lost its substance in the past has brought about the disintegration of education into "studying of liberal arts courses without intellectual craving" and "studying of specialized courses without a liberal arts background" with the result that for students their aim is mostly the earning of credits.

2) Civic Education and Specialized Education

The term "civic" in the case of "civic education" typically carries the expectation that it is divorced from notions of "specialization" and "professionalization." However, is this interpretation fair? In section four, "civic-mindedness" was defined as "the action and approach to address public issues present in society by working collaboratively with those of differing background and stance." The citizen in this sense is not necessarily limited to individuals who base their behaviour principles solely on their political conviction while not possessing any specialization. Rather, it is important for each individual to actively exert their own specialization while working together with others in committing to the public good. At the same time, it is desirable to have the demeanour and actions of professionals rooted in such "civic-mindedness".

In summary, students who enter society following their undergraduate education at a university are both a professional with specialized knowledge and a public citizen. These two do not need to contradict each other. In fact, we should aspire for their integration. In this perspective, the liberal arts education as a civic education needs not be perceived as something unrelated to specialized education that can be achieved through simply learning a broad range of topics. Instead, it is possible and rather important, to introduce liberal arts education in a context that is closely related to specialized education.

The specific required learning objectives for liberal arts education as a civic education based on its connection with specialized education can be organized into the following three categories. We hope that these suggestions can be of some use to even small single department colleges in addressing the difficulty with offering a full range of liberal arts curriculum[21].

i. The ability to explain the contents of one's specialized learning field to those outside of the specialization
ii. The ability to think about and understand the social and public significance of one's area of specialization
iii. The ability to realize and to relativize the limitation of one's own area of specialization

(6) The Need for Participatory Learning

Innovation also must be made concerning the educational methods for the liberal arts when the goal is the cultivation of "civic culture." While the above discussion often touches upon the need for participatory

[21]For example, the educational programs instituted in science-focused universities in the UK and US from the late 1960s to the mid 1970s (UK: "Science in the Social Context"; US: "STS Program") represent one example of liberal arts education that stresses the importance of the relationship with specialized education.

learning, it has been pointed out that there is a need to change the main emphasis from teaching centered on teachers to learning centered on students. In order to do so, it is widely known that we need to make innovations using a variety of participatory learning methods and not rely upon the conventional lecture class format. Specific examples include a workshop type approach that includes seminar classes, problem based learning (PBL) , and service learning.

However, when considering the ideal of fostering civic culture in particular, the importance of participatory learning needs to be re-emphasized, including raising concerns that most of the courses in today's liberal arts education are offered exclusively in lecture format. This re-examination is essential for liberal arts education that fosters a modern civic mindedness that is committed to the public through solidarity and autonomy, not the civic cultivation that once acted as a passport to an "affluent lifestyle" in the past.

In addition, the stage of liberal arts education is not limited to within universities. In unearthing and resolving public issues in society, it is also important to incorporate the experiences of students in the field where public issues occur in society in order to give students an opportunity to employ the skills and knowledge learned at the university level and to provide students a sense of their social responsibility as a member of society as well as the fortitude to put this into practice. In order to have students understand the importance of holding dialogue and cooperating with people of differing specializations and values, it is important to provide opportunities for cooperation with students from differing specializations, international students, adult students and members of society, so as to foster an understanding regarding the importance of human diversity. These experiences are meaningful for acquiring practical skills, including teamwork and leadership, and should provide opportunities for students to seriously consider their own career choice.

In order to provide this type of learning focused education, we need to develop new classroom designs that are different from conventional ones. Together with enabling easier access to computers and other IT devices, classroom innovations also need to be made in terms of student work spaces that enable a variety of activities.

In addition, workshop style education has not been actively employed in the conventional system for developing university instructors meaning that today's university instructors cannot necessarily teach in this format. Together with having each individual instructor understand the significance and purpose of this education method through faculty development and other means, technical assistance, needless to say, will also be required. Yet, we also need to be actively aware that many education methods have been developed outside of universities and thus when implementing these we will need to review the methods of instructor performance evaluations.

Moreover, a system to support the learning activities of students outside the classroom will need to be built. For example, the establishment of organizations like learning support centers should be considered.

6. "Retooling" the Instructors Responsible for University Education

Needless to say, the role of instructors is vital in achieving the vision of liberal arts education outlined in this report. Transitioning from teaching to learning will also only display the appropriate effectiveness for the first time under instructors who possess superior skills as educators. Graduate schools at Japanese

universities, however, have not made conscious efforts toward cultivating university instructors. The focal point of graduate school education in Japan can be found in the development of researchers centred primarily on specialist academic fields. Little effort has been applied to the development of liberal arts educators at the university level. Moreover, graduate schools in Japan have yet to even touch upon the idea of cultivating instructors who can lead the type of liberal arts education discussed thus far in this report. The current situation shows that the expectation in Japan is that some of individual researchers also acting as instructors will go on to become good university instructors through their own voluntary efforts. The prevailing pattern seems to be a matter of simply waiting for superior university instructors who can be responsible for liberal arts education at the university level to emerge from the larger universe of all instructors.

Furthermore, the situation concerning universities in recent years has reached the point where it can destroy this self-seeded structure. The intensifying competition seen in Japan and overseas, combined with the resulting trend for the further segmentation of research fields, has made education at the graduate school level even more narrowly focused. In addition, more and more doctorate program graduates are facing difficulties in finding employment due to the smaller number of university instructor posts resulting from Japan's declining birthrate. Consequently, since the trend to emphasize the hiring of university instructors based on the number of their academic papers and conference presentations as a key evaluation criterion has grown stronger, young researchers are forced to conduct research and write academic papers on narrowly focused themes for which results can be easily achieved over the short-term. This situation is also apparent in the cultivation of researchers in the humanities and sciences that have been the central building blocks for liberal arts education to date[22]. As such, the future of liberal arts education at the university level in Japan must unfortunately be considered bleak.

In order to enhance liberal arts education at the university level, first, we must start by changing the mentality of today's university instructors. Second, while it appears roundabout, we need to begin re-examining the method of education at the university level. If these two points are not realized, we may create the tragic situation where poor instructors without a liberal arts background themselves lead liberal arts education in Japan. The first clearly evident action is for university instructors to reaffirm that their role is to execute both research and teaching duties equally and not act as a pure researcher. Universities, through faculty development, should start debate and research on the method of liberal arts education. At the same time, the executive offices of universities need to clearly define their policy regarding methods of liberal arts education and make this widely known to all university staff. Efforts must be made within universities to reaffirm that liberal arts education at the university level is just as important as specialized education. At the same time, graduate schools in Japan also need to offer education and training for cultivating university instructors using faculty development and other means[23]. The teaching assistant system should also be utilized not only from the aspect of providing financial assistance to graduate school students, but also as an training system for developing future good instructors.

[22]Although more attempts to evaluate would-be instructors based on interviews and mock lectures are being made in recent years, the problem lies with the fact that no efforts are being made in graduate school education for the development of instructor capacities focused on compliance with these evaluations.

[23]For example, the UK has established the Postgraduate Certificate in Higher Education (PGCH) curriculum to verify the educational / teaching skills of university instructors. http://www.mext.go.jp/b_menu/shingi/chukyo/chukyo4/003/gijiroku/07011713/002.pdf

In addition, graduate schools must also seek to create a curriculum framework that seeks proactive interaction with other fields to develop education that connects to the ideal of liberal arts education in undergraduate curriculum discussed in this report above. For example, it will be meaningful to provide students with opportunities to consider the relationship between their specialist field and society through undertaking outreach activities. In addition, consideration should also be given to developing minor field curricula that will enable learning in academic subjects outside of a student's specialization[24]. It will be important to provide opportunities for students to consciously broaden their horizons in the sense that education at the graduate school level has students master a specialization that requires a more narrow and focused point of view.

A separate problem from those stated above is that in recent years a major ingredient for concern in most universities has been the increasing dependence on part-time instructors in liberal arts education. This indicates that the implementation system for liberal arts education at the university level has become vulnerable over the short term while the "retooling" of instructor groups responsible for liberal arts education will become impossible if stable employment opportunities continue to decline unchecked over the midterm. Even if it is possible to realize a reduction in operating costs by entrusting liberal arts education to instructors of an unstable status who do not have regular work, this will result in the one-side exhaustion of human resources and is nothing more than a free ride for the future. It has reached the point where all university staff must be aware of the critical nature of the structure and take action quickly to avoid the downfall of the system.

7. Obtaining Sociability or Fostering Individuals with Intellectual Depth

While a university is an institute of higher education, it is at the same time, or rather, above all, a type of social environment. Indeed a university may have buildings, classrooms, laboratories, teaching staff, as well as foster the creation of theses and publications while its students eventually go on to the workforce, but such "objective results" as measured in terms of the number of research papers written, the rate of employment and rate of certification, reflects no more than just one facet of a university as a social environment. However, there is perhaps little or no accurate standard or quantifiable guidepost that measures how much an individual will grow by spending a period of his or her life in such a social environment.

Why do people miss their student days when they get older? This is because there is a social life at a university outside of the institutional fabric woven by lectures. The manners of popular professors, meals at the student cafeteria, club activities and various student events, meeting with all sorts of people or interacting with friends, the atmosphere of the neighbouring streets, all are things that students experience through life at a university as a social environment that could be called the "scent" of life that will stay with an individual throughout his or her life. If the "scent" of this type of social environment known as the university was given a name—hidden curriculum—then such curriculum is perhaps rather the main source

[24]In the United States university education system students first learn a wide range of fields in four years of liberal arts education and then focus in earnest on specialized education at the graduate school level while in Japan's university education system students are able to study specialized education sooner. However, the fact that Japanese students only possess a limited degree of knowledge in fields outside of their specialization will likely become a handicap if they were to pursue a career as a researcher or university instructor after graduation.

fuelling one's growth. Maturation through training in this hidden curriculum broadens one's perspective and fosters individuals capable of carrying out intellectual conversations outside of his or her specialization as well as enjoying interaction with people of completely different cultural backgrounds.

In thinking about the role of culture in modern university education, this report ventured to emphasize the perspective of "civic culture" that allows coordination and cooperation with others. However, it should be pointed out that liberal arts carry a different meaning than civic education for each and every individual living in this world. Frankly speaking, acquiring culture plays an important role in expanding one's historic and spatial view.

Moreover, the term "cultured individual" that contains a certain connotation that transcends history and region also deserves some attention. While the same individual can be described using words such as "literary person," "insightful personality," "full of wisdom" and so on, there is also a focus on the individual's "characteristics" that cannot be reduced down to the mere level of specialized knowledge. Such an individual may be described as having a "prudent character." Such "character" does not come from one's efficient learning of certain specialized knowledge. In fact, it may be quite the opposite. It is perhaps achieved through hard work that is rather inefficient; in other words, it may be cultivated through active involvement in the "wasteful endeavours" seen as the hidden curriculum.

Education remains an unending challenge for humans. This report clearly addresses structural changes that have taken place in Japanese society since the year 2000. However, the purpose of education that is believed to be universally applied and transcends its time-binding characteristic, in a nutshell, should be to "ignite the fire" in the spirit of our future leaders. The most advanced knowledge learned through a few years of university education has a short expiration date. The "ignited" spirit that allows one to lead a long intellectual life after the completion of university is more important[25]. For this very reason, universities should draw on both their explicit curriculum as well as their hidden curriculum.

[25]We understand that today and moving forward universities will need to address demand for lifelong learning and conduct reviews based on the diversification of their students (including age and work experience, etc.). However, this report aimed to clarify the meaning of liberal arts education for younger students who enrol in university.

Part III Challenges in the Linkages between Universities and Workplaces

***The following discussion pertains to subject areas in the humanities and social science fields and subject areas not directly linked to specialized vocational qualifications, e.g., medicine.**

1. Challenges surrounding young people

(1) Employment difficulties faced by young people

Since the collapse of the bubble economy, the number of university graduates who are unable to obtain stable full-time and permanent employment upon graduation and are forced to enter unstable temporary positions has increased significantly. For those who have had temporary employment or periods of unemployment, finding full-time and permanent employment has been a challenge. The distinct employment pattern of the Japanese labour market has further compounded the employment difficulties faced by young people. The predicament of those dubbed the "lost generation" who encountered dismal job prospects in the 1990s has not been fundamentally solved to this day and is deeply embedded in Japanese society. Despite temporary improvements seen in the employment situation due to the ensuing economic recovery, the global recession at the end of 2008 has once again raised concerns about a bleak employment outlook.

In recent years, many companies have moved away from traditional hiring and recruiting practices that attach weight to the personal characteristics of individual students including personal initiative and ability to work in teams and their future "potential"[26]. Companies require a higher threshold of skills from students or evaluate young people against a more rigorous set of criteria. However, as is often said, the skills sets required by companies may be a high level of interpersonal skills that are acquired during the first years of professional experience or the ability to compose ideas unimaginable to ordinary people or the experience of overcoming a major obstacle in one's lifetime. In short, companies place the greatest priority on skills that are loosely connected to university education and that are difficult for any educational institution to address systematically.

Such circumstances cast uncertainty over the future prospects of university students. Under pressure to start the job search early, many students are compelled to put an immense amount of energy into the job search over a long period of time. This has not only been detrimental to the academic life of students, it has also given rise to a number of problems in their psychological health. Companies, for their part, indicate the recent surge in job-hunting activities (recruitment activities) has created gross inefficiencies.

(2) Background: Japanese-style employment system and collapse of its foundation

The social and economic fabric consists of various sub-systems of finance, industry, employment, social security, education, and other sectors. Each sub-system complements and aligns itself with the others and as a whole the fabric functions effectively and efficiently. However, if a certain system is altered in the context of changes in the environment, the complementarities between systems is lost and

[26] "Potential" here refers to whether students possess a flexible learning capacity to develop their professional skills upon being hired based on their placements and assignments within the company. Companies are known to attach importance to the university "brand" when hiring students. The university brand serves as an indicator of the students' learning capacity measured by their ability to pass the university entrance exam. In this light, it is a reasonable measure of job qualification.

incompatibilities and problems accumulate.

Similarly, the employment difficulties faced by young people cannot be resolved solely through measures targeted only at the phenomenon itself. As demonstrated below, irreversible changes in the environment surrounding the society and economy of Japan are at the root of these difficulties. Any solution therefore should begin with an understanding of the problems or discrepancies occurring between the sub-systems that derive from the changes in the environment.

1) Japanese-style employment system and university education

The employment system in Japan used to consist of two broad categories. The so-called "Japanese-style employment system" revolved around full-time and permanent employees and featured long-term stable employment, a seniority-based system, capacity development, and harmonious intra-company relations between employees and management. The alternative system revolved around the remaining temporary employees. The Japanese-style employment system was created during the high economic growth period and fulfilled an important role in bringing in superior human resources to companies amidst the constant shortage of labour. Long-term employment was assumed and a wide range of detailed training was provided within the company. The qualities demanded from new recruits included future "potential", personal initiative, and ability to work in teams as noted in (1). Emphasis was not placed on practical professional skills rooted in specialized expertise.

Meanwhile, a multitude of new-system universities were inaugurated in 1949 as part of the school system reform that was implemented soon after the end of World War II. Following this reform, the university enrolment rate increased, coupled with the sharp rise in the proportion of the population in higher education, and the large human resources demand of industries was met. Around this time, however, as the east-west Cold War dichotomy escalated, tensions grew both publicly and privately within Japanese society based on differences in ideologies on the left and right. Consequently, there was widespread belief among educational circles, including universities, especially with regards to subjects in the humanities, that linking education with workplaces was to make education subservient to industry and was therefore discouraged.

2) Destabilization and decline of Japanese-style employment system

Under the Japanese-style employment system, universities had little interest overall in professional skills development while companies rarely questioned the outcomes of university education and took it upon themselves to develop the capacities of their employees. For a long time, this relationship between universities and workplaces appeared to be functioning smoothly based on a paradoxical affinity between what are in essence two dissociated entities. This was really, however, premised on the favourable environment provided by the continuous expansion of the economy.

After the collapse of the bubble economy in 1991, as the economy continued to stagnate and competitive pressures increased through globalization, many companies were no longer able to maintain the kind of full-time and permanent employment that ensured long-term employment and seniority-based wages. Consequently, regulations on temporary employment were eased leading to a marked tendency to decrease full-time and permanent employment and increase temporary employment. In this process, the

recruitment of new graduates was deemed to offer the most flexible way by which companies could adjust their employment practices. Furthermore, changes in the human resources structure based on long-term employment and seniority-based wages have worsened the conditions of full-time and permanent employment as well as transformed the methods of intra-company education and training activities that were premised on such features of employment. The increase in demand for employees who are ready to enter the workforce without requiring long-term training has had the effect of both raising the threshold of skills required from new graduate recruits (not directly related to university studies) and increasing the selectivity of recruitment.

Thus, the current environment no longer enables and supports the traditional linkages between universities and workplaces.

(3) Inadequacies in the linkages between universities and workplaces

The employment difficulties faced by young people are rooted in the change in the balance of labour supply and demand. This was a consequence of the decline in full-time and permanent employment during the low-growth period of the Japanese economy while the university enrolment rate continued to increase and the number of university graduates rose rapidly.

In this context, the existing linkages between universities and workplaces have proved to be inadequate. Because universities neglected to draw links between learning outcomes and the skills needed in the workplace, students were hardly able to demonstrate the professional skills they acquired through university education. Moreover, they are forced to face a difficult job market where no safety nets are available if the job search is unsuccessful. Meanwhile, companies continue to exhibit little interest in the professional skills students acquired through university education. This is unprecedented worldwide and the methods of linking universities with workplaces need to be adjusted anew including increasing the vocational relevance[27] of university education.

This cannot be achieved without also examining the problems other than education. Even if existing methods of linking universities with workplaces were to improve by increasing the vocational relevance of university education, many persons will lose opportunities to engage in decent work[28] if the current employment pattern remains unchanged. The recent global recession made us aware that both the Japanese economy and its underlying employment structure are extremely vulnerable. This is not just an issue for students, and however difficult it may be, we believe efforts should be made to reconstruct the socioeconomic systems that have existed so far in response to the changes in the global environment surrounding Japan.

[27] In this report, the word "relevance" in "vocational relevance" is used to mean pertinence, significance, or meaningfulness. In other words, university education is "relevant" in the sense that it is pertinent to the workplace and is useful in an actual work situation. The way by which university education is pertinent or useful to the workplace varies by subject (see p.47, 3(5)).

[28] "Decent work" here refers not only to work which offers wages that are commensurate with the skills and contributions of the individual and work-hours that enable work-life balance but also work that offers the

2. Responses to employment difficulties of students

The challenges surrounding young people need to be addressed by taking into account the inherent structural issues. The measures taken to date, however, were not necessarily sufficient on this point. The following is an overview of the responses taken by universities, companies and businesses, and the government.

(1) Universities

With regards to the employment difficulties of students, universities are primarily concerned with two items. The first is career guidance for students. With many private universities failing to meet their enrolment quotas the employment situation of graduates due to its great impact on the recruitment of new students is of critical interest from a management perspective. Numerous universities actively offer career guidance including career education immediately upon entry into university as well as counselling and practice in interviewing.

The other item is the profound impact that the increasingly rigorous and early start of student job-hunting activities has had on university coursework. Many university faculty members perceive this as a grave issue, and through university associations have submitted a request to a business federation for the remedy of the early start of job-hunting activities among taking other measures.

We believe these types of responses only scratch the surface of the problem. It seems sufficient recognition is not being given to the need to transform the existing methods of linking universities with workplaces and not enough is being done to increase the vocational skills development functions of undergraduate degree programs.

(2) Companies and businesses

It has already been noted that companies require increasingly advanced skills from students. With respect to remedying the early start of recruitment activities, the Nippon Keidanren (Japan Business Federation) in its ethics charter sets out among other items that companies shall respect the academic schedule and refrain from starting the applicant selection activities early. Nevertheless, the cutback in recruitment of new graduates amidst the tough economic environment is itself adding pressure to increase selectivity. In order to not lose out in the competition with other firms, businesses increasingly tend not to comply with the ethics charter. Many university faculty members raise this as a problem as noted in (1).

Meanwhile, in recent years the business community has begun to actively take it upon themselves to make recommendations regarding the methods of university education[29]. The recommendations of businesses are meaningful in thinking about ways to enhance vocational skills development in university education and should not be interpreted merely as "pressure" placed on university education. However, while businesses make these recommendations on the one hand, generally speaking companies do not

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individual unlimited possibilities to make continuous improvements.

[29] For example, in the report entitled "To develop and ensure competitive human resources" submitted by the Nippon Keidanren in April 2009, it notes that universities provide vital opportunities for developing human resources. It recommends that liberal arts education be enhanced keeping in mind the "ideal" human resources that are sought by companies and proposes the maintenance of student quality through the implementation of rigorous grading systems, etc.

regard the current outcomes of university education as something to prioritize in their recruitment activities.[30] Even if companies did recognize their recruitment activities inhibit university education, suitable solutions have not been identified.

(3) Government

The government has responded to this problem in a variety of ways. Here, our discussion focuses on two main approaches. The first approach aims to enhance career guidance and career education in schools, with the purpose of "fostering young peoples' awareness about work and occupations"[31]. Such measures were traditionally promoted primarily in primary and secondary education.

The second approach aims to identify with sufficient specificity the skills required from citizens and professionals and use this knowledge to improve university education, etc. The three primary skills are: "youth employability skills"[32]; "basic workforce skills"[33]; and "typical graduate attributes"[34]. These were considered as part the SCJ's deliberations on the methods of subject-specific quality assurance in university education requested by MEXT. The ministry's original request was made in light of the issues raised in the Central Council for Education report that proposed the third set of skills, "typical graduate attributes".

Of the two approaches, the former is not itself directed at the development of vocational skills through university curriculums. On the other hand, while the latter approach aims to enhance the vocational relevance of university education, as will be described in 3, the links between universities and workplaces are limited and the approach is not expected to largely transform the methods of linking universities with workplaces. The efforts to assure the quality of university education by subject area entail identifying with further specificity the skill sets that are expected of a graduate through the latter approach and will play an important role in increasing the vocational relevance of university education.

(4) Helping young people transition to the workplace: A need for conceptual change

As seen from above, neither universities, companies, nor the government have made sufficient efforts to transform the traditional linkages between universities and workplaces.

Historically, the long- and commonly-held belief has been that young people in Japan will make a smooth transition from the school to the workplace. It did not occur that specific measures were needed to support the transition beginning with vocational skills development in schools including university education. However, such circumstances were almost unprecedented worldwide and a similar phenomenon is unlikely to return anytime soon. Moving forward, a fundamental shift in our thinking is necessary. SCJ believes the support measures for young people need to be drastically rethought based on

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[30] In the fields of science and engineering, importance is often attached to what students learned in university. It is believed that this has to do with the intrinsic characteristics of the subjects as well as the fact that many students go on to graduate studies.

[31] Taken from the report entitled "Young People's Independence and Challenge Plan", released in June 2003 by the "Strategy Council to Foster a Spirit of Independence and Challenge in Youth" comprised of then Minister of Education, Culture, Sports, Science and Technology; Minister of Health, Labour and Welfare; Minister of Economy, Trade and Industry; and Minister of State for Economic and Fiscal Policy.

[32] 2004, Ministry of Health, Labour and Welfare.

[33] 2006, Ministry of Economy, Trade and Industry.

closely examining the current situation faced by young people where the transition from the school to the workplace is marked by monumental obstacles.

The following chapters describe the initiatives to this end. The next chapter discusses the topic of increasing the vocational relevance of university education through subject-specific quality assurance. Chapter 4 examines new methods for linking universities with workplaces from a mid- to long-term perspective. Lastly, chapter 5 returns to the topic of the current situation and presents specific recommendations on measures that should be taken with regards to the "job search issue" in particular.

3. Increasing the vocational relevance of university education

(1) SCJ's subject benchmark statements for curriculum design

As noted in 2, "youth employability skills", "basic workforce skills", "typical graduate attributes", among other skills, have already been identified as skills required from the workforce and professionals. Each is convincing in its respective way. Moreover, the approach of specifying specific learning goals is shared by the subject benchmark statements for curriculum design that are proposed in this report.

However, all three skills are cross-sectoral skills and as a matter of fact only slightly coincide with university curriculums that are mostly designed by subject area. In addition, the two skills other than "typical graduate attributes" are identified from the perspective of skills required at the workplace and are unlikely to shape the design of university curriculums as a whole.

Based on the discussions of the Central Council for Education that proposed "typical graduate attributes", SCJ will develop benchmark statements for the design of curriculums to assure the quality of university education by subject area following MEXT's request. In conformity with the specific programs offered in each subject, the benchmark statements will integrate the skills required of the workforce and professionals with the philosophy and principles of each subject taught in universities and are expected to play an important role in increasing the vocational relevance of university education.

(2) Vocational relevance of university education

The benchmark statements will articulate the philosophy and principles of each subject area. This will be a somewhat abstract statement of the "basic competencies" that all students learning the subject should expect to acquire. Using these as reference points, each university will then be expected to set forth more specific and detailed learning goals. (The "basic competencies" to be identified by the benchmark statements may be considered as a set of model learning goals.)

"Basic competencies" are "skills" that students should obtain through their studies of a subject matter. Typically, these skills enable individuals to take some sort of action drawing upon specialized expertise, understanding, or methodology. Such skills may be identified in any number of ways within each subject and need to be examined in light of their actual utility to students. In this regard, it is useful to examine their vocational relevance.

A wide range of skills are believed to have vocational relevance. They may range from extremely

[34] 2008, Central Council for Education, Ministry of Education, Culture, Sports, Science and Technology.

practical skills to expertise in the development and transition process of the subject and its future challenges as well as an understanding of the subject's fundamental concepts and the philosophy and principles related to the ethical aspects of the subject.

(3) Relationship to generic skills

A key goal of learning is naturally to acquire the "skills" that enable individuals to draw upon specialized knowledge, understanding, or methodology. University education must always consider how students will receive the intellectual training to acquire these skills ("learning methods" have significant importance in this light). Through intellectual training, students will be able to acquire generic skills that are applicable in the context of the specific subject and in many other contexts associated with the workplace. This is an essential function of studies for major/minor degrees and should be clearly stated as a learning goal of the major/minor.

The acquisition of those generic skills that individuals should obtain through undergraduate degree programs as members of the workforce and professionals should also be clearly stated as the learning goals of each university. In doing so, universities are advised to consider which generic skills will be developed through specialized education and liberal arts education in accordance with their intrinsic characteristics and design mutually complementary curriculums. The view upheld by some that generic skills equal liberal arts education needs to be corrected.

(4) Placing the students' (workers') perspective at the centre of discussion

Whether it is "basic competencies" that are being considered or the specific learning goals that each university sets out by using the basic competencies as reference points, the students' (future workers and public citizens) perspective should be at the centre of discussion. The two approaches – setting out the methods of university education based on the skills required in society and the workplace and examining the vocational relevance of university education based on the goals of universities and the intrinsic characteristics of university programs – both are similar in the sense of not being in alignment with the students' perspective.

What does it mean to place the students' perspective at the centre in examining the vocational relevance of university education? It means that universities will give priority to the "ways of working desired by students" in relation to skills development. The students' perspective is discussed here not just as a matter of principle. It is based on the belief that skills development in universities may not be sufficiently fruitful if the students' perspective is not considered. The same is true with whether or not students will be able to demonstrate their skills at the workplace and continue to enhance their skills. The advent of the knowledge society coupled with an increasing proportion of the population going on to higher levels of education signifies there is an increasing number of workers and citizens who create and utilize knowledge. From a socioeconomic perspective, it is crucial that these people are provided with opportunities to sufficiently demonstrate their potential at work and in social activities in order to make effective use of such highly skilled human resources.

In this connection, it is important that students are provided with a clear, easy-to-follow explanation about how individual courses address the learning goals and what their vocational relevance is.

(5) Differences in vocational relevance among subjects

Needless-to-say, universities offer a diverse range of subjects including subjects aimed at developing specialized professionals, subjects aimed not at developing specialized professionals but fostering skills useful in certain business situations, and subjects with no real direct relevance to any business or work[35]. The vocational relevance of the skills set out as learning goals is also diverse. The skills may have relevance because they are directly linked to individual specialized professions in line with the intrinsic characteristics of individual subjects. In addition, the skills may have relevance because they have more generic applications or because they have very general and potential applications such as "learning habits".

For subjects whose relevance to the workplace was not traditionally considered, it is possible to design curriculums that newly integrate vocational relevance. However, individual universities and departments and faculties are free to decide what policy they will pursue regarding the vocational relevance of university education. We are by no means forcing universities to increase the vocational relevance of university education by neglecting educational principles and the intrinsic characteristics of the subjects. It is more problematic to propose vocational relevance that in fact does not exist and thus, priority should be placed on disclosing the real situation to students.

(6) Related initiatives

Up to this point, we have discussed the relation of increasing vocational relevance to the benchmark statements for the design of curriculums and the methods for increasing the vocational relevance of university education. Related to this, it is important for each university to engage in the following.

First, in the context of its interactions with high schools at the admissions stage, it is important that each university clarify the vocational relevance of its education programs based on our discussion in (5) and then reflect this in actual curriculum design and state this in its admissions policy.

Following students' enrolment, universities should encourage students to engage in long-term internships and build work experience as seen in other countries and implement the semester system to make these activities feasible so that from an early stage students can discover the "outside world" (world outside of education) and think deeply about their career paths. In addition, there is much more to university education than just developing the skills useful for the pursuit of individual jobs. Universities must also foster citizenship in learners including a panoramic understanding of social issues, recognition of universal ethical values, and awareness of one's social responsibilities. Thus, there also needs to be education that cultivates, for instance, individuals' sense of morality and autonomy as professionals, knowledge and practice of laws, etc. to protect the rights of themselves and others, and motivation and action to proactively transform society.

Lastly, prior to students' graduation, in order for companies and other employers to begin to actively evaluate the outcomes of university education, it is important that universities make improvements to their grading systems. SCJ's subject benchmark statements for the design of curriculums are expected to

[35] It is sufficiently possible to enhance the generic skills deemed necessary for professionals in these subjects, for instance, by conducting academic analyses of issues and exploring rational measures for their resolution.

illustrate evaluation methods of learning outcomes. We anticipate that each university will use them as reference points in developing their own unique evaluation method.

4. Development of new linkages between universities and workplaces

The previous chapter discussed increasing the vocational relevance of university education. The employment system that has been established in Japan under the existing framework, however, assumes specialized education of universities cannot be expected to have much vocational relevance especially for the humanities subjects. A discussion solely aimed at making university education suitable to current circumstances may contribute to validating the existing situation and making it definitive. When considering the vocational relevance of education in each subject area, it is important to develop a mid- to long-term vision for the new society and industries to be created and think about the role that university education should fulfil while fully bearing in mind suitability under current circumstances.

Thus, in order to contribute to the development of subject benchmark statements and university initiatives to improve education, the following paragraphs discuss our vision for the future society and future industries and the new style of education from the perspective of university-workplace linkages. This is of course just one view, and is not intended to deny the existence of other views. We would like to simply reiterate that in reflecting on our current university education, it is important to always have a vision for the future.

(1) Vision: Our future society and industries

1) A society in which people can demonstrate and enhance their skills on multiple dimensions

When thinking about what sort of society and industries we should be striving for, the central question is how to design a society in which people can live happily while appropriately responding to the globalization of the economy. Although we will inevitably need to make some value judgments what is important here is to consciously structure a pluralistic industrial society[36]. We believe the goal is to increase the opportunities by which people can demonstrate and enhance their skills on multiple dimensions so that society as a whole can move in the proper direction. Why? Because an excessively one-dimensional and homogenous industrial structure may be advantageous in some contexts but may become caught in a large-scale crisis if the environment changes. In addition, an extremely uneven distribution of wealth or reduction in decent work opportunities will itself harm society's soundness from within.

1(2) postulated that the Japanese-style employment system is declining due to pressures from international competition through globalization. The number of full-time and permanent workers ("full-time employees") is decreasing while they continue to be replaced by temporary workers. The traditional employment structure of full-time and permanent workers based on long-term employment and

[36] Specifically, in addition to maintaining and enhancing the international competitiveness of export-oriented industries it is important to vitalize industries which can meet domestic demand and support peoples' livelihoods in communities and to increase the number of such industries. A discussion about this vision is beyond the scope

seniority-based wages is also collapsing. Even if this polarization trend turns out to be limited in extent it is hard to imagine that circumstances will permit a return to the former employment system. We need to identify a new direction and steer Japan towards it.

2) Establishment of new system that fills the gaps in the existing system

Realistic approaches often lie along the continuum from past to present and do not largely diverge from this continuum. Long-term employment was one of the pillars of the Japanese-style employment system. This was made possible by the flexible reassignments of human resources within a company and this in turn was supported by the extensive education and training opportunities provided internally. Each type of business has ups and downs. If a company is unable to flexibly reassign human resources it is forced to lay off personnel in diminishing sectors. In actuality, this is fundamentally the underlying concept of the employment systems of European and North American countries.

However, today, this type of system is progressively becoming less functional as "full-time employees" are replaced by temporary workers and companies cut back on education and training activities. In order to ensure the mobility of human resources while at the same time maintain quality job performance, companies will either need to completely outsource jobs that require specialized expertise or employ human resources with expertise under a system that has a degree of mobility. This type of employment through employment contracts based on a specific "job description" has become standard practice in Europe and North America. The question is, with respect to those people who are in charge of jobs that require a degree of expertise and who will become increasingly important over the coming years, what legal standing will they have in the context of employment laws? We need to consider whether they will be treated as a type of dispatch worker under the existing system or as a new type of "full-time employee under a different employment system from that of current full-time employees who are protected by legally robust dismissal regulations[37]. Furthermore, in thinking about this issue, we must keep in mind that individual workers will need to shift their areas of expertise as employment mobility increases and therefore unemployment assistance systems will need to incorporate vocational training opportunities. The design of the new employment system that will fill the gaps of the existing system is an important issue for consideration. It will largely influence the structure of our future society and industries.

3) Proactive efforts for development of career ladders

The previous paragraph discussed the need to design a social system to accommodate new working methods that revolve around specialization. However, in light of the current circumstances surrounding employment and industry and the "hollowing out" (de-industrialization) of Japan's rural areas more proactive measures are also necessary.

The term "career ladder" is a recent concept proposed in the U.S. The ladder describes the progression from relatively "easy" positions to more advanced positions and sets out the education and training and work experience needed for each position as well as levels of pay. Career ladder development is an initiative to expand decent work opportunities that are notably lacking in rural areas. Research will be

of this paper and is refrained.

[37] Essentially the definition of "full-time employee" in European and North American countries.

steadily carried out on the various industries of the communities and possibilities will be opened up in which workers will be able to raise their work value and living standards in a way that is also profitable to employers.

We believe Japan too has a pressing need to establish mechanisms for carrying out these initiatives through coordination with government agencies and sectors related to employment, education, and industry in order to advance the development of career ladders in rural communities.

(2) A new style of university education

1) The significance of "specialization"

Globalization enables "optimization" on a global scale and thus allows for dramatic increases in economic efficiency. At the same time, however, while globalization provides people with opportunities to attain immense success on people must constantly worry about being replaced by others due to differences in their respective market values. An overwhelming majority of people will naturally acutely feel the effects of the latter.

In the course of one's life, it is important that people feel they are needed by others and that they are helping others. People also find satisfaction in being able to do something they could not do before and to increase and expand their own possibilities. Work is one of the most basic means for achieving the above. If the motive for doing "good work" is reduced to just financial incentives the quality of labour will likely go down significantly.

The "specialization" of work will be key to raising the competitiveness of the Japanese economy again by targeting the gaps in the existing employment system and increasing the size of the high quality intellectual workforce. Moreover, it may help individuals maintain a certain level of secure livelihood and dignity and fight off fear about being replaced by other workers through globalization.

2) Specialization in university education

Basically, it will be rare that "academic specialization" in university undergraduate education will match up one-to-one with "career specialization" excluding certain fields such as physician and teacher training programs. Nonetheless, undergraduate specializations play an important role as a foundation for attaining further specialization during the students' future professional career and their clear association with the workplace - the "endpoint" of education - should be taken into account to a certain extent. Just because a set of generalist credentials tend to be prioritized in current job-hunting activities, universities need not devote their efforts exclusively to career guidance support and neglect vocational skills development through specialized education.

Traditionally, the Japanese education system up to high school was designed with general courses as the focus. While efforts may have been made to raise awareness about career choices, there was little designed to help students decide on their career tracks. It is known that the traditional type of linkages between universities and workplaces existed mainly in the humanities and social science fields of universities, where, as noted earlier, universities offered few initiatives for vocational skills development, while companies too rarely valued the outcomes of university education.

In view of the circumstances in which the Japanese economy finds itself this pattern is no longer viable. In the future, it will become ever more important to properly identify career specializations and equally university education will need to make conscious responses. Based on this standpoint, career education that will raise students' awareness about which careers they should pursue should be enhanced in high schools.

Throughout their school years students avoid from making career choices and as a result are faced with this question for the first time during the summer break of their third year of university. Without ever having formed a clear image of the "job" description, they close their eyes, take a leap of faith, and start work with a particular "company". This approach has many risks. If specialized education of universities even loosely corresponded with career specializations students would be able to envision the "job" with some specificity and how they will be involved with it. This we believe will greatly contribute to making a smooth "transition" from the school to the workplace.

Of course the traditional linkages between universities and workplaces are still by far the mainstream pattern. However, these approaches have already reached their limits and we must consider new alternative ways of linking universities with workplaces and advance concrete initiatives to this end.

3) A new style of university education

Our efforts to increase the vocational relevance of university education should extend beyond the frameworks of existing subject areas. From a mid- to long-term perspective, we need to also seek to transform the ways the subjects are designed including the establishment of new subjects. However, in trying to bring "career specialization" and "academic specialization" closer together it is important that learners of the subject have prospects for employment in the "profession" suited to their studies based on the important assumption that there are social needs for the profession as well as people who wish to take up the profession. Our efforts shall go beyond curriculum reforms of individual universities to develop socially reliable and objective "standards" regarding the practical skills with which people engaged in certain professions should be equipped. For this purpose, it is hoped that entities that extend beyond the individual university level, for example specialized academic associations will play an active role[38].

In addition, to increase the vocational relevance of university education it will be important for universities and non-university education and training institutions to rise above their differences and work together to better articulate their educational programs (their links with career tracks) and expand their partnerships (e.g., credit transfer). In order to carry out these initiatives smoothly, the promotion of system-wide coordination and adjustments will be essential.

Furthermore, if the vocational relevance of university education can be increased, universities (including graduate schools; hereinafter the same) will play a larger role in the recurrent learning of the workforce. However, in order for universities to better fulfil this role in an appropriate manner, various measures will need to be taken. They include admissions procedures that are tailored to people with work experience, the institutionalization of educational programs for part-time learners, and the establishment

[38] Professional societies play a vital role in the U.S. and UK. The majority of subject-specific accreditation bodies in the U.S. are professional societies. In the UK too professional societies carry out similar activities in diverse subjects.

of short-term intensive courses.

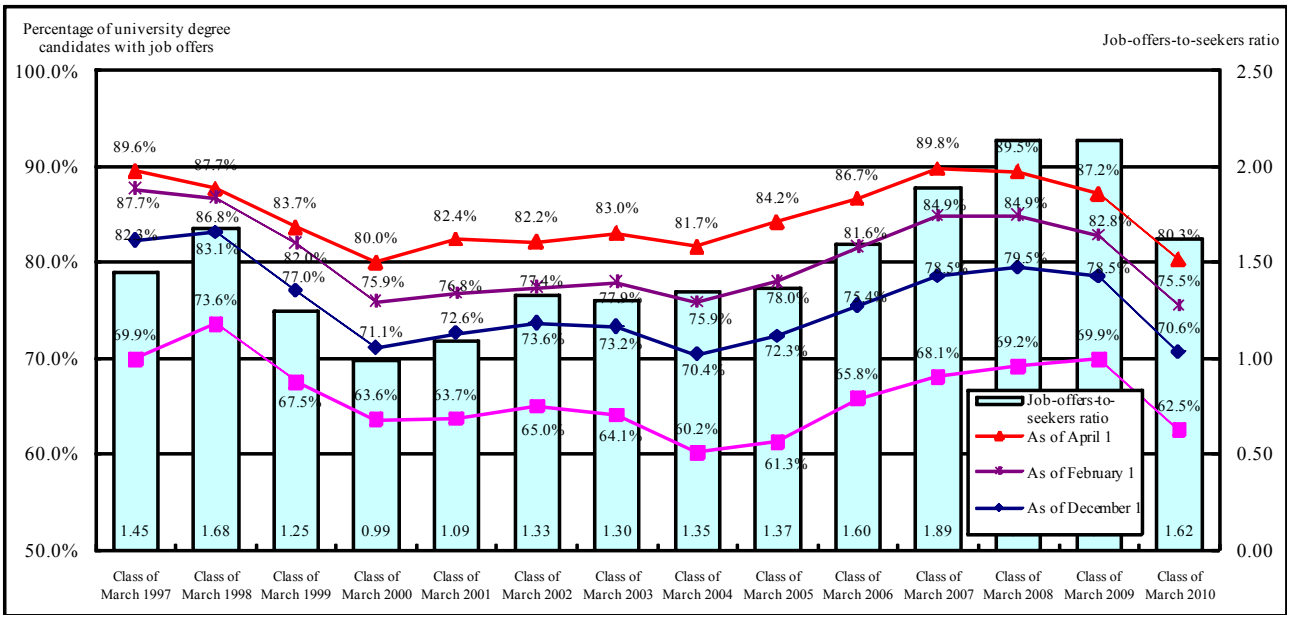
These initiatives are anticipated to lead to the development of a new style of universities and university education that does not conform to our traditional understanding of universities and university education. In principle, the expansion of university education should be widely accepted also bearing in mind that this requires the diversification of university education and differentiation of university functions.

5. Review of job-hunting practices: What measures are needed?

(1) The job search situation of university students: Changes

In recent years, a variety of issues have been raised over the job-hunting activities of university students. First, the general facts are reviewed. Figure 4 shows the trends in the job-offers-to-seekers ratio for university degree candidates and the percentage of students with job offers by season (sample survey) between 1997 and 2010. While nothing definitive can be asserted as the data for the percentage of graduates with job offers are taken from a sample survey and no data are available for the years before 1997 it appears some major changes occurred during this period.

Figure 4 Trends in university graduates' job-offers-to-seekers ratio and percentage of graduates with job offers



Source: Ministry of Education, Culture, Sports, Science and Technology and Ministry of Health, Labour and Welfare, "Survey of Employment (Job Offers) Situation of University Degree Candidates";
Works Institute, "26th Works Survey of Job-Offers-to-Seekers Ratio of University Graduates (Class of 2010)"

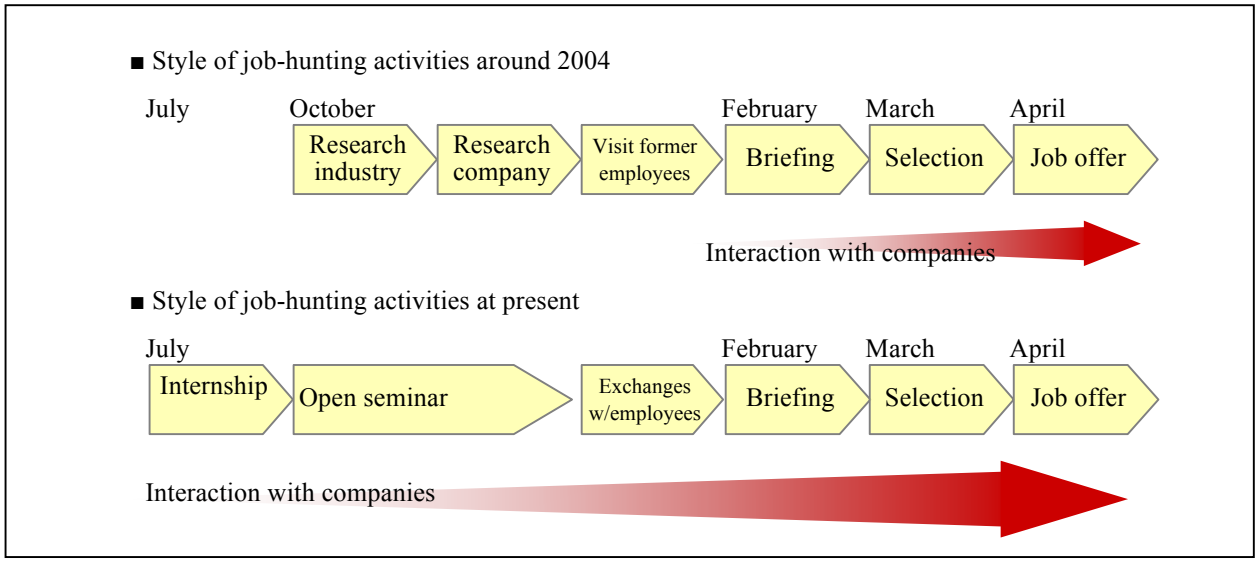
* The percentage of graduates with job offers at each point in time uses the number of job seekers as of October as the benchmark and is the ratio relative to the number of people who have job offers as of each point in time. (Due to the downward tendency in the number of job seekers at each point in time, if we take the number of graduates with job offers corresponding with the number of job seekers at that point in time, the percentage of graduates with job offers will be higher for all points in time except for October.)

First, the figures from the data suggest the following changes have occurred since 1998-99:

- Since 1999 the percentage of graduates with job offers has declined as of October, December, and February of each year with the only exception in October 2009 when the percentage was the same as that of 1997.
- Since 1999 the difference in the percentage of graduates with job offers as of February and April has expanded from 1-2% before 1999 to 5-6% after 1999.
- As of April 1997 the percentage of graduates with job offers was 89.6% with a job-offers-to-seekers ratio of 1.45 times. However, in the following year of 1998 the same percentage declined despite the increase in the job-offers-to-seekers ratio. Between 2007 and 2009 the percentage was similar to the 1998 level with a high job-offers-to-seekers ratio ranging between 1.89 times and 2.14 times.

The first two of the three scenarios above indicate that there is a tendency towards prolonged job searches. In particular, the widening difference in the ratios of people who find jobs as of February and April suggests that more people are finding jobs as of April due to "substantive" job-hunting activities still taking place as of February. Meanwhile, as seen in Figure 5, the promotion of internships among other initiatives during this period has brought students into contact with companies earlier. Therefore, we can see that despite the earlier start of job-hunting activities there is a tendency towards more students not being able to receive job offers at an early stage.

Figure 5 Changes in style of job-hunting activities



Source: Jobweb

The third scenario points to the changing nature of the "job-offers-to-seekers ratio". Employers today do not continue to recruit personnel until they have filled the quota they initially specified. Job offers may easily decline if employers cannot find students who meet the desirable qualities. In this sense, the "job-offers-to-seekers ratio" of recent years may be intrinsically different from that of the previous years when Japan enjoyed soaring economic growth (Table 1).

Table 1 Degree of importance of quality and volume in company recruitment practices

□Overall		Quality			Volume			Specific skill	Specific university
		Very important	Quality over volume	Sub-total	Very important	Volume over quality	Sub-total		
Graduate school (Humanities)	Class of 2010	47.8%	50.1%	97.8%	0.6%	0.6%	1.2%	0.9%	0.1%
	Class of 2009	39.3%	52.6%	91.9%	0.7%	5.1%	5.8%	2.3%	
	Class of 2010/2009	8.5%	-2.5%	5.9%	-0.1%	-4.5 %	-4.6%	-1.4%	0.1%
Graduate school (Sciences)	Class of 2010	47.2%	48.0%	95.2%	0.6%	1.0%	1.6%	2.9%	0.2%
	Class of 2009	37.0%	52.9%	89.9%	0.9%	5.9%	6.8%	3.3%	
	Class of 2010/2009	10.2%	-4.9%	5.4%	-0.3%	-4.9 %	-5.2%	-0.4%	0.2%
Undergraduate school (Humanities)	Class of 2010	45.1%	52.2%	97.3%	0.5%	1.2%	1.7%	0.8%	0.2%
	Class of 2009	32.9%	58.1%	91.0%	0.9%	6.6%	7.5%	1.3%	0.2%
	Class of 2010/2009	12.2%	-5.9%	6.3%	-0.4%	-5.3 %	-5.8%	-0.6%	0.0%
Undergraduate school (Sciences)	Class of 2010	44.2%	51.6%	95.9%	0.5%	1.7%	2.2%	1.6%	0.4%
	Class of 2009	31.0%	57.4%	88.4%	1.0%	8.2%	9.2%	2.4%	0.1%
	Class of 2010/2009	13.2%	-5.7%	7.5%	-0.5%	-6.5 %	-7.0%	-0.8%	0.3%

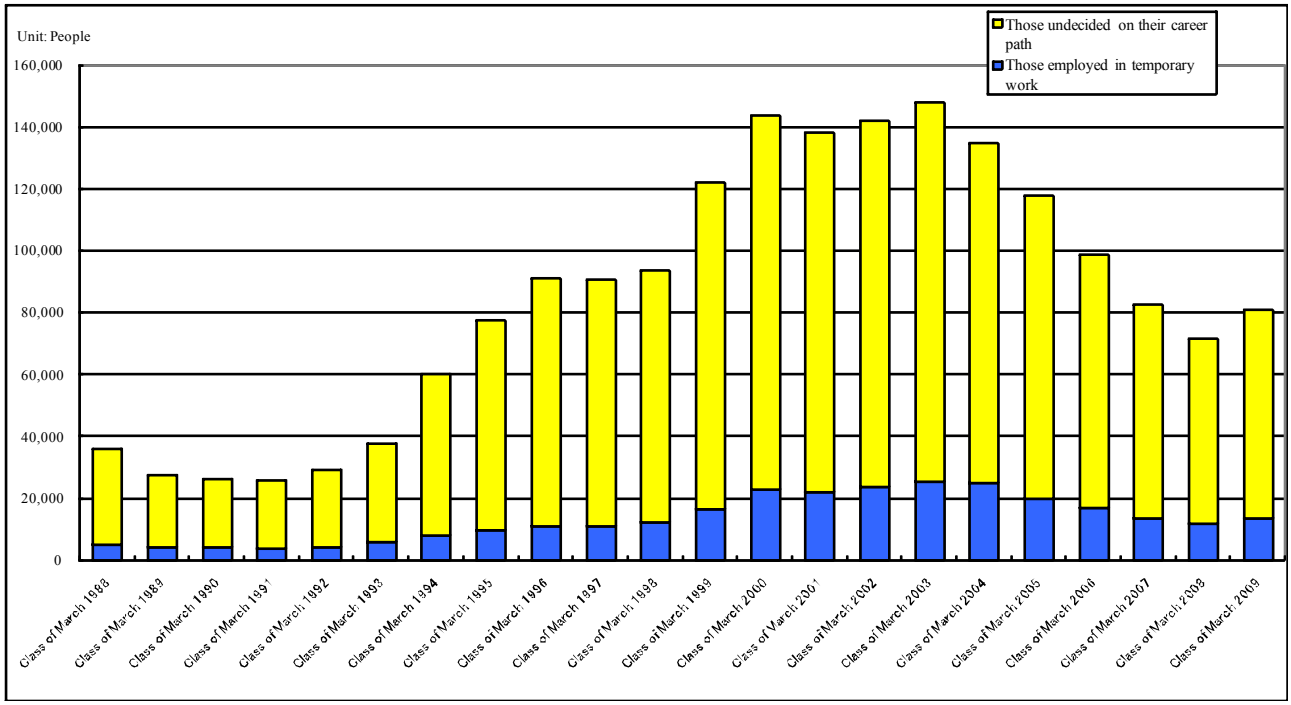
Source: Jobweb (Based on Mainichi Communications Inc., "2010 Company Survey on Expected Recruitment of New Graduates and Recruitment Activities")

Figure 6 examines the trends of university graduates who are undecided on their career path[39] and university graduates who are employed in temporary work[40] using data from the Basic School Survey. While a sweeping generalization cannot be made about the attributes of the people who comprise these categories, the following can be suggested. That is, based on observations that these groups have increased sharply since the collapse of the bubble economy in 1991 and that their numbers are changing with a certain degree of correlation with the changes in the job-offers-to-seekers ratio seen in Figure 4, Figure 6 represents those people who were unable to forge smooth linkages between their university education and the workplace and their changes in number.

[39] Defined as graduates who are not enrolled in graduate schools, not employed, not enrolled in specialized schools or overseas schools, etc., and not employed in temporary work, and "those who do not have a clear career path, including housework, employment, 'graduate studies', and 'enrolment in specialized schools and overseas schools, etc.'"

[40] Defined as those who were engaged in work for less than one year regardless of the nature of the work.

Figure 6 Trends in university graduates who are undecided on their career path and university graduates who are employed in temporary work



Source: MEXT, "Basic School Survey"

(2) Core of the problem and its underlying factors: Job-hunting and recruitment activities pushed to the limit

The points made in the previous section are re-stated below:

i) Despite job-hunting activities starting earlier an increasing number of students cannot find employment at an early stage;

ii) As employers increasingly prioritize quality over volume the "job-offers-to-seekers ratio" may be changing in nature; and

iii) Since the collapse of the bubble economy, an increasing number of people are unable to forge smooth linkages between their university education and the workplace and the number tends to vary greatly due to fluctuations in the economy.

It is difficult to provide a single, clear interpretation of this situation. Students' job searches involve multiple actors, including students, companies, universities, and the career support industry. Regarding i) in particular, the question of which actor has primary "responsibility" has long been asked but there is not necessarily a clear-cut explanation for the prolongation of job-hunting. If the companies' priority is "quality" as seen in ii) (the same can be said for students vis-à-vis companies), the longer time period required for the job search may also be inevitable.

However, with regards to current job-hunting (recruitment) activities, many point to the psychological distress felt by students[41] and the sense of futility expressed by companies. The "distress" and "sense of

[41] The practice of one-time recruitment of new graduates, discussed in a later section, is likely a source of psychological stress to students. While the practice allows companies to distribute risk on the one hand (companies can make adjustments through the following year's recruitment and beyond), students cannot

futility" emerging from this situation where jobs are not easily obtained despite the tremendous efforts being made over the long-run, indicate the decreasing efficiency of job-hunting (recruitment) activities. Indeed, the fruitlessness of the job-hunting (recruitment) process may very well be increasing.

One of the major causes giving rise to this situation is the increasing number of student job applications and the expanding pool of applicants from which companies must select their candidates with the career support industry and information and communication technology driving this trend. The end result is that while an increasingly large number of applicants apply an equally large number of applicants fall through the cracks. Students visit one company after another but still cannot land a job and companies are forced to deal with one student after another including many who demonstrate little interest in the company.

That said, however, it is questionable whether the situation can be improved solely through regulatory measures such as the employment agreement Japan had previously. Why have companies begun attaching strong importance to "quality over volume"? And why do students apply to many companies? These questions need to be thought about against the significant changes taking place in our economic environment. The companies' behaviour is rooted in the intensification of competition due to the global economy while the students' behaviour is rooted in the "concerns" arising from the difficult job search and employment climate. The rising number of people who are unable to forge smooth linkages between their university education and the workplace after the collapse of the bubble economy as illustrated in iii) may be a clear sign that the emergence of such concerns is inevitable. The current job-hunting (recruitment) activities are like a steam boiler in which the pressure is building up to the danger level[42].

(3) Role of universities and businesses in job-hunting and recruitment activities

Up to this point, we have examined the job search situation of university students, the core of the problem, and its underlying factors. Based on these observations, it is believed that the issue of job-hunting activities needs to be understood in an essentially different light than before. The universities' response as well as companies' and businesses' response to the employment difficulties faced by students were previously outlined in "2. Responses to employment difficulties faced by students". As the use of the term "job-hunting activities" implies, both the university and the business communities continue to maintain the mindset from the "employment agreement" days in terms of their responses to the issue. In July 2008, the three organizations of The Japan Association of National Universities, The Japan Association of Public Universities, and The Federation of Japanese Private Colleges and Universities Associations submitted a request to the Nippon Keidanren (Japan Business Federation). This being prior to the Lehman shock, it may have been inevitable that the employment difficulties of students received little interest. Nonetheless, the sole issue raised in the request was the effect of the early start of the recruitment and selection activities of companies on university education. More specifically, the following three items were requested. They are also fundamentally consistent with the items listed in Keidanren's own "Corporate Ethics Charter on the Recruitment and Selection of Undergraduate and Graduate Degree

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distribute risk on the other hand (students cannot reapply for the one-time recruitment of new graduates positions once they have graduated).

[42] Whether or not our analysis of the situation as described here is appropriate will largely depend on the results of future research. Nonetheless, the forthcoming discussion will assume that our analysis has tentative relevance at this point in time.

Candidates, etc."

Requests made to the Nippon Keidanren by university associations

- We request that companies strictly follow a practical selection process and refrain from the early commencement of recruitment activities targeted at undergraduate and graduate students at the start of their final year as well as students in the preceding year.
- We request that companies implement recruitment and selection activities that respect the education programs of universities, for example, conducting them as much as possible on weekends, holidays, and long-term breaks.
- We request that companies make an official job offer to undergraduate and graduate students in their final year after October 1 and refrain from requiring the submission of a letter of acceptance, contract, solidarity guarantee, etc. prior to September 30, i.e., before the official job offer is made because this may hinder the students' freedom to conduct job-hunting activities and pose a psychological burden on students. Companies that carry out post-job offer ceremonies, pre-employment training, etc. are requested to give consideration that such activities and events do not hinder the studies of students.

These requests are no doubt important. However, this idea that universities need only to worry about the early start of recruitment activities or the "restraints" etc. placed on students prior to receiving their job offers holds true only for Japan's previous period of soaring economic growth. Today, a new understanding of the issue of job-hunting activities is needed as well as a broader framework of response measures.

First, there is the issue of the early start of job-hunting (recruitment) activities. If we consider the underlying factor, i.e., the significant changes taking place in the economic situation, we would know that there is limited effectiveness in simply blaming the problem on companies for starting too early and attempting to address the problem merely with ethical regulations as Japan did during its high growth period. Furthermore, the career support industry has a large influence on current job-hunting and recruitment activities. Even if the industry can be said to have problems simply criticizing it will not lead to any improvement in the situation.

In terms of universities, it is important that they first offer appropriate career guidance through which students will develop the ability to think proactively about their career tracks and move closer to realizing their desired careers without being swayed by superficial information. Such efforts are essential for stopping the meaningless and excessive practice of students choosing one company over another based on superficial factors. Efforts are required to reduce this recent practice. At the same time, companies are advised to respond to students' more proactive decisions about career tracks by improving their recruitment activities.

Naturally, our hope is that the earlier start and prolongation of job-hunting (recruitment) activities do not have adverse impact on university education programs. We do believe, however, that this issue needs to be considered from a slightly broader perspective. In view of the circumstances in which it is becoming increasingly difficult to find ways of smoothly linking universities with workplaces as before, it cannot be said that curbing the early start of job-hunting activities merely by isolating students in universities for as

long as possible does good even for students. What needs to be curbed is the early start of students' meaningless and excessive practice of choosing one company over another based on superficial factors. As stated in 3(6) on page 48, in order for students to be able to make an appropriate choice about their career track it is important that universities offer opportunities early in the students' university education to learn about the "outside world" including companies. This we believe will also contribute to shortening job-hunting activities that are currently restricted in nature. Regarding the issue of balancing both the academic schedule and job-hunting activities, it is important that concrete improvements are made. This includes the development of specific rules and processes that specify, for example, the effective utilization of weekends, holidays, and long-term breaks, as well as a review of the existing methods of practical job-hunting and recruitment activities to increase their effectiveness and efficiency. On these measures universities and businesses are urged to work together. We believe that both universities and businesses have a critical mission to move the situation forward in this direction from one of chaos.

In all likelihood, however, the above measures will not drastically improve the issue of job-hunting activities in the near future. The transition of youths from schools to workplaces that is becoming increasingly complicated should be understood as a persistent issue shared by many developed countries. Therefore, it is also an urgent task to provide "support" measures in response to the problems arising from the current job-hunting activities. The first is measures to reduce the burden borne by students due to the prolongation of job-hunting activities; the other is measures to develop safety nets for young people who are unable to find employment. The latter, in particular, is especially important given that a sizable number of people continue to not be able to make smooth linkages between universities and workplaces after the bubble period and that the number is expected to increase with further economic retrenchment. While the current global economic recession is making the job search difficult for Japanese university students, this situation should not be considered as a temporary exception. Safety nets need to be developed and enhanced with the assumption that such a situation may occur anytime in the future.

Finally, let us not forget our most fundamental task, namely to ensure that the vocational relevance of university education is increased and that companies appropriately value the skills students have acquired through university education. This point is not taken seriously enough in current job-hunting (recruitment) activities and should be considered as a central element in the development of new linkages between universities and workplaces.

(4) Way forward

Based on the above understanding, the following measures are proposed in relation to the issue of current job-hunting activities.

1) Enhancement of student support

A. Career guidance at universities

The Standards for Establishment of Universities were revised in February 2010 and required universities to establish "mechanisms for fostering the skills needed to achieve social and vocational independence". Comprehensive guidance aimed at promoting the social and vocational independence of students is itself beneficial and many universities have provided a variety of forms of career support

and career education before the current law was implemented. However, whether the initiatives of some universities are actually fulfilling their intended purpose of offering "student support" is a cause for concern.

For example, because students' performance in the job market is given priority in private universities from their business point of view, it is not uncommon that these universities tend to focus on the development of skills useful to the job search and the communication of knowhow as well as the facilitating the acquisition of licenses and credentials. Even if this is not true and universities offer a wide range of career guidance with an eye to promoting the lifelong career development of students and proactive preparations for achieving vocational independence, all too often these efforts are not closely linked to the overall university curriculum, and above all, not conducted in coordination with specialized education. More fundamentally, today's employment difficulties cannot be addressed by improving the consciousness or motivation of students unless the structural aspects of the current employment difficulties (as described in this report) are accounted for.

Whether or not career guidance at universities is required by law, it should be conducted in tandem with efforts to increase the specialization and vocational relevance of university curricula as a whole as well as efforts to improve the universities' capacity to develop the specialized and vocational skills of students[43]. It should be understood that career guidance that principally offers career tips and tactics may ultimately arouse concerns among students and cause them distress (The establishment of "mechanisms for fostering the skills needed to achieve social and vocational independence" as set forth in the Standards for Establishment of Universities should likewise take this perspective into account.).

B. Reduction of the burden of job-hunting activities

Among the burdens imposed on students by the prolongation of job-hunting activities, the problem of accommodation is one of the most acute for rural students conducting job-hunting activities in major cities such as Tokyo. We believe a number of measures should be considered in response including making public accommodation facilities available at low prices and establishing a system to subsidize accommodation and transportation fees.

With regards to companies' treatment of students, on the one hand one sometimes hears about unreasonable recruitment practices such as companies requiring students to repeatedly come in for interviews only to not make a job offer in the end. On the other hand, one also hears rumours that companies are becoming excessively concerned about how students are rating the company with information easily spreading on the Internet. Thus, it appears an entirely different set of problems are emerging from those assumed in the university associations' request and the ethics charter of the Nippon Keidanren described in (3). In order to minimize the stress and burden imposed on both students and companies by the prolongation of job-hunting activities as much as possible, we believe a new set of ethics need to be developed on the methods of the present job-hunting activities.

[43] Enhancing all university curriculums to appropriately bear this perspective in mind as well as conducting training aimed at the early development of career plans through the creation of a "learning card" that lists what students have learned through university education and what types of work and volunteer experiences they have gained, among other measures are significant in terms of laying the foundation for the lifelong career development of students.

2) Development of safety nets for young people who cannot find employment

A. Development of comprehensive safety nets

Many of the young people who were unable to find jobs during the so-called "employment ice age" (1993 – 2005) had no choice but to find temporary employment and had very little possibility to increase their vocational skills and improve their livelihood either through employment as a temporary worker or through public vocational training.

It is up to each worker to decide on their desired method of employment according to the supply and demand situation of labour. However, considering that the provision of stable employment opportunities forms the social basis for enjoying a financially secure lifestyle, we believe the ideal type of employment is one that makes long-term continuous employment possible. For all other types of employment arrangements need to be created to allow for continuous skills development as well as sustainable career development.

In particular, it is a loss to society to overlook the young people who were unable to find employment at the initial stage of transition from university to society or those who found employment but were obligated to accept unstable and poor working conditions. To prevent the emergence of a second lost generation of youth the government has already begun to take some steps. But in addition to these measures the development of new social safety nets is also urgently required. This will include supporting young people who cannot find employment develop vocational skills, paying for their cost of living during the training period, as well as actively introducing them to places of employment.

What individuals can do on their own to secure employment opportunities is limited. For this reason, universities should, as they do for current students, offer career counselling and job placement services to former students for at least three years after their graduation as well as provide graduates with other support related to career path decisions. These measures are also connected with the issue discussed in B below. In addition, it is important that services are enhanced to match young people who cannot find employment with employment opportunities. This will be done through partnerships between universities and government job placement offices ("Hello Work"), job placement cooperation between universities and private-sector job placement and worker dispatch programs, and free job listings offered by non-profits organizations.

At the same time, companies for their part need to endeavour to provide stable employment opportunities such as by making the government's "second safety net" (training and livelihood support system under the Emergency Human Resources Development and Employment Support Fund) permanent and utilizing the social vocational skills development and evaluation system that draws on the "Job Card System".

B. Easing of "new graduate" criteria employed in corporate recruitment

Under the widely utilized method of recruiting workers in Japan called the one-time recruitment of new graduates (i.e., students in their final year of university) once students graduate from university they are traditionally not allowed to apply for the positions open to the graduating class of the following fiscal year. According to the 2006 White Paper on the National Lifestyle, just 22.4% of

companies surveyed[44] considered the applications of young recent graduates in the same framework as new graduates while 44.0% of companies did not consider recent graduates as candidates for recruitment and 29.1% of companies placed recent graduates in the same category as mid-career candidates for recruitment. However, because the emphasis of mid-career recruitment is usually on prior work experience for young people who could not find employment to begin with this is not an easy path to employment.

In other words, if people are not hired as full-time employees immediately upon graduating from university their chances of becoming full-time employees in the future are extremely limited. Coupled with the constrained chances that people with temporary work (not full-time work) have to increase the value of their labour and living standards in many cases the problems faced by young people who could not find full-time employment upon graduation are becoming ever more serious. If the one-time recruitment method of new graduates adopts the traditionally strict interpretation of the "new graduate" criteria all chances of an individual finding full-time employment will be concentrated on one period of his/her lifetime. Furthermore, due to fluctuations in the economy the method may cause certain generations to bear more risk than other generations.

As the linkages between universities and workplaces become less smooth with the changes in the economic environment the potential negative effects of the one-time recruitment method of new graduates are being recognized as something that cannot be overlooked by society. Thus, this report discusses the easing of the "new graduate" criteria employed in corporate recruitment[45].

What should be done? For example, if the goal is to permit young recent graduates who graduated within at least the last three years to apply for positions under the one-time recruitment of new graduates, the following two broad categories of approaches are envisaged. The first is the "regulatory" approach. Specifically, this might include the promotion of companies' independent efforts to improve their practices through an ethics guideline like the one developed by a business federation. Or, this might include taking some sort of legal measure, assuming that companies' independent efforts cannot be expected to be effective. However, by setting out that the strict interpretation of the "new graduate" criteria (i.e., while those individuals who enrolled in university late or who repeated a grade are still "students" and can apply as new graduates, young people of a similar age who have graduated and have "blanks" in their resumes cannot apply) "needs to be revised" from a normative viewpoint, can an effective change be expected? There is the essentialist question of whether this should be treated as an ethical problem or not. Further there is the technical question of how to verify the situation. But above all, we believe there are considerable limits to the approach of forcing companies that are reluctant to change their practices to do so against their will.

The other approach is the "economical" approach. According to the White Paper on the National Lifestyle, 22.4% of companies responded that they considered the candidacies of young recent

[44] Data based on The Japan Institute for Labour Policy and Training (JILPT)'s "Survey of Recruitment of Recent Graduates" (2005). The survey studied 2,364 companies which considered the candidacies of over 300 people for full-time permanent positions in the last three years.

[45] The easing of the "new graduate" criteria is expected to mitigate the sense of urgency felt by students due to current job-hunting practices and to some extent contribute to reducing the growing frenzy of current job-hunting activities.

graduates in the same category as new graduates. If, based on a clear definition, a list of these companies is disclosed and young recent graduates and students have access to this information we believe this will have considerable impact on the current situation even if the list only contains the names of a few companies. By doing so companies included in the list will be able to attract a diverse range of human resources to their companies by not fixating on the "new graduate" criteria. In addition, this in effect adds a new type of recruitment method to the "one-time recruitment of new graduates" practice that had been traditionally understood as consisting of just one method and the old and new practice will be competing with each other. As a result, through a type of market mechanism we will be able to find out which practice is favourable for efficiently recruiting the human resources desired by companies and make adjustments accordingly.

Whichever approach is adopted the support functions and systems of universities need to be strengthened in order for recent graduates to be able to receive career support from universities or university associations for some period of time after graduation. We urge the relevant government departments to swiftly consider this issue in further detail including the measures just described.

3) Substantive job-hunting and recruitment activities

In the above discussion, we noted that one of the aspects that make the current job-hunting and recruitment activities problematic is their promotion of "meaningless and excessive practice of students choosing one company over another based on superficial factors". The problem is observed not only from the length of time it is taking for students to land a job despite all of the energies put in over a long period; it is also seen from the turnover rate among recent graduates (those who graduated within the last three years) that has been hovering well above 30% in recent years.

To make a smooth transition from university to the workplace students will thoroughly develop vocational skills during their four years of undergraduate education while taking the time to think deeply about what careers they would like to pursue before transitioning to the workplace. If this is indeed the ideal university-to-workplace transition, then it seems the current form of job-hunting and recruitment activities greatly diverge from their ideal form. In the current practice, it seems there is too much of students and companies drawing attention to and praising each other on superficial strengths and features. Job-hunting and recruitment activities should be designed to be basic and practical and more strongly linked to actual "work". If universities and businesses cooperate with each other it should not be impossible to bring about a set of changes to the current situation of job-hunting and recruitment activities. Thus, both actors are urged to work together on this matter as well.

The ways for improving the current job-hunting and recruitment activities and their alternative methods are surely not all the same. However, as a concrete example, we would like to present an already existing method called "job category-based recruitment"[46]. As the name implies, the type of position is announced

[46] With job category-based recruitment targeting university degree candidates in particular there are concerns over questions including whether the ability to adapt to the environment will be lost and how much understanding students without work experience will have in advance about his/her type of position. Thus, it is effective if the system has a certain degree of flexibility. For instance, when transferring a person to another division for the first time since his/her entry into the company the new place of assignment should not be restricted to the initial type of position held by him/her.

in advance and applicants apply for particular positions. This recruitment method has generally been used for people with work experience and is gradually being used more frequently for the recruitment of university degree candidates.

With job category-based recruitment the job description is fixed to some extent and allows companies to recruit students who set high work goals. By reducing the incidence with which workers feel that their job is not right for them after entering the company the system is believed to have a certain level of effectiveness for lowering the early turnover rate[47]. The usual one-time recruitment of new graduates that does not specify types of positions inevitably has a tendency to prioritize generalists' qualities such as communication skills, level of professionalism, and training potential. In contrast, job category-based recruitment prioritizes adaptability to jobs with specific types of work and from this perspective both companies and students are expected to have a higher regard for the relevance of university education especially specialized education.

In this way, job category-based recruitment will allow students to make smooth transitions to the workplace upon developing their vocational skills during university education and developing a clear sense of what type of work they would like to do and is envisaged as an alternative method that will contribute to reducing the problems of the traditional one-time recruitment method[48]. In improving the substance of job-hunting and recruitment activities in this way as well it is important to increase the vocational relevance of university education and improve the human resources system of companies. It should be kept in mind that it is not sufficient to merely adapt the methods of linking universities with workplaces, in other words, the pattern of job-hunting and recruitment activities.

(5) Goal: New linkages between universities and workplaces

Figure 7 presents a simple diagram of the linkages between universities and businesses discussed above.

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[47] "Effects of Recruitment Pattern on Turnover Rate of Graduates (Within Three Years of Graduation)" (2007, Yoshio Higuchi Study Group, Keio University). The increase in the early turnover rate is viewed in various ways. For example, the 2006 White Paper on the National Lifestyle states, "Young people who graduated during the economic stagnation and could not find the sort of employment they wanted are leaving their jobs to find work that matches their desires. Thus, the increase in the early turnover rate may also be attributed to factors related to the business cycle". Some emphasize more constant underlying factors pointing out that young people may have lower incentives for long-term continuous employment amid the fluidization and increasing lack of transparency of the seniority-based human resources system ("Why do Young People Quit in Three Years?" [2006, Shigeyuki Jo). Other causes may be possible including changes in young peoples' awareness about work and occupations. However, realistically it is believed that these are not the sole causes and that there are multiple factors influencing the turnover rates including environmental variables such as the business cycle and changes in the seniority-based human resources system. It is also possible that changes in the surrounding environment are changing the attitudes of young people.

[48] In recent years, the new recruitment method of "year-round" recruitment" is increasingly employed as an alternative to job category-based recruitment. While its definition is not necessarily clear (the same with job category-based recruitment), it is believed to have two meanings: "year-round recruitment" in the sense of recruiting mainly those with work experience as necessary; and "year-round recruitment" in the sense of recruiting new graduates even in months other than April.

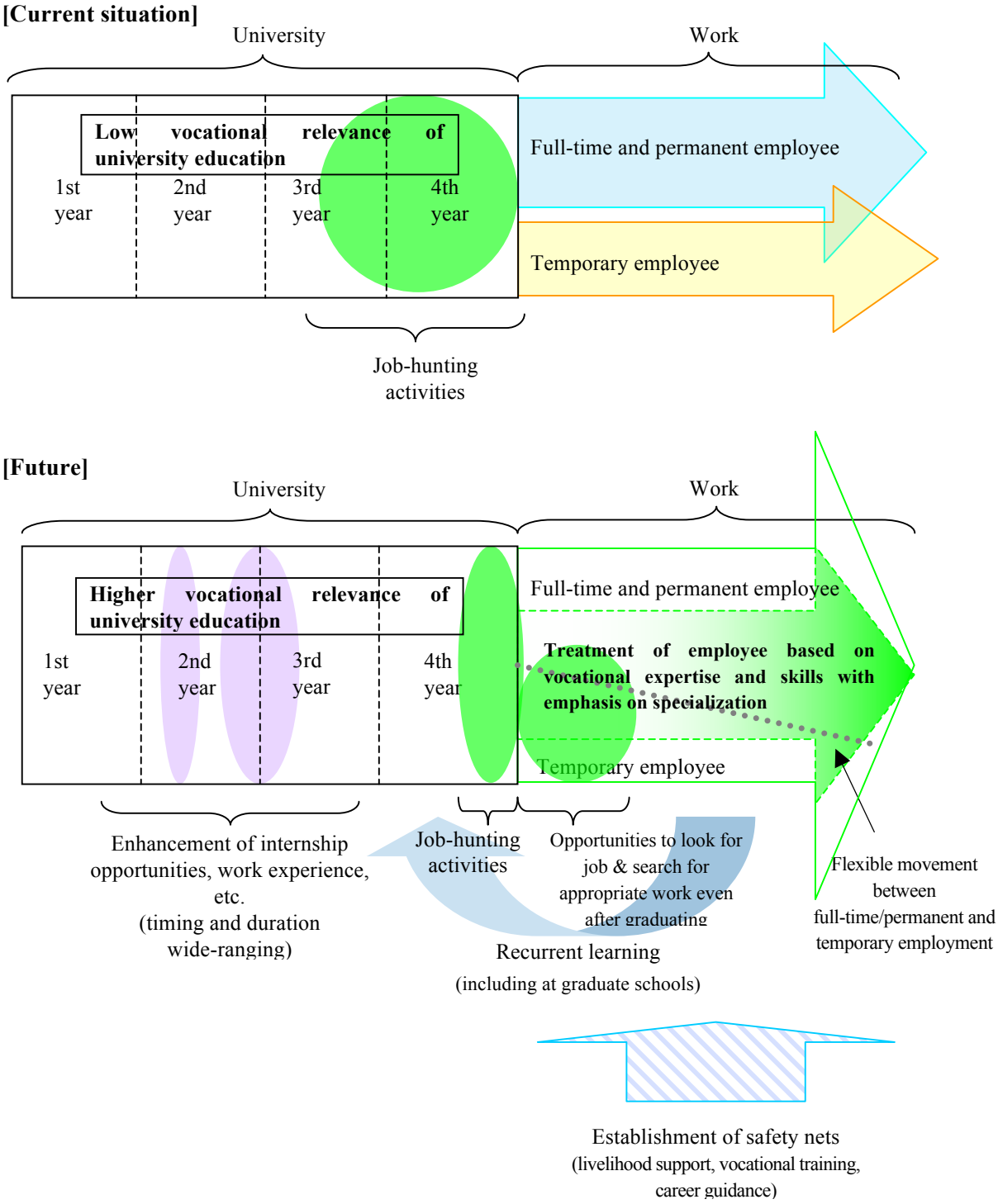
For the recruitment of new graduates in the latter case, the majority of cases are believed to be either those in which the required number of people could not be recruited in the April recruitment, or cases in which personnel are also recruited in the fall for students who returned to Japan from their overseas studies. For the need-based recruitment of mainly experienced personnel in the former, most of the instances are believed to be job category-based recruitment.

The Current Situation is characterized by six main features: (1) The low vocational relevance of university education; (2) Job-hunting and recruitment activities that place little emphasis on content learned in university and last over a long period; (3) A clear division between full-time permanent and temporary employment where future career development is largely determined by which of the two types of employment one obtains upon graduation from university; (4) A labour market that does not attach importance to specialized vocational expertise and skills; (5) A lack of recurrent learning opportunities at universities for the workforce; and (6) The lack of safety nets for those unemployed or with unstable employment that has poor working conditions.

In contrast The Future illustrates the ways of linking universities with workplaces that we should aim for. Regarding each of the above six items, the following improvements are made to the current situation. They are: (1) A higher vocational relevance of university education including gaining work experience and carrying out internships related to university studies; (2) Job-hunting and recruitment activities that are based on the desires of students as well as recruitment standards that prioritize compatibility between learning content acquired in university and the type of human resources sought by employers and that start upon the students' completion of most university courses; (3) Entry-level careers that broadly permit people to look for jobs and search for appropriate work even after graduating from university; (4) A labour market that promotes a balanced treatment of full-time permanent and temporary employees according to their vocational expertise and skills with an emphasis on specialization; (5) Expanded opportunities for recurrent learning that can be taken advantage of as often as necessary; and (6) Establishment of safety nets that integrate livelihood support, provision of vocational training opportunities, and career guidance.

Through these new ways of linking universities with workplaces university education is expected to make greater contributions while a fair and dynamic society and industries are created. Needless to say, it is unrealistic to think that the transformation will take place instantly from the current situation to the future situation we have envisioned. A reasonable process by which to make the transition is the step-wise reduction and resolution of the inconsistencies of the current situation that have gradually come to light. This will be done by appropriately recognizing the structural factors that emerge from the inconsistencies and introducing a method that matches the situation of the new era and also incorporates elements of the current system.

Figure 7 A New Form of Linkage Between Universities and Workplaces



6. Swift action for development of desirable linkages between universities and workplaces

It is said the education of young people is the same as global transformation. In terms of ensuring both a bright future for Japan and its international presence in the global era the quality assurance of university education is urgently required. In undertaking practical and specific efforts towards this end the present situation in which universities and workplaces are not necessarily appropriately linked needs to be reviewed and realistic measures need to be proposed for improving the situation. It is based on this recognition that we compiled Part III of this report beginning with an explanation of the "challenges surrounding young people" in the present era.

In recent years, awareness has grown over the importance of discussing education as it relates to careers and employment and of proposing and promoting pluralistic measures to assist young people's transitions from school to the professional world in line with the changes in the industrial makeup and social system rather than leaving it up to the individual. These seeds of change are seen sporadically. However, it is believed that this is the first time that any organization, including of course SCJ, has attempted to discuss the relationship between universities and workplaces with a focus on the "vision for the new university education" as presented in this report including the current situation of job-hunting and recruitment activities while bearing in mind everything from the structural changes of the post-war economic society to its future prospects. In view of the problems confronting the present Japanese society and the difficult situation in which young people find themselves, we believe many people will agree with us that it is an urgent issue to consider education, workplace/employment, and industry in an integrated and realistic fashion and to quickly take appropriate action.

With the discussion in Part III being about the "challenges of the linkages between universities and workplaces" mainly in connection with the humanities and social science subjects, there are still dimensions of the issue that need much further explanation. As noted earlier, it is an urgent issue to respond to this matter. We strongly hope this report will provide momentum for the swift commencement of action to advance specific initiatives for establishing desirable linkages between universities and workplaces, with university organizations such as universities and scholarly societies, as well as companies and businesses, the government, the career support industry, and the people working together in this endeavour.

Afterword In search of "collaborative knowledge" in the 21st century

Quality assurance of university education must be based on both an accurate understanding of the present circumstances of universities and our vision for how the world should be in the 21st century. If we compare today to the mid-20th century when the new system of universities was introduced after World War II universities and the environment surrounding universities have changed significantly.

First, the phenomenon that had the greatest effect on universities is the transition to universal higher education. University enrolment has consistently expanded in Japan since the end of the war and 55% of young people in the same age group now go on to university. Today the majority of those who complete university education will be contributing to the various "fields" of society as a working professional and as a public citizen. In this light, it is expected that universities not only make it their mission to pass on knowledge as institutions isolated from society but fulfil an even greater role in the sense of fostering the basic skills that students will need to serve society in the future.

If university education marks one of the key stages in a person's continuous learning process extending from primary and secondary education, the essence of the learning taking place in university education should also be considered from the perspective of its linkages with society that will be led by and created anew by students leaving university. This will be important also when considering those matters that concern the linkages between primary and secondary education and university education. We believe these considerations may offer the first clues to resolving many of the problems surrounding the selection of university enrolees and the job-hunting activities of students.

If we next turn our eyes to what has happened globally, we see that science and technology made rapid advancements in the 20th century and peoples' livelihoods rapidly improved in both prosperity and convenience. On the other hand, the growth and expansion of industry have pushed the Earth's regenerating capabilities, natural resources, and the biosphere to the limit. The books *Silent Spring* published in 1962 and *The Limits to Growth* published in 1972 raised alarm over the one-dimensional development of science and technology. This movement led to the 1987 United Nations report "Our Common Future" that proposed the concept of "sustainability". Following these developments, the Intergovernmental Panel on Climate Change (IPCC) was established in 1988. The fact that an international organization began to examine climate change issues marked the start of a new era when it became imperative to re-examine industry practices to ensure the sustainability of the environment and humankind.

In addition, the speed-up, spread, and diversification of transportation and communication methods created a world in which a change in one country or one region has immediate impact on people across the world. This has "advantages" such as enabling the quick deployment of international relief when a disaster hit a region. At the same time this introduces "vulnerabilities" as fluctuations in one region can cause the global economy to collapse. A critical challenge today is addressing the question of how to maintain a stable and viable society under globalization.

In the 1948 Universal Declaration of Human Rights those who experienced the two world wars in the

20th century declared “the advent of a world in which human beings enjoy freedom from fear and want is the highest aspiration of the common people”. Two years before that in 1946 the Japanese Constitution was the first to state something similar in its preamble that read “We recognize that all peoples of the world have the right to live in peace free from fear and want”. Nevertheless, to this day, this aspiration of humankind has not been realized. On the contrary, numerous challenges that threaten the sustainability of the global environment and humankind have arisen.

These challenges involve a complex mix of factors and their resolution requires the mobilization of various types of academic knowledge. While those who received higher education should have some expertise as professionals in their fields, it is important that universities foster their mentality to cross the barriers of their expertise and work together – collaborate – with others as good public citizens.

By defining what the essential elements of university education are, we are essentially designing the transformation of science and technology and social systems towards building a peaceful and sustainable world. Bearing this in mind, all university stakeholders must realize that they bear a heavy responsibility in this process.

The discussions that will be taking place to create the subject benchmark statements will be proposing and shedding light on the essential elements of each subject area. It is advised that this information is shared with all universities as well as with primary and secondary schools that precede university education and with workplaces that succeed it. In this way, we hope the education process as a whole will have a greater meaning to the lives of each and every learner. Furthermore, we hope each and every member of society will work together in their respective positions towards building a sustainable world.

Report

Reference Standards of Course Development for Discipline-Based Quality Assurance in University Education – Business Administration

August 31, 2012

Sectional Committee on the Study of Reference Standards in Business Administration, Committee on Curriculum Design/Development for Disciplinary Quality Assurance in University Education, Science Council of Japan

This report is the results of the deliberations of the Sectional Committee on the Study of Reference Standards in Business Administration, Committee on Curriculum Design/Development for Disciplinary Quality Assurance in University Education, Science Council of Japan. This is the English rendered by the Sectional Committee in cooperation with the National Institute for Educational Policy Research.

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Executive Summary

1 Background

In May 2008, the Science Council of Japan (SCJ) received from the Director-General, Higher Education Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT) a request addressed to the President of the SCJ entitled "Deliberations regarding the direction of discipline-based quality assurance in university education." The SCJ thereupon set up a task-specific committee in June 2008 called the "Study Committee on the Direction of Discipline-Based Quality Assurance in University Education," carried out several deliberations, drafted the "Direction of Discipline-Based Quality Assurance in University Education" in July 2010 in response to MEXT's request, and delivered it to MEXT in August of the same year.

In its response, the SCJ proposed developing points of reference in discipline-based curriculum design and development as a method of discipline-based quality assurance. After delivering the response, the SCJ proceeded to develop points of reference in several areas. Since a point of reference in business administration has been completed, the SCJ wishes to release it so that it can be used in organizations such as universities providing curricula related to the field.

2 Overview

(1) Definition of business administration

Business administration consists of the scientific knowledge system relating to the planning and operation of the organizational activities of all types of "going concerns," whether for-profit or not-for-profit, including not only private-sector enterprises but also central and local government authorities, schools, hospitals, NPOs, households, etc. The planning and operation of organizational activities includes the planning of new business ventures, business entity management, verification and improvement of the results achieved in business management, the diversification of existing enterprises, and the various activities associated with different positions within an entity's organizational structure. All of these activities are collectively referred to as "administration."

(2) Characteristics specific to business administration

In the past, business administration was generally positioned as belonging to the social sciences. Recently, however, business administration has increasingly taken on the character of an "integrated science" that makes effective use of research results generated in the natural sciences. Business administration embodies several perspectives specific to the field.

The first perspective is the bird's-eye view of a for-profit or not-for-profit going concern, which is referred to as the "management perspective" or "management agency perspective."

The second perspective is the perspective of the managers that fill the positions making up the entity's organizational structure, and which is focused on finding effective solutions to the issues

affecting individual functional units within the entity.

The third perspective examines the activities of a for-profit or not-for-profit going concern in terms of how these activities are connected to the development of society as a whole. The development of any given for-profit or not-for-profit going concern is inextricably linked with the society that envelops it, and it is vital that each entity examine for itself how its activities are integrated with the social order.

(3) Basic grounding that all students learning business administration should acquire

A person who has studied business administration should understand, and be able to explain, how a for-profit or not-for-profit going concern implements decision-making, the logic that underpins this decision-making, and what kind of results this decision-making will lead to. They should also be capable of analyzing the structure of the various types of problem that confront a going concern, and be able to suggest the optimal action to take to resolve these problems. Persons studying business administration will acquire the know-how needed to actually manage a going concern, and the ability to put this know-how into practice.

The types of specialist capability that a student who has studied business administration will have acquired would include, for example, the ability to plan the operations of a going concern, the ability to monitor the flow of funds in a going concern, the ability to measure the results of the going concern's activities in monetary terms, the ability to identify customer needs, and develop products for which there is significant customer demand, etc.

(4) Basic principles related to the learning methods and the evaluation methods for learning outcomes

A wide variety of learning methods can be used for business administration, including lectures, reading, exercises, internships, and on-the-job learning, etc. Lectures constitute the most fundamental learning method, since they enable students to learn both classical knowledge and the most up-to-date theories relating to business administration. However, because business administration is a discipline that relates very closely to practical activity, internships and on-the-job learning – which gives students the opportunity to think about problems in real-life situations and to acquire knowledge from personal experience – also constitute very effective learning methods.

(5) A relationship between specialist education and general education that aims to enhance students' cultivation as well-rounded citizens

Business administration is a discipline that seeks to adjust the way the operations of all for-profit and not-for-profit going concerns are integrated with society. For this reason, it requires a high degree of perceptiveness in regard to natural laws, the essential aspects of human nature, social justice, etc. As a consequence, not only is business administration built on the foundation

provided by general education, by reconstructing general education knowledge from the perspective of a for-profit or not-for-profit going concern, business administration can itself function as a general education subject in a meaningful sense.

Contents

1 Introduction

As we move into the 21st century, university education in Japan has entered an era of structural transformation. While Japan's total population has started to decline, the number of 18-year-olds has been falling even more rapidly. At the same time, however, the share of 18-year-olds going on to university has risen dramatically. Whereas university education was once something reserved for the "social elite," it has now passed through the subsequent stage of "mass production" university education into a new stage of "universal university education," in which more than half of young people attend university. Most university students will enter the workforce directly after completing their undergraduate degree. This means that the content of university education is even more important than ever for society as a whole.

At the same time, thanks to the rapid pace of change in transportation and communications technology and the trend for business corporations to grow ever larger, we are also entering a new, globalized era in which changes in any given region spread almost immediately throughout the world. Since university education entrusts young people with the future of the world, it is vitally important that the content of university education be subjected to a reexamination.

If one examines the overall trends in education and research, it is clear that, while the ever finer subdivision of academic disciplines continues unabated, a process of fusion is also taking place, and the framework of categorization into distinct academic disciplines that has underpinned the quality of teaching and research in universities in the past is starting to break down. There is a real need for a new approach to educational quality assurance that can cope with the challenges of universalization and globalization.

Today, we have reached the stage where the university community and the academic community need to undertake the compilation of reference standards, or "points of reference," for curriculum design that are aimed at ensuring the quality of undergraduate degrees. While academic disciplines have become more diversified, there are still common characteristics that are shared by all disciplines; ensuring that these common features are embodied at the level of the undergraduate degree is the foundation for quality assurance in university education.

The content of discipline-based quality assurance in university education comprises four key areas: (1) Characteristics specific to the individual discipline in question; (2) The basic grounding that all students studying the discipline in question should aim to acquire; (3) The basic principles relating to learning methods and to evaluation methods for learning outcomes; (4) A relationship between specialist education and general education that aims to enhance students' cultivation as well-rounded citizens.

A point of reference for the discipline of business administration should aim to clarify, in concrete terms, what the subjects of teaching and research in business administration are, what fundamental perspectives differentiate business administration from other disciplines, what kind of skills a person graduating in a business administration related field should be expected to have acquired, what kind

of teaching methods can be used to inculcate these skills, how the study of the specialist field of business administration can contribute towards enhancing the civic consciousness of ordinary citizens, etc.

What this Report presents is, very specifically, a point of reference for the teaching of business administration at undergraduate level; it is not intended to be applicable to graduate-level study or to elementary or secondary level education. Business administration knowledge needs to be deepened and enhanced in the course of the undergraduate student's subsequent career, whether in graduate school or in the workplace after graduation. The teaching of business administration as part of the undergraduate curriculum is intended only to put in place the foundations on which the student can continue to build at a later date.

The point of reference for business administration presented in this Report outlines how the Science Council of Japan (SCJ) believes that business administration should be taught at the undergraduate level. It is hoped that individual universities will use this document as a reference for the compilation of their own optimized curriculum for the teaching of business administration, a curriculum taking into account the individual university's guiding philosophy, the administrative and human resources available to the university, the quality of the university's students, etc. It is also to be hoped that the teaching staff involved in teaching business administration in universities will also be able to make effective use of their understanding of business administration in other roles, for example in government agencies, certification bodies, university organizations, related associations, business enterprises, institutions of elementary and secondary education, etc. In this way, it will be possible to respond effectively to the need for quality assurance in university education in 21st-century Japan.

2 Definition of Business Administration

(1) Definition of business administration

Business administration consists of the scientific knowledge system relating to the planning and operation of the organizational activities of all types of "going concerns," whether for-profit or not-for-profit, including not only private-sector enterprises but also central and local government authorities, schools, hospitals, NPOs and NGOs, households, etc. The planning and operation of organizational activities includes the planning of new business ventures, business entity management, verification and improvement of the results achieved in business management, the diversification of existing enterprises, and the various activities associated with different positions within an entity's organizational structure. All of these activities are collectively referred to as "administration."

The scientific knowledge of business administration represents the formalization of tacit knowledge held by business owners, senior managers, functional managers etc. in the shape of knowledge that can be shared by all of humanity. However, in order for this scientific knowledge to be made to function in the real world, it needs to be linked with the tacit knowledge, so the transmission of tacit knowledge is also included within the teaching of business administration.

The for-profit and not-for-profit going concerns that are the object of study for business administration input into the organization management resources such as people, objects, money, information, etc., and create new value for society by converting these inputs into products and services. When these products and services are provided to parties outside the organization, they can again be transformed into management resources, and the process of conversion can be expanded and continued. In many cases, the conversion process involves collaboration based on a division of labor which in turn leads to the creation of organizations that allow business objectives to be achieved more efficiently.

While business administration today constitutes a system of scientific knowledge relating to the planning and operation of for-profit and not-for-profit going concerns, through the generation and development of factories in modern society, this scientific knowledge has become systematized as an academic discipline. While the knowledge developed to solve management problems was originally accumulated in order to resolve problems encountered in firms' production facilities, over time it came to be applied to the entirety of business enterprise operations, developing into "business administration know-how for business owners."

As business enterprises grew in scale and complexity, and as markets grew more diversified and competition more intense, the scope covered by management issues expanded to include the challenges posed by having to adapt to changes in the economic environment and in the social and political environment, etc., with a corresponding expansion in the range of research fields within the business administration discipline. As an academic discipline, business administration has evolved beyond merely seeking to shed light on internal issues affecting organizations, to include

research aimed at clarifying strategies for handling the relationship between the organization and the external environment, and the business environment itself has become an object for empirical analysis, leading to the emergence of "business administration in the broad sense."

Business administration in the broad sense has developed along multiple axes, including: (1) Management theory, which addresses the issues facing a for-profit or not-for-profit going concern from the perspective of a business owner or functionally-specialized manager; (2) Accounting, which deals with the recognition and measurement of the monetary value of business activities, the transmission of this information to external and internal stakeholders, and the provision of useful accounting information for utilization in decision-making (from various different perspectives) and in the reconciliation of overlapping interests, etc. (3) Commercial science, which addresses the transactions, delivery, inventory handling, financing, insurance etc. that serve as a "bridge" linking production with the consumer; (4) Management engineering, which identifies problems affecting management, uses engineering-style methods to address them, and seeks to find the optimal solution for each problem; (5) Management information science, which utilizes information science to support timely decision-making, etc.

(2) Fields covered by business administration

1) Management theory

As management theory is concerned with the organizational functioning of for-profit and not-for-profit going concerns, the main object of research comprises organizational aspects such as the formation of efficient organizations and the establishment of production systems, strengthening the motivation of the employees who are the component elements of the organization, etc.; strategies for enhancing the proper relationship between organizations and the environment in which they exist have also become a target for management theory research. Within the framework provided by "business administration in the broad sense," management theory can be seen as representing "business administration narrowly defined."

2) Accounting

Accounting developed from bookkeeping, the purpose of which was the recording and reporting of commercial activities and the safeguarding of assets. With the development of the joint stock company system, bookkeeping evolved into financial accounting and management accounting. Financial accounting has as its purpose the recognition and measurement in monetary terms of all management activities aimed at the procurement, utilization and distribution of capital, and the compilation and disclosure of financial statements showing financial status, operational performance, funding status, etc. Management accounting is conducted for management purposes that include management decision-making and performance appraisal aimed at the efficient, effective utilization of capital. In addition, as accounting is able to "map," in monetary terms, the future, present and past of a going concern's operations, it plays a useful role not only in the decision-making by internal and

external stakeholders of private-sector enterprises, central and local government authorities, schools, hospitals etc., but also in maintaining the sustainability of society as a whole.

3) Commercial science

Those aspects of commercial science relating to transactions have developed in the form of marketing theory, circulation theory and business studies. Circulation theory and business studies examine transactions from a macro perspective, and are also referred to as "macro marketing theory." By contrast, marketing theory examines organizational activities relating to transactions from the perspective of the management of an individual enterprise. A transaction has the customer as the transaction partner, and is carried out within a relationship of competition with other enterprises. In the case of transactions involving consumers or quasi-consumers, it is common for a distribution firm such as a wholesaler or retailer to act as intermediary between the firm that is the main agent in the transaction and the end customer in the transaction. For the transaction to be carried out effectively, therefore, it is vitally important to have an understanding of the external environment, including the market environment, the competitive environment, and the distribution environment. This is why marketing theory is closely linked with consumer behavior theory, competition analysis, circulation theory and business studies.

4) Management engineering

The main source from which management engineering evolved was industrial engineering. With a main focus on techniques for the effective design of goods such as products, services, etc., and on techniques for the efficient utilization of systems for producing these goods and supplying them to customers, management engineering has developed as a set of engineering-style techniques for identifying and resolving management problems. Fusing business administration with engineering as it does, in addressing the various types of managerial problems, management engineering makes use of knowledge from a wide range of related fields, including accounting, marketing, information science, systems engineering, human engineering, production engineering, quality management, mechanical engineering, etc., to provide theories and methods for the optimal resolution of the problems affecting an organization.

5) Management information science

Accompanying the rapid development of information science, management information science has emerged as a means of clarifying the movement of information (as a management resource) and its utilization within management; management information science aims to realize a unification and fusion of information science with business administration. Management information science has the power to transform existing value creation frameworks – which have traditionally operated at the level of products and manufacturing, based on a reductionist logic derived from science and engineering – into a new kind of value creation framework that operates at the level of management, through the effective utilization of information.

Traditionally, Japan's monozukuri style manufacturing was centered on the foundations provided by scientific knowledge from which derived the logic used in the design of products and the design of production processes. However, in contemporary management, value creation also needs to be added to this mix. What is required now is a product design knowledge that utilizes both the natural sciences and the humanities and social sciences; management information science is a research field that uses information technology to make this kind of design possible.

The discipline of business administration that these fields make up serves to develop the knowledge required for the maintenance, survival and development of going concerns that produce value for society (in the form of goods and services), and provides a wide range of knowhow and techniques to help solve the problems faced by people working within organizations. At the same time, business administration also provides the knowledge required to achieve the goals of the organization as a whole by utilizing the division of labor between people to render the operation of the organization more efficient.

3 Characteristics Specific to Business Administration

(1) Perspectives specific to business administration

Business administration has been positioned as one of the social sciences, alongside economics, law, politics, sociology, psychology, etc., and in the past research in the business administration field has tended to focus on management as a social phenomenon. In recent years, however, business administration has increasingly come to take on the character of an "integrated science" that makes use of research results not only from the social sciences, but also from the natural sciences. For-profit or not-for-profit going concerns bring large numbers of people together within the same organization, and carry out their operations within the framework of social interaction between people. A wide range of different academic disciplines can be applied to the management of a for-profit or not-for-profit going concern. For example, viewing business management in terms of its economic aspects provides a foundation for management economics; if a for-profit or not-for-profit going concern is viewed as a "society in microcosm," then the application of a sociological perspective establishes the basis for the sociology of management. "Business administration" can thus be used as an all-inclusive term for a wide range of academic disciplines focused on for-profit and not-for-profit going concerns.

Nevertheless, business administration has its own specific perspectives that are different from those of other social sciences. Broadly speaking, in analyzing management issues, business administration adopts one of two main perspectives: a perspective that takes a bird's-eye view of the entire organization, and a perspective that analyzes the issues facing the individual functions that make up the organization. In more concrete terms, the former seeks to find solutions to problems from the perspective of top management, while the latter addresses problems from the perspective of functional managers. In order for a for-profit or not-for-profit going concern to be efficiently managed, it is necessary to undertake collation and analysis based on both of these perspectives, so as to devise strategies for solving the problems facing the organization. Both of these perspectives involve an approach to analysis of management phenomena different from that used in economics or law, and both can be seen as perspectives specific to business administration.

The first of these perspectives specific to business administration involves viewing organizational activities from the viewpoint of a business owner. A for-profit or not-for-profit going concern is an organization, which seeks to achieve its organizational objectives efficiently. At the same time, there is a need for the individual units that make up the organization to be coordinated as a unified whole. This is the perspective of top management, which seeks to optimize the entirety of the organization's activities. As a metaphor for this, one could consider the way the individual musicians that make up a symphony orchestra need a conductor to coordinate their playing. This perspective is also referred to as the "business owner's perspective" or the "management agency perspective." When an organization's internal and external problems

are viewed from this perspective, the problems seen are different from the phenomena that would come into view from an economic or legal perspective, and they require different solutions. At the same time, the problem analysis and solutions deriving from the adoption of this perspective are meaningful activities, in so far as they bring about the efficient realization of organizational objectives and help to create value that society needs.

The second perspective specific to business administration is the perspective that views organizational activities from the viewpoint of the individual functional managers that make up the organization. When considering how to achieve organizational goals efficiently, a major prerequisite is that the units that make up the organization, and the activities of these units, must be efficient. The scientific management approach focused on the issues facing factory supervisors, in terms of how to make the work of individual factory operatives more efficient. Every individual organization has its own specific issues that it needs to resolve, depending on which specialist field it is active in. Theories were formulated aimed at "partial optimization" in each specific functional area, and practical techniques were developed based on these theories. Business administration as a discipline evolved out of the accumulation of this function-specific practical knowledge. Of course, one of the key features of business administration as an "integrated science" is the way that it utilizes knowledge from a wide variety of sciences – including economics, psychology, engineering, statistics, mathematics, etc. – to solve problems.

A further point is that, as a branch of the sciences, business administration embodies a third perspective which it shares with the other sciences: this is the perspective which views the activities of for-profit and not-for-profit going concerns in relation to the development of society as a whole. Any given for-profit or not-for-profit going concern is an agent forming a constituent part of society, and as such is expected to contribute proactively to society's development. This coordination of the activities of the going concern with the wider society needs to be approached from two aspects.

The first aspect relates to the way that a for-profit or not-for-profit going concern must respond to changes in society by establishing new businesses, by developing new products and new business models, and by constantly providing new value for society in response to the transformation of society. Besides providing new goods and services, this process can also continue to generate meaningful results for society through the creation of new jobs, the safeguarding of the environment, etc.

The second aspect relates to the importance of self-examination by the going concern, to determine whether it is tackling the various issues that it is expected to address as a component element of society in an appropriate manner, e.g. by ensuring that it makes a fair contribution to all of its stakeholders, etc. For example, a firm's accounting statements allow the firm to monitor the content and results of its operational activities in monetary terms, and to disclose this information to the stakeholders involved with the firm. Accounting statements will normally be examined to verify that they are in accordance with legal requirements (i.e. with the relevant

accounting standards), but it is also important for a firm to implement self-inspection in regard to its compliance with civic expectations. Firms may also publish environmental reports and corporate social responsibility (CSR) reports, etc., as a means of disclosing the firm's corporate citizenship activities to its various stakeholders. Research on management ethics stresses that business owners' actions need to be appropriate not only from a corporate governance perspective, but also socially, in terms of a corporate citizen perspective.

By implementing examination based on both of these aspects, a going concern can demonstrate its social value as an actor helping to make possible the sustainable development of society as a whole. In essence, while business administration is able to use the business owner's perspective to clarify the nature of internal activities within the organization, it can also use the visualization of operational activities to demonstrate the social value of the for-profit or not-for-profit going concern. By means of the self-examination of social value undertaken by for-profit or not-for-profit going concerns, the systematized knowledge of business administration contributes to the sustainable development of society.

(2) Diverse approaches

A wide variety of different approaches exist for analyzing the operational phenomena of for-profit and not-for-profit going concerns. If these approaches are grouped according to a conventional academic classification scheme, they can be classified as theoretical approaches, historical approaches, and policy-based approaches.

An example of the theoretical approach would be the work of Erich Gutenberg; in Germany in the 1960s, Gutenberg established a productivity paradigm based on the management economics perspective, making use of the theoretical relationship between the capacity utilization rate and the cost curve, etc. The historical approach is exemplified by the research of Alfred D. Chandler, who used his analysis of the historical process by which the DuPont Corporation diversified its operations to show how organizations act strategically. As an example of the policy-based approach, Konrad Mellerowicz undertook systematic research on the content of the policies adopted by German firms, and on the decision-making processes by which these policies were arrived at.

At the same time, as business administration has the characteristics of an integrated science, it also supports a wide range of other approaches, including the economics approach, the sociological approach, the psychological approach, the mathematical approach, the statistical approach, etc. By making effective use of these different approaches, business administration has been able to elucidate knowledge relating to a wide variety of management phenomena, and to find solutions for specific, concrete management issues; this is readily apparent from a perusal of the history of business administration.

Firstly, because market transactions generate transaction costs, business administration has been able to undertake analysis of different types of organizational forms from the transaction cost

reduction perspective, by treating the business enterprise as a resource allocation system that acts in place of the market. Furthermore, by viewing firms in terms of the principal-agent relationship, business administration has been able to shed light on aspects of corporate governance such as the role of shareholders and auditors, through the adoption of a perspective that recognizes that the interests of shareholders and managers are not identical, and that they do not have access to the same information. This clarification of how firms' organizational structures are generated and formed can be seen as an application of the economics approach, with its emphasis on bounded rationality and on the maximization of utility.

Secondly, business administration has applied sociological theories to small groups within the workplace, to analyze what kind of impact interpersonal relationships within the workplace exert on job satisfaction. By analyzing the behavior of workplace operatives, it has been possible to clarify the social causes of the rules constraining their actions, which in turn has made it possible to find solutions for problems relating to the improvement of workplace behavior.

Thirdly, by utilizing empirical data with the aim of enhancing operatives' motivation, business administration has shown that the factors that contribute to job satisfaction are not necessarily congruent with the factors leading to dissatisfaction. This has led to the development of job design methods that strengthen operatives' job satisfaction, and their motivation, by incorporating elements that promote increased satisfaction into individual jobs. This can be seen as the result of applying psychological methods to the design of organizational structure.

Fourthly, mathematical theories have been applied to the study of how business enterprises etc. draw up their budgets. Mathematics' optimization theory has been applied to the situation where organizations need to derive maximum benefit from a limited budget by determining which projects out of a range of possible investment projects the organization should invest in in the current fiscal year. In cases where the business owner or senior manager would find it difficult to achieve a broad enough perspective to make appropriate budgeting decisions, mathematical theory can be used to support the decision-making process; this represents the application of the mathematical approach to the resolution of management issues.

Fifthly, the rapid evolution and increasingly wide dissemination of information and communications technology over the past few years has made it possible to utilize a wide variety of data relating to customers' purchasing behavior. These data show how customers are responding to the state of competition in the marketplace and to individual firms' marketing plans. By analyzing these data using statistical approaches such as multivariate analysis, it has been possible to implement quantitative evaluation of the competition structure and of the suitability of individual marketing plans. This can be viewed as an example of the application of the statistical approach to the formulation and evaluation of firms' marketing plans.

(3) Role of business administration

By developing the knowledge needed for a for-profit or not-for-profit going concern to operate

efficiently, and the knowledge to help a going concern make a positive contribution to society through its organizational activities, the discipline of business administration plays three major roles within society.

Firstly, through the study of business administration, it is possible for someone to acquire the knowledge and capabilities needed to animate an entire organization, even a huge organization such as a multinational corporation. Animating an entire organization effectively requires different knowhow and skills from those required to animate a single unit within a larger organization. For an entire organization to demonstrate capabilities that are more than just the sum of the capabilities of its constituent units, top management must possess special knowledge and abilities. A business owner or senior manager needs to have a different perspective and a different awareness of problems to individual functional managers; the way they exercise their leadership abilities will affect the capabilities of the entire organization, just as the way a given piece of music sounds to the audience can vary dramatically depending on the conductor. Business administration makes explicit the knowledge and capabilities that a business owner or senior manager requires, and in so doing contributes to the cultivation of successful business owners and managers. A comparison can be made with the way the education of a conductor involves the imparting of different knowledge and skills from those needed by the players of individual instruments. Business administration contributes to the cultivation of the business owner's perspective, with its bird's-eye view of organizational activities, and of the related capabilities.

Secondly, by enabling large numbers of people to acquire business administration knowledge, the discipline of business administration not only shows people how to operate within an organization, it also imbues them with the knowledge to work effectively as part of an organization. In today's society, it is extremely difficult for most people to contribute meaningfully to society outside of an organization. Whether as an employee of a business enterprise or as a volunteer in a charity or NPO, by becoming a member of an organization, people can achieve things that they would be unable to do alone. By acquiring the knowledge and skills needed to function effectively as a member of an organization, the individual is able – through the medium of the organization – to make a greater contribution to society than would otherwise be the case. For example, within the organizational structure of a business enterprise, applying specialist knowledge to the activities of individual functional units such as operational planning, R&D, finance, personnel, manufacturing, sales, etc. makes it possible for these units to implement their specific functions more effectively. Business administration facilitates the clarification of the knowledge needed for individual specialist functions, and the teaching of this knowledge. At the same time, by positioning the individual specialist functions within the organization as a whole, it is possible to address the issues affecting one's own functional unit more effectively by examining them in the light of overall trends within the organization as a whole.

Thirdly, business administration knowledge is able to provide know-how that can help a

for-profit or not-for-profit going concern to optimize its operations with respect to the sustainability of society as a whole. Besides making it possible for functional units to carry out their activities effectively, business administration also clarifies the knowledge needed to realize the objectives of the entire organization in an efficient manner. In addition to contributing to the development of the individual for-profit or not-for-profit going concern, this business administration knowledge can also contribute towards ensuring that the development of the individual going concern is coordinated with the development of society as a whole; the knowledge can be transmitted and used as shared knowledge for the benefit of all humanity. In this way, the for-profit or not-for-profit going concern can have its significance as a constituent member of the wider society recognized, and can develop in harmony with the social order.

While the formal knowledge of business administration constitutes knowledge that can enable organizations to sustain themselves and to develop, it can also be utilized as knowledge for enabling organizations to develop appropriately within the wider order of society as a whole. For example, knowledge relating to corporate governance (which embodies the approach adopted by top management) represents not only knowledge that can enable the organization to operate efficiently, but also knowledge that can allow the organization to operate harmoniously as a constituent element of society, and that can safeguard stakeholders' interests. A concrete example of this is the enactment of legislation to improve corporate governance that is based on the findings of business administration. Business administration knowledge is knowledge that enables for-profit and not-for-profit going concerns to achieve sustainable development while still conforming to the social order. In this sense, business administration is a genuinely valuable discipline that can foster the development of for-profit and not-for-profit going concerns in a manner linked to the development of society as a whole.

(4) Collaboration with other sciences

Business administration is a culmination of knowledge on the management of all for-profit or not-for-profit going concerns, and it is also knowledge for solving concrete problems of unit organizations. Any for-profit or not-for-profit going concerns can be a subject of diverse academic research. When it is considered as a social phenomenon, business administration becomes research subjects such as economics, law, sociology, and psychology, etc., while in natural sciences, it can become research subjects such as engineering, mathematics, statistics and so on. Business administration has developed as an academic discipline to solve various concrete problems of organizations and workplaces, and so long as it is necessary for solving problems, it will actively utilize knowledge gained by these scientific analyzes. Business administration is positioned as a comprehensive science on management from this point.

In the early days of its formation, business administration borrowed various types of knowledge from other academic disciplines to solve problems. Therefore, it has been explained as an applied field for each science. However, in solving various problems for for-profit or not-for-profit going

concerns, it became necessary to culminate the results of science from a point of view unique to business administration. In addition to simply applying knowledge from other academic disciplines, business administration has organized and systematized knowledge on management from a unique viewpoint and turned it into management knowledge.

When reviewing management issues of all for-profit or not-for-profit going concerns from the viewpoint of top management, there are also problems that can be solved by applying knowledge already disclosed in other academic disciplines, but it became clear at the same time that this did not solve all the real problems. In order to solve management problems, business administration aimed to take advantage of the knowledge of other sciences as well as taking into consideration the unique viewpoint of business administration. Furthermore, there are concepts developed and disseminated in business administration that other sciences have utilized, and some concepts are already regarded as common sense. Examples include the PDCA (Plan-Do-Check-Action) cycle and customer satisfaction. As the activities of the organization become globalized and companies think about management issues on a global scale, it becomes necessary to aggressively incorporate knowledge of cross-cultural understanding and outcomes of information science. As it has been doing so far, it is important for business administration to continue to cooperate with different sciences, to integrate and fuse together, and to develop new knowledge.

4 Basic Grounding All Students Learning Business Administration Should Aim to Acquire

(1) Basic knowledge and understanding to be acquired by learning business administration

1) Fundamental significance of learning business administration

Those who have studied business administration, first of all, will be able to understand and explain how for-profit or not-for-profit going concerns make decisions, how they act, and what kind of results occur, with what kind of logic. Those who have studied business administration analyze the structure of the various problems confronting concerns and can clarify what kinds of actions to take to solve these problems quantitatively and qualitatively. Also, if going concerns deviate from their optimal behavior, they will be able to explain what factors within the organization this is attributable to.

Those who have studied business administration will understand the decision making process and behavior of all for-profit or not-for-profit going concerns that are important actors in society, and will be able to measure and explain the results quantitatively and qualitatively. This is an important intellectual ability for citizens today.

In addition, by learning business administration from a realistic point of view, students of business administration acquire knowledge to practically manage any for-profit or not-for-profit going concerns and the ability to practice it at the same time. In addition, they will be able to actually start up any for-profit or not-for-profit going concerns in an appropriate manner.

However, in order to acquire such practical competence, besides the knowledge learned through lectures, onsite learning and training where it is applied are necessary. Therefore, even if students learn business administration knowledge at the undergraduate level, it is not guaranteed that they can immediately act as managers.

By accumulating basic knowledge on business administration, accounting, marketing, business engineering, business informatics etc., and experiencing practical training in actual for-profit or not-for-profit going concerns, always reflecting on actual experiences, students' initial "knowledge" transforms into practical knowledge through practical management. Business administration knowledge can be deepened by learning, executing, and reflecting with a viewpoint as an actor of "If I was the manager, what would I do?" The business administration learning in the baccalaureate degree program establishes the foundation of this practical process.

2) Basic knowledge and understanding to be acquired

The area studied in business administration spans a wide range of subjects such as business administration, accounting, marketing, management engineering, management information science, etc. However, basic knowledge and understanding that students studying business administration should acquire in baccalaureate degree program are divided into the following

four levels. The difference in the levels is not the difference between “shallow / deep” and “low / high” levels, but in what perspective the phenomena of management is viewed. However, it is not required that all levels be covered in lessons.

i. Basic knowledge and understanding of business administration as common sense

As general common sense, students have a knowledge of for-profit or not-for-profit going concerns, and at the same time have knowledge and understanding about management. Even students who do not belong to business administration related faculties such as the Faculty of Business Administration, Faculty of Commerce, or Faculty of Management Information, etc. may actually face problems in daily life if they do not have knowledge and understanding of business administration. For example, if they cannot distinguish between a stock company and an NPO, they may have excessive expectations for volunteer organizations. Or if they can not read securities reports such as balance sheets, profit and loss statements, cash flow statements, etc. of a company where they wish to find employment, they may choose the wrong company at which to be employed.

ii. Basic knowledge and understanding of business administration as a functional manager

When you work in the field of management, at this level you can understand the professional knowledge and skills necessary for it. This is the level where you can also understand and use management terminology widely used in the corporate world. For example, at this level you understand the meaning of “business division system”, “marketing mix”, “EVA (Economic Value Added),” “convertible bonds,” and “excess debt” and can use these technical terms properly and accomplish your job efficiently in corporate activities. In the organization, the functional person in charge must be able to understand expertise in each field and solve various problems in the field of work.

iii. Basic knowledge and understanding of business administration as a professional specialist·

At this level you can understand and improve very complicated management problems by making full use of the knowledge, skills and thinking skills of business administration. This level of knowledge and understanding is that of a management professional, and for the first time you can find problems, analyze the structure behind them, and make the best possible solution. It is hard to say that this level of highly specialized business knowledge and understanding can be obtained sufficiently by undergraduate education alone. By acquiring the level of undergraduate education adequately, then repeatedly learning through practical experience, returning to the foundations of business administration learned at university, deepening one’s own understanding of business administration, and based on this taking on the challenge of new practices, you can acquire this level of knowledge and understanding. Thinking like this, even though you can not acquire the knowledge and understanding completely at the time you graduate from university, it is important to take on the challenge

of business administration as a specialty field as an undergraduate and acquire knowledge of business administration as a professional.

iv. Basic knowledge and understanding of business administration as social insight

This is the level of knowledge and understanding where you can judge what role for-profit or not-for-profit going concerns play in society as a whole, and what value they contribute to society within the sustainable development of society. Why were for-profit or not-for-profit going concerns founded and why do they continue? What kind of significance do these businesses have for the sustainable development of people's lives and society? How we they adapt to changes in society by transforming their business contents? And how will they manage such business in a new way that is appropriate for social development? At this level you can explain such matters from the meaning of human beings and society, and furthermore from the relationship with the natural environment.

Here, not only scientific knowledge on management, but also deep knowledge in areas such as prediction of actual human behavior and the results of decision-making is necessary. This knowledge and understanding can be revised in line with the development of society while explaining realistic management of for-profit or not-for-profit going concerns back to their mechanisms and social significance to society. Studies in business administration can be part of such social insight. However, such insight needs to have deep cultural knowledge about human beings, society, and nature, and business administration as a part of social insight is positioned not only as a special subject but also as a general liberal arts subject.

(2) Basic capabilities to be acquired by learning business administration

1) Capabilities specific to business administration

i. Handling of practical issues and occupational significance

For students who find employment in for-profit or not-for-profit going concerns, or who start their own business, it is almost the same meaning to acquire management knowledge as to acquire professional skills. Business administration with a strong practical element lets you acquire the ability to efficiently run a real working life as a professional or manager with specialized profession. For example, when starting a job in a company or starting his/her own business, a person who has studied business administration usually acquires the ability to gain insight into what kind of market environment is attractive; what companies positioned in what kind of market environment are profitable; and which companies have appropriate marketing strategies. In addition, by analyzing securities reports and financial documents (financial statements), etc., they can judge the profitability, stability, and growth potential, etc. of a company.

The knowledge of business administration applies to all for-profit or not-for-profit going concerns, so the subject also has real meaning for students who wish to become public officials, etc. Among other things, while transitioning from local government administration

to local government management, reform of municipal accounting systems through the introduction of corporate accounting methods, transitioning to national management and national accounting, etc. in government are progressing, and there is practical meaningfulness to acquiring knowledge in business administration developed by private enterprise.

Furthermore, business administration students can design manufacturing processes, design market research, or calculate the market value of an acquiree company, for example, according to the specialized field that he/she studied in detail. If you work in business administration you can also proceed with confidence based on a clear theory about the way to motivate members of the organization and to guide group decisions appropriately.

ii. Significance in relation to civic life

Learning knowledge on the management of all acquiree will be effective not only in industrial society but also in civil society. It is also useful for managing diverse groups including local government organizations, volunteer organizations, communities, and others. Knowledge of business administration has been developed as knowledge to solve the various problems confronted by private enterprises. However, that knowledge is effective knowledge for efficiently managing concerns as organizations, and it is being utilized by concerns other than private enterprises. In mature civil society, acting parties constituting society are expanding to not only private enterprises but also many organizations such as civil society groups, volunteer organizations, schools, hospitals, and independent administrative agencies, etc.

When considering the activities of these diverse actors and their management, it is important not only to efficiently operate concerns, but also to see how these businesses contribute to the sustainable development of society, and it is necessary to critically examine whether the management of business concerns is appropriate from the viewpoint of the natural environment and human rights / social justice. These perspectives are exactly the viewpoints of citizens as sovereign owners of society, and it is the knowledge gained by business administration to provide citizens with one of the important grounds for these judgments. Applying the knowledge developed in business administration to many for-profit or not-for-profit going concerns from the viewpoint of citizens opens new horizons to consider social life. In that sense, business administration is an important knowledge system not only for corporate society but also for civil society. By learning business administration, you can think about the ideal form of a new society at the same time.

iii. Changes in academics and society and study of business administration

As in the field of other social sciences, business administration is evolving as it responds to changes in society; demands from management of all for-profit or not-for-profit going concerns; and sustainable development of society as a whole. Business administration, which has solved various problems related to the management of all for-profit or not-for-profit

going concerns, has created new knowledge and has developed and disseminated new concepts as society has changed. It has changed the movement of society through its intellectual production activities and contributed to the creation of a new society. Therefore, business administration plays a role as “source of value creation” that creates new value for society. At the same time, it plays the role of an intermediary linking the development of knowledge and changes of society.

For example, information technology including computers generates new industries, and at the same time, it revolutionizes the manner of management. In order to elucidate it, business informatics and many new theories were developed. Concerns that connect activities at the space station and on the ground are now managed and new business fields are being developed. In addition, global environmental issues have become a problem not only in industrial society but also in civil society, and diversified concerns have created CSR reports. Information on gender equality, the treatment of women at work and in hiring, is disclosed in CSR reports.

In this way, the study of business administration is always linked with the latest movements of society, and is an intellectual base to change society itself. By learning business administration, students can see the future of society as a whole as well as corporate society. Based on what they have learned, students of business administration can learn and master the latest knowledge about management challenges in this new era. The studies of business administration in the baccalaureate degree program also give students the foundation for further learning.

iv. Specific capabilities expected to be acquired

Specific abilities acquired through education in business administration are extremely varied. In addition, as mentioned above, there are various approaches to understanding the behavior of all for-profit or not-for-profit going concerns which are the subject of business administration. Because business administration has the character of a general science, various approaches and diverse contents of study / learning methods are required, but professional knowledge and understanding will differ depending on which approach students learn deeply. However, whichever approach students learn deeply, there is basically a common theme in the concrete abilities acquired by students learning business administration. The general abilities and professional abilities acquired through business administration are as follows. Of course, the professional abilities acquired by the study of business administration in the baccalaureate degree program remain basic, but can be developed into higher-order studies by subsequent experience and further study.

(i) General capabilities

a Students can have an empirically supported view of the current state and future of management of for-profit or not-for-profit going concerns.

b Students can understand, appropriately evaluate, and position others' opinions on

management.

c Students can provide an appropriate interpretation of newly occurring management events, and express themselves or engage in practice if necessary.

d Students fully understand the environmental adaptability of for-profit or not-for-profit going concerns and can organize concerns appropriately.

e Students can collect literature and data about specific management challenges, and examine and solve them.

f Students can explain to non-specialists what business administration is and what management is.

(ii) Specialist capabilities

a Students can plan and operate for-profit or not-for-profit going concerns.

b Students can grasp the flow of funds of concerns and measure the results of management activities in terms of money.

c Students can grasp the needs of customers and develop satisfactory products for them.

d Students can properly organize concerns and to manage the organization.

e Students can motivate individuals and groups in an organization towards organizational goals and activate the organization.

f Students can design production and distribution processes and solve problems when they occur.

g Students can manage concerns developing globally from a global perspective.

Many of these abilities are thought to be general skills and specialist abilities acquired by studying business administration in baccalaureate degree program education such as at the faculties of commerce, business administration, or management information. In addition, through various practical experiences, students can master higher level specialist skills.

2) Generic skills

Education in business administration aims to provide students with general knowledge and ability, and expertise and ability in the planning and operation of all for-profit or not-for-profit going concerns in the market economy system. Like other fields of social science, the learning process contains many opportunities to deepen the process of collecting and processing diverse sources of information and deepening the insight about real society and human beings.

Especially, among for-profit or not-for-profit going concerns that business administration considers, there are huge organizations, small organizations, volunteer organizations, and national and local governments, etc., covering almost all areas of society. From that, learning of business science has many opportunities for students to acquire broad knowledge about social systems and the history and current state of organizations in general, and about thinking about the character of human behavior and society. Therefore, in the education of business

administration, as a precondition to fulfill its mission in society in which all for-profit or not-for-profit going concerns develop continuously, opportunities to deeply examine the relationships between for-profit or not-for-profit going concerns and nature, the essence of human beings, social justice and other values.

From this, those who have systematically learned business administration can usually acquire the following generic abilities.

a Students can gather information on real society, select it, process it, organize it, and send it out as appropriate information.

b Students can think of the real society historically and conceive the desirable form of society.

c With deep insight about human beings, students can consider various societies from a global perspective and plan businesses suitable for each society.

d Students can present the social significance of the business they intend to run to society and get support from many people.

e Students can achieve their goals while cooperating with many people within diverse organizations.

5 Basic Principles Relating to Learning Methods and to Evaluation Methods for Learning Outcomes

(1) Learning methods

Since business administration is deeply tied to practice, the methods of learning include education on theoretical knowledge and practical education at the same time. Various educational methods such as lectures, reading, exercises, practical training, and field training, etc. are used to raise the results of study. These methods should be flexibly combined according to the aim of the educators, how they wish to place emphasis, and the situation of the student, etc. In learning business administration, the following diverse methods of learning are usually considered.

1) Lectures

Through lectures, students will have the opportunity to learn the diverse research achievements of business administration from the basic knowledge of business administration to state-of-the-art research trends. Lectures are effective for students to understand the fundamental concepts, theories, propositions etc. of business administration, etc., and they are the basis for studying deeper learning of business administration thinking. At the same time, it is beneficial to touch on advanced research trends through lectures. Many students can acquire the viewpoints and concepts of business administration through such lectures.

It is useful for students not only to listen to lectures, but to be made to think together with lecturers, think of more developed questions, and to present their own opinions. For this reason, lectures should be bi-directional, including opportunities for students to express their own opinions.

2) Reading

While reading and understanding the text fully, critical reading is also the starting point for all knowledge acquisition. Reading and exchanging opinions based on it will give students the ability to understand the opinions of others while touching on various ideas, and give them the ability to logically describe their ideas and will also be an opportunity to develop their voluntary intellectual experiences and creativity.

3) Exercises

In order to learn business administration deeply tied to practice, problem-solving type study where students discover the problems occurring in the management of for-profit or not-for-profit going concerns themselves, analyze the problem structure, find a solution to the problem is indispensable. In the baccalaureate degree program, such learning methods are generally taken in the form of exercises, reports, and graduation theses, etc. Students and academic advisors exchange opinions separately, consult with the direction of the survey, and students find out the clues for problem-solving themselves. Here, students gain self-learning abilities since the students' autonomy is respected to the utmost, and they go through the process of discovering the problem themselves and solving it themselves under the advice of

their instructor.

On the other hand, some students acquire skills or learn theories through simulations by using computers directly, such as in business engineering and business informatics. There, they will acquire knowledge and skills by repeating exercises themselves.

4) Internships and on-the-job learning

In business administration education, along with lectures and exercises, education where students directly observe the workplace, think onsite and acquire knowledge from experience is effective. Examples include visits, surveys and studies of companies, factories, industrial facilities or commercial facilities in Japan or overseas; internships for a certain period of time in Japan or overseas; or observing shopping streets. Such learning methods are good opportunities for students to experience the workplace and use the knowledge that has appeared in textbooks and lectures, etc. while feeling the worksite, and finding and acquiring knowledge for themselves that does not appear in class.

(2) Evaluation methods

Evaluation methods for educational results in business administration vary depending on the educational goal, level of knowledge, educational method, and so on. In some cases, the degree of knowledge acquisition is evaluated, and it is sometimes the evaluation is based on completing a certain task to a certain level using knowledge and skills. Or the depth and sharpness of recognition or unique ideas may be evaluated.

For example, when learning bookkeeping, you not only need to memorize account items, but also acquire skills until you can actually process sales slips and prepare financial statements. As long as bookkeeping and preparation of financial statements deal with objective figures, their evaluation can also be done objectively. Also, business informatics requires that students have the skills to actually create some kind of program by themselves. They may also be objectively measured by nationwide certification tests.

However, unlike these subjects, for example, as in the case of a graduation thesis, in scenes where students are required to examine the theory with an excellent idea or to analyze information from a sharp point of view, there is no uniform rating scale or indicator of the level to be achieved. Of course, there are many points to evaluate in a graduation thesis, such as the uniqueness of the idea and the importance of the findings, thorough examination of the prior research, the rigor of the demonstration and the thesis procedure, the degree of compliance with the rules and methods. However, depending on how much emphasis is placed on these points, ultimately, it depends on the high evaluation ability of the evaluator who has deep knowledge about the field and the event.

In practical and onsite training, multifaceted assessment through instructors observing students' behavior and asking questions in the field becomes important. In the process of experiencing practical training and onsite education, what the students did, what they felt, and what they thought are important factors of evaluation. Ex-post investigation and reflection of the person

himself also becomes an important clue. Even so, in many cases there is no uniform rating criterion or indicator of the level to be achieved, and which element to evaluate depends on the high evaluation and judgement ability of the evaluator with deep knowledge. As long as the content of education is high, it is inevitable that the rate at which the evaluation depends on the judgment ability of the evaluator increases, and this is a limit of the evaluation itself.

The evaluation of those who studied business administration will be done by combining such various evaluations. Overall evaluations may be done with an emphasis on acquisition and utilization of academic knowledge and skills, or emphasis may be placed on mastery of practical knowledge and skills and the competence to master them. The adoption of various methods and various evaluation methods depending on universities or classes is to be respected in the sense that they result in nurturing various types of human resources for society as a whole.

6 A relationship between specialist education and general education that aims to enhance students' cultivation as well-rounded citizens

(1) Cultivation as well-rounded citizens and business administration education

Learning business administration has its own aspects that enable students to cultivate citizenship and behave as good citizens.

As mentioned earlier, one viewpoint of business administration is checking that for-profit or not-for-profit going concerns develop while maintaining consistency with society as a whole. From this point of view, as long as for-profit or not-for-profit going concerns survive as one acting entity constituting society, checking whether or not they act appropriately in response to changes in society as a social actor, or whether there is any deviation from the constraints of nature, human nature, and social justice, etc. is also a task that a person who has studied business administration should address.

For example, when the deterioration of the global environment emerges as a problem common to all humanity, thinking about what kinds of businesses, new products and services, or business models can solve such issues is a relatively easy task for those who have learned business administration. It is also possible to set up a venture business for that, or to call on citizens to establish NPOs.

Alternatively, those who have learned business science with regard to deterring acts contrary to social justice from inside and outside the organization can make use of their knowledge and skills to contribute. The act of pursuing profits in a market economy system itself is recognized as a legitimate act. However, in such an act, if there are actions against human social justice and social justice, they must be rectified. Those who have learned business administration can use that knowledge to fulfill their responsibilities by seeking actions by corporations as corporate citizenship. Therefore, learning business administration will give students the knowledge to act as good citizens and build a good civil society.

(2) Business administration education and liberal arts education

Those who learn business administration need to acquire not only expert knowledge on management but also a wide range of education about human beings, society and nature.

for-profit or not-for-profit going concerns are one acting entity that make up society, and need to develop harmoniously and sympathetically with the whole of society. Managers are required to constantly examine whether the contents of the business are adapting to societal value or social change. In order to perceive social and market trends, change the contents of the business and respond to changes in the world, it is not only necessary to efficiently run the organization, but knowledge and ability to gain deep insight into changes in society itself surrounding the entity are necessary. For managers who steer entire organizations, broad insight and flexible ideas that can

respond to social changes are required. Such broad knowledge and ability are formed on the basis of a liberal arts education not only in business subjects as a specialist subject but also as a baccalaureate degree program.

At the same time, when civil society reconsider the significance of the existence of going concerns, a liberal arts education that clarifies the basic conditions necessary for human beings to live such as the laws of nature, the essence of human beings, the formation of society, history, culture and religion will be a fundamental condition for persons who studied business administration to properly act as citizens in society. In the modern society in which globalization is advancing, the situation surrounding concerns has undergone substantial transformation. Understanding the concepts and behaviors of people living in different cultures, communicating with such people, and thinking about the implications of the constraints on the environment and resources on the activities of concerns, while acting globally, is required. A liberal arts education plays an important role for those who have learned business administration to properly engage in such activities.

Because business administration contributes to nurturing the entrepreneurial spirit, knowledge on nature and social mechanisms gathered from the viewpoint of managing for-profit or not-for-profit going concerns in the planning of new business is integrated into one’s own knowledge system. Existing knowledge is arranged from the perspective of harmonizing the sustainable development of one’s own business and society, and a knowledge system about nature and society different from other disciplines is provided. In this sense business administration is also a liberal arts subject.

7 Business administration and the cultivation of the entrepreneurial spirit

In order for all for-profit or not-for-profit going concerns to flexibly develop while adapting to changes in the world, entrepreneurs who plan management, especially new businesses and diversify existing business, play an important role. Planning and managing a new business is not only for private enterprise entrepreneurs, but also for managers of various business concerns such as NPOs or NGOs. In a society in which organizations have matured, the managerial function is not limited to private enterprises but is widely used by all organizations, and management in for-profit organizations is made use of in non-profit organizations such as NPOs and administrative organizations.

We have already mentioned that knowledge of business administration is also knowledge to harmoniously develop all for-profit or not-for-profit going concerns with the progress of society as a whole. Along with changes in society, it is always required to establish for-profit or not-for-profit going concerns and diversify business contents. Whether it is a private enterprise or a non-profit organization, we always need knowledge to plan, organize and manage new business, and business administration means to provide learning for such systems by organizing this knowledge. Entrepreneurial spirit is a strong intention to gain insight into the future of society, respond creatively to such changes, and proactively pursue innovation in one's business. At the same time, by launching a new business, entrepreneurial spirit is a great intention to develop as a whole with the entire society as a citizen. Business administration is also an academic discipline to foster this entrepreneurial spirit, to promote continuous business entity transformation and social evolution.

<Glossary>

Business division system

For example, in an automobile company, when there are various kinds of products such as passenger cars, trucks, buses, forklifts, etc., an organizing form in which each type is organized into one business division as if it were one organization.

Marketing Mix

How you combine marketing tools such as products, brands, prices, advertisements, and distribution channels will have a significant impact on sales. The marketing mix is a combination of these marketing means.

Insolvency

A state in which the liabilities on the balance sheet (debt) exceed the assets (property), and debts that cannot be repaid remain even if the company is liquidated and the assets of the company are sold to repay the debt.

EVA (Economic Value Added)

EVA is one of the indicators to measure the economic value added produced by a company, and refers to the economic value created by the company against the invested capital.

Convertible bond

Formally, it is referred to as a "convertible bond-type bonds with subscription rights to shares" and refers to corporate bonds that have the right (conversion right) to be converted into shares of the issuing company.

Entrepreneur and venture business

An entrepreneur is a person who plans and continuously operates businesses. A venture business sells the company when it has been established immediately, and plans new businesses one after another.

<References>

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[2] The Science Council of Japan, Answer "Regarding the state of quality assurance by field of university education," July 22, 2010.

[3] Gutenberg, Erich, Grundlagen der Betriebswieltschaftslehre,1 Band, Die Production, 1961, Translated into Japanese by Mizoguchi, Kazuo and Takada, Kaoru "Principles of Business Economics" Production, Chikura Publishing Co., Ltd, 1957.

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<Reference material 1> Committee on Quality Assurance Promotion by Field of University Education, Business Administration Field Reference Standards Study Subcommittee Deliberation Process

2011

September 1 SCJ Board of Secretaries, 133th meeting
The Sectional Committee on the Study of a Point of Reference in Business Administration established and committee members determined.

October 10 Sectional Committee, 1st meeting
Board members elected.
How to proceed.

December 18 Sectional Committee, 2nd meeting
About reference standard proposal
On the direction of future study

2012

January 29 Sectional Committee, 3rd meeting
About the composition of the reference standard plan report

February 26 Sectional Committee, 4th meeting
About the reference standard plan draft outline

March 18 Sectional Committee, 5th meeting
About reference standard proposal

April 15 Sectional Committee, 6th meeting
About reference standard proposal
About symposium

May 13 Sectional Committee, 7th meeting
About reference standard proposal
About symposium

June 16 Sectional Committee, 8th meeting
About reference standard proposal
Public symposium "A Point of Reference in Business Administration in Undergraduate Education"

June 24 Sectional Committee, 9th meeting
About reference standard proposal

August 24 SCJ Board of Secretaries, 157th meeting
Report by the Sectional Committee on the Study of Reference in Business Administration, "Reference Standards of Course Development for Discipline-Based Quality Assurance in University

Education – Business Administration" approved.

<Reference material 2> Public Symposium

Science Council of Japan Public symposium
"A Point of Reference in Business Administration in Undergraduate Education"

Date and time: Between 2:00 p.m. to 5:00 p.m., Saturday, June 16, 2012
Venue: The Lecture Hall of the Science Council of Japan

Program:

2:00 p.m.to 2:05 p.m.: Opening remarks: delivered by Fujinaga, Hiroshi (Chairperson, Sectional Committee on the Study of a Point of Reference in Business Administration, Science Council of Japan)

2:05 p.m.to 2:25 p.m.: Keynote lecture: Kitahara, Kazuo (Chairperson, Committee on Curriculum Design/Development for Disciplinary Quality Assurance in University Education)

2:25 p.m. to 2:55 p.m.: Sectional committee report: Fujinaga, Hiroshi (above)

Break

3:05 p.m. to 4:55 p.m.: Panel discussion:

Moderator: Okubayashi, Koji (Deputy Chairman of the Business Administration Field Reference Standards Study Subcommittee)

Panelist: Fujinaga, Hiroshi (above)

Takashima, Katsuyoshi (Professor, Graduate School of Business Administration, Kobe University)

Yamazaki, Kazumi (President, Rissho University Professor, Business Administration)

Inoue, Hiroshi (Director, Social Public Relations Division, Japan Economic Organization Federation)

Matsumoto, Daigo (Doctoral program at Graduate School of Business Economics, Aomori Public University)

4:55 p.m. to 5:00 p.m.: Closing remarks: Suzuki, Hisatoshi (Executive Vice President, University of Tsukuba)

Comprehensive Moderator: Nishio, Chizuru (Professor, Graduate School, University of Tsukuba)

Sponsorship: Japan Federation of Management related Academies

Report

A point of reference in curriculum-design/development for disciplinary quality assurance in university education—mechanical engineering

August 19, 2013

Sectional Committee on the Study of a Point of Reference in Mechanical Engineering

Committee on Mechanical Engineering, Science Council of Japan

This report is the results of deliberations of the Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on Mechanical Engineering, Science Council of Japan. This is the English translation rendered by the Sectional Committee in cooperation with the National Institute for Educational Policy Research.

The members of the Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on Mechanical Engineering, Science Council of Japan

Chairperson	Kitamura, Takayuki (member of 3rd section)	Professor, Graduate School at Kyoto University
Vice-chairperson	Tsuchiya, Kazuo(special associate member)	Professor, Doshisha University
Secretary General	Tanaka, Yoshihiro(special associate member)	Assistant Professor, Graduate School at Nagoya Institute of Technology
	Arinobu, Mutsushiro(member of 3rd section)	Comptroller, The University of Tokyo
	Kishimoto, Kikuo(member of 3rd section)	Professor, Tokyo Institute of Technology
	Iwabuchi, Akira(associate member)	Vice President, Iwate University
	Kasagi, Nobuhide(associate member)	Principal Fellow, The Center for Research and Development Strategy
	Tadano, Shigeru(associate member)	Professor, Graduate School at Hokkaido University
	Tanishita, Kazuo(associate member)	Professor, Waseda University
	Tsuge, Ayao(associate member)	President, The Japan Federation of Engineering Societies
	Fukuyama, Mayumi(associate member)	Hitachi-GE Nuclear Energy, Ltd.
	Kobayashi, Shinichi*(special associate member)	Professor, Graduate School at University of Tsukuba
	Hamanaka, Junko* (special associate member)	Assistant Professor, The National Center for University Entrance Examinations

*Committee member until March 2013

Coordinating staff organizing the report:

Coordination	Ishihara, Yuuji	Director for Scientific Affairs II
	Saida, Yutaka	Assistant attached to Director for Scientific Affairs II
	Okiyama, Kiyomi	Deliberation specialist attached to Director for Scientific Affairs II
Investigation	Sakiyama, Naoki	Senior research specialist

Executive Summary

1 Background

In May 2008, the Science Council of Japan (SCJ) received from the Director-General, Higher Education Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT) a request addressed to the President of the SCJ entitled "Deliberations regarding the direction of disciplinary quality assurance in university education." The SCJ thereupon set up a task-specific committee in June of the same year called the "Study Committee on the Direction of Disciplinary Quality Assurance in University Education," carried out several deliberations, drafted the "Direction of Disciplinary Quality Assurance in University Education" in July 2010 in response to MEXT's request, and delivered it to MEXT in August of the same year.

In its response, the SCJ proposed developing points of reference in disciplinary curriculum-design and development as a method of disciplinary quality assurance. After delivering the response, the SCJ proceeded to develop points of reference in several areas. Since a point of reference in mechanical engineering has been completely organized, the SCJ wishes to release it so that it can be used in such organizations as universities providing curricula related to the field.

2 Overview

(1) Definition of mechanical engineering

Mechanical engineering consists of natural (epistemological) sciences and design sciences (sciences for design) related to machines with the capability of converting energy and information given from the outside into useful functions such as movement, force, and information. The epistemological science underpinning it is "mechanics," and design science is required for realizing functionality harmonized into a whole through the synthesis of individual elements. Since mechanical engineering deals with diverse functions, it is closely related to many other areas of natural sciences, and at the same time, as it provides the basic knowledge and wisdom in human life within society~, collaboration with other fields including the humanities and social sciences is therefore important.

(2) Role and characteristics specific to mechanical engineering

The role of mechanical engineering is to provide a systematic knowledge of mechanics, which is part of the fundamental laws that constitute nature, and demonstrate specific measures in machine technology that bring safe and reliable life and can live up to humankind's aspirations, taking environmental and resource limitations as well as cost effectiveness into consideration. Providing engineers with the feasibility and safety in design and manufacturing based on current knowledge is also the fundamental role of mechanical engineering.

"Mechanics," on which mechanical engineering is based as an epistemological science, covers a wide variety of scales and phenomena. Traditionally, there are fundamental disciplines of mechanics such as disciplines regarding the motion of a point mass or solid, the materials strength, fluid dynamics, and thermodynamics (thermology). As a methodology for incorporating epistemological science into a specific design, design science (which covers control of systems, optimization, and production planning) is included in mechanical engineering as an important underpinning. The following approaches exist in the learning of mechanical engineering: proceeding to an understanding

of design science based on epistemological science; proceeding to an understanding of epistemological science based on design science; and, proceeding to an understanding of the entire scientific underpinnings of mechanical engineering based on practical technology.

(3) Basic grounding for all students learning mechanical engineering should aim to acquire

① Basic knowledge and understanding to be acquired in learning mechanical engineering

In addition to the underpinnings of natural sciences related to machines (fundamental knowledge of physics and mathematics), those learning mechanical engineering are required to have a fundamental knowledge and understanding of mechanics, design, and control systematized according to the aim of mechanical engineering. They are also expected to be interested in related fundamental sciences and interdisciplinary areas, and understand their core principles from a broad and comprehensive perspective. The will to study by which they can proactively learn the relevant sciences is important here. Since machines are deeply related to the fabric of contemporary society and individuals' lives, those learning sciences related to machines must be cognizant of the condition that machine technology is significantly responsible for the sustainability and development of society and individual lives within it.

② Basic capabilities to be acquired by learning mechanical engineering

As the functions of machines covered by mechanical engineering are diverse, so are what contents to learn and how to learn them. There are, however, basic commonalities in specific capabilities acquired in the learning of mechanical engineering. These commonalities can be classified as follows: a capability to logically define problems based on systematic knowledge of mechanical engineering; a capability to analytically solve problems based on systematic knowledge of mechanical engineering; a capacity to understand other areas by analogy based on systematic knowledge of mechanical engineering; a capacity to realize a specified function under constraints by applying and synthesizing individual fields of knowledge; and, a capability to give a logical and crystal-clear explanation based on systematic knowledge of mechanical engineering. In addition, once one has gone through the process of learning mechanical engineering, one will have acquired scientific thinking.

(4) Basic principles related to the learning methods and the evaluation methods for learning outcomes

The learning methods for mechanical engineering are mainly lectures, experiments, exercises, practice, and research. Since mechanical engineering covers diverse subjects, it is useful to combine subjects organically such as selecting and weighing subjects according to their purposes. The items to be evaluated include a deductive capacity, an inductive capacity, competence related to basic knowledge, the capacity to identify, analyze, and solve problems, and communication skills. It is necessary to adopt diverse and flexible evaluation methods according to the contents of and method for each type of education and the situations of individual learners.

(5) A liberal arts education in which expertise and generality are combined

Machines do not simply bring convenience into our lives, but are deeply related to society and a human sense of values. It is also important to analyze and identify the risks and benefits

of technologies that are becoming larger and more complex. Having a well-rounded general education in addition to specialized expertise helps to develop accurate insights into both technological and social challenges and the capacity to solve them.

Contents

1 Introduction

In May 2008, the Science Council of Japan (SCJ) received from the Director-General, Higher Education Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT) a request for deliberations regarding the direction of disciplinary quality assurance in university education. In June of the same year, the SCJ set up a task-specific committee and carried out several deliberations. As a result, in August 2010, the SCJ proposed to develop points of reference in disciplinary curriculum-design and development as a method of disciplinary quality assurance.

A point of reference is used for reference when identifying the specific goal of learning in the curriculum for each field. It demonstrates ideas provided with generality and comprehensiveness that contribute to the materialization of a curriculum for the relevant field—a curriculum that is voluntary and autonomous and conforms to the ideals and realities of each university (department or faculty).

This report is a point of reference in the field of mechanical engineering, and the SCJ wishes to release it this time so that it can be used in such organizations as universities providing curricula related to the field.

2 Definition of Mechanical Engineering

Mechanical engineering is an academic field that consists of natural (epistemological) sciences and design sciences (sciences for design) related to machines.

Machines can be defined as (1) "consisting of combinations of objects capable of resisting external force," (2) "by executing certain relative movement," and (3) "converting energy or information given from the outside into useful functions such as motion, force, and information." (1) and (2) indicate the relationship with natural laws that form the substance of machines, demonstrating that the science underpinning mechanical engineering as an epistemological science[2] is "mechanics." (3) indicates the functions of machines, demonstrating that design science[2] is required for realizing functionality harmonized as a whole through the synthesis of individual elements. In addition, many of the core sciences in other areas centered around engineering are included in the fundamental knowledge of machine functions. That is, machines in a broad sense indicate the diversity of mechanical engineering, and at the same time, demonstrate that the field of mechanical engineering is closely related to other areas of the natural sciences.

Technology is practice that achieves actual functions in human life within society. Engineering as a part of science (engineering science) is systematic knowledge and understanding that becomes the underpinning of that practice, which suggests that in the field of mechanical engineering, it is important to collaborate with other areas of human endeavor including the humanities and social sciences. It should be noted that in contemporary society, issues are raised about engineers' ethics and social sustainability, and that a knowledge of machine functions from a variety of perspectives is required in mechanical engineering.

Engineering science is an academic field whose purpose is to contribute to human life and social welfare, and a sense of human values is included in it. If the "functions" desired by people or societies are diverse, it follows that the classification and definition of machines are to be expanded; however, unlimited expansion of the definition of machines with diverse functions leads to unlimited expansion of the science underpinning them. Therefore, this document focuses on the science for the originally defined machines that are the core of mechanical engineering.

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[1] Similar definitions appear in *JSME Mechanical Engineers' Handbook* (The Japan Society of Mechanical Engineers), *Handy Book* (Ohmsha), and *Koujien* (Iwanamishoten).

[2] See "A New System of Sciences—Combining the Humanities and Sciences for Society" (June 2003), Committee on a New System of Sciences attached to the Governing Council, the Science Council of Japan

3 Characteristics Specific to Mechanical Engineering

(1) Perspectives specific to mechanical engineering

Engineering science incorporates the perspectives of both epistemological science and design science. There are two directions in engineering:

- that of learning natural laws and putting them to use to benefit humans (from epistemological science to design science) and
- that of meeting the demand for the functions necessitating research to conform to natural laws (from design science to epistemological science).

Note that engineering science is bidirectional. Given the aforementioned three elements that define machines, mechanical engineering education requires a scientific approach related to analysis centering on mechanics, and an understanding of systematized knowledge related to synthesis centering on design science.

"Mechanics," on which mechanical engineering is epistemologically based, covers a wide variety of scales and phenomena. Traditionally, there are fundamental disciplines of mechanics such as disciplines related to the motion of a point mass or solid, the strength of a solid body, fluid dynamics, and thermodynamics (thermology). With the development of human life within society, the scale of time and space demanded by humans for machine functions has expanded vastly compared to the time and scale we were once familiar with (in the range from one millimeter to ten meters and from one second to around ten years). For example, the function of a tiny mechanical element comes to be deeply related to the individual atoms and electrons constituting that element, in which case mechanics for machines comes to include the notions of quantum mechanics. Moreover, a large-scale system in which many elements interact with one another in a nonlinear manner and demonstrate complex behaviors also comes to be covered by mechanical engineering. A typical example of that is a living body; when attention is directed to the mechanical aspect of a living body, it is also covered by mechanical engineering. From the perspective of mechanical engineering, that means that knowledge based on chemistry or biology becomes necessary. With changes in society, it can be said that the fundamental disciplines of mechanical engineering are expanding.

As a methodology for incorporating epistemological science into a specific design, design science is included in mechanical engineering as an essential underpinning. The design science held by mechanical engineering includes not only a mere functional design but also all product-related processes (such as planning and conception, development, design, production planning, sales, transportation, distribution, usage, evaluation, repair/maintenance, disposal, collection, and recycling). Furthermore, machines and machine systems produced based on the knowledge of mechanical engineering not only contribute to contemporary human life and welfare, but can also serve as a driving force that brings about innovations for the future. Mechanical engineering does not just produce "goods" as its practical activity (technology), but becomes involved with human life within society in general, including human communications and sensibilities, through its study on functions, and is deeply related to how human society ought to be.

(2) Diverse approaches

There are diverse approaches to ways of learning mechanical engineering. Firstly, one approach centers on epistemological science. Learning starts by understanding natural laws

based on the mechanics related to force, deformation, motion/flow, and heat. It is an approach in which one fully grasps individual laws and then proceeds to understand design science, which achieves functionality as a system created by synthesizing those laws.

Another approach centers on design science. Learning starts by understanding system design and control with the aim of achieving functionality. It is an approach in which one views the mechanisms of various functions and processes related to their production (manufacturing) and usage as a whole, and at the same time, proceeds to understand the epistemological science related to natural laws on which those mechanisms are based.

Yet another approach centers on technology. It is an approach in which one learns a specific system (for example, transport equipment such as automobiles and aircraft) and then proceeding to understand the entire scientific underpinnings of mechanical engineering. As a practice, mechanical engineering provides human society with specific technologies. There are numerous machine systems that are likely to exert a significant influence on society, that are designed for specific purposes, and that possess a high degree of complexity. Developing expertise about those systems is also one of the missions of mechanical engineering. Through that approach, a deepening of an understanding of epistemological science and design science in the process of understanding those systems is achieved.

(3) Role of mechanical engineering

The role of mechanical engineering is to provide a systematic knowledge of mechanics—part of the fundamental laws that constitute nature—and, by using that knowledge, to demonstrate specific measures in machine technology that bring safe and reliable life, and can live up to humans' aspirations while taking environmental and resource limitations as well as cost effectiveness into consideration. Providing engineers with the feasibility and safety of design and manufacturing based on current knowledge is also the fundamental role of mechanical engineering. That is to say, the main role of mechanical engineering is to unfold the understanding required to achieve machine functions, and at the same time, reveal its limitation.

To date, mechanical engineering has provided the knowledge bases of functions of specific machines related to transportation, energy, and production, and systems created by combinations of specific machines. By expanding the coverage from its core area, while incorporating information, life, physical, and other sciences, it has also produced diverse machines including electronic, information, intelligent, bio-mechanical, and health and welfare machines as well as new machine systems to meet the expectations of society.

Mechanical engineering is characterized by being comprised of various areas of science. What is studied in mechanical engineering involves underpinnings, and covers diverse phenomena. In addition, mechanical engineering interacts with all the other sciences. Based on those complex characteristics, mechanical engineering will continue to assume the role as a contributor to knowledge systems for creating technologies that meet society’s needs.

(4) Collaboration with other sciences

Functions performed by artificial objects can be found in virtually every aspect of daily life. With that being the case, diverse points of contact with almost all the other sciences exist in mechanical engineering.

Given the flow of knowledge from mechanical engineering to other sciences, the following aspects of mechanical engineering can be recognized: the sharing of objectives to be studied (natural laws), collaboration for creating systems to achieve functions, and provision of the means necessary for the development of other sciences (machine functions). As a part of

engineering science, in particular, mechanical engineering is strongly connected in many respects to such areas as natural science, agriculture, medical science and pharmacy. Through collaboration with other fields, mechanical engineering re-organizes the acquired knowledge for use and application. For that reason, while scientifically deepening itself, mechanical engineering can also function as a driving force for developing new areas of science or creating innovative technologies through linkage with other sciences and interdisciplinary areas.

Given the flow of knowledge from other sciences to mechanical engineering, it can be said that the current functions of machines include functions based on not only classical and statistical mechanics but also quantum mechanics, and that they have been formed by synthesizing a wide range of knowledge from other engineering areas, physics, and chemistry. In addition, their relationship with mathematical, information, and bio- and medical sciences is also deepening. Furthermore, in terms of connection with humans within society, mechanical engineering also needs study on functionality in order to adapt to or harmonize with environments, with an eye even to human emotions and sensibilities, social environments, and the global environment. It is necessary for mechanical engineering to create the knowledge leading to specific solutions and technologies by interacting with a wide range of other disciplines including the humanities and social sciences, such as economics, business studies, and psychology.

Through those collaborations, mechanical engineering will become one of the distinctive core elements of engineering science—a science supporting the satisfaction of human desires—and will form part of the assets of knowledge common to all humanity.

4 Basic grounding all students learning mechanical engineering should aim to acquire

(1) Basic knowledge and understanding to be acquired by learning mechanical engineering

① Basic knowledge and understanding to be acquired

In addition to the underpinnings of natural sciences related to machines (fundamental knowledge of physics and mathematics), those learning mechanical engineering are required to have a fundamental knowledge and understanding of the following items systematized according to the aims of mechanical engineering.

i. Basic items related to mechanics

The underpinning science related to natural laws—a source of machine functions—is "mechanics," including "thermology," and incorporates the following fundamental disciplines:

- A science on the motion of a point mass or solid
- A science on strength related to the deformation and fracture of a material
- A science on fluid for prediction and control of flow
- A science that systematizes the heat transport such as thermal conduction and radiation, chemical reactions, the thermophysical properties of fluids, and the conversion process between heat and work.

Note that notions synthesizing the above and notions combined with a knowledge of other sciences exist and that the classification of fundamental disciplines are thus not limited to the ones shown above.

ii. Basic items related to design and control

Design science is the underpinning science for synthesis that achieves machine functions and can be categorized into the following fundamental disciplines:

- A science on the correlation between humans, matter, energy, and information and for achievements of functions
- A science on prediction and control of a designed system or optimization of such a system
- A science that realizes demanded functions or values in production activities under various constraints including cost effectiveness and effects on society.

Note that although the basic items are demonstrated as above by being divided into analysis and synthesis, it is possible to create diverse structures of "mechanical engineering" according to how purposes or goals are set. In that sense, there is no unified structure of mechanical engineering, and how choices are made or weights are placed varies significantly. In addition, since machines are systems that embody diverse values related to human life, when learning mechanical engineering, it is important to pursue collaborations with a wider range of knowledge not belonging to the above fundamental areas. Therefore, students learning mechanical engineering are expected to be interested in related fundamental sciences and interdisciplinary areas, and possess an understanding

of those ideas that form their core principles from a comprehensive and well-rounded perspective.

② Social significance of learning mechanical engineering

The social significance of learning mechanical engineering lies in finding how a better life for those living within society can be created using machines. By acquiring a knowledge and wisdom of mechanical engineering, it becomes possible to understand the functions and mechanisms of machines that form the foundation for said significance.

As shown by the fact that the introduction and spread of machines have helped to improve standards of living and realize industrial promotion, material supply, health promotion, disaster and accident prevention, and so on, mechanical engineering has played a key role in the development of humanity. What is important for those learning mechanical engineering is thus the will to study by which they proactively learn the relevant sciences with the aim of sustaining and improving the quality of human life. We must recognize, however, that there is a danger of machines introduced in the interests of convenience causing dire results due to accidents or destruction of the environment. It is also important to understand how to prevent or avoid those results by becoming well-rounded and maintaining a certain humility. Since machines are deeply related to the fabric of contemporary society and individual lives, those handling machines must be aware of the fact that in their relationship with machines, they may be significantly responsible for the sustainability and development of society as a whole and the lives of individuals within society.

(2) Basic capabilities to be acquired by learning mechanical engineering

① Capabilities specific to mechanical engineering

i. Occupational significance

Machine technology is a means of implementation for the development of a highly convenient, safe, and reliable human society through machines. Mechanical engineering is an academic field that systematizes the background knowledge and understanding of machine technology. By learning mechanical engineering, it becomes possible to acquire the underpinnings of that technology.

It also becomes possible to acquire a perspective based on design whereby an executable solution is arrived at by making full use of knowledge even for a problem for which there is not necessarily only one solution, and a practical methodology and tenacity in which moderation is always respected while pivoting on both analysis and synthesis in a balanced manner and, if necessary, compromises are willingly made. Furthermore, it becomes possible to understand the importance of technical, ethical, and social considerations.

The machine industry is highly diversified. Therefore, a vast area of knowledge and understanding must be synthesized to create demanded functions. In other words, not only mechanical engineering but also collaboration with a wide range of other areas is essential for technology (practice). While studying the science of mechanical engineering, students can understand the importance of a wide perspective, develop an interest in other areas along with an eagerness for learning them, and acquire collaborative learning methods.

ii. Significance in civic lives

The significance of mechanical engineering in civic lives can be divided into ones for a specialist in mechanical engineering and for a citizen who has learned mechanical engineering. In the former, besides being able to contribute to society as a professional expert, significance lies in becoming able to acquire the foundation for becoming a civic leader on matters related to machine technology. In the latter, when associating oneself within society as a citizen, significance lies in providing a knowledge base with respect to machines, which have already become daily necessities, and promoting an understanding of their principles so that they can be put to appropriate use. Furthermore, mechanical engineering enables one to acquire a rational attitude of thinking about ideas and methods that further increase the convenience of everyday life and the knowledge underpinning them. Technological innovations related to machines, for that matter, create new values in society and the lives of individuals. With that being the case, those who have learned mechanical engineering can easily understand general information such as the functions, mechanisms, and principles of new machines. This also makes it possible to put machines with new functions to proper use and acquire the foundation for realizing a more comfortable, safe, and reliable society and life in general. In other words, it becomes possible to recognize new values, put them to proper use, and bring about the improvement of the quality of life within society.

Note that machines can be weapons depending on how they are used. To prevent the dangers caused by the misuse of machines or an accident, also, basic knowledge related to machines is important both as an expert in mechanical engineering and as a citizen.

Machines are deeply related to society as a whole, not only in daily life, but also in the technology of large-scale systems such as energy equipment. When thinking about how society should be and will be in the future, a fundamental knowledge of machines plays a vital role. Being able to properly understand and judge social situations regarding machine technology is a part of the underpinning knowledge (general education of engineering science) to act rationally in response to challenges, including social decisions involving difficult problems.

iii. Learning mechanical engineering and academic and social changes

Compared to the time and scale with which humans were once familiar, the scale of time and space covered by machines has expanded vastly due to the pursuit of sophisticated functions; complex and large-scale systems are currently being developed and used. Besides its importance related to the functions of individual elements, mechanical engineering plays a critically important role also from the viewpoint of grasping an overview of a given system. As the integration and sophistication of machines progress, the science of mechanical engineering itself changes in tandem with social changes.

There are signs of change in the relationship between practical experience and science due to the rapid development of science and technology. In the past, repetition of technological practice tended to systematize knowledge and understanding. Today, however, developing knowledge about natural laws create new technologies more often. There are two stances in mechanical engineering, one giving priority to practice and applications and the other giving priority to knowledge-base formation. This tendency points to the recent increase in the importance of developing knowledge about natural

laws. It should be noted that new machine technology is emerging through the incorporation of a knowledge of information science involved in it, also an important viewpoint.

The development of science and technology demands the fusion of diverse areas and development of new areas. As seen in problems on a global scale such as environmental problems, those facing contemporary society are becoming increasingly diverse and complex. To address those problems, beyond individual research areas, various fields of knowledge must be pooled and synthesized. To that end, it is important to deepen each field of knowledge and at the same time understand the systems and structures between fields of knowledge. Mechanical engineering plays a leadership role in bringing about social development. Though its underpinning sciences are mechanics and design science, its academic contents change, always involving other sciences. Since mechanical engineering is deeply connected with human life, its academic contents need to be improved so that it may keep up with social changes.

iv. Specific capabilities expected to be acquired

The functions of machines covered by mechanical engineering are diverse, and so are what contents to learn and how to learn them. Sets of expert knowledge and understanding vary depending on the direction a teacher emphasizes and on the approach a student chooses.

Since the common aim is to identify and solve problems regarding machines that contribute to the improvement of the quality of human life and society and to their safety and reliability, however, there are basic commonalities in specific capabilities acquired in the learning of mechanical engineering. Based on what has been described so far, these capabilities can be classified as follows:

- Capable of having an opinion with ample evidence about the present and future of mechanical engineering and machine technology.
- Capable of understanding, properly evaluating, and positioning others' opinions of mechanical engineering and machine technology.
- For a newly developed machine technology, capable of giving proper
  - ✧ interpretation, expressing one's own opinion, and participating in practice.
- Capable of designing and using appropriate machinery by fully understanding the use environment and conditions.
- Capable of examining specific problems and issues related to mechanical
  - ✧ engineering and machine technology by collecting materials and data and solving them.
- Capable of explaining what machines are to those not specialized in them.

The basic capabilities to be acquired by learning mechanical engineering can be classified as follows:

1. Inductive capability: a capability to logically define a problem based on a systematic knowledge of mechanical engineering
2. Analytical capability: a capability to analytically solve a problem based on a systematic knowledge of mechanical engineering
3. Understanding: a capability to understand other areas by analogy based on a systematic knowledge of mechanical engineering

4. Design capability: a capability to realize a specified function under constraints by applying and synthesizing individual fields of knowledge

5. Explanation capability: a capability to give a logical and crystal-clear explanation based on a systematic knowledge of mechanical engineering

② Generic skills

Through the process of learning mechanical engineering, the capabilities that one can acquire that can be used for general purposes, i.e., scientific thinking, as follows:

- A capability to think rationally and logically
- A capability to judge an uncertain matter with awareness of a cause-and-effect relationship
- A skill in handling numbers
- Understanding with respect to natural sciences
- Understanding with respect to technology in general
- A capability to work as a member of a team
- A capability to rationally use and operate equipment related to everyday life
- A capability to find a problem related to machinery in civic life, analyze it rationally, and work out a solution

5 Basic principles related to the learning methods and the evaluation methods for learning outcomes

(1) Learning methods

The main learning methods for mechanical engineering exhibit the forms and functions shown below. Since mechanical engineering covers diverse subjects, however, it is useful to combine subjects organically such as selecting and weighing subjects according to their purposes.

① Lecture

Gives an opportunity to systematically learn diverse knowledge and understanding of mechanical engineering such as the basics of epistemological science and design science, purposes of and methods for their application, examples of their practice, and cutting edge trends, in a balanced manner. Such knowledge and understanding become the foundation for learning by other educational methods. In this case, it is important to give students the opportunity to think for themselves as well as giving them detailed explanations.

② Experiment

Deepens the understanding of epistemological science by reproducing things that follow natural laws. Promotes an understanding of design science by reproducing the effects of synthesis expected under assumed conditions. Furthermore, helps in the acquisition of evidence related to a basic theory or application method by actually testing whether a certain theory or hypothesis is valid.

③ Exercise

To understand a field of generalized knowledge deeply, of great value is testing what cause-and-effect relationship obtains under various assumed conditions. Experience of testing from the viewpoint of not only epistemological science but also design science is also important. Through exercises related to specific matters, students can recognize their own levels of understanding. It is also important to recognize the diversity and complexity of actuality by comparing theory and reality.

④ Practice

Experience through actual manufacturing can deepen an understanding of basic knowledge and at the same time, helps students experience the knowledge and methodology of design science that incorporates basic knowledge into technology as practice. Through that experience, students also become able to actually perceive the significance of mechanical technology's contribution to society, recognize the value of acting as a member of a team, and understand the importance of communication. In addition, the practice here involves practice outside of school whose educational purpose and method are made clear and a type of education that helps students learn trends of technology overseas (including the importance of culture and cross-cultural communication related to that technology).

⑤ Research

Carries out investigation, experiment, design, and analysis for a task given or assigned

on one's own. Helps to comprehensively develop capabilities to identify, analyze, and solve problems through search for and acquisition of necessary knowledge during the aforementioned process. In addition, helps to promote competence through the careful reading of scientific documents and the creation of reports.

(2) Evaluation methods

Evaluation methods for learning outcomes differ depending on educational purposes and methods. There is no standardized measure for evaluation. Those learning mechanical engineering are evaluated based on combinations of diverse types of evaluation. Major types are shown below. Note, however, that there can be other types of evaluation. It is necessary to use diverse and flexible evaluation methods according to individual curricula, individual educational methods, and the situations of individual students.

- Evaluate (mainly through lectures and exercises) the level of understanding regarding basic knowledge (deductive capability).
- Evaluate (mainly through lectures, exercises, and experiments) the level of acquisition regarding a capability to apply basic knowledge (inductive capability).
- Evaluate (mainly through experiments and task-oriented research) competence related to basic knowledge.
- Comprehensively evaluate (mainly through task-oriented research) capabilities to identify, analyze, and solve problems.
- Evaluate (mainly through practice and task-oriented research) communication skills.

6 A liberal arts education in which expertise and generality are combined

Mechanical engineering is integrally related to humans and society, which derives from the essential significance of engineering. Knowledge related to machines gives not only the background knowledge related to recognition and application of natural laws, but also insights into the relationship among objects, energy, and information with humans and society. From the viewpoint of generality, an understanding of the humanities and social sciences in the context of the relationship of machines with humans and society is especially important. That understanding also leads to an understanding of the public aspects of machine technology in a society in which machine technology is shared.

Machine technology requires linkages among diverse fields of knowledge. Those learning mechanical engineering are thus required to have the will and understanding with which they learn not only other engineering fields but also the basics of other fields such as natural science, agriculture, medical science and pharmacy, as well as the general trends of their development. When studying mechanical engineering, students are required to have a capacity to explain technical details to non-specialists in general terms, and at the same time, to acquire a basic knowledge for understanding explanations given by experts in mechanical engineering and other fields. In other words, beyond the narrow confines of fields of specialization, organic collaboration with those in other fields is essential; it is important to have a relative view of one's expertise and recognize its limitations on one hand, and to acquire communication skills, share knowledge bases with people in other fields, and establish channels of communication, on the other. This ability is one of the areas of general education of technology absolutely essential for citizens in contemporary society living amongst machines.

Machine technology has underpinnings common in human society. Therefore, developing a global view as a citizen with expertise is important. What is called for is the understanding that the essence of globalization lies in developing common values within human society based on the organic linkage of many distinct regional cultural groups. Also called for is a general education that becomes the basis for dynamic activities that go beyond national borders and particular scientific domains. We must bear in mind that a superficial type of learning intended to improve linguistic abilities alone without also addressing cross-cultural awareness does not constitute genuine globalization.

Technologies that have grown large and complex have correspondingly made the risks and benefits associated with them in society and humans' lives large and complex. When thinking about the direction over the future of the society or the world in which one lives, one cannot make rational judgments without a knowledge of machine technology. To achieve social consensus, it is demanded that citizens properly analyze and identify the risks and benefits technology brings and the causes or reasons for them, and participate in decision-making on social matters through communication with others. Those learning mechanical engineering must possess the above awareness as a requisite general education principle.

As mentioned above, machines do not just bring conveniences into our lives, but are deeply related even to society and a human sense of values. Having a broad general education and expertise fosters accurate insights into technological and social challenges and the capacity to meet them.

<Reference material 1> Deliberation progress of the Sectional Committee on the Study of a Point of Reference in Mechanical Engineering

Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on the Promotion of Disciplinary Quality Assurance in University Education

2012

March 16	SCJ Board of Secretaries, 148th meeting The Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on the Promotion of Disciplinary Quality Assurance in University Education established and committee members determined.
April 17	Sectional Committee, 1st meeting Board members elected. Definition of mechanical engineering. How to proceed.
June 26	Sectional Committee, 2nd meeting Information about JABEE accreditation programs provided. Direction of a point of reference.
August 27	Sectional Committee, 3rd meeting Information about the Central Education Council's report provided. Characteristics specific to mechanical engineering.
October 15	Sectional Committee, 4th meeting Occupational significance and significance in civic lives.
December 3	Sectional Committee, 5th meeting Basic capabilities to be acquired by learning mechanical engineering.

Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on Mechanical Engineering

2012

November 30	SCJ Board of Secretaries, 166th meeting Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on Mechanical Engineering, established and committee members determined (effective on December 21).

2013

January 21	Sectional Committee, 1st meeting Learning methods and evaluation methods of mechanical engineering Expertise and generality
March 22	SCJ Board of Secretaries, 170th meeting The extension of the committee's operating period decided.
June 15	Sectional Committee, 2nd meeting Public symposium "A Point of Reference in Mechanical Engineering in Undergraduate Education"
July 26	Committee on Disciplinary Quality Assurance in University Education, 4th meeting Report by the Sectional Committee on the Study of a Point of Reference in Mechanical Engineering, Committee on Mechanical Engineering "A point of reference in curriculum-design/development for disciplinary quality assurance in university education—mechanical engineering" approved.

<Reference material 2> Public symposium

Science Council of Japan Public Symposium
"A Point of Reference in Mechanical Engineering in Undergraduate Education"

Date and time: Saturday, June 15, 2013 13:00-16:00
Venue: Collaboration Room, 9th West Building, Ōkayama Campus, Tokyo Institute of Technology

About the Symposium

The Science Council of Japan (SCJ) is presently creating a point of reference in each field of expertise for the purpose of quality assurance in university education. Now that a draft point of reference in mechanical engineering has been completed, this public symposium is held with the aim of hearing diverse opinions from those involved in mechanical engineering education in universities, those in industries, and those interested in faculty education to deepen discussions, and reflect results on said point of reference.

Schedule:

Opening address 13:00-13:05
Kitamura, Takayuki, Chairperson, Sectional Committee on the Study of a Point of Reference in Mechanical Engineering; SCJ member; Professor, Kyoto University

1. "Disciplinary Quality Assurance in University Education and a Point of Reference" 13:05-13:45
   Kitahara, Kazuo, Chairperson, SCJ Committee on the Promotion of Disciplinary Quality Assurance in University Education; SCJ special associate member, Professor, Graduate School at the Tokyo University of Science; Professor emeritus, Tokyo Institute of Technology and International Christian University
2. "A Point of Reference in Mechanical Engineering" 13:45-14:30
   Kitamura, Takayuki, Chairperson, Sectional Committee on the Study of a Point of Reference in Mechanical Engineering; SCJ member; Professor, Kyoto University
3. "Engineer Education Program Accreditation" 14:30-15:10
   Kishimoto, Kikuo, SCJ member; Professor,Tokyo Institute of Technology
4. "Expectation of Human Resources Development in University" 15:20-16:00
   Arinobu, Mutsuhiro, SCJ member; Comptroller, The University of Tokyo
5. Plenary Discussion 16:00-16:45

Closing address 16:45-17:00
Tsuchiya, Kazuo, Vice-chairperson, Sectional Committee on the Study of a Point of Reference in Mechanical Engineering; SCJ special associate member; Professor emeritus, Kyoto University

Report

Reference Standards of Course Development for Discipline-Based Quality Assurance in University Education – Philosophy

March 19, 2014

Sectional Committee on the Study of Reference Standards
in Philosophy
Committee on Philosophy, Science Council of Japan

This report is the results of deliberations of the Sectional Committee on the Study of Reference Standards in Philosophy, Committee on Philosophy, Science Council of Japan. This is the English translation rendered by the Sectional Committee in cooperation with the National Institute for Educational Policy Research.

The members of the Sectional Committee on the Study of Reference Standards in Philosophy, Committee on Philosophy, Science Council of Japan

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Vice-Chairperson	Fujiwara, Seiko (member of 1st section)	Associate Professor, Graduate School of Humanities and Sociology, University of Tokyo
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- Tsugami, Eisuke, Professor, Faculty of Arts and Literature, Seijo University
- Yamanaka, Hiroshi, Professor, Faculty of Humanities and Social Sciences, Tsukuba University

The following staff engaged in coordinating activities in the preparation of this report.

Coordination	Inoue, Shion	Director for Science Affairs I
	Watanabe, Hiromitsu	Assistant Attached to the Director for Science Affairs I
	Ishibe, Yasuko	Specialist Attached to the Director for Science Affairs I

Executive Summary

1 Background

In 2008, the Science Council of Japan was asked by the Director-General for Higher Education at the Ministry of Education, Culture, Sports, Science and Technology to deliberate on quality assurance in university curriculums according to specific fields of study, which resulted in the Science Council of Japan recommending the creation of subject benchmarks for each field. For the subject of Philosophy, the Sectional Committee on the Study of Reference Standards in Philosophy carried out due deliberations and present in this report a summary of subject-specific benchmarks.

Previously, the Science Council of Japan published the report *Tetsugaku bunya no tenbou – tomo ni ikiru kachi wo terasu tetsugaku e* – (Prospects in the field of philosophy – Towards a philosophy that sheds light on the value of living together –in April 2010 and the declaration *Mirai wo misueta koukou kouminka ronri kyouiku no sousei <kangaeru "riron">* (Towards the creation a high school civics education that looks to the future – Thoughtful "ethics") in May 2015, and have repeatedly discussed the role of philosophy in education. The subject benchmark of this report, following on these aforementioned efforts and taking into consideration the current state of the educational process and teaching, reaffirm the significance of traditional methods of education but also takes into account that new teaching methods, focused on applied and clinical philosophy, etc., are growing due to the rich possibilities they offer.

2 Overview

(1) Education as the Meaning of Philosophy

The most important path that philosophy has laid out for modern society is education, with the objective of cultivating the successors of human civilization and nurturing human beings who will participate in and contribute to deliberations in democratic society.

(2) The Nature and Extent of Philosophy

Various definitions of philosophy exist, but here we prescribe it as "the building of a reference framework to understand the world we live in as a whole." This subject benchmark therefore covers philosophy not only in the narrow sense of traditional Western philosophy, but also addresses scientific philosophy, ethics, aesthetics and art study, the Japanese intellectual history, Chinese philosophy, Indian philosophy (including Buddhist studies) and religious studies, for a total of eight related areas. We have therefore selected expressions that are applicable to all eight areas and emphasized the work of philosophical thinking not only as analysis and criticism, but also in terms of constructive aspects.

Compared with philosophy education at Western universities, which is limited exclusively to Western philosophy, philosophy education at Japanese universities has, since its inception, been connoted with Asian philosophy and thought (as indicated above), as well as with aesthetics and art

study and religious studies (both of which also have ties to experiential science). This tradition provides students in Japan with a variety of learning content while also comparing the thinking and intellectual practices of Western philosophy with those of other regions; such relativizing in turn makes it possible to reflect on the foundations of one's own thinking and enables the building of an educational environment that encourages even more thorough philosophical thinking.

(3) The Nature, Extent and Inherent Characteristics of Philosophical Studies

The eight disciplines above are reciprocally invigorating while maintaining their respective academic traditions in Japan, which is also reflected in their academic societies. Each of the eight disciplines has its own self-understanding and identity.

(4) Basic Knowledge That All Students Taking Philosophical Studies Should Aim to Learn

In the process of undertaking philosophical studies, students will awaken themselves to develop the three pillars of knowledge, understanding and attitude: thinking about the "knowledge" of philosophers and thinkers, writers, artists and persons of religion of various places and times, being inspired by the thoughts of such predecessors to deepen one's own "understanding," and comparing and connecting those results with the viewpoints and values of new things in modern times while rethinking the grounds on which one's thinking rests to acquire one's "attitude."

The key to philosophical competence is none other than "thinking abilities." Logical thinking ability is a general bachelor's-level skills, while critical thinking ability is a component of liberal arts instruction at more than a few universities. Academic philosophical learning employs these general skills to extend thinking and, through more specialized learning, consider the use of appropriate philosophical knowledge and foster a problem-solving outlook and the understanding to find a path to reason for various problems such as principles, values and world views at a deep dimension.

(5) Basic Ideas about Methods for Learning and Evaluating Learning Outcomes

The understanding gained from studying the philosophical sciences id general and, at the same time, fundamental. As such, methods of learning are of a gradual nature and do not necessarily fit into the standardized learning elements or levels of difficulty. Furthermore, it is desirable that the study of philosophical sciences is conducted using an interactive process that emphasizes students' active nature, deepening from assistance from teachers to autonomous learning. Essays and reports have been the standard for evaluation, but in order to respond to the current demand to nurture generic skills, it is necessary to combine these with oral presentations and discussions.

(6) The Relationship between a Specialized Education and a Liberal Arts Education for the Cultivation of Citizenhood

Citizenhood, the state of being a citizen, is a fundamental attitude required for managing others and a democratic community. A professional education and liberal arts education in philosophical studies can play a particularly vital role in the cultivation of citizenhood. The reasons are for the following.

1) Philosophy links higher knowledge among various fields and can form a nucleus of cultural knowledge (liberal arts) that harmoniously drives specialized knowledge and citizenhood.
2) Philosophical debate forges the ability of citizens to judge, which is the basis of democracy.
3) Philosophical learning can teach individual citizens how they should take responsibility for various important problems in the modern world, particularly the field of ethics.

(7) How to Educate Educators in Philosophical Studies

As mentioned above, philosophical studies have an important role in higher education. Even in secondary education, the necessity of a philosophical education that that nurtures fundamental thinking abilities, not simply presenting a civics (ethics) course as a traditional subject of examination, has been recognized both domestically and abroad. Those overseeing such studies need to acquire specialized knowledge in philosophical studies, therefore making the existence of courses specialized in philosophical studies, such as a university Philosophy Department both at the undergraduate and graduate level, vitally important.

Contents

1 Introduction

A major characteristic of philosophical studies is that it is the oldest form of study among human intellectual activities. At the same time, it is also a direct successor to those intellectual activities. For example, scholars who study the thinking of past philosophers and thinkers are trying to objectively study their thoughts as historical objects, but are also aiming to further develop those thoughts in a certain way or to critically surpass those thoughts. In this sense, it can be said that the scholar is taking over from past philosophers and thinkers, taking what they were attempting to do and doing something similar. This feature of philosophical studies has become a source of respect from society, but conversely also a cause for ridicule.

On the other hand, we have reached an endpoint for philosophy serving as the ultimate foundation for all disciplines as the mother of all studies or the big thinkers giving rise to far-reaching ideological movement that lead the world, and the significance of philosophy's is being reconsidered anew.

So how do philosophical studies with these characteristics and issues have significance to us living in the present day, other than satisfying old-fashioned interests? Philosophical studies, unlike the making of things and economics, cannot directly contribute to directly enriching society, nor is it expected to do so. However, one of its possible contributions, is vitally important for the survival and well-being of humanity although it is difficult to discern. The most important path that philosophical studies contribute to society is to "develop" people–that is, provide an education. Looking back, Confucius, Socrates and Buddha were great teachers before being philosophers and thinkers.

So, what kind of a "person" is philosophical studies trying to cultivate, and is it possible to do so? Two things can be pointed out. The first is that an education in philosophical studies must include as an essential element familiarity with the philosophical texts of the Ancient East and West (although this alone cannot and should not be enough). Through the study of philosophy, students will learn the appeal of confronting the fundamental questions that humans have grappled with over the ages, and learn reverence for human intellectual heritage. In addition to understanding past intellectual heritage as such, as students move through their education learning the associations between modern issues and situations in which people today find themselves, they will come to understand that many of the problems that humans have dealt with from ancient times continue today in a modernized form and are, in fact, omnipresent issues deeply related to their own lives. In this way, students come to realize that they themselves are also successors of human intellectual heritage. In other words, the persons who develop their philosophical studies are, first of all, successors to human civilization.

Philosophical studies are also characterized by the style of thinking when considering a problem. In other words, philosophical studies approach a problem based on principle and removed from individual interests to universality, with clarity that provides for as much shareability as possible, and that is critically reflective while considered within a dialogue with others. The nature of these thoughts are, of course, shared by other disciplines. However, in philosophical studies, they are considered in a somewhat excessive and subjective form. This is why philosophy lies at the root of critical thinking.

The characteristics and strengths of these thoughts are displayed not only when thinking about traditional philosophy problems. As can be seen in the practice known as “clinical philosophy,” they are extremely important when we attempt to think deeply about the various problems we encounter in our society, when we try to reflect on the biases of our lives and thoughts while one step removed from them, when we crave to find a path to share fundamental/underlying thoughts with the others we meet in the course of our lives, or when we try to discover and formulate a question that needs to be asked about things that are important to the human race even though they still remain in an unclear form. An education in philosophical studies provides students with such thinking skills and attitude. This is why philosophical studies is considered to be at the core of a liberal arts education in almost all modern countries.

Still, there is no other way to achieve the above contribution without a philosophical studies education properly performed with a clear purpose. If so, then the duty of those who are involved in philosophy education and scholarly study will be to apply their wisdom to conceiving ways to realize the above ideas in their respective educational institutions. The establishment of this subject benchmark is one attempt to do so.

The drafting of this subject benchmark is a self-redefinition of philosophy as an educational activity, and in no way attempts to fit philosophy into a predefined mold. Moreover, the process of drafting this subject benchmark was in itself a process of establishing a reference philosophical dialogue through discussion

The creation of subject benchmarks is a self-redefinition of philosophy, which is an educational activity, and never attempts to force philosophy education into a certain form. In addition, the process of creating this subject benchmark was itself the result of a process of exceptional philosophical dialogue of thorough discussion to create a draft, calls for public comment through various academic societies and corrections thereof, and discussion at public hearings. Philosophy is a highly self-reflecting business that constantly questions the question, "What is philosophy?" If so, our self-defined attempt must be open to the future. In response to future circumstantial changes and deepening of our philosophical thinking, we will continue to reconfirm that this subject benchmark is reviewed and revised accordingly.

2 The Nature and Extent of Philosophy

Philosophy comes from the word *philosophia*, which means “love of knowledge” and referred to learning in its most fundamental sense. Therefore, if philosophy is defined in its broadest sense, it refers to matters of questioning and analyzing the principles that make things happen. In other words, it is a way of rethinking, interpreting and critically reconstructing the concepts that underlie our understanding of things or the value norms that support our practices. For this purpose, philosophy has a working “language” that is used to develop logical thinking and critical thought, but that language

also helps to foster empathy and imagination based on mutual understanding and mutual criticism of various perspectives rooted in eras, cultures and places, and foster dialogue and communication. In a nutshell, the work of philosophy is the construction of a referential framework to understand the world we live in as a whole.

Philosophy is not limited to a particular discipline. With the specialized differentiation that has occurred since the establishment of modern science, other academic disciplines have a number of fundamental concepts supporting their research activities: self-evident premises that are not questioned on fact. Philosophy, however, takes such fundamental principles and basic concepts as its theme, questioning and analyzing those facts. Naturally, the reworking of fundamental concepts and basic themes also applies to philosophy itself, making it an exceedingly reflective activity. Therefore, philosophy forms the foundations for almost all other areas of thinking and practices and therefore is the basis for all other academic areas. The fundamental principles and concepts with which philosophy should be concerned are not only with basic values such as Truth (related to perception), Goodness (related to actions), Beauty (related to sensibilities) and Holiness (related to transcendence), but also includes existence, nothingness, reason, sensibility, spirit, divinity, life, death, love, time and space, causality, freedom, intention, mind and body, cognition, knowledge, language, science, rationality, logic, meaning, duty, fairness, justice, interpretation, history and gender and so on.

At universities in the West, philosophy, ethics and aesthetic research/education normally fall under the umbrella of "philosophy courses." At Japanese universities following the introduction of Western civilization and culture after the Meiji Restoration, related fields such as philosophy, ethics, aesthetics and religious studies were established independently and, together with other philosophy-related departments, form a "philosophy department" in a broad sense. Although this development grew out of the special historical circumstances in Japan at the time, the result was that "philosophy departments" in Japan cover diverse areas with a broader range of thinking and intellectual practice compared with universities in the West. This can said to be advantageous for research and education in the broad meaning of the word *philosophy*, for the reasons described below.

Indeed, in the broad sense of the meaning of philosophy as a framework that should be referenced for global understanding, it should not be limited to the narrow meaning of traditional "philosophy" as used in the West, but broadly cover human thought and intellectual practice, as an effort stretching across several thousand years of human history and, furthermore, as part of various civilizations, cultures, history and traditions. Prior to the Meiji Restoration, Japan had the thinking and intellectual traditions of Confucianism, Buddhism and Shinto. After the introduction of Western "philosophy," these traditions served as the foundations for developing philosophical thinking and practice in Japan also assisted in the relativization of Western philosophy in terms of comparing Japanese thinking and intellectual practices with those of other regions. This is where the unique significance and strengths of the research, teaching and learning of philosophical studies in Japan lies, but also makes it possible to reflect on the grounds on which one's own thinking rests to develop new intellectual prospects.

Philosophy education and research became established in Japan this way, but in that process, the study of non-Western intellectual history (that is, the study of the intellectual history of Asian regions) did not necessarily fit into the Western concept of "philosophy" in the narrow sense of that word and chiefly became part of philosophical studies. "Intellectual history" carries this meaning in this report. As a result, philosophy-related departments at many universities today include not only philosophy, ethics, aesthetics and religious studies of Western origin, but also Chinese philosophy (Chinese thought), Indian philosophy (Indian thought and Buddhism), Japanese intellectual history, so they are able to offer a diverse program of content to Japanese students.

3 The Nature, Extent and Inherent Characteristics of Philosophical Studies

Because philosophy education and research at Japanese universities is (as described above) is wide and diverse we have divided them into eight fields and describe the definition (nature and extent) and characteristics of each. These divisions are well-established at the Science Council of Japan, but some universities currently use other designations that fit with their own educational purposes and curricular systems.

(1) Western Philosophy

Philosophy fundamentally questions actual problems, providing a foundation for all academic inquiry while clarifying a framework for understanding the world. The main questions of Western philosophy, which began in Ancient Greece, include ethics, pragmatism, etc. in line with values and norms: "What is existence?" (ontology), "What can we know?" (epistemology), "What is an act?" and "How should we act morally?" (ethics). Through such fundamental questions, individual issues are variously raised and mutually associated; by cooperating with others across academic disciplines, a variety of areas have developed, such as social philosophy, political philosophy, philosophy of law, philosophy of science, philosophy of education, philosophy of art, religious philosophy, applied philosophy and clinical philosophy.

As a methodology, a distinctive feature of Western philosophy is to analyze principles and concepts for exploration and to systematize their complicated relationships. However, this system itself can be questioned according to developments in various disciplines and societal changes.

There are two major orientations in Western philosophy research. The first is accurate interpretation of classical texts and critical review of the theories presented therein and critical examination of those theories by adding a fundamental revision. The second orientation is to overcome past theories and problem settings by presenting original questions and, by trying to analyze the presented problems, offer new topics and their solutions. "Classical" texts are the result of a multilateral approach with deep deliberation on real problems, and they also include a wealth of clues for developing original discussions in line with modern problems, making these two major

orientations mutually reciprocal.

Western philosophy attempts to unflaggingly construct a "framework for global understanding" by intentionally topicalizing principles and concepts, questioning and analyzing facts and, based on the results, crossing borders into other disciplines. This effort is important not only to the acquisition and accumulation of knowledge, but also to the acuity and width of scope in problem posing, to the logic and consistency of arguments for deriving knowledge, and for certainty of the basis for those arguments. In the respect, Western philosophy provides the foundations for developing logical thinking and critical thinking.

(2) Philosophy of Science

The philosophy of science has three main objectives. First, it seeks to solve the classical problems of philosophy, especially the ontological and epistemological ones, in the realms of the scientific world and scientific knowledge. Second, the philosophy of science works with specific scientific fields (biology, physics, mathematics, etc.) to examine their underlying concepts and principles, to analyze and develop methodologies, to create a bird's-eye view of fields, to connect different fields, and so on—that is, lay the foundation work needed for scientific fields. In this sense, the philosophy of science is part of science itself. The third objective is to scientifically study the various kinds of metascience of the phenomena called science: scientific history, scientific sociology, science and technology sociology, metrology, science, the cognitive science of science, scientific anthropology, science and technology ethics, researcher ethics, etc., and to position their essential parts.

Depending on which of these three objectives takes precedence, the contribution of the philosophy of science differs. If the first objective is the primary driver, it is just the philosophers who contribute. When it is the second objective, it is working scientists who contribute; when it is the third objective, the contributions of civic society come into play through the establishment of civilian control of science. Nevertheless, no matter what positioning is used, the generally accepted basic concepts, principles and methodologies should not be taken as a matter of fact and are to be scrutinized back down to the fundamentals.

(3) Ethics

Ethics explores "Goodness," one of the classical philosophical divisions of Truth, Goodness and Beauty; it is one part of philosophy that explores moral values, norms and personality. In this regard, ethics is contiguous with legal philosophy, which discusses legal values and norms from a philosophical perspective. On one hand, ethics conceptually examines the basic concepts of morality (ethics, norms, values, virtue, duty, justice, freedom, will, personality, etc.) and philosophically questions the basis for ethical evaluation of deeds and character. On the other hand, "lived morals" are examined in the context of the history of ethical thought.

Traditionally, normative ethics was the axis of moral inquiry, and considered the practical

content of moral norms and the moral principles that serve as criteria for moral judgment. But at the same time, beginning with the question, "Is moral assertion a judgement about some moral fact?" ethical exploration with consideration given to moral judgment and moral assertion from conceptual, linguistic and metaphysical standpoints, has also become an important axis.

Such exploration is sometimes distinguished from normative ethics in order to analyze statements about morality at a higher level, removed from the assertion. In recent years, this higher level has been referred to as "meta-ethics." From the latter half of the 20th century, applied ethics (bioethics, environmental ethics, information ethics, business ethics/occupation ethics, engineering ethics, etc.) have become an important area of ethical consideration due to the growing complexity of social structures and rapid technological progress, as well as to normatively deal with various social phenomena.

(4) Aesthetic and Art Study

Aesthetics (art philosophy) is, among other things, the philosophical consideration of the value of "beauty," and most especially the subject of philosophical considerations of human efforts related to the values of beauty or aesthetics in art. The word *aesthetic* is translated into Japanese as *bigaku* (the study of beauty), but the original term is an academic one derived from the Greek word for sense perception. Particularly in recent times, the phenomena of aesthetic culture and representation (including subcultures) taken as a whole is drawing attention to sense perception in terms of probing our actions and their limitations.

Many Japanese universities often have courses called Aesthetics and Art History or Aesthetics and Art Studies set up within their philosophy programs, which is rarely seen in the West. The reasons for this follow below. Globally and in Japan, the study of art genres (art, literature, music, theater, film, etc. for both performing and fine arts) includes art theory and art history. Study of the theory and history for these genres is grouped as "art studies," but even so these areas of research are all premised on concepts of aesthetics, performing arts, fine art, creators, forms and value evaluations, which are all excellent philosophical concepts. And it is aesthetics (the philosophy of art) that principally considers the meaning of those concepts. On the other hand, individual artistic works are one of the core parts of human spiritual culture, expressions of the religious view, worldview and thinking of the times in which they were made, and necessary to the historical and empirical study of aesthetics (the philosophy of art) as well as philosophy, intellectual history, religious studies and the like. It goes without saying that the aesthetics and philosophy of art cannot be achieved without the study of art history and other aspects of art. That Japanese universities integrate aesthetics and art history or aesthetics and art studies into one course has been a conscious structural decision. For literature, courses in Japanese literature and foreign

literature are separate, while some universities have specialized faculties/department such as music departments and performing arts department.

(5) Japanese Intellectual History

Japanese intellectual history is an academic discipline that examines the history of various intellectual activities on the archipelago and the formation of "Japanese-style" values and worldviews, and their originality, using various methods to objectively clarify historical perspectives.

In order to put on the field the world of Japanese intellectual history, which has never sufficiently developed its world of systematic and logical thinking, it is normal to consider thought and philosophy not only in the highly structured narrow sense, but to also include the consciousness underlying folklore, customs, building, artistic works, rituals, etc. that is not logicized. On the other hand, the discipline of Japanese intellectual history characteristically has close interaction and mutual exchange with neighboring disciplines such as historical studies, literature, religious studies, folklore, aesthetics, etc., as they share a common base of materials and documents.

Japanese intellectual history suffered a great damage due to movements before and during World War II to clarify Japanese spirit in the interests of expanding national influence then the subsequent setbacks that accompanied defeat. As a result, academic circles in post-war Japan have made various attempts to objectify and relativize Japanese intellectual history by strengthening historical perspectives and introducing comparative philosophical methods in order to ensure objectivity as a discipline.

(6) Chinese Philosophy

From a philosophical, intellectual history and religious history point of view, Chinese philosophy uses methods for historical investigation of documentary records and field surveys in order to study thought and religion in the Hundred Schools of Thought, Confucianism, Taoism, etc. in China as well as the facets of those ideas that were taken up in the Korean Peninsula, Japan and the like. Chinese thought (or Chinese philosophy) is also used.

Educational study in Chinese philosophy in Japan began with the introduction of the Chinese writing system and, together with Buddhism, formed the core for thought and ethics throughout the Edo Period. The modernization that came with the advent of the Meiji Period brought, on one hand, the Imperial Rescript on Education, a typical ideological resource for loyalty and patriotism education used in the service of national policy. On the other hand, analysis of content through *philosophia* methods introduced from Europe was promoted academically and empirically. In addition to morality training (*shuumi*) in secondary education, *kanbunka* (the study of Chinese letters, which existed separately but parallel to the study of Japanese) was the main teaching material used with high school and university students under the old education system.

The current state of academic studies of Chinese thought can be classified into four categories, research into: 1) ancient philosophy (Hundred Schools of Thought), 2) Confucianism, 3) Taoism, and 4) modern-day thought. It is somewhat unusual that in Japan, Chinese Buddhist studies belong to the area of Indian philosophical studies.

(7) Indian Philosophy (Including Buddhist Studies)

Studies in Indian philosophy (including Buddhist studies) largely focus on philosophical thought and practical theory in the India-originated religions of Buddhism and Brahmanism.

In Japan, Buddhism, along with Shintoism and Confucianism, has traditionally had great cultural and social influence that has continued into modern times, with Buddhism studies today pursued mainly as an academic field centered on philosophical matters. Buddhism spread from India to China, the Korean peninsula and Japan, from Sri Lanka to Southeast Asia, and from Tibet to inland Asia. These three routes transmitted Buddhism throughout the world and expanded its cultural influence. Because of this [influence], Japanese Buddhist studies cover domains such as religious studies, ethics, Chinese philosophy, Japanese philosophy, and Japanese thought and history, etc., and also from the perspective of how India-originated Buddhist thinking developed unique characteristics in each country/region, making it a main branch of a broader Indian philosophy.

On the other hand, Indian philosophy in the strict sense is characterized by study of the schools of Brahmin philosophical systems rooted in the Vedic scriptures. Each school's thought systems, argument analysis for Buddhist thought and Brahmanism's mixing with indigenous faith that resulted in the establishment of Hindi philosophical thought, along with the influences of Islam that became prominent from the 13th century onward and followed upon by the momentum of modern thinkers, has made Indian philosophy into a major research area of intellectual history.

(8) Religious Studies

Religious studies, by inquiring into the diverse religious phenomena in the world, reveal the influences of religion upon us, how we relate to religion and what the possibilities and restrictions of religion are.

Although religious studies are often contiguous to philosophy courses, study of religious thought has been traditionally popular. Nowadays, however, in addition to thought and scripture, religious studies undertake efforts toward a comprehensive understanding that includes matters such as myths, ceremonies, precepts, customs, arts and entertainment, buildings and community, as well as the history and social conditions that have changed them. For this reason, religious studies incorporate theories and methods from history, social studies, psychology, anthropology, folklore studies, regional studies and other areas of study, indicating the importance of religious studies in cultural and social science. In recent years, the field has expanded its involvement into natural science fields such as cognitive science and applied ethics such as bioethics and environmental ethics, as well as increasing its role in international education as globalization proceeds.

As the scope of applicable areas and methods widen, the nature of comparison and reflection remain the same. So on one hand there is awareness of interreligious and intrareligious comparison so as not to not fall into self-righteous judgment, while on the other hand, importance has been placed on eliminating assumptions about religion and reworking the framework of religious perception.

The characteristics of religious studies per this report's definition of philosophy as "building a framework to understand the world," apply not only to religious studies but also to the religions themselves. Therefore, within individual religions, there has been distinctive scholarship predating modern times inherited by Christian theology, Buddhist teaching and religion, Shintoism, etc. In the West, religious studies and Christian theology have often been in conflict, but in Japan, a dialogue is established between religious studies and theology/teaching.

4 Minimal Level of Grounding to be Acquired by All Philosophy Students

The areas encompassed by the philosophical studies are many and varied. So, students will have to choose their curriculum out of consideration for the characteristics of each area. However, regardless of their choices, we should attempt to provide them with the following core knowledge, abilities, and intellectual attitudes.

As stated previously, the key features of philosophy are its desire for a principle-based understanding of things, and its interdisciplinary intellectual nature that transcends academic fields. Philosophy lives through continued inquiry into fundamental and broad questions that span all areas, questions concerning "truth, goodness, beauty, holiness" such as "what exists in the world?", "what truth can we know?", "what is the correct way to think?", "is knowledge subjective or objective?", "what does it mean to be 'human'?", "what does it mean to 'live'?", "what is happiness?", "what is good and evil?" and other inquiries. Then, that contemplation leads to a retrospective investigation in which one ponders and questions the basic nature of one's own way of life and of modern society, without assuming such things to be obvious or self-apparent.

Therefore, regarding coursework in philosophy, the following three features should be required: knowledge regarding how different philosophers, thinkers, artists, writers and religious leaders, from East and West, past and present, engaged in contemplation; the ability to deepen one's thinking in connection with the thoughts of these philosophy predecessors; and a willingness to compare and connect those results to new value systems and viewpoints in modern society and to question one's own foundation, as an opportunity for personal implementation of these philosophical skills. Learning philosophy also provides a great opportunity to deepen the knowledge, ability and willingness just mentioned. By combining these three features, philosophy education allows the learners themselves to become the foundation for building a better life. Learning philosophy has professional and social

significance as well. Engaging in an open-minded, clear dialogue with people who have different values and mindsets is indispensible in modern professional and social life. This is how the knowledge, abilities, and attitudes acquired through learning philosophy become the foundation for people to work together and perform better in their jobs, ultimately creating a better society.

(1) Basic Knowledge and Understanding to be Acquired through Studying Philosophy

1) Students shall understand the concepts and thoughts found in the writings of key philosophers, thinkers, logicians and other historical figures from East and West. Artistic works also express the thoughts, values, worldviews and religious views of the creator and of the time period in fine detail, and thereby form a central part of human's intellectual culture. In order to meet and dialogue with ideas from a different age and region, students must understand the original context as based on its historical background, and must grasp the ideologies and intellectual trends, from East and West, past and present, as they exist in that "otherness."

2) Students shall understand the perspective of comparative analysis – that one must learn about different time periods, regions, and different traditions of thought and intellectual trends to better understand the specific ideologies, intellectual trends, and social phenomena one is interested in, and to clearly define the features of each ideology and trend.

3) Upon gaining the understanding and knowledge above, students shall, in accordance with specific examples, deepen their understanding of fundamental values like "truth, goodness, beauty, holiness" and other concepts like "existence, nothingness, reason, sensibility, spirit, God, life, death, love, time & space, causality, freedom, will, body, consciousness, knowledge, language, science, rationality, logic, meaning, duty, interpretation, history, gender" which form a referential basis to help us understand the world in which we live. Students shall also become able to apply these to their thinking and decisions in everyday life and in society.

4) Students shall learn what type of principle-based inquiries occur, what types of discussions result from those inquiries, and what type of thoughts and intellectual trends emerge within each professional field in modern society (politics, society, economics and business, art, ethics, religion, physics, biology, medicine and caregiving, environment, media and news, education) and connect that to their own life.

5) Students shall, by considering the historical and comparative perspectives in 1) 2) above, understand the circumstances in which the various modern questions of philosophy arose and their historical/geographical context.

6) Students shall understand that the inquiries handled in philosophical studies are inquiries that transcend or are fundamentally central to the various professional areas of politics, society, art, religion and science, and shall understand that philosophy is an intellectual endeavor that can bridge those fields or creatively reconstruct their principles and foundations.

7) Fine arts and religious studies, as explained in "3. Nature and Characteristics", have traditionally been placed alongside philosophy in Japanese universities for organizational and morphological reasons, so they are covered by this benchmark. However, their interdisciplinary qualities are stronger now, and in addition to research on ideologies, they currently include descriptions and analysis of specific examples (artistic works and religious events) and social phenomena. Therefore, students must gain historical knowledge relevant to those individual examples (art history, religious history) as well as knowledge about theories about those examples.

(2) Basic Capabilities and Skills to be Acquired through Studying Philosophy

As explained above, the defining features of philosophy are its examination of the fundamental principles and concepts that transcend or found the various academic disciplines. Thus, although there are skills specific to philosophy (which a student majoring in philosophy should acquire), there are also broadly-applicable thinking and discussion skills (generic skills) that can be acquired by anyone learning philosophy. These generic skills are the skills that students should acquire from any discipline upon reaching a certain level, and are also the skills necessary for rational behavior in society. Especially with regards to democracy – a structure in which authority is given through the consent of the people – all modern people should first acquire the ability to think and discuss rationally. One reason for the fact that philosophy has become a pillar of liberal arts education is that philosophy is expected to inculcate the abilities that maintain this fundamental constitutive principle of society. The following sections are divided into a description of the generic skills to be cultivated through philosophy, and a description of the specific skills that can be cultivated by majoring in philosophy.

1） **Generic Skills - General Reasoning - to be Cultivated though Studying Philosophy**

"Generic skills" are general thinking and discussion skills that are broadly applicable, and that provide lifelong support in work, society and life itself.

i. General skills that support learning

ii. Problem-discovery skills

iii. Problem-analysis and problem-solving skills

iv. Bidirectional communication skills

(Refer to <Reference material 1> for a detailed account of each type of skill)

Of the skills above, b, c and d are nothing other than the so-called “critical thinking” skills. Critical thinking forms the core of generic skills for modern humans, and is a requisite ability for understanding other people and different cultures. Also, philosophy education is one the best opportunities for cultivating critical thinking skills. In philosophy, you habitually engage in intellectual behaviors like reflectively reconsidering your own assumptions or seeking out the rationality present in an irrational claim as a matter of course, but these behaviors of methodological retrospection (questioning the way you think or consciousness itself) are not that common in the other academic disciplines (at least not in the early stages). Furthermore, it is these types of behaviors that enable philosophy to establish inquiries that transcend academic fields. In that sense, philosophy has the merit of being able to teach generic skills, which should not depend on academic field, from an interdisciplinary point of view.

2）Philosophy-specific Skills to be Cultivated and Strengthened by Majoring in Philosophy

In professional study of philosophy, students will gain an outlook and path to problem-solving, by examining problems at a deeper level (principles, value systems, worldviews) and making proper use of philosophical knowledge and concepts in their thinking, while fully utilizing the generic skills above. Also, students will learn this process through grappling with philosophy texts from the past. These “philosophical” acts, when contrasted with people trying to solve problems in their everyday lives, demonstrate the following characteristics. First, we deliberately uncover and question things normally taken for granted. Secondly, we pay rigorous attention to the concepts and words used to establish or solve the problem. Thirdly, we continuously check the construction and validity of our arguments and of others’ arguments. Dialogue with the texts of past philosophers encourages further growth in this type of problem-solving; this is because past texts always have a historical backdrop and context different from our own, so if we want to understand them, we must go through the process of pondering words and concepts to clearly reconstruct their arguments and problems. And, since the texts themselves represent a similar process of looking at the thought of people even further back, we can extract from them an array of tools to help us engage in the fundamental process of problem discovery, analysis, discussion and problem solving, in a clearer and more robust way.

Therefore, through professional training in philosophical studies, the student can be expected to develop the following skills specific to philosophy.

i. Ability to propose questions

ii. Ability to analyze problems

iii. Ability to understand philosophical texts

iv. Ability to think and imagine philosophically

v. Ability to make philosophical judgments

vi. Ability to engage in philosophical dialogue

(Refer to <Reference material 1> for a detailed account of each type of skill)

(3) Basic Intellectual Attitudes and Behaviors to be Acquired through Studying Philosophy

1）**Respect for and self-awareness as an inheritor of humankind's intellectual heritage**

2）**Intellectual courage and adventurous spirit**

3）**Willingness to listen**

4）**Intellectual tolerance and caring**

5）**Intellectual flexibility**

6）**Willingness to continually implement ideas and learn as part of society**

(Refer to <Reference material 2> for a detailed account of each type of skill)

5 Basic Approach to Learning Methods and Assessment Methods

(1) Learning Methods

1）**Learning and Teaching Philosophical Studies is both Cyclic and Holistic**

The content of philosophical studies is universal, general, and fundamental; it is not knowledge limited to a given context or circumstances. This means that any one principle or concept is applicable in many other contexts, and furthermore, that one's understanding of such principles and concepts will be both gradually acquired through and even transformed by a variety of different contexts and circumstances. Therefore, we should note that it is impossible to measure acquisition in philosophy studies by dividing each individual concept into either "didn't learn it at all" or "mastered it", and we should keep this in mind when designing any philosophy education program.

In addition, knowledge in the philosophical studies has the quality in which the meaning of any part is determined by the overall system or context. For example, the specialized meaning of "experience" in philosophy can only be sufficiently understood after looking at the overall ideological trend called "empiricism." So, organizing philosophical content into a clearly-ordered, segmented hierarchy, such as into fundamentals and advanced, is not only difficult; it may even be antagonistic to philosophical knowledge itself. Similarly, development of thinking and understanding in philosophical studies is not a process that lends itself to simple linear ordering or gradations.

In fields like this, learning one part also means learning a general pattern that reflects the whole. And, when we feed back that understanding of the whole to an understanding of the

parts, we gain a deeper understanding of the parts. Therefore, we should remember that though philosophy is a gradual process, philosophy education should aim to provide continual opportunities for students to "reconsider the parts with an understanding of the whole."

2）Learning Philosophy is an Active, Bidirectional Process

To achieve the type of learning of philosophy outlined above, the learning should take place via a bidirectional process that emphasizes the learner's active nature, the learning style should move to a deeper level (from a learning dependent on the teacher's assistance to an independent learning directed by the student themselves) due to this process, and students should reflect on and constantly relearn their own philosophy through dialogue with the instructor and other students. The following learning formats can be incorporated into the educational process to help achieve these aims.

i. Lectures
ii. Seminars
iii. Reading original texts
iv. Training/experience/fieldwork
v. Reports/essays
vi. Self-study and group learning
vii. Experiments
(Refer to <Reference material 3> for a detailed description of each format)

(2) Assessment Methods

1）Basic Approach

Assessment of learning outcomes in philosophical studies is based on measuring whether students acquired knowledge and abilities specific to philosophy, such as comprehension and thinking abilities. So, what would statements like "I understand philosophy" or "I learned how to think philosophically" indicate?

We cannot judge whether a student "understood philosophy" simply by having them repeat, verbally or in writing, what they heard in lecture or read in the class readings. The assessment method must test whether the student can do things like give specific and easy-to-understand explanations to others (or conversely offer a succinct summary), make comparisons with other ideas by pointing out similarities and differences, and apply the ideas to real examples near at hand. When applying past ideologies to current conditions, one can easily make the mistake of casually interpreting the ideas using modern standards, so understanding the original context for the ideas should also be a key criteria. This also applies to ideologies from other cultures.

Saying "I (finally) understand philosophy" could refer to the experience when, as your get

older and experience life events, you think back and say “oh, I guess that’s what all that was about” and have finally appreciated the truth of its statements. However, in university classes, students’ understanding cannot remain internal; we must confirm the validity of their understanding by having them express it to instructors and other students. In that regard, assessment methods in philosophy are not much different from other fields.

Depending on the student, whether they “learned how to think philosophically” might be better demonstrated by having them construct a philosophy by themselves, rather than researching any specific philosophers or thinkers. Conventional philosophy education has operated under the assumption that students could not create their own philosophy before sufficiently understanding the thought of earlier philosophers. However, given the current goals of university education with their focus on developing creativity and problem-solving skills, it may be wise to respect students’ desires to create their own philosophy based on their consciousness of certain problems. By comparison, students majoring in literature research may not be able to create a literary work that matches the literature they are able to research, but in philosophy, the ability to consider some philosopher’s ideas and the ability to think through and create one’s own philosophy are not fundamentally different. However, we cannot approve of cases in which students fail to respond to assigned problems on a test or report, instead choosing to proceed with their own theories in a self-indulgent way.

Measuring critical thinking ability is an easily misunderstood task; critical thinking does not mean to nitpick others’ carelessness, but to question things that have been taken for granted (perhaps even by oneself), which, more than anything else, is what adds depth to one’s own thinking abilities. We must communicate those points to students. Assessment criteria should be along the lines of whether students can offer counterexamples to a given opinion, point out the limits of an opinion by discerning its applicable scope, and determining whether a presumption was included in the opinion.

Assessment not only measures how well students have learned to think, it can also improve on those thinking abilities. That is, working on the issues presented in tests and reports provides the greatest opportunity for students to do their own thinking. Students who do not have much basic philosophical knowledge may prefer to have their final assessment simply be a fill-in-the-blank type of paper test, but we think it would be best to avoid simple memorization tests, and instead to design test questions that force the student to utilize their knowledge and think.

Additionally, giving consideration to the fact that philosophy education is a bidirectional act that leads to reflection and new discoveries even for the instructor, instructor must always reflect on their own assessment capabilities, remaining fully aware of the possibility that a student may have unknown potential that extends beyond the instructor’s awareness or capabilities.

2）**Grading Policy**

In conventional philosophy education, essay tests and reports were standard assessment methods, but a combination of oral presentations, discussions, group work and other methods will be necessary to meet current demands of fostering generic skills. Mutual assessment by students (peer review) is also effective, but in those cases, the instructor must carefully explain the criteria used in the assessment.

i. Declaration of which abilities/activities are subject to assessment

For philosophical studies, the following items should be included in assessment.

・Basic knowledge of ideological history/history of philosophy, various theories, and the ability to utilize (philosophical) concepts

・Willingness and ability to reason independently, rigorously, critically, and creatively

・Willingness and ability to engage in proper and fair discussion with others

・Overall knowledge and understanding of class materials (for seminars and reading original works)

・Willingness and ability to independently check and confirm background information for understanding lectures and seminars

・Ability to construct valid proofs and come to conclusions regarding a problem chosen by the student for inquiry, by selecting the proper approach for a solution, and by collecting, organizing and analyzing necessary materials (mainly for dissertations)

・Ability to interpret and verbalize raw experience from life or gained in the field in a more abstract and principled framework

ii. Assessment Methods

Rather than relying on any singular performance metrics like written exams, oral exams, reports, dissertations, or presentations/discussions/debates/group work, all classes should utilize a compound assessment based on a combination of these.

Conventional methods like reports and dissertations are able to provide an overall assessment of the various abilities indicated above, so they have been considered to be better than written tests. However, with the development of the internet, it has become difficult to determine what portions rely on reference materials and to what extent. Giving this due consideration, rather than assessment of a single report at the end of the semester, it is necessary to grasp how well individual students are thinking and understanding using performance metrics or reaction papers in each session of class.

Additionally, philosophy educators have an occupational duty, as it were, to investigate any improper actions – plagiarism first and foremost – from a principled point of view, in terms of what aspect is unethical for what reason, then clearly formulate those points and provide them to educational institutions and academia generally.

6 Relationship between Liberal Arts and Specialized Education in regards to Cultivating Citizenhood

"Citizenhood" is a collection of fundamental attitudes necessary for participating in a democratic community with others. Citizenhood does not only refer to the moral attitudes that deal with people individually, such as respecting human rights, but also to an attitude willing to form a society. That means a willingness to build a democratic society, to better develop that society, and to treat individuals comprehensively according to the moral considerations held by the democratic society.

The necessary characteristics and virtues for citizenhood could be generally stated as: honestly stating what you think is true, courage to do what you think is right, autonomy to create and obey rules for oneself, an independent spirit that does not rely on authority or other powers-that-be, an open tolerant spirit, the ability to respect the rights of others, the ability to properly evaluate political policies and practice, active participation in public discussions, desire to work, the ability to correctly cope with changes in the economy and scientific technology, the ability to make reasonable demands, etc. Naturally, a desire to participate in a democratic society must be fomented before these fundamental behaviors can be achieved.

The desire to participate in society and these basic behaviors and should be nurtured through every academic opportunity in every academic field. However, in the philosophical studies, professional education and liberal arts education fulfill uniquely important duties for the cultivation of citizenhood. As a fruit of the assiduous thinking of philosophers from before this modern age, we have at least some wisdom that can be applied to society now, and referring to this wisdom is a key part of the liberal arts.

One reason that philosophical studies can fulfill this role with regards to cultivating citizenhood is because it ties together knowledge of various fields and forms the core of liberal arts, which advances expertise and society in harmony.

Liberal arts education is not merely about acquiring useful knowledge from the past; its main goal is formation of rich, diverse human interaction. The liberal arts education demanded by modern society is simply taking a bird's eye view of the overall interrelatedness of human society, appreciating the roles and lives of various people as variables in society, and acquiring the awareness and willingness to empathetically understand anyone's position. That means it is also something for harmonious understanding of the segmented and specialized modern world. The liberal arts are not mere preparation or a prior stage for a professional curriculum. Rather, they have the role of transferring expert knowledge from the context of a specialized group's set of interests and concerns to a context of society's set of interests and concerns, and then providing feedback in the form of questioning and re-examining the meaning and value of that knowledge. To put it another way, expertise only becomes meaningful and valuable once it has transformed back into the liberal arts. The relationship between expert knowledge and cultural refinement is a cyclical flow, much like that between expert groups and the society of citizens, as must be the case.

Philosophical studies fulfill a large role in liberal arts education in this sense. The primary reason is that re-examination of prior knowledge and information, as with the Socratic method, is a major duty in philosophy. The generality and abstractness of philosophical discussions can fulfill the roles of: questioning the meaning or efficacy of specialized knowledge under a wider social, cultural or historical context; examining various ethical, social, and cultural problems borne of scientific technology from a layperson's perspective; verifying the nature of expert groups from the perspective of a regular citizen; and tying together segmented, isolated fields in a lateral way.

Liberal arts represents the knowledge of general citizens that is not limited to expertise. "Not limited to expertise" here should not be interpreted in a negative sense i.e. that general citizens are lacking in expertise. Experts are not experts outside of their own areas. Rather, general citizens – who are not limited to expertise – place importance on the benefit and happiness of a wide range of peoples (more than specialized groups do), and give context to the work of experts thereby giving meaning to and appreciating that expertise. In this sense, philosophy is a field that, like Socrates, deliberately aims to maintain a layperson position.

A second reason is that philosophy, especially philosophical discussion, can foster good judgment in citizens – which is the foundation of democracy. The ability to make judgments is the most crucial skill in human life, and fostering it should be given maximum focus in education. Judgments aim to assign the amount of truth, validity, or value to something, such as in questions like "is this scientific report true or not?" (truth judgment), "are the actions in this project ethical or not?" (moral judgment), "how much will this policy benefit the poor?" (value judgment), "how much value does this work of art have?" (aesthetic judgment), "how frequently does this psychological principle arise?" (probability judgment), or "is this research plan feasible or not?" (feasibility judgment). However much knowledge one has, without the ability to make judgments, one will not be able to take any action in practice. Philosophy fosters the ability in people to make judgments in line with their own specific circumstances, evaluate, consider and make selections about whether to take an action or not. This judgment ability of citizens is one that should be most emphasized in our shared political, economic and cultural life, and one which can be improved through philosophy education.

And, thirdly, philosophy teaches that each citizen bears the responsibility for serious problems in modern world and especially problems in the areas of ethics. Philosophy education, by developing people's judgment skills, can strengthen the independent spirit in citizens, and cultivate deeply considerate people. In any society, people are significantly influenced by cultural authorities, as well as by political and economic forces. Philosophy teaches us to critically re-examine and ponder their views. Then, we learn to think in our own way, and gain a distaste for consuming propaganda in any of its forms, for subservience and unconscious obedience. Philosophy encourages people to critically and constructively deliberate on current laws, system and politics, by dialoging with cultures and civilizations from different times and places. Philosophy can fundamentally question the nature of oneself and society. Philosophy represents the knowledge for reconstructing those in a creative fashion. And philosophy can provide opportunities for reflection in every aspect of society. However much

science and technology advances, this role cannot be replaced by expertise-driven science and technology. Philosophical education raises citizens who see the problems of modern society as "my personal" problem and desires to compose fundamental solutions to those.

So, within philosophical studies, what is the relationship between professional education and liberal arts education in terms of encouraging citizenhood? Just like other professional education, professional education in philosophical studies also plays the role of advancing research in specialized fields, building up knowledge in the field, and passing that on to the next generation. However, we should bear in mind that for professional education in philosophical studies, more than in other fields, the root of its expertise is founded in the liberal arts. This is simply because the knowledge sought by philosophy is connected with fundamental and universal human values such as "truth, goodness, beauty, holiness", and these values are the foundation for judging the value of expertise and technology in every other field. Philosophical studies is an academic field where one investigates the basis of those values and re-examines oneself and society accordingly. In that respect, the social and occupational meaning philosophy holds will always play a fundamental role in any field. The results borne of past philosophers' contemplation greatly contribute to the formation of this foundation called "liberal arts."

7 On Raising Up Philosophy Educators

(1) Raising Educators for High School *Civics* and *Ethics*

The issues facing training high school philosophy educators for *Civics* and *Ethics* courses are as follows.

1) Few *Civics* or *Ethics* instructors studied philosophy in college or graduate school.

At a Q&A session at a philosophy education workshop held during the 69th Meeting of the Philosophical Association of Japan at Oita University in May 2010, one opinion offered was "the number of instructors who select philosophy or ethics as their educator curriculum has been dropping. We are worried that, at this rate, we will even lose the opportunity to implement the philosophy education we are discussing here."[1] This is also relevant to the problem of raising university-level educators, which is discussed below.

As stated in this opinion, the number of high school *Civics* and *Ethics* instructors who studied philosophy or ethics in university is dropping, and this is a problem if the *Civics* and

[1] Statement *Mirai wo misueta koukou kouminka ronri kyouiku no sousei <kangaeru "riron">*. "Creation of High School *Civics* & *Ethics* Education for the Future – Towards a 'Thinking *Ethics*'" pp.3-5. http://www.scj.jo.jp/ja/info/kohyo/pdf/kohy-23-t213-1.pdf

Ethics instructors only studied politics, economics or history. We say this because the thoughts and systems presented in *Civics* and *Ethics* classes are the products and results of philosophical thought, and should be learned internally by students as they maintain continual awareness of that process. That sort of philosophical thinking is an ability gradually acquired through philosophical studies at university.

2） Memorization-heavy ideological history is emphasized, deviating from students' lives and interests.

In the statement "Creation of High-School Civics & Ethics Education for the Future – Towards a "Thinking *Ethics*" offered in the Philosophy-Ethics-Religious Studies Sectional Committee at the Science Council of Japan as published on May 28th 2015, a claim was made that what we education must provide is "the ability to think for oneself, make judgments for oneself, and act for oneself; the ability to continually ask fundamental questions; the ability to interact with others as humans; and improvement in the quality of 'citizens' acting in society," indicating that to foster these qualities and abilities, the high school civics course *Ethics* – which conventionally leaned towards being a mere transfer of knowledge about ideological history – should be converted into a class that fosters thinking abilities.

Previously, the question "is philosophy history necessary in elementary and secondary school education?" was raised at the same philosophy education workshop in 2010, and a statement that "High school *Ethics* instructors are not there to increase the number of ethics students, nor to support lectures on ethics at university, but to give students practice in making ethical decisions, whether for the majority of students who do not advance to higher education or for the majority of students who have no interest whatsoever in ethics" was published in the annual report for the 52nd Meeting of the Japanese Society for Ethics .

Despite these statements, textbooks that focus primarily on ideology history continue to be adopted, and classes are still taught centered around memorization of content – far removed from true nature of philosophical thought. The importance of history can only be appreciated when its connection to current society and students' lives today is made clear, but classes continue to ignore this and simply progress chronologically. The reason is that, for teachers who did not major in the subject, the easiest material to teach students is a list of people's names in historical order, along with a brief description and keywords for each respective person. Also, university entrance exams test knowledge in a comprehensive fashion, so high school classes often attempt to prepare students for that. Basically, the reasons for focusing on philosophy history are extremely passive, primarily being because it is the easiest style for teachers who are not well-versed in the subject. The issue indicated in ② above is closely related to the issue indicated in ① above.

3） Emphasizing philosophy in secondary education is the norm around the world,[2] but not in Japan's system

This is also connected to the issue of classes focusing on memorization of philosophy history, as indicated in ②. In the "Report: Outlook for Philosophy – Towards Philosophy that Promotes the Value of Coexistence" (*Hokoku: Tetsugaku bunya no tenbou – tomo ni ikiru kachi wo terasu tetsugaku e*) report submitted as a part of the "2010 Statement of Japan Outlook in Academics" from the Science Council of Japan Philosophy Committee, the following three items can be proposed as fundamental intellectual abilities that should be polished through the fields of philosophy and thought: i) deep-level "contemplation" and "insight" that can re-examine and question assumptions that we take as given in our everyday thought; ii) "imagination and sensitivity" that can accept, understand, and sympathize with the presence of other people, cultures and value systems that greatly differ from our own; and iii) the "ability to engage in dialogue" that enables one to listen to and distinguish a variety of differing voices, to communicate one's own ideas in a way that others can understand, and to offer responses to others. Philosophy education as practiced in the world's secondary education institutions maintains the educational goals of fostering these abilities and also directly linking them to growth in the citizenhood mentioned above. In the aforementioned proposal "Creation of High School *Civics* & *Ethics* Education for the Future – Towards a 'Thinking *Ethics*'", the two pillars of high school *Ethics* are given as philosophical dialogue, and critical examination of the teaching of prior philosophers found in a passage from an original text. If the former is for the development of "ability to dialogue", the latter likely concerns "imagination and sensitivity" and "insight" – which aim to understand the thoughts of people and societies from different ages and societies. "Contemplation" is connected with both.

So, our immediate needs are to develop a new philosophy education for fostering the aforementioned abilities, and to raise instructors who can handle such duties, making use of traditional knowledge in the philosophies, including ideological history. University-level philosophy education now requires raising personnel with educational capabilities that can inculcate "contemplation", "insight", "imagination and sensitivity", and "ability to dialogue" in junior high and high school students in the future, as a way of raising instructors for secondary education. In order to achieve this, students must genuinely feel that they

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[2] Philosophy for children, which started with Matthew Lipman in the 1970s, has spread to elementary and secondary school education in most countries in these past 40 years. Also, in recent years, we find vibrant philosophy education even at tradition-based schools in the English-speaking world, such as at Rugby School. The International Council of Philosophical Inquiry with Children. Please refer to their homepage. http://icpic.org/

themselves have acquired these abilities, during education at university more than anywhere else, and it would be beneficial to have universities thereby provide a model for a new secondary school education.

(2) Raising University Instructors

Education of university instructors in Japan is insufficient in all fields, not just in philosophical studies. Young researchers usually do not learn much about how to teach until they enter graduate school and begin teaching duties. A program like the following should be created in order to train young researchers into excellent educators.

1）**Fostering Expert Researchers**

First, the most important thing about becoming a university instructor is the ability to perform research that meets international research standards and publish results regularly. Even in the areas of humanities and the social sciences, which includes philosophical studies, it is necessary to further improve our communication abroad in the form of submissions to international academic journals, creating high-standard academic journals with a review board composed of leading-edge researchers (from inside and outside Japan), and writing/translating top essays and works into English and other languages, not only to promote bidirectional international academic exchange, but also to maintain a top-level research. Publishing research that has been recognized as leading-edge will raise the level of philosophical studies in our country, and enable research training that looks towards placing personnel in posts in foreign educational institutions.

2）**Development of New Liberal Arts Education and Introduction Education**

As already stated, the role of philosophy in liberal arts education is significant. On the other hand, many researchers in the field of philosophical studies study classic works or perform research in ideological history, and as far as content, there is a large gap between that research and the actual site of education where the student will be in charge of teaching liberal arts. The first time that a young philosophy researcher stands at the podium as a teacher is often in liberal arts education at a university that does not offer a major in philosophical studies. We must tell young researchers and graduate students that if you just generate research papers relevant in a specific field and do not work on placing that in a wider cultural and social context nor investigating its meaning, then many students at current universities will show no interest in your work, and teaching them will be extremely difficult. Currently, in liberal arts education and first-year education at many universities, highly specialized philosophical thought is not in demand; rather, a new type of liberal arts/first-year education that includes critical thinking, training in logical/expressive skills, and a consideration of the path and meaning of human life/ethical problems in modern society is desired. What is expected of

instructors by universities right now is the capacity to re-imagine one's own research as a form of liberal arts education as previously defined, and to expand on students' fundamental grounding, while presenting oneself as a model of fundamental social skills that can serve as a role model for students. For that purpose, and also for reading of original texts, it would be beneficial to publish a compiled anthology of old texts that have been carefully selected for inclusion from various original texts, taking the parts that are significant for liberal arts education in modern society. Additionally, in recent years, many universities are taking new strides in connecting philosophy to growth in communication abilities, through dialogues and philosophy-in-practice called "philosophy training" (including philosophy cafes, philosophy for children, business dialogues, philosophical counseling, critical thinking development, etc.) We must provide these new methods and resources for liberal arts education to young researchers in the form of philosophy workshops and seminars.

3）Raising University Instructors through Instructor Programs and TA Experience

Currently, at universities in Japan, young graduate students and postdoctoral researchers doing research are often suddenly forced to teach as part-time lecturers at the university. Those young men and women often do not have any knowledge of education methods or educational psychology necessary for higher level education, let alone any teaching experience itself. Lectures that cover only arcane topics will not garner much interest from most students; some students will feel dissatisfied with the class, and some may even come to question the value of philosophical studies itself. This is an unfortunate state of affairs for both the student and the teacher. Therefore, we must work out a method of teaching lectures that works for the listeners.

In America, graduate students at research universities receive guidance from instructors at education-focused universities and participate in an intermural program called "Preparing Future Faculty Program (PFFP)" to learn how to be teacher in general university settings. A few universities in Japan also offer PFFP. We must promote this program under the joint support of various philosophy academic groups and spread the program across the country. Also, one cannot really say that the teaching assistant (TA) system is fully utilized in Japan. We should adopt a full TA system that goes beyond simple assistance with office work, one in which instructors work with TAs for the education of students, and we should pay a commensurate wages for it. Postdoctoral and PhD researchers at graduate schools should help the instructor with student education as a TA, by assisting with preparation and review, running tutorials, teaching recitation classes, and grading tests and reports, to gain some preparatory experience through teaching at a university.

4）Elementary/Secondary School Educator and Specialist in Cultural Administrative Bodies as New Career Paths

Most PhD and postdoctoral students in philosophical studies in the past were aiming for a research job, often as a university instructor. However, the so-called “post-doc problem” still has not be solved. Aware of the post-doc problem, the Ministry of Science and Education has been implementing “Career Path Diversification” since 2006, and the Science Council of Japan reported on the Sectional Committee for Examining the Problem of Raising Young Personnel in 2008. However, both of these focus mainly on the natural sciences. We would like the same efforts to be made in the humanities and social sciences.

For example, we should give more consideration to the idea that elementary or secondary school instructor and cultural expert in cultural administration at a federal or local government body are good job prospects for post-doctorates and PhD students. Currently, elementary and secondary education emphasizes a system where the young kids guide their own learning in a format called “active learning.” Looking at the characteristics we have described above, we can say that people who majored in philosophical studies are excellent choices to fulfill such a role in education. Also, people who majored in fine arts could contribute to education that requires sensitivity skills. The findings and wisdom from religious studies could be made use of in cross-cultural education too. We need not restate that the importance of these occupations in society is not less than that of university educators or researchers, and we strongly hope that in the future these occupations will enable the generation of a loop or cycle between research in philosophy and work in society or elementary and secondary school education.

<Reference material 1>　　Description of Abilities and Skills

1）Generic Skills - General Reasoning - to be Cultivated though Studying Philosophy

i. General skills that support learning

・The ability to utilize information communication technology (computer use, and means of using the internet), maintaining information literacy and information ethics

・The ability to learn through many different kinds of media

・The ability to effectively use libraries (including the ability to search warehouse databases for information)

・The ability to utilize publically-available academic databases (including CiNii, J-Stage)

・The ability to properly organize/record complicated, diverse information, and to search and retrieve data as necessary

ii. Problem-discovery skills

・The ability to interpret experiences one is unlikely to face in real life at an abstract/generalized level, verbalize such experiences, and formulate them as a "problem."

・The ability to flexibly utilize one's sensitivity, to train one's ability to focus, and by looking at things from a bird's eye view, to discover problems close at hand and to translate them into language.

iii. Problem-analysis and problem-solving skills

・The ability to reconstruct one's own and others' claims and arguments – that is, the ability to separate the argument into premises and conclusions, making clear the hidden assumptions, and then assess the validity and persuasiveness of the arguments.

・The ability to check whether one's own argument or others' arguments contain any logical fallacies or statistical errors.

・The ability to surmise likely counterarguments and come up with responses as a way to strengthen one's argument.

・The ability to discern how strong of a premise is required for each argument in its context.

iv. Bidirectional communication skills

・The ability to coordinate a dialogue for individuals with different positions and perspectives.

・The ability to patiently, carefully listen to verbal expressions of opinion which are not necessarily arranged in a logical way.

・The ability to properly reconstruct heterogeneous thoughts of others.

・ The ability to present one's own opinion about a problem, either verbally or in writing, in a way that is clear and persuasive in a rational way.

2）**Philosophy-specific Skills to be Cultivated or Strengthened through Majoring in Philosophy**

i. Ability to Raise Questions

・The ability to propose new, serious questions that have not been examined before, by either clarifying the points at issue and assumptions in the basis of a variety of arguments, or by reading and interpreting various authors.

・The ability to propose new, significant questions that have not been examined before, regarding reality or the self, by re-examining the nature of the problem at a universal, abstract level, or by reworking it in ways like examining it in the light of past thought.

ii. Ability to Analyze Problems

・The ability to analyze language, such as by clearly defining terms or distinguishing concepts which were not previously distinguished to analyze a problem and put it into a more easily solvable form.

・The ability to succinctly formulate and sketch out problems that are difficult to visualize, such as problems that span multiple areas, problems with confounding external arguments, and problems that are intricately connected with other problems.

iii. Ability to Understand Philosophical Texts

・The ability to understand various claims, giving consideration to their context and background. The ability to rationally and flexibly read, analyze and reconstruct texts. The ability to understand and interpret original classic works along with relevant background information.

・The ability to carefully read historical materials for the actions above, and the language abilities to support such reading.

・The ability to accurately describe and analyze extralinguistic cultural materials, such as works of art, etc.

iv. Ability to Think and Imagine Philosophically

・High level reasoning ability: The ability to make logical inferences (deduction, induction) and to find false assumptions, invalid inferences, and other deficiencies in the argument. The ability to come up with and effectively express thought experiments or valid examples and counter examples for the argument (examples that support or discredit the argument.) In order to develop this expert level capability, it would be best to include logically structured education or training in logical operations in the curriculum.

・The ability to thinking critically/reflectively: The ability to, provisionally, willfully invalidate and fundamentally re-examine information, knowledge, currently-accepted views and received wisdom, and re-evaluate their truth values and validity. The ability to question

assumptions that form the basis for one's own thinking, beliefs, and actions, and to deeply reflect on oneself as a human.

- The ability to think at the meta level: The ability to formulate and re-examine basic assumptions (which may not be explicit) of various academic fields including science, or the methodological theory on which they are based.
- The ability to apply philosophical concepts: The ability to distinguish between "fact" and "model" for example (or perhaps distinguish between "use" and "mention" – the difference between saying something using words and saying something about the words themselves. These are frequently confused, leading to haphazard discussions), to criticize arguments that confuse the two, and to construct, criticize, and evaluate arguments using philosophical concepts.
- The ability to think/imagine creatively: The ability to create new concepts or ways of thinking, and to gain an overhead view of the main logic for a solution. The ability to give new meaning to events and issues. The ability to generate and express an overall vision.

v. Ability to Make Philosophical Judgments

- The ability to make better judgments in individual instances by referring to general principles and analyzing their context and conditions.

vi. Ability to Engage in Philosophical Dialogue

The ability to acknowledge others who may have greatly different or opposing opinions and worldviews, to engage in a rational discussion, to mutually deepen each other's thinking with critical examination, and to cooperate towards a creative solution, or the ability to coordinate and arrange such a discussion. This includes the following ability.

- The ability to construct an argument: the ability to defend a certain claim, or the ability to construct a rationally-persuasive argument criticizing a certain claim. The ability to determine involvement (what kinds of things are connected to the claim and what kinds of things are irrelevant), to use proper examples, to use accurate and analytical evidence, and to assemble a logical argument.
- The ability to transform oneself: The ability to alter one's own way of thinking and creatively change one's way of being through dialogue with others.

<Reference material 2> Description of Intellectual Attitudes and Behaviors

1）Respect for and Self-awareness as an Inheritor of Humankind's Intellectual Heritage

One of the charms of philosophical studies is that it is one most ancient of human intellectual endeavors and also that we are direct inheritors of that intellectual activity. Persons involved in philosophy education should guide students, through the study of philosophy, to find the appeal of facing deep questions that humankind has patched together over a long time, and to have respect for humankind's intellectual heritage. Also, in addition to understanding past intellectual heritage as such, by learning and connecting that to modern issues and conditions we are facing, we realize that many of the problems examined in ancient times are universal problems that continue to exist today in an altered form, causing us to relate academic knowledge and skills to our own lives. In this way, students will likely realize that they themselves are also inheritors of humankind's intellectual heritage.

Additionally, we point to the following as basic intellectual attitudes that can be acquired through philosophical studies.

2）Intellectual Courage and Adventurous Spirit

・The attitude of relativizing authority and/or influences from others, and thinking creatively and self-critically with an independent spirit
・The stance of humbly voicing the things one thinks are true as a result of such earnest thought, and turning that thought into action
・The spirit of facing up to new situations with an ability to adapt for flexibly responding to complicated and difficult problems

3）Willingness to Listen

・The willingness to carefully listen to the other person's claim, including its context, without denigrating or attacking that person. This especially means "an attitude of continuous listening" which can lead to dialogue and coexistence with other cultures and ideas – ever more necessary in this globalizing world.

4）Intellectual Tolerance and Caring

・The attitude of wanting to examine the limits of traditional intellectual systems in each field and the values present in other fields, to recognize the nature of unfamiliar places and times, ideas and sensibilities in fields, and how those are put into practice, and to transcend the barriers between fields.
・The willingness to offer productive solutions for the subject at hand, solutions that encourage development and growth, or the attitude of wanting to understand other's claims in their context and background, and to suggest effective ideas related to the content of such claims.

5）**Intellectual Flexibility**

・The attitude of being courageous enough to change oneself when you have determined something to be valid upon proper discussion, even if that thing is an unfamiliar concept or thought, or even one that conflicts with thoughts that you held until that point.

6）**Willingness to Continually Implement Ideas and Learn as part of Society**

・The willingness to learn from problem-management and solutions in the real society, and not just apply acquired knowledge and skills when dealing with problems that emerge in society. Studying philosophy strengthens lifelong learning abilities (which are important for playing an active role in society), contributes to the development of personality characteristics in broad ways, and can contribute to better development of communities through such personal development.

<Reference material 3> Description of Learning Methods

i. Lectures

Considering the organizational and economic constraints of a university, lectures will probably continue to be a key format for classes into the future. However, if we intend to cultivate general philosophical abilities and intellectual attitude even in a lecture format, we will need some techniques to ensure bidirectionality. In accordance with the characteristics of the lecture content, we should seek to encourage student-led participation through question-and-answer sessions, discussion, debate, reaction papers, quizzes, interim reports, extracurricular group work, roleplaying or other activities during lecture.

For introducing discussion into especially large-sized classes, there are methods like "buzz groups" (buzz group: the class is divided into several small groups to discuss a small topic in a very brief amount of time, and then report on the result), and "fishbowls" (fishbowl – 5 to 10 students are appointed to participate in a discussion, while the rest of the students listen.

Whichever method the instructor uses to get feedback from the students, the important point is for the instructor to utilize that method within the class. For example, if overwhelmed with interesting comments from the students, the teacher could do things like mention those comments in the next class, or contact the student after class and have them give a small presentation, or use printouts or slides to show students comments during class.

ii. Seminars

Seminars have fewer people so they are an ideal format for active student learning. Also, with regards to the study of logic, seminars are excellent ways for students to acquire the ability to actually construct proofs. One common issue that we must be aware of is that if only presenting student does all the work every time, the other students will be limited to a passive role. Even in seminars, instructors can make efforts to extract more activity from every student, such as by calling on students for questions, assigning the discussion summary to a student other than the presenting student, or by publishing a journal of all seminar discussions at the end of the semester.

The following are some additional techniques for encouraging a more active discussion during class.

Clarify the goal of the discussion in advance
Tailor questions to spark discussion
Occasionally introduce topics or guide discussion directly

Using a teaching assistant (TA) in seminars can be effective. However, you must have a thorough meeting and discussion with the TA in advance.

iii. Reading Original Texts

We must restate the significance of reading original texts in the field of philosophy. Ideally, reading as a form of learning assumes a certain level of training in language skills that enable to students to proactively and independently look at original texts, but its goals are not the same as those of a foreign language course. Reading original texts has a dynamic quality in that the dialogue with people from the past can induce changes in oneself. Therefore, in this type of classroom format, we must pay attention first to accurate interpretation of the text, but also to students' ability to propose inquiries, critical thinking abilities, creative thinking abilities, reflection, ability to compose arguments and cultivation of ability to dialogue. In order to cultivate these, we must design classes to venture beyond merely interpreting texts and encourage students' voluntary participation in discussion that can be sparked during the interpretation of texts.

Also, because reading original works is a process that requires quite a bit of time, it is often not possible to read a complete text within a single semester. Philosophy educators should make the effort to carefully select important texts, compile good anthologies that can assist students understanding a general field or the overall view of a specific trend by reading original works, and also by offering evaluations needed for such work.

iv. Training/Experience/Fieldwork

Philosophical studies do not consist solely of books and documents. In clinical philosophy, there are effective learning methods such as tours, internships, philosophical cafes and other places where philosophical ideas have been put into practice. Furthermore, other extremely important opportunities and motivators for learning include experiencing nursing (as a patient) for care ethics, ecotourism for environmental ethics, tours of laboratories/museums for philosophy of science, business experience with science cafes, tours of art museums/history museums for the fine arts, on-site investigations into religious activities and facilities (even abroad) for religious studies, on-site investigations for Chinese philosophy and Indian philosophy studies.

Additionally, fieldwork as a form of research is indispensible in the above fields, whether in the form of participant observation, questionnaires, surveys, interviews, or projects and exhibitions. If a class makes use of experimental philosophy or social survey methods, students may have to learn programming, statistical analysis tools, or surveying techniques.

Given this perspective, we should plan to proactively introduce training into philosophy education.

v. Reports/Essays

The purpose of reports and essay writing as an education method is to cultivate students' ability to propose questions, think critically, think creatively, think logically, build arguments, and use concepts correctly. These are fundamental skills that are necessary for students in all fields and not just in philosophical studies. But since professors in the philosophies are seen as experts in logical/critical thinking, they have a special role in training students in essay/report writing. In

essence, they are expected to develop practical and rational instruction methods and materials which can encourage students to shift from the "essay writing" of secondary school education to genuine academic writing. By living up to this expectation from other fields, philosophy instructors can contribute to the development of a universal education program for the overall process, from discovery of a problem to composition of a lucid and compelling essay.

vi. Self-Study and Group Learning

In recent years, many universities have been implementing a variety of initiatives for supporting self-learning outside of class. For example, learning commons set up in libraries and other self-study facilities help students engage each other in discussion or dialogues more readily. Also, some online class management systems are outfitted with electronic notification boards that allow for students enrolled in a given class to converse with each other from home. Used properly, this could encourage independent learning in students.

Also, a good recommended reading list can be effective to help individual students looking for independent, contemplative readings.

vii. Experiments

In recent years, the stage for research and education in philosophy has not been limited to the humanities department. There are also research courses for philosophy of science and science & technology ethics in the science department and the information science department, medical care philosophy in medical schools, and environmental ideology and environmental ethics in the department of environmental studies. Experimental philosophy – which aims to prove philosophical claims thought experimental means (e.g. computer simulations, psychological experiments) – has been becoming more common in areas where philosophy intersects and overlaps with another field. Some recent examples include using a computer with multi-agent simulations to investigate the speculative hypothesis about how conventions emerge, performing psychological experiments and observation to investigate effective means of teaching ethics in business, and using a questionnaire to demonstrate that people's intuitions about determinism and freedom of the will are compatible.

To manage these new trends, philosophy educators should began examining what type of experimental skills we want students to learn, and what type of education program we should develop in collaboration with other fields.

<Reference material 4> Deliberation progress of the Sectional Committee on the Study of Reference Standards in Philosophy

22nd Session

2014

January 31 SCJ Board of Secretaries, 187th meeting
The Sectional Committee on the Study of Reference Standards in Philosophy established.

February 28 SCJ Board of Secretaries, 188th meeting
Committee members for the Sectional Committee on the Study of Reference Standards in Philosophy determined.

March 19 Sectional Committee, 1st meeting
Board members elected.
Discipline-based quality assurance and Reference Standards
Role of this Sectional Committee
Future activities and schedule

May 19 Sectional Committee, 2nd meeting
A point of reference philosophy
Explanation given by Kazuo Kitahara, committee member of Committee for Quality Assurance in University Education
Examined drafts of "definitions" and "characteristics" for each field

23rd Session

December 2 Sectional Committee, 1st meeting
Confirmed results of Sectional Committee activities in 22nd session
About direction for Sectional Committee activities in 23rd session

December 6 Sectional Committee, 2nd meeting
Sectional Committee activity report

2015

January 29 Meeting of the Executive Board of Science Council of Japan (203rd Meeting)
Resolved to add committee members (specially-appointed members)

February 19 Sectional Committee, 3rd Meeting
Examined original draft of benchmarks

March 21 Sectional Committee, 4th Meeting
Examined original draft of benchmarks

May 3 Sectional Committee, 5th Meeting

Examined original draft of benchmarks

How to proceed

May 28 Sectional Committee, 6th Meeting

Examined original draft of benchmarks

June 8 Sectional Committee, 7th Meeting

Examined original draft of benchmarks

How to proceed

June - August Hearing of opinions from relevant academic organizations

The Philosophical Association of Japan, The Japanese Society for Ethics, The Japanese Society for Aesthetics (The Japan Art History Society and The Musicological Society of Japan), The Japanese Association of Indian and Buddhist Studies, The Sinological Society of Japan, Japan Association for Religious Studies, Association of Japanese Intellectual History

September 7 Sectional Committee, 8th Meeting

Examined the revised submission of benchmarks

How to proceed

October 31 Hearing with representatives from relevant academic organizations

December 12 Public Symposium

"Can we live without philosophy? – The role of ethics/religious/philosophy education in universities –"

2016

February 26 Meeting of the Committee for Quality Assurance in University Education (5th Meeting)

Approved the report "Reference Standards of Course Development for Discipline-Based Quality Assurance in University Education – Philosophy"

Report

Reference Standards of Course Development for Discipline-Based Quality Assurance in University Education – Civil Engineering and Architecture

March 19, 2014

Sectional Committee on the Study of Reference Standards
in Civil Engineering and Architecture
Committee on Civil Engineering and Architecture, Science Council of Japan

This report is the results of deliberations of the Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture, Committee on Civil Engineering and Architecture, Science Council of Japan. This is the English translation rendered by the Sectional Committee in cooperation with the National Institute for Educational Policy Research.

The members of the Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture, Committee on Civil Engineering and Architecture, Science Council of Japan

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Vice-Chairperson:	Yoshino, Hiroshi (member of 3rd section)	Professor Emeritus, Tohoku University
Secretary General	Yoda, Teruhiko (member of 3rd section)	Professor, School of Creative Science and Engineering, Faculty of Science and Engineering, Waseda University
Secretary General	Takada, Mitsuo (associate member)	Professor, Graduate School of Engineering, Kyoto University
Secretary General	Asakura, Yasuo (associate member)	Professor, Graduate School of Engineering, Tokyo Institute of Technology
	Komatsu, Toshimitsu (member of 3rd section)	Specially-Appointed Professor and Professor Emeritus, Kyushu University
	Hanaki, Keisuke (member of 3rd section)	Professor, Graduate School of Engineering, University of Tokyo
	Yoshimura, Manabu (associate member)	Professor, Faculty of Urban Environmental Sciences, Tokyo Metropolitan University
	Kitahara, Kazuo (special associate member)	Professor, Graduate School of Mathematics and Science Education, Tokyo University of Science
	Furuya, Nobuaki (special associate member)	Professor, School of Creative Science and Engineering, Faculty of Science and Engineering, Waseda University

Cooperation was received from the following party in the preparation of this report.

- Kitamura, Takayuki (member of 3rd section) Professor, Graduate School of Engineering, Kyoto University

The following staff engaged in coordinating activities in the preparation of this report.

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Investigation	Sakiyama, Naoki	Senior Research Specialist

Executive Summary

1 Background

In May 2008, the Science Council of Japan (SCJ) received from the Director-General, Higher Education Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT) a request addressed to the President of the SCJ entitled "Deliberations regarding the direction of discipline-based quality assurance in university education." The SCJ thereupon set up a task-specific committee in June of the same year called the "Study Committee on the Direction of Discipline-based Quality Assurance in University Education," carried out several deliberations, drafted the "Direction of Discipline-Based Quality Assurance in University Education" in July 2010 in response to MEXT's request, and delivered it to MEXT in August of the same year. In its response, the SCJ proposed developing points of reference in disciplinary curriculum design and development as a method of disciplinary quality assurance.

Concerning the cited response, for discipline-based quality assurance practices, it proposed that reference standards be established for the design and development of courses. After delivering the response, the SCJ proceeded to develop reference standards in several areas. Since reference standard in civil engineering and architecture has been completely organized, the SCJ wishes to release it so that it can be used in such organizations as universities providing curricula related to the field.

2 Overview

(1) Definitions of civil engineering and architecture

The academic disciplines of civil engineering and architecture are ones via which theories, applications and technologies are studied; such being with respect to the planning, establishment, construction, maintenance and management of the built environments that humankind finds indispensable for its existence, and being also with respect to the creation of harmonious relationships with natural environments. “Built Environments” in this context refers to environments to which man’s hand has been applied, the scope of definition encompassing buildings such as houses, schools and hospitals, etc., to which may be added both structures such as roads, breakwaters, bridges, tunnels, railways, harbors and airports, etc., and the lifelines of water and sewer services, electricity and gas supplies. The term also captures the facilities, etc., erected for various forms of production. What is more, from the urban and regional spaces from which they are comprised, there is the demand that such environments be safe, healthy, comfortable, convenient and efficient. Furthermore, in addition to providing people with opportunities to lead enriched social lives, built environments must also contribute in terms of offering protection from natural disasters, coexistence with natural environments, and the

pushing forward of the development of humankind. Such built environments are very much tied-in to the natural features and climate of their regions, to the culture and the social setting. Moreover, while forming harmonious relationships, they should be structurally strong and possess environmental functionality, etc. Accordingly, it is important that built environments look to cooperate with a range of different domains, commencing with engineering, the sciences and agriculture, but also including disciplines such as the humanities and social sciences.

(2) Characteristics specific to civil engineering and architecture

For the modern human being, it might be said that for the most part they inhabit built environments to which man's hand has been applied. As to the study of civil engineering and architecture, even before the individual is placed in the position of receiving an education that will allow them to become a future specialist, from the perspective of them also being a rank and file citizen who both experiences and receives the benefits of civil engineering and architecture within the context of their daily life, they are readily accessible disciplines in that they generate insights concerning the relationship of the individual to contemporary society, and how such constructs might be best evolved in the future. What is more, another specific characteristic that is applicable to both civil engineering and architecture is that they do not just involve the handling of a broad range of other disciplines including the humanities, the social and the natural sciences. Indeed, they are fields of study that also take a comprehensive approach to topics such as beauty and scenery, etc.

Civil engineering represents a technological form that is closely tied to the posture adopted by social infrastructure, such in turn being manifested through the approaches that are taken with respect to matters such as disaster-prevention, transportation, energy supplies, water resources, and urban planning, etc. The structures thus derived tend to exhibit a strong public persona. What is more, when considered in terms of developments that take place on a global scale that exceeds the nation state, civil engineering represents a very important discipline that involves not just humankind, but the very basis of the livelihoods and living environments of all terrestrial life.

For architecture meanwhile, through the vehicle of the buildings that it develops, it works to bring harmony to the functionality, the structures, and the infrastructure, etc., that we encounter within those spaces that are near to our daily lives. Concurrent to it giving birth to beauty and convenience in those spaces that have a direct impact on human sensitivities, architecture also has a strong relationship to the natural environment, history and climate, etc., that surrounds building sites. Thus, it is an academic discipline that is closely-aligned to the livelihoods of citizens.

Regarding the study of civil engineering and architecture, rather than it being the case of students simply learning individual technology formats, in responding to the set conditions,

concerning problems for which there is no single answer, through comprehensively employing all forms of natural science and viewing the issues from all related perspectives, what is demanded are the "design" skills necessary to imagine a range of solutions, and that within the curriculum there include "design," "practice" or "graduation design" elements.

(3) Basic grounding for all students learning civil engineering and architecture should aim to acquire

1) Basic knowledge and understanding to be acquired in learning of civil engineering and architecture

For those who study civil engineering and architecture, in addition to possessing a basic knowledge of natural sciences such as mathematics and mechanics, etc., which represent the foundations of engineering, it is also required that they exhibit a knowledge of the matters through which society expresses its demands. Such take the form of possessing a knowledge of the natural sciences, the humanities and social sciences. They also include understanding the basics of mechanics, and knowing how to realize comfort and health while concurrently minimizing environmental burdens. Society expects that those who work as engineers will also know the basics of planning and design, and be familiar with information-processing technologies. Engineers are also expected to have a basic grounding in the ethics that underpin their profession. What is more, in accordance with society's wide-ranging aims, there is the requirement that the various forms of individual knowledge undergo integration, and that individuals possess an ability to plan, design and realize specific forms of social infrastructure and buildings. Accordingly, it is necessary that a comprehensive understanding of the myriad elements from which cities and regional systems are comprised is developed. Thus, such skills are to be cultivated through field surveys and project-based learning.

2) Basic capabilities to be acquired in learning of civil engineering and architecture

In a manner that places little burden on the environment, civil engineering and architecture technologies represent the practical means by which citizens and society are provided with housing, public facilities, and urban infrastructure systems, all of which offer both safety and peace-of-mind. Such technologies are what underpins the principles on which civil engineering and architecture are based.

As to the basic skills to be acquired by undergraduate students of civil engineering and architecture courses, based on the level at which they engage with the disciplines in any subsequent professional capacity, slight differences will evolve. Irrespective of such variances, rather than simply being able to comprehensively decide and communicate

when developing optimized solutions, there will be a commonality in that they should be able to contribute to the creation of more favorable conditions within society.

Concerning the study of civil engineering and architecture within the context of there being numerous different natural and social environments, to plan, design, implement and manage facilities whose human scale measurements span from individual buildings through to entire city and regional systems, the aim is that individuals will master both general and specialized knowledge and skills. The process by which such mastery is obtained is identical to what is witnessed with respect to other engineering disciplines. It requires that the mechanisms by which physical phenomena occur be correctly understood, and that the process by which issues are efficiently resolved through comprehensive decisions based on accurate analysis be learnt. Additionally, as is the case for the various domains of the humanities and social sciences, the learning of insights regarding both the real world and real people is be necessary.

(4) Basic principles regarding the evaluation methods to be employed with respect to study methods and study results

Concerning the teaching methods required for the study of civil engineering and architecture, what proves effective is organically combining a variety of methods such as lectures, experiments, design, exercises, hands-on training, and research projects (including graduation theses, graduation design, and graduation planning), etc. Within such a context, such methods can be selected and weighted in accordance with the aims of teaching, etc. Concerning what about the study of civil engineering and architecture should be subject to evaluation, student's might be tested on their degree of understanding with respect to both basic and specialist knowledge; their ability to discover topics, and subsequently analyze and resolve them; their communications skills; their management abilities; and their decision-making abilities with respect to theoretical matters, etc. Whatever the case, in responding to the content of what is taught, how it is taught, and the conditions under which each student learns their subject, the evaluation methods employed should be both numerous and flexible in nature.

(5) Correlation between specialized education, general education, and the cultivation of citizenship

The academic domains of civil engineering and architecture are ones by which the spatial foundations that act in support of the lives of people and industry are constructed. Accordingly, to study them effectively, in addition to possessing both a specialized knowledge and outlook, it is vitally important that individuals are deeply conscious of what citizenship means when viewed from the perspective of an ordinary stakeholder within society. Within civil engineering and

architecture education, it is particularly important that the organic relationships existing between the various academic disciplines be taught, this idea applying equally to engineering and design, as it does to the broad range of general education topics. Furthermore, with respect to all of mankind and all the natural world's flora and fauna, it is demanded that by cultivating within them both imagination and a sense of responsibility, education will instill within its students a consciousness of cohabitation and coexistence. In addition to a specialist in civil engineering and architecture needing the ability to communicate with many different people who each express a unique opinion and have their own perspective, possessing both imagination and insights regarding other cultures and individual circumstances is also demanded. Having such skills is very important in terms of cultivating an enriched sense of citizenship.

(6) Correlation between civil engineering, architecture and society

Of the various engineering disciplines, it is civil engineering and architecture that have particularly close relationships with society and nature. Concerning the built environments to which civil engineering and architecture have given birth, they have acted to protect human lives and property from threats posed by nature since ancient times. In addition to preventing disasters, such constructs have also contributed to the shaping of social infrastructure, with such assets in turn acting as the foundations on which various forms of production have been built. It is such foundations that have proven to be indispensable in the development and maintenance of human society, and accordingly such social constructs have enjoyed a close relationship with built environments. Human society has been successfully established due to the great deal of trust placed in the built environments that have taken shape. What is more, in addition to the strong sense of responsibility entrusted in civil engineering and architecture, a theoretical consciousness is strongly demanded when such technologies are applied.

Contents

1 Introduction

On entering the 21st century, university education in Japan has embarked on a period of structural change. Against the backcloth of a decline commencing in total population size, a sharp fall in numbers has also been witnessed among the age cohort comprised of 18-year-olds. However, in that there has been a concurrent rapid increase recorded in the matriculation rates of the same cohort, after passing through a period of education that adopted a strategy of "mass producing" graduates, university education, which was once considered to constitute "elite education," has now embarked on a period of "universalization," with matriculation being achieved by more than half of all 18-year-olds, most of whom are destined to stand on the frontlines of society in the future after graduating with a bachelor's degree. Accordingly, from the societal perspective, the content of university education has taken on an even greater meaning.

Meanwhile, due to developments such as advances in transportation and communications, and the creation of huge industries, etc., concerning the age of globalization in which small regional changes can subsequently spread worldwide, in that a university education should be able to entrust youngsters with the future of the world, it has become necessary to reconsider the content thereof.

In research and education, while within academia the trend continues towards research fields becoming ever more fragmented, there are also advances occurring with respect to the fusion of different disciplines. Such developments have meant that the frameworks which once supported the quality of research and education in traditional university settings have crumbled, and what is now demanded are quality assurance practices for the new forms of education that are needed to respond to the forces of universalization and globalization.

With respect to both university and academic communities themselves, in aiming to take steps to assure the quality of the bachelor's degrees they confer, they have arrived at a point in time at which reference standards for the design and development of courses should be developed. Even if academic domains become ever more diversified, among each there should be the retention of common distinctive characteristics, with the realization of such matters at the level of a bachelor's degree representing the basis by which the quality of a university education is assured.

As to the nature of individual discipline-based quality assurance within university education, it is comprised of the following: 1. The definitions and characteristics of the relevant academic discipline, 2. The basic grounding for all students learning the relevant academic discipline should aim to acquire, 3. The basic principles related to study methods and methods for evaluating study outcomes, 4. The correlation between specialized and general education for the cultivation of citizenship, 5. The correlations drawn with society.

Concerning reference standards for civil engineering and architecture, as to what should be the subject of educational research, the following matters should be clarified in detail: how the

interpretation of the basics of civil engineering and architecture differ from the practices of other academic disciplines; how basic capabilities shall be acquired by students if they graduate from courses whose subject matter relates to civil engineering and architecture; what study methods should be applied to allow students to acquire such skills; how general education as members of society can be maximized through the studying of civil engineering and architecture as specialized disciplines; and as an outcome of such education, how to make a social contribution, etc.

It should be noted that this report clarifies reference standards for civil engineering and architecture as such matters pertain to bachelor's courses conducted at the university level, and that the matters mentioned do not pertain to what occurs either at graduate school or within the context of courses undertaken as part of elementary and secondary education, etc. Their knowledge of and grounding in civil engineering and architecture should be matters about which the understanding of individuals is deepened throughout their lives via opportunities commencing with graduate school education and post-graduation employment, with the role of such disciplines within bachelor's courses being to lay the foundations of such knowledge and insights. Furthermore, for individuals who have completed primary and secondary education and who possess an interest in such disciplines within the context of a familiarity within their lives, the reference standards offer a compass as to what might be studied in bachelor's courses.

As to the reference standard for the disciplines of civil engineering and architecture that are laid out in this report, the SCJ has drawn a picture as to how such matters should be addressed within the context of civil engineering and architecture being taught as bachelor's courses. While referring to these standards, with respect to the teaching of civil engineering and architecture, it is hoped that each university will realize the creation of optimized courses by taking into consideration their own school motto, and by utilizing both their management and human resources, along with the gifts possessed by their students. Furthermore, concerning the academics involved in the teaching of civil engineering and architecture at the university level, through cooperation with the national government, certified evaluation and accreditation institutions, university groups, related organizations, industry, and primary and secondary education institutions, etc., it is hoped that these reference standards will be utilized within the context of understanding the subjects of civil engineering and architecture. Through such developments, within the context of Japan in the 21st century, it shall be possible to meet contemporary demands with respect to assuring the quality of university education.

2 Definitions of civil engineering and architecture

(1) The handling and requirements of civil engineering and architecture

For humankind's existence, "clothing, food and shelter" are imperatives. Thus, in that they are academic disciplines that also work to create "shelter," civil engineering and architecture are crucial in terms of both the contribution they make to the development of the production assets required to secure "clothing" and "food" supplies, and in terms of the assistance they render in protecting natural environments.

Modern human beings spend almost all their lives in "Built Environments," such being settings to which man's hand has been applied. The scope of definition encompasses buildings such as houses, schools and hospitals, etc., to which can be added both structures such as roads, breakwaters, bridges, tunnels, railways, harbors and airports, etc., and the lifelines of water and sewer services, electricity and gas supplies. The term also captures the facilities, etc., erected for various forms of production, and the urban and regional spaces from which they are comprised. By utilizing such built environments, humans can gather together their families, as well as relaxing, learning, working, exercising and pursuing pleasures. At the barest minimum accordingly, there is the demand that such environments be safe, healthy, comfortable, convenient and efficient. Furthermore, in addition to providing people with opportunities to lead enriched social lives, built environments must also contribute in terms of offering protection from natural disasters, coexistence with natural environments, and pushing forward with the development of humankind. In the contemporary context what is more, there is the requirement that built environments must respond to the demands of low-carbon and sustainable societies.

Such built environments are very much tied-in closely to the natural features and climate of their regions, to the culture and the social setting, and while forming harmonious relationships, they should be structurally strong and possess environmental functionality, etc.

(2) Definitions of civil engineering and architecture

The academic disciplines of civil engineering and architecture are ones via which theories, applications and technologies are studied; such being with respect to the planning, establishment, construction, maintenance and administration of the built environments that humankind finds indispensable for its existence, and being also with respect to the creation of harmonious relationships with natural environments.

(3) Fields of study

Built environments are not merely constructs whose scope is limited to matters of mechanical-rationality or technological-safety. Rather they must also be settings that possess

functionality and beauty, etc., such being in keeping with both the behaviors and sensitivities of human beings. Accordingly, the content of the associated fields of study is broad-ranging, such being comprised of domains such as structural engineering; geo-technical engineering; hydro-engineering; disaster-prevention and reduction; transportation and traffic engineering; urban, regional and architectural planning; environmental, facilities and energy engineering; historical, landscape and design studies; building materials science; and building construction and stock management, etc.

Furthermore, in that within built environments there are also demands expressed for matters such as hygiene, comfort, functionality, economy and beauty, etc., there exists a broad range of involvement from disciplines that lie beyond the realm of engineering which are present in the sciences, within agriculture, the humanities and social sciences, etc.

With civil engineering, it is not merely the case that an individual gain the design skills necessary for them to construct various forms of social infrastructure. Indeed, there needs to be the understanding that allows them to appreciate the comprehensive management of built environments in overall terms. Accordingly, it is demanded that they possess both a broad-ranging appreciation of social measures, as well as an appreciation of public policy and public-sector economics, etc.

For architecture, a major issue for consideration is how structures are to be designed. While being built in accordance with the prevailing conditions found at the site, individuals must possess the comprehensive skills required to incorporate the myriad of built environment-related demands. They must also realize a beautiful structure that is in accordance with the aims set forth. To achieve all this, both a broad-ranging knowledge and a sense of beauty are demanded.

(4) Attitudes to learning

As human beings, we tend to live our lives in built environments. Moreover, in that we inhabit constructs that are the subject of the academic disciplines of civil engineering and architecture, there are teaching materials in our immediate vicinity. That is something about which students need to be made sufficiently aware. As to the sort of attitude that would be desirable among students, it would be one by which daily they considered what was good and bad about the environments and structures that surrounded them. They would evaluate what was good and bad, and whereby problems existed, while undertaking their studies, they would identify the causes and backgrounds, and develop strategies by which such matters might be resolved, etc.

3 Characteristics specific to civil engineering and architecture

(1) General nature of civil engineering and architecture

For the modern human, it might be said that for the most part they inhabit built environments to which man's hand has been applied. As to the study of civil engineering and architecture, even before the individual is placed in the position of receiving an education that will allow them to become a future specialist, from the perspective of them also being a rank and file citizen who both experiences and receives the benefits of civil engineering and architecture within the context of their daily life, they are readily accessible disciplines in that they generate insights concerning the relationship of the individual to current society, and how such constructs might be best evolved in the future.

Furthermore, while considering in much the same way artificially-created spaces and environments, if anything, when viewed from a macro perspective, it might be said that civil engineering represents a discipline that conceptualizes the correlations, etc., that exist between urban settings and transportation, and those present between cities and nature. From the simple standpoint of realizing the creation of buildings, it might also be suggested that architecture sees matters from a micro perspective, with the human body acting as its yardstick of measurement, it thus being a discipline that conceptualizes the correlations that exist between construction and urban settings, and those present between structures and nature, etc. As to the approaches derived from these perspectives, a characteristic of them is that comfortable and safe living environments are created for humans when such approaches are continuously integrated within the contextual setting of actual built environments. What is more, another specific characteristic that is applicable to both civil engineering and architecture is that they do not just involve the handling of a broad range of other disciplines including the humanities, the social and the natural sciences. Indeed, they are fields of study that also take a comprehensive approach to topics such as beauty and scenery, etc. For civil engineering, it represents a form of technology that is tied in closely to the posture adopted by social infrastructure as manifested through the approaches taken to disaster-prevention, transportation, energy supplies, water resources, and urban planning, etc., the structures thus derived through such considerations exhibiting a strong public nature. What is more, when considered in terms of matters that take place globally on a scale that exceeds the nation state, it represents a very important academic discipline that relates not just to human beings, but to the roots of the livelihoods and living environments of all forms of life.

Meanwhile for architecture, through the vehicle of the buildings that it develops, it works to bring harmony to the functionality, the structures, and the infrastructure, etc., that we encounter in the immediate proximity of our daily lives. Concurrent to it giving birth to beauty and

convenience in those spaces that have a direct impact on human sensitivities, it also has a strong relationship to the natural environments, history and climate, etc., that surround building sites, and is thus closely-aligned to the livelihoods of citizens.

Regarding those who study civil engineering and architecture, rather than it being the case of them simply learning other forms of technology, in responding to the set conditions, concerning problems for which there is no single answer, through comprehensively employing all forms of natural science and viewing the issues from all related perspectives, what is demanded of them are the "design" skills necessary to imagine a range of solutions, and that within the curriculum there include "design," "practice" or "graduation design."

(2) Nature specific to Japanese civil engineering and architecture

Commencing with the United States and the European countries, the tendency is to divide civil engineering and architecture as disciplines into numerous smaller teaching domains. On one hand, topics such as structural mechanics, environmental engineering and construction technologies, etc., are often related to the field of construction engineering. On the other, there are distinctions made such as the topics of architectural design, history and urban design, etc. The former cluster of topics is often referred to as "engineering," while the latter are often labeled either as "design" or "architectural design." What is more, there are many instances of departments being established to allow these different domains to be taught independent of one another. As to the situation in Japan, since the introduction of the modern education curriculum during the Meiji Period, tradition has been for civil engineering and architecture to be taught in conjunction with one another. Moreover, in that Japan is one of the most seismically-active of the industrialized nations, and in that it frequently suffers wind and water damage arising from typhoons etc., from the perspective of disaster-prevention as well, the nation's understanding of civil engineering and architecture has been established through a recognition of the imperative relationship that exists between matters of engineering and design.

With the arrival of the 21st century, both globally and regionally we are confronted head-on by serious issues such as global warming, etc. What is more, the scale of such problems goes well beyond national borders, with one outcome being the ever-increasing demands made regarding the development of sustainability and coexistence occurring between natural and man-made environments. Thus, concerning the uniqueness and methodology of Japan's civil engineering and architectural education, with its horizontal fusion of elements of both engineering and design, it is said that the nation has arrived at the point where more work needs to be done to proactively transmit the benefits of such approaches to the world.

As to "Civil Engineering" as a term, its origins allude to a format by which the entirety of a broad-ranging social infrastructure might be addressed. Thus, with respect to a

conceptualization that was so broad as to include elements of structural engineering, geo-technical engineering, hydro-engineering, transportation and traffic engineering, urban planning, renewable-energy engineering, and agriculture-focused civil engineering, the scope of civil engineering in Japan, in accordance with the fragmentation and specialization that has occurred in academic fields, has now taken on the appearance of a discipline that somewhat cuts across architecture and agriculture-focused civil engineering, etc. Considering such developments, as a specialized term, Civil Engineering is used rather than resorting to a Japanese language equivalent.

By contrast, for "Architecture" there has been a shift in the other direction, with more focus being placed in foreign countries on aspects of art and design. While it is the case that in many foreign countries architecture as an academic discipline does not include much at all in the way of engineering elements, as it is taught in Japan, the syllabus includes environmental and facilities engineering, structural and materials engineering, and building construction and production elements, etc. Additionally, related topics such as structural design and infrastructure design, etc., are also taught. What is more, a broader overall approach is being taken to the teaching of design with a comprehensive approach that has overlaps with aspects of art and engineering.

(3) Current issues and future directions for civil engineering and architecture education

When viewed from a global perspective, the following matters both allude to the issues that currently confront civil engineering and architecture education; and those directions that should be pursued in the future.

1) One issue is how to best respond to economic fluctuations that are in turn dependent on the sensitivities of global markets, and how to go about responding to the sudden changes that occur in the costs of raw materials, fuel, and construction, which are the outcomes of political friction between countries. A second economic issue is how to respond to dramatic population increases and decreases with respect to guaranteeing the stability and sustainability of living environments.

2) Concerning switching over to both natural and sustainable energy sources, the searching out of further improvements with respect to civil engineering constructs and architectural structures.

3) The revision of ideas to accommodate a disaster-prevention mindset with respect to large-scale natural disasters occurring due to phenomena such as climatic change, earthquakes, tsunami, and landslides, etc.

4) On a global scale, the protection of assets of historical heritage, natural environments and water resources; and concurrently achieving a sense of harmony between such assets and matters related to urban development, transportation infrastructure development, resources development, the establishment of living environments and building construction.
5) On a global scale, achieving a sense of harmony between natural environments and built environments through both expanded exchanges among civil engineering and architecture researchers, academics, practitioners and students, and via the sharing of knowledge, information, and experiences among such stakeholders.

Furthermore, when viewed within the Japanese context, the following matters both allude to the issues that currently confront civil engineering and architecture education domestically; and those directions that should be pursued in the future.

1) One issue is how to best go about continuously and seamlessly integrating together civil engineering and architecture. A second and related issue is how to go about achieving cooperation between these disciplines in the real world.
2) Concerning the issue of societies that are both ultra-ageing and declining in population terms due to low birth rates and increasing numbers of elderly, a phenomenon with which Japan is directly confronted in advance of other countries, there is the need for leading-edge research and education to be conducted with respect to the contraction and maintenance-management of living environments under such circumstances.
3) From civil engineering's current state of fragmentation and specialization, for it to be able to accurately respond to the rapid changes occurring in social environments and economic structures, and for it to address the increasing diversification of citizen needs, a reorganization is necessary in terms of "macro civil engineering" being established as a comprehensive technology.
4) Steps need to be taken to resolve students' poor learning acquisition which is an outcome of the expansion of architecture as an academic discipline, a development that has resulted in an explosion in the volume of the content that students are expected to learn. Furthermore, to be able to respond to current social issues, it is necessary that design education and problem-solving education be enhanced.
5) Concerning ongoing demands in recent years with respect to the active involvement of citizens in public works, steps need to be taken regarding how to best respond to such demands and how to best promote citizen cooperation.

6) Emphasis needs to be placed on education that integrates both undergraduate and graduate school studies. For the benefit of future international cooperation, steps need to be taken to secure and mutually-assure the international equivalence of specialist education.

4 Basic grounding for all students learning civil engineering and architecture should aim to acquire

(1) Basic knowledge and understanding to be acquired by learning of civil engineering and architecture

1) The social significance of studying civil engineering and architecture

Since the birth of civilization, two things have been demanded of civil engineering and architecture. Firstly, there has been the requirement that they act to protect the livelihoods of people from the ravages of nature. Secondly, while being in harmony with the natural environment, there has been the requirement that civil engineering and architecture contribute to the creation and enhancement of those living environments that are necessary for developing the social infrastructure, safety, and comfortable livelihoods required to support the efficient means of production by which people can live.

By studying civil engineering and architecture, it becomes possible to draw connections and to appreciate the relationships that exist between forms of social infrastructure (civil engineering facilities), building functionality, and the activities of the myriad of people who occupy both urban settings and regional spaces. Through such an appreciation, it then becomes possible for individuals to plan, design, implement, maintain, and manage such facilities. As to the social significance that lies at the root of such learning, through civil engineering and architecture, it is possible to appreciate how cities and regions might be created and maintained both comfortably and safely, while not burdening the environment.

Within the contextual setting of civil engineering and architecture as disciplines, there is the issue of addressing a myriad of people who each exhibit differing characteristics and behavior patterns while making use of the same spaces. Concurrently, there is the demand that projects be promoted with the agreement of individuals and social groups who each possess different values and standards. For those who study civil engineering and architecture, it is demanded that they appreciate the myriad of different people and societies, and that they have an outlook that is both broad and fair.

2) Basic knowledge and understanding to be acquired

For those who study civil engineering and architecture, in addition to the possession of a basic knowledge of the natural sciences such as mathematics and mechanics, etc., such which represent the foundations of engineering, it is also required that they exhibit at least a rudimentary knowledge and understanding of the following matters through which society expresses its demands with respect to civil engineering and architecture.

1) Knowledge of the natural sciences: This means to have a basic knowledge of the

natural phenomena that tie into mankind's ability to live on the planet (earthquakes, the land, climate, hydrology, the oceans). It also means to possess knowledge of the wider environment. Individuals must also appreciate the relationships that exist between natural environments and human activity.

2) Knowledge of the humanities and social sciences: This means to understand how cities as a construct have taken shape within the broader context of human history, and the roles that they have subsequently played in the actions of mankind. Individuals must possess a broad knowledge with respect to the humanities and the social sciences.

3) Understanding the basics of mechanics: This means to have a basic understanding of matters such as materials engineering, structural engineering, geo-technical engineering, hydro-engineering, and environmental engineering, etc., all of which contribute to the foundations on which the disciplines of civil engineering and architecture are built.

4) Understanding the basics of comfort and health realization while minimizing environmental burdens: Concerning the development of built environments that prove to be sustainable, such an understanding means to possess a basic appreciation of those matters that relate to the environmental conditions to be realized, such being the effective usage of necessary resources, the employment of energy-efficient technologies, the undertaking of lifecycle evaluations, and environmental conditions being put in place with respect to the realization of heat, atmosphere, sound and light elements, etc.

5) Understanding the basics of planning and design: While possessing a basic understanding of those matters that relate to the theories and methodologies by which cities and regions experience design within the broader historical context, individuals should have the skills to both grasp space and express themselves spatially.

6) Understanding the basics of information-processing technologies: This means to have a basic understanding of technology, both as it relates to the acquisition of data through research and measurement (surveying and experimentation), and with respect to how such data is statistically processed.

7) Engineering ethics: This means to have a solid ethical grounding as an engineer in appreciating the multifaceted impact that technology can have both on nature and society.

What is more, in accordance with society's wide-ranging aims, there is the requirement that the various forms of individual knowledge undergo integration, and that individuals possess an ability to plan, design and realize specific forms of social infrastructure and

buildings. Accordingly, it is necessary that a comprehensive understanding of the myriad elements from which cities and regional systems are comprised be developed. Thus, such skills are cultivated through field surveys and project-based learning.

(2) Basic skills to be acquired in the studying of civil engineering and architecture

1) Skills specific to civil engineering and architecture

i. Professional significance

In a manner that places little burden on the environment, civil engineering and architecture technologies represent the practical means by which citizens and society are provided with housing, public facilities, and urban infrastructure systems, all of which offer both safety and peace-of-mind. Such technologies are what underpins the principles on which civil engineering and architecture are based.

As to the basic knowledge and understanding to be acquired by undergraduate students of civil engineering and architecture courses, based on the level at which they engage with the disciplines in any subsequent professional capacity, it is possible that slight differences will evolve.

Concerning those students who subsequently go onto work in positions and industries that lie at the core of the civil engineering and architecture domains, for example, those employed in the building industry, at design studios, at thinktanks, as consultants, at construction-related research facilities and in civil service positions that are construction-related, what shall be demanded of them are cutting-edge knowledge, skills and cognitive processes with respect to the civil engineering and architecture disciplines. Such students shall also need the skills to resolve related technical issues. Meanwhile, concerning the specialist professions of architect, certified engineer, and surveyor, etc., while on one hand practitioners will require a range of basic knowledge in order to secure the recognized qualifications, in going beyond what is required by professions such as the civil service, it will be demanded of such practitioners that they acquire the comprehensive decision-making and communication skills to possibly develop optimum solutions for societies comprised of a myriad of different stakeholders. Furthermore, rather than just discovering solutions within the context of those conditions that are forced upon them, it is hoped that such individuals will also develop the skills that will allow them to assume a leading role within society in the development of more favorable conditions.

Whereby individuals secure future employment in positions and industries such as transportation and communications, energy and the environment, and real estate, etc., where part of their duties may put them into contact with aspects of civil engineering and

architecture, the skills that will be demanded of them shall include being able to accurately understand the structure of certain issues related to the disciplines, and possessing the ability to correctly evaluate suitable approaches by which such matters might be resolved. Furthermore, rather than just possessing the skills to understand such issues and evaluate them, what shall also be important will be the ability of students who have studied civil engineering and architecture to call upon the myriad of unique knowledge and skills that they have acquired to apply those assets to the resolution of such issues.

ii. Significance in terms of civic life

Social infrastructure and buildings have a significant impact on civic life. The effect of beautiful and robust structures that make the effort to be designed in a manner in accordance with the demands expressed by users is significant. By contrast, structures that appear susceptible to natural disasters, fires and accidents, and social infrastructure and buildings that are deficient in terms of their functionality and efficiency, represent a significant barrier to both civic life and productivity. The same could be said for structures that fail to match with local customs or the streetscapes of historical settings. Such structures act as a barrier to civic life, and they also do not have a positive impact in terms of the nurturing of healthy citizens.

To promote the creation and maintenance of positive social infrastructure and buildings, there exists the requirement that both general members of the public who will use such assets either directly or indirectly have a correct understanding of their social value. As positive members of society, there is also the requirement that such citizens actively participate in planning processes as well. Specifically, linkages can be made to the realization of a civic life that combines safety with a minimal burden being placed on the environment. This can be achieved by creating a correct understanding among widely-dispersed stakeholders including citizens towards the foundations of social infrastructure, and then combining such perceptions with the making of fair decisions.

The subsequent careers pursued by individuals who study civil engineering and architecture should not merely consist of the supplying of social infrastructure and buildings. Rather, by cooperating with the non-specialist population around them, such individuals should seek to be involved in the creation of healthy cities and regional spaces.

ⅲ. Changes in academic disciplines and society, and the study of civil engineering and architecture

Civil engineering and architecture are both academic disciplines that boast illustrious histories. With respect to robust and functional structures of which high-rise buildings and

high-function lifelines are but two examples, and with respect to the societal demands expressed towards social infrastructure systems, in responding to such needs there has been a heightening and refining of the associated basic mechanics, analysis theories and engineering technologies. Furthermore, along with the development of new building materials, new energy-saving facility technologies, urban planning that makes use of natural energy sources such as wind and solar, and high-precision communications that leverage IT, various new issues have also arisen.

Historically, civil engineering and architecture are considered rather complex disciplines in that the range of their involvement with other areas of study is not just limited to the domains of natural science and engineering. Rather, they also enjoy interactions with many fields of enquiry within the social sciences. With the increasing demands forthcoming from society with respect to safety and environmental issues, the interactions of civil engineering and architecture with other disciplines will continue to increase. Furthermore, against the background of increasing internationalization, the trend is for more and more civil engineering and architecture to take place overseas. Thus, greater demands will be placed on practitioners in terms of their ability to communicate in English, etc., and in their ability to suitably respond to a myriad of natural and social environments.

Concerning the facilities that are the subjects of civil engineering and architecture, they can range in scope and complexity from simple houses to major arterial transportation systems. However, irrespective of their spatial scale, all are important in that they are directly used by members of the public. Thus, when such facilities are supplied, it is necessary that they be sufficiently explained. In addition to there being more and more opportunities for citizens to get involved in social-infrastructure planning processes, the importance of being able to adjust the interests of various stakeholders and achieve consensus among them has also increased. Accordingly, for individuals who study civil engineering and architecture, the ability to communicate in a manner that underpins their ethical standing is necessary. Along with a heightening of social interest in issues concerning the environment, disaster-prevention, and the maintenance and management of infrastructure, it could be said that there is a demand for also being adaptable in terms of flexibly-responding to changes in values and consciousness.

Within the context of an undergraduate education, it would be difficult for students to learn everything about civil engineering and architecture in that their content is so broad. At the very minimum, however, as has been set out above, it is necessary that students gain a clear understanding that both civil engineering and architecture are such comprehensive academic domains.

iv. Specific skills to be acquired

In studying civil engineering and architecture, there are a myriad of specific skills to be acquired. Indeed, in that there is a huge variety of social infrastructure and buildings that are the subjects of the disciplines, there is also a great range of content and methodologies to be learnt. Considering their broader context, there exists the opportunity to design a wide range of different courses and curricula when teaching civil engineering and architecture. Accordingly, based on those areas that specific teaching structures choose to emphasize, and on the approaches that students adopt, the resulting specialized knowledge and understanding of individuals can vary.

Irrespective of such variances, however, there are certain specific skills to be acquired that are common to the studying of civil engineering and architecture, both in terms of increasing the quality and efficiency of the spaces that people occupy, and with respect to the aim of being able to recognize and resolve issues related to the creation of safe and sustainable cities and regions. The specific skills in question have been summarized below.

1) Concerning the past, present and future of civil engineering and architecture, it is necessary that individuals develop opinions that are sufficiently grounded in scientific fact.
2) Concerning civil engineering, architecture, and the construction technologies that result, it is necessary that individuals develop an ability to understand the opinions of others, an ability to suitably evaluate them, and an ability to position them within a broader context.
3) Concerning newly-developed construction technologies, it is necessary that individuals can interpret them correctly, can describe them in their own terms, and can also be involved in their practical application.
4) Based on a sufficient understanding of the environmental and historical positioning of social infrastructure and buildings, individuals should be able to suitably plan and design such facilities while recognizing the issues of setting and aesthetics.
5) Concerning both specific and related issues that pertain to civil engineering, architecture, and the construction technologies that result, individuals should have an interest both in the collection of related sources and data, and in the resolution of such matters.
6) Concerning the nature of social infrastructure and buildings, individuals should be able to also explain them to non-specialists using easily-understood terms.

Based on the summary above, it is possible to describe the basic skills to be acquired in the studying of civil engineering and architecture as follows:

1) Problem-discovery skills: Based on a systematic knowledge of the disciplines, concerning issues that confront cities and regions, by using research, planning and design techniques, individuals who study civil engineering and architecture should be able to clarify what problems exist.

2) Analysis skills: Based on a systematic knowledge of the disciplines, individuals who study civil engineering and architecture should be able to resolve problems in an analytical manner using logic.

3) Planning, design skills: By utilizing creativity both in terms of the individual and comprehensive application of knowledge, individuals who study civil engineering and architecture should be able to realize designated functionality while working under any imposed limitations.

4) Explanatory skills: Based on a systematic knowledge of the disciplines, using detailed documentation, models and plans, etc., individuals who study civil engineering and architecture should be able to explain their ideas in a manner that is both logical and clear (such skills including the ability to give explanations in English).

2) Generic skills

Concerning civil engineering and architecture education within the context of there being numerous different natural and social environments, to survey, plan, design, implement and manage facilities whose human scale measurements span from individual buildings through to entire city and regional systems, it is necessary that individuals master both general and specialized knowledge and skills. The process by which such mastery is obtained is identical to what is witnessed with respect to other engineering disciplines. It requires that the mechanisms by which physical phenomena occur be correctly understood, and that the process by which issues are efficiently resolved through comprehensive decisions based on accurate analysis be learnt. What is more, in a manner that is identical to that which is witnessed in the humanities and the related social sciences, there are also many occasions included through which observations are made of real society and human beings to deepen understanding.

Based on such an understanding, in addition to the skills mentioned earlier that should be specifically acquired in the study of civil engineering and architecture, it is felt that the following generic traits that might be used should also be acquired.

1) In responding to the need to understand a variety of phenomena, the ability to both collect information and analyze it mathematically.

2) The ability to consider issues both efficiently and logically, and then to make comprehensive decisions accordingly.

3) Against both natural and historic contexts, the ability to consider in scientific terms the correlations that exist between mankind and the environment.

4) The ability to achieve objectives while working in conjunction with a variety of other people who possess different values.

5 Basic principles regarding the evaluation methods to be employed with respect to study methods and study results

(1) Study methods

There exists a strong correlation between civil engineering and architecture on one hand, and society on the other. Both disciplines are of a comprehensive nature in that they possess deep linkages with the areas of science and technology that people require to be able to live sociable lives that are safe, comfortable and enriched. Accordingly, there exists a great diversity of useful teaching methods for both civil engineering and architecture such as lectures, experiments, design, exercises, hands-on training, research projects (including graduation theses, graduation design, and graduation planning), etc. These different means can be employed to raise study effectiveness. In that both civil engineering and architecture are recognized as comprehensive disciplines, rather than just limiting their interaction to the humanities and social sciences, in looking for ways to teach them, it is desirable if a broader perspective is taken in also considering interactions with art and the study of aesthetics. However, within the context of undergraduate education, it is not necessarily the case that all such teaching methods be considered as essential. Rather, a flexible approach should be taken to combining the different teaching methods together in accordance with established aims. For example, for learning about the relationships that exist between the theoretical and the practical with respect to what takes place within the context of the real world, the combining of lectures together with a combination of experiments, exercises, and hands-on training would also be an effective teaching methodology. Under normal conditions, the following diverse teaching methods can be imagined.

1) Lectures

In civil engineering and architecture, lectures are given on a range of topics from elements of basic knowledge through to the latest trends in leading-edge research. What is more, they provide students with opportunities to gain an understanding of the basic theories that underpin the work being done within the various domains of the academic disciplines. Lectures are an effective means by which to gain a correct understanding of the concepts, theories, and practices, etc., that constitute the basics of civil engineering and architecture. They also represent the basis by which a deeper understanding can be gained of the disciplines. When lecturing, rather than occasions being purely unidirectional with students only being required to listen, steps should be taken to make them bidirectional with students being given sufficient opportunities to express their own thoughts and opinions. Furthermore, the introduction and usage of audiovisual teaching aids and a variety of different media can also prove effective.

2) Experiments

As to the role of experimentation within the various domains of civil engineering and architecture, with respect to the gaining of understanding, in addition to experimentation contributing to the development of required knowledge, the aim of such practices is the mastering of certain technologies and skills. For heightening the effectiveness of teaching, it is felt that the conducting of experiments in combination with the content of lectures represents a positive approach. Furthermore, as a study approach, experimentation is not just effective in that it allows students to appreciate theoretical and practical relationships, rather such occasions are also effective for maximizing the desire of students to learn.

3) Design

For things that are yet to exist, design provides the opportunity for their representation in as greater detail as possible prior to their coming into being. Moreover, for things that have been expressed thus and then subsequently created, design allows for their identical representation through plans and other formats. As to what characterizes design as a teaching approach, it allows for creativity to be comprehensively exercised through the utilization of the various forms of knowledge acquired through lectures, experiments and exercises. This allows for the embodiment of structures that, while working under the various imposed limitations, nevertheless possess certain designated functionalities. Within the context of the natural environments that are subject to civil engineering and architecture, while considering factors such as local customs, climate and history, etc., the designing of built environments represents an effective form of problem-solving study.

4) Exercises

To effectively learn the disciplines of civil engineering and architecture, both of which enjoy extensive relationships with the practical, the study of problem-solving techniques and the carrying out of exercises are important. From case studies drawn from numerous domains and the results of various research, both approaches use such information to reveal the issues that should be identified, such matters then being analyzed and solutions considered. For gaining an appreciation of real issues, it should be noted that the examining of case studies, the implementing of role-playing exercises, and the discovery of solutions through teamwork, etc., are also effective approaches.

5) Hands-on training

Hands-on training opportunities such as internships offer much in the way of utility. From experience received on the frontlines, an understanding is gained of the importance of the basic

knowledge that underpins civil engineering and architecture. Students also become conscious of knowledge and technology relationships, while developing an appreciation as to the importance of communication skills. Furthermore, concerning skills and knowledge gained through fieldwork, they come to realize the direct relationship that such matters have with society and nature. There are also circumstances under which students may become aware of technical developments, not just here in Japan, but also overseas. Such exposure can result in an interest in either working overseas or engaging in international cooperation.

6) Research projects (graduation theses, graduation design, graduation planning)

Concerning civil engineering and architecture research projects, while referring to the practices adopted by academic advisors who have for many years been engaged in educational research, it is important that students learn how to decide upon their own research topics, and the process by which topics are resolved once they have been set. As how to proceed with academic research, individual students should exchange opinions with their advisors, and they should receive consultations concerning the direction of research. In the final analysis, however, they should be left to find for themselves the clues by which their research topics might be solved. By going through the process of self-resolution of research topics while concurrently receiving advice, students will develop an ability to learn things by themselves. What is more, another important aspect of the learning process is developing literacy skills by reviewing and perusing scientific literature, and by report preparation, etc. While the methods discussed thus far have been expressed in terms of the graduation-thesis format, concerning graduation planning and graduation design, while some differences exist in topic-definition, design-conceptualization, design-details, and the steps to be taken in topic resolution, in the final analysis, students should again be left to find for themselves the clues by which their research topics might be solved.

(2) Evaluation methods

Concerning the methods employed for evaluating study results in civil engineering and architecture, in that the various domains within each of the broader disciplines cover extensive material themselves, even if the educational goals, the knowledge levels and the teaching methods employed were to be identical for each, it cannot be avoided that the methods required to evaluate them need to be both numerous in number and flexible in nature. With respect to the adoption of such an approach, it is particularly relevant to engineering and architecture in that within the broader disciplines there are numerous study domains whose premise is not just that students require a grounding in the sciences, but that they also understand art. Accordingly, whereby the level of knowledge acquisition itself is to be evaluated, it is important to note that in addition to instances whereby students are evaluated on their acquisition of knowledge and skills with respect

to obtaining a certain level of achievement with regard to a certain topic, that evaluations are able to be made whereby students are presented with a topic to test their design knowledge for which there is the possibility of more than one answer.

Concerning experiments, design, exercises, and hands-on training, etc., with respect to the manner of response and the approaches taken to dealing with the events that occur within such contexts, what is important in evaluating each such instance is an ability to put into practice individual intent and an ability to explain plans clearly. Furthermore, for evaluation purposes, important clues are also offered by literacy, observation and points of reflection, etc. However, it is not necessarily the case that the establishment of standardized rating scales or the setting up of indices to denote the levels to be achieved represents an easy proposition. Accordingly, as to the type of evaluation to apply to which instance, the decisions made are dependent on the evaluative ability of evaluators who possess a deep knowledge of the relevant domain or the relevant events that occur within such contexts.

Concerning research projects, as to what is to be desired of students is that they display excellent ideas in undertaking research and that they be proactively involved in the conducting of experiments and the carrying out of design. With respect to how the results of their efforts are to be evaluated, standardized rating scales and the setting up of indices to denote the levels to be achieved shall be required. As to how criteria might be used in the evaluation of research projects, the following matters are offered as examples: the originality of student research ideas; the novelty of student research results; the extent to which students refer to, consider, and validate previous research within their own work; the possibility of research results being of a high enough academic standard to allow for submission to academic journals, etc.; and the impartiality of students when handling the theoretical aspects of their research topics, etc. Furthermore, on an individual student basis as well, it is important that their experiences, thoughts and processes when engaging in research projects be suitably evaluated.

As to evaluating individuals who study civil engineering and architecture, as has been indicated, being able to effectively do so shall require the combining of a wide variety of different evaluative techniques. If the “evaluation” concept itself is used as a keyword, then the following combinations with respect to such matters can be imagined.

1) Evaluating an individual’s degree of understanding with respect to the basic grounding they possess in civil engineering and architecture (principally manifested in terms of lectures and exercises).

2) Evaluating an individual’s degree of understanding with respect to the specialist knowledge they possess in civil engineering and architecture (principally manifested in terms of lectures, experiments, design, and exercises).

3) Evaluating an individual's overall abilities with respect to the knowledge they possess (principally manifested in terms of research projects, design).
4) Evaluating an individual's literacy (principally manifested in terms of experiments, design, research projects).
5) Comprehensively evaluating an individual's abilities with respect to the initial discovery of topics/issues, their subsequent analysis, and their final resolution (principally manifested in terms of research projects, design).
6) Evaluating an individual's communication skills (principally manifested in terms of hands-on training, research projects).
7) Evaluating an individual's management abilities (principally manifested in terms of research projects, hands-on training).
8) Evaluating an individual's decision-making abilities with respect to theoretical matters (principally manifested in terms of exercises, hands-on training, research projects).

6 Correlation between specialized education, general education, and the cultivation of citizenship

The academic domains of civil engineering and architecture are ones by which the spatial foundations that act in support of the lives of all people and industry are constructed. Accordingly, to study them effectively, in addition to possessing both a specialized knowledge and outlook, it is vitally important that individuals are deeply conscious of what citizenship means when viewed from the perspective of an ordinary stakeholder within society. Within civil engineering and architecture education, it is particularly important that the organic relationships existing between the various academic disciplines be taught, this idea applying equally to engineering and design, as it does to the broad range of general education topics. Furthermore, with respect to all of mankind and all the natural world's flora and fauna, it is demanded that by cultivating within them both imagination and a sense of responsibility, education will instill within its students a consciousness of cohabitation and coexistence.

As to the nature of civil engineering and architecture, one factor that distinguishes them is that the humanities, the social sciences, and the natural sciences are all represented within the composition of their domains. Moreover, a close relationship exists between civil engineering and architecture, and a broad range of other disciplines. For example, economics, sociology, law; scenic aesthetics, philosophy, literature, psychology, physiology, biology; history including scientific and technological history; anthropology, folklore, traditions and culture. There is also a general relationship with art. Accordingly, it is important that during the period that civil engineering and architecture are taught to students, steps be taken to coordinate and cooperate with the teaching of a general education in a broad range of other domains. For both teachers and students furthermore, it is demanded that exchanges take place with a wide range of other academic disciplines.

Whether it be forms of social infrastructure or any number of individual buildings, none can be realized by individuals who choose to act alone. Furthermore, if such structures are to be built, in that the form that they assume will come to represent the essence of social existence within living environments, in the contemporary setting, it is demanded that such structures be planned, designed and brought to fruition in consultation and with the cooperation of numerous citizens. In that such circumstances require a broad cross-section of public opinion, the receiving of feedback regarding people's lives, and discussing matters with those who will use and manage such constructions, civil engineering and architecture professionals need communication skills to effectively interact people who possess different opinions and come from different backgrounds. In addition to communication meaning both language ability and a command of vocabulary, possessing both imagination and insights regarding other cultures and individual circumstances is also demanded. Having such skills is very important in terms of cultivating an enriched sense of citizenship.

7 Correlation between civil engineering, architecture and society

Of the various engineering disciplines, it is civil engineering and architecture that have particularly close relationships with society and nature.

Concerning the built environments to which civil engineering and architecture have given birth, they have acted to protect human lives and property from threats posed by nature since ancient times. In addition to preventing disasters, such constructs have also contributed to the shaping of social infrastructure, with such assets in turn acting as the foundations on which various forms of production have been built. It is such foundations that have proven to be indispensable in the development and maintenance of human society, and accordingly such social constructs have enjoyed a close relationship with built environments. Human society has been successfully established due to the great deal of trust that has been placed in the built environments that have taken shape within it. What is more, in addition to the strong sense of responsibility entrusted in civil engineering and architecture, previously a theoretical consciousness was strongly demanded when such technologies were applied. Concerning the trend in modern society for changes in human activity to occur at a much-accelerated pace, in responding to such developments, there has been a continuous demand for the quality and volume of buildings to be enhanced. In anticipating future social change, while keeping in mind the importance of nurturing future generations, the mission of civil engineering and architecture should be to help with the realization of sustainable societies.

Since the Industrial Revolution, the expansion of human activity has resulted in mankind making exorbitant demands of nature. This development in turn has given birth to myriad issues. Considering such developments, for the future of the planet in the modern sense, it is imperative that a symbiotic relationship be successfully created between nature and mankind. Accordingly, the technology and planning skills possessed by civil engineering and architecture must be willing to contribute to the development of such a positive symbiotic relationship.

Compared to the pace of social change, many forms of social infrastructure and individual buildings exist for rather long periods. Thus, they continue to be used despite the ongoing changes occurring around them. In each country of the world, some structures assume the role of cultural assets, their role being to convey certain messages to future generations. What is more, even if older structures offer little in terms of historical value, through vehicles such as simple houses and large-scale structures, the memories of people and societies from a certain era can be conveyed to future generations.

Commencing with the provision of social infrastructure, concerning the issue of investment being undertaken in civil engineering and architecture, both on the national and regional level, such outlays can have a significant economic impact. Conversely, once the “concrete” of social infrastructure and buildings has hardened, the economic burden of maintaining and managing such assets also becomes

significant. Such matters highlight the deep-seated correlation that exists between the application of social infrastructure and architecture to society and the wider economic implications of its employment.

As to where the disciplines of civil engineering and architecture can be applied, it is obviously the case that such locations are not limited in scope to just here in Japan. In other words, in responding to the needs of developing nations, there is much that the nation can offer within the context of the civil engineering and architecture domains. When considering such matters, with respect to the myriad of countries who each differ from one another in terms of their climate, culture, history, values, and social and economic conditions, it is important that matters proceed in a manner that is in accordance with the local social situation. There are common technologies that do not exist in certain regions. There are also instances of responding to regions with forms of technology whose structure has been modified accordingly. Thus, having a broad-ranging knowledge and outlook is necessary for the promotion of suitable implementations in each instance.

Based on the arguments hereto set forth, concerning the curricula to be employed in the teaching of civil engineering and architecture, there is the necessity that it be drawn from a broad range of disciplines including the humanities and social sciences. Through the employment of basic subjects related to both the humanities and social sciences, it will be possible to enhance education in the civil engineering and architecture domains. By universities combining general education and specialist education within their curricula, it will be possible to nurture civil engineering and architecture human resources and equip them with the broad-ranging insights that they require.

<Reference Material 1> Deliberations progress of the Sectional Committees on the Study of Reference Standards in Civil Engineering and Architecture

Committee on the Promotion of Discipline-Based Quality Assurance in University Education

2012

July 27 SCJ Board of Secretaries, 155th meeting

The Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture, Committee on the Promotion of Discipline-Based Quality Assurance in University Education established and committee members determined.

August 30 Sectional Committee, 1st meeting

Board members elected.

Definitions of civil engineering and architecture

October 11 Sectional Committee, 2nd meeting

Direction of Reference Standards

December 19 Sectional Committee, 3rd meeting

Measures being taken by universities and academic committees both domestically and overseas.

Committee on Civil Engineering and Architecture

2012

November 30 SCJ Board of Secretaries, 166th meeting

The Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture, Committee on Civil Engineering and Architecture, established and committee members determined (effect on of December 21)

2013

February 15 Sectional Committee, 1st meeting

Structure of Reference Standards in Civil Engineering and Architecture

April 4 Sectional Committee, 2nd meeting

Draft proposals regarding the various chapters of the Reference Standards

June 10 Sectional Committee, 3rd meeting

A draft of the Reference Standards was drawn up

July 13 Sectional Committee, 4th meeting

Public symposium ("Reference Standards in Civil Engineering and Architecture in Undergraduate Programs").

2014

January 31 Committee on Discipline-Based Quality Assurance in University Education of the Science Council of Japan, 7th meeting

Approval was given in committee to the report entitled, "Reference Standards of Course Development for Discipline-Based Quality Assurance in University Education - Civil Engineering and Architecture," which was prepared by the Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture of the Committee on Civil Engineering and Architecture.

<Reference Material 2> Public Symposium

Science Council of Japan Public Symposium
"Reference Standards in Civil Engineering and Architecture in Undergraduate Programs"

Date and time: Between 2:00 p.m. and 5:00 p.m., Saturday, July 13, 2013
Venue: The Lecture Hall of the Science Council of Japan

About the Symposium

In accordance with a proposal being prepared on the topic of "Reference Standards for the Assurance of Quality in Civil Engineering and Architecture Undergraduate Programs," this symposium is being held to receive the opinions of interested parties from related organizations, universities, and industry, etc. As to the "Draft Proposal on Reference Standards for Civil Engineering and Architecture," concerning academics involved in the teaching of civil engineering and architecture at the university level, the national government, certified evaluation and accreditation institutions, university groups, related organizations, industry, and primary and secondary education institutions, etc., in addition to these reference standards being utilized within the context of understanding the subjects of civil engineering and architecture, it is hoped that they will make it possible to meet contemporary demands with respect to assuring the quality of university education here in Japan.

Program:

Event Moderator: Teruhiko Yoda (Secretary of the Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture; Member of the Science Council of Japan; Professor, Waseda University)

2:00 p.m. to 2:05 p.m.: Opening remarks: delivered by Masashi Kamon (Chairperson of the Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture; Member of the Science Council of Japan; Principal, National Institute of Technology, Kagawa College)

2:05 p.m. to 2:25 p.m.: Keynote address: delivered by Kazuo Kitahara (SCJ Special Associate Member; Professor, Graduate School of Mathematics and Science Education, Tokyo University of Science)

2:25 p.m. to 2:45 p.m.: Sectional committee report: delivered by Masashi Kamon (Member of the Science Council of Japan; Principal, National Institute of Technology, Kagawa College)

2:45 p.m. to 5:00 p.m.: Panel Discussion:

Moderator: Hiroshi Yoshino (Vice Chairperson of the Sectional Committee on the Study of Reference Standards in Civil Engineering and Architecture; Member of the Science Council of Japan; Professor Emeritus, Tohoku University)

Panelists: Yasuo Asakura (SJC Associate Member; Professor, Graduate School of Engineering, Tokyo Institute of Technology)

Reiko Amano (SJC Associate Member; Division Manager, Intellectual Property Division, Kajima Corporation)

Toshimitsu Komatsu (SJC Member; Specially-Appointed Professor and Professor Emeritus, Kyushu University)

Keisuke Hanaki (SJC Member; Professor, Graduate School of Engineering, University of Tokyo)

Nobuaki Furuya (SJC Special Associate Member; Professor, School of Creative Science and Engineering, Faculty of Science and Engineering, Waseda University)

Tsuneyoshi Mochizuki (SJC Associate Member; Director, Japan River Association)

Teruhiko Yoda (Member of the Science Council of Japan; Professor, School of Creative Science and Engineering, Faculty of Science and Engineering, Waseda University)

5:00 p.m. to 5:05 p.m.: Closing remarks: delivered by Hiroshi Yoshino (SJC Member; Professor Emeritus, Tohoku University)

Reference Standard
for
History Teaching/Learning in University

9 September 2014

Reference Standard Sub-Committee, History Committee,

Science Council of Japan

Contents

Preface

In May 2008, the Science Council of Japan was requested by the Higher Education Bureau of the Ministry of Education, Culture, Sports, Science and Technology to deliberate on the method to assure the quality of university education in each specific subject field. After due deliberation, in July 2010, the Science Council of Japan submitted the general report to the Ministry.

After the submission of the general report, the Science Council of Japan proceeded to preparing the reference standard of each subject field. As one of them, *Reference Standard for History Teaching/Learning in University* (in Japanese) was prepared by the Reference Standard Sub-Committee, History Committee, Science Council of Japan, and it was publicized on 9 September 2014.

This is the English translation of *Reference Standard for History Teaching/Learning in University* (in Japanese) rendered by the Reference Standard Sub-Committee, History Committee, Science Council of Japan, in cooperation with the National Institute for Educational Policy Research.

1 Introduction

1-1 Weakening Historical Awareness among Japanese Young People

Historical awareness, that is to say, the awareness of continuity and change in terms of history, seems to be weakening among Japanese young people such as university students. This may be attributable, in large part, to such circumstances as follows: (a) the obscurity of future prospects that has become noticeable in the latter part of the 20th century as a result of diversification of value; (b) the strengthened trend of neo-liberalism accompanied by the principles of market fundamentalism and self (individual)-responsibility. Weakening of historical awareness among Japanese young people makes prevalent the so-called neo-realism among them, by which they are interested only in matters directly concerned with them such as the personal incidents in their daily life. Neo-realism, thus, tends to weaken the interest of Japanese young people in things remote from them in terms of space and time, leading, as an inevitable result, to a sort of apathy to the history of foreign countries.

On the other hand, however, an increased number of young people have participated in volunteer activities in the areas struck by the Great East Japan Earthquake of 11 March 2011, as well as in anti-nuclear power movements stimulated by the breakdown of the Fukushima Nuclear Power Station. Though it is hoped that through these activities the human basis, on which the renewed historical awareness can be fostered, may be constructed, it is still a current limited to rather small part of Japanese young people.

Taking these circumstances into consideration, the most urgent problem for university teachers is to develop a method of history teaching/learning that encourages students to reflect on matters in historical context based on their actual experience or interest relative to, for example, such social problems as earthquake disaster and nuclear pollution.

1-2 Difference of Historical Views between Japan and China/Korea

One factor that causes the Japanese young people's seeming apathy to foreign history is the difference or opposition of historical view between the Japanese government and China/Korea, the focal point of which is the modern history of East Asia culminating in the Japanese colonial invasion of China and Korea. Out of such political-cum-ideological confrontation between the Japanese government and China/Korea often arises a feeling of rejection against China/Korea in the mind of part of Japanese young people who are inexperienced or immature in the international exchange of opinion.

On the other hand, however, it is an undeniable fact that the majority of the foreign students and foreign post-graduate students in Japanese universities are from China and South Korea. Taking this into consideration, it is incumbent for university teachers to

develop a method of history teaching/learning aimed at fostering the faculty of university students to understand the history and culture of foreign countries, and, more specifically, the faculty to discuss scientifically, not emotionally, the controversial points in modern East Asian history with foreign students from China, South Korea &c.

1-3 Importance of Global View of World History

A rather long time has passed since the necessity to overcome the nation-state-oriented history (national history) began to be advocated. In contradiction to this, nation-state-oriented history seems to gain more and more prevalence in many countries in recent years. It is, however, the lesson of modern world history that self-complacent national history cannot contribute to the solution of difficult international problems confronting us at present.

To seek a solution to the opposition of historical views between the Japanese government and other Asian states, it is indispensable to seek the historical view on the Asian scale, overcoming the national history and, further, the global view of world history.

Thus university teachers are expected to provide university students with a method of history learning that enables them to analyze the present international problems involving Japan and other Asian states from the global view of history, not as matters remote from them but as problems familiar to them in the same manner as the rehabilitation from earthquake disaster and the cleaning of nuclear pollution.

2 Definition of History

Mankind has reached the present situation with the accumulation of a huge number of past events, through hundreds of thousands years since its birth. History is the study to elucidate meaning of the past, choosing facts from among past events.

The events chosen here are called historical facts, and historical facts can be found in all realms of human activity. Therefore, all genres of history are to be included in the concept of 'history', not only general history and archaeology, but the history of art, history of science, history of technology, legal history, gender history, history of economy, history of politics, history of international relations, history of literature, history of philosophy, history of education, history of medical science, history of disease, environmental history, history of disasters, and so on. Thus, 'history' embraces quite extensive fields.

This report takes all of those extensive fields as objects, and does not deal with history as the major of the history department in universities.

3 Characteristics of Historical Thinking

3-1 Historical Thinking as One's Own Independent Understanding

In elucidating the meaning of historical facts, we face the following two problems: (a) How to select a fact as the object to be elucidated from among innumerable facts in the past; (b) What criteria are to be used for understanding the fact.

Those who are concerned with history have to face and solve these problems by themselves, as historical thinking is subjective or one's own independent understanding, and if trying to gain understanding, they have to develop it independently, reflecting on what their life is in the present world. In addition, relation of the present to the past is not the same or equal, depending on how remote the past is from the present, e.g. ancient, medieval or modern. Modern history works on the past which leads directly to the present, and tries to explain the present world, whereas in ancient or medieval history we have to face a world different from the present and to be relativistic in relation to the present.

The attitudes demonstrated above are requisite for not only scholars of history but all students who learn history in various fields in universities.

3-2 Historical Thinking as Scientific Understanding

Historical thinking as scientific understanding can be attained, based on historical documents and materials: not only literary and archaeological materials but paintings, sculptures, utensils, mechanics, building, cultivated land, water supply, industrial remains, and so on.

Moreover, historical facts, even if not discernible as physical traces, remain in, for example, place-names, myths and traditions, folk-lore, songs, religious rituals, and so on. Although it is extreemly difficult to draw out historical facts from memories embedded in the materials enumerated above, still more important are these materials. Historical materials are sometimes intentionally concealed or cast away either in wartime or in some other critical time. In that case, it is difficult to discover historical facts in literary materials, but they must be found in people's memory to some extent.

In order to gain both subjective and scientific understanding, it is necessary to handle historical materials scientifically. So we should be careful in choosing materials, and be trained to have a keen eye for fakes. Arbitrary reading or prejudices sometimes lead to incorrect understanding. Especially when making use of someone's memories as materials, we need to confront them with those of other people.

In the case of history it is not possible to verify the past by way of experiment as in the case of natural science, so history cannot be scientific in the sense of natural or experimental science. 'Scientific' in history implies 'understandable' in general: in

other words, whether an interpretation of historical phenomenon is convincing or not is to be judged by ourselves based on our own experience in life.

Needless to say, historians should deal with problems concerning historical materials, such as analysis of historical materials or proper reading of them, and also these problems should be taught in universities. In history teaching/learning in universities, historical materials are to be presented to each student to read and interpret in a scientific way, and to discuss with other students. As a result of this method of history teaching/learning, each student could describe his/her own image of history.

4 Historical Thinking requisite for All University Students

4-1 Historical Approach to Present State of Things

The present state of things, such as the state and society in which we live and the individual as he/she presently is, has been formed in the long process of history as the accumulated result of the human factor of historical selection as well as the chance factors unrelated to human choice in the past. It is thus requisite for all university students to develop the ability to understand the present from historical perspective, not seeing it as fixed or unchangeable.

4-2 Multiplicity of Historical Views

Historical points of view, however, are not singular. There can be a multiplicity of historical viewpoints to understand the present state of things, on the ground that historical thinking is not only scientific but also subjective understanding. In the case of historical problems that involve many nations, as an example, each nation may have a different historical viewpoint of the problem. With regard to problems pertaining to social discrimination formed in history, for another example, there may be difference of historical viewpoint between the discriminated against and the discriminator. Even individuals living in the same society at the same time may have different historical viewpoints depending on the socio-economic circumstances in which they have grown up.

Thus, historical points of view cannot be singular. There is not a single ‘correct answer’ to historical problems. Students are, as a result, required to develop an attitude of respect for the different historical viewpoints of others, such as other nations, other peoples and other individuals.

5 Methods of History Teaching/Learning and Assessment of Learning Outcomes

5-1 Methods of History Teaching/Leaning

The purpose of history teaching/learning in university education being the development of the faculty of university students to reflect on the present state of things in a historical context, basing on their independent way of thinking, and, at the same time, to respect the historical views of others (other nations, other peoples and other individuals) based on the others' ways of thinking, it is recommended as a method of history teaching/learning, in addition to ordinary lectures and seminars, to organize discussion on historical problems among students of different opinions. In the case of this type of history teaching/learning, the topics of discussion (historical events or phenomena) and source materials thereof could be provided by teachers, though it is more desirable if students themselves can provide them.

In the following paragraphs, specific examples of the topic of historical discussion in various fields of history, with explanations of the characteristic features of respective fields of history, will be enumerated.

(1) Japanese History

Most problems involving current Japanese society have been caused by historical movements in world politics, world economy &c. It is thus important for university students to have a global view of world history overcoming the nation-state-oriented (national) view of Japanese history.

It is, however, not easy to actually acquire a global view of world history. The factors that make it difficult include, for one thing, the fact that in the high school curriculum Japanese history and world history are separated into different subjects, and, for another, university teachers themselves are bound by their own specific themes of historical researches, often lacking the due outlook of world history.

Further, the historical concepts used in writing Japanese history tend to be nation-state-oriented. *Nihon-bunka-ron* (Japanese-culturalism), that emphasizes the uniqueness of Japanese culture, is its typical example. Two props of *Nihon- bunka-ron*, among others, are *Inasaku-bunka-ron* (wet-field-rice-cultivation-centered view) and *Kokuhū-bunka-ron* (Japanese-style-culture-centered view) that still linger, for example, in high school Japanese history textbooks. Thus, *Inasaku-bunka-ron* and *Kokuhū-bunka-ron* are suitable topics of discussion among university students to reexamine the nation-state-oriented view of Japanese history.

To counterbalance *Inasaku-bunka-ron*, that overemphasizes the role of *inasaku* (wet-field rice cultivation) in the historical development of Japanese society, it is effective to

point out the importance of dry-field cultivation and its products. To enumerate some examples: (a) a culture lacking wet-field rice cultivation was predominant in ancient northern Japan; (b) the development of agriculture in medieval Japan depended not only on wet-field rice cultivation but also on the two-crops-raising system in dry fields; (c) such dry-field products as cotton and silk played an important role in historical transition periods from the medieval to early modern, and, later, from the early modern to modern, respectively; (d) traditional Japanese foods such as *udon* (wheat noodle), *soba* (buckwheat noodle), *tōfu* (soybean curd), *shōyu* (soybean sauce), *miso* (soybean paste) are made from dry-field products. By taking up source materials showing these points as the basis of discussion, it is possible to organize the discussion to reexamine the wet-field-rice-cultivation-centered view of Japanese history.

In the case of *Kokuhū-bunka-ron*, that features *kokuhū-bunka* (Japanese- style-culture in medieval period) to differentiate Japanese culture from Chinese culture, it is effective to counter-pose the following facts: (a) Chinese literature, especially Chinese poetry, continued to be the cultural background of the nobility in medieval Japan, and the art of composing Chinese poem was highly valued in the Emperor's court, though Japanese poetry known as *waka* is often assumed to have become popular in the 9th to 10th centuries; (b) all of the fundamental instruction books for young men of the nobility in medieval period were written in *kanbun* (classical Chinese language). By taking up source materials showing these points, it is possible to organize the discussion to reexamine *Nihon-bunka-ron* (Japanese-culturalism).

Young men such as university students today must live in a more and more globalizing world. Taking this into consideration, it is urgent for university teachers to develop a method of history teaching/learning that enables them to have a global view of world history, without losing sight of the characteristic features of Japanese history.

(2) Foreign History

In order both to get rid of the present trend in Japan in which young people seem to be domestically oriented, and to make Japan a nation able to contribute properly to the international community, it is necessary to encourage students to learn how to recognize historical facts from the global viewpoint of world history. Therefore, teaching foreign history in universities should be regarded as more important than before. Of foreign history, modern history is apt to be regarded as more important and crucial, as it is directly linked to the present world. But this is not true. Ancient and medieval history is necessary for students to learn as well, for to gain the ability to understand history properly it is useful to learn the history of mankind from the beginning. Then, students could more easily have a broad overview of the present world so that they could recognize and analyze complex structures of factors to change history.

To give an example, the victories of the Greeks in the Greco-Persian Wars in

490BCE and 480 to 479BCE used to be regarded in Western countries to have led the West (Europe) independently from the East (Asia) to develop the unique and great Western civilization. In some works of the Attic tragedies, it is possible to find the contrast between the Greeks who esteem freedom and the Persians who submit to servitude under the King. This contrast, however, reflects the ideology prevalent among the Athenians in the fifth century BCE. and has no direct relation with the real society.

G. Grote, an English historian of ancient Greece (1794-1871), adopting the contrast mentioned above, tried to explain the significance of the Greco-Persian Wars as the victory of the Greeks over the Persians and emphasized the contrast between civilized and primitive, freedom and despotism, and rule by law and suppression. This emphatic contrast by Grote determined direction of study of ancient Greek history thereafter.

In the latter half of the 20th century, academic efforts illuminated that the Greeks were substantially influenced by the Persians both before and after the Greco-Persian Wars. The Western view that the Greco-Persian Wars determined the supremacy of the European world is now under modification and correction. In addition, the Persian civilization itself was formed, being influenced by other civilizations in Orient like Egypt, Assyria, Babylonia, Lydia, and so on. The dynamic mutual and cross-cultural relations in ancient East Mediterranean areas will be elucidated more and more from now on.

Teaching/learning ancient or medieval history leads students to be free from ethnocentricism and to understand and have sympathy with other peoples and their cultures. Thus, teaching/learning foreign history in universities is effective and indispensable so that students are to be trained to analyze and understand the structure of the present world.

(3) Archaeology

There are various disciplines for the study of history. Archaeology is one of them, and it tries to reconstruct the human past based on material culture. When we compare this discipline with other historical sciences depending largely on written documents, we can point out the following advantages of archaeology: (a) We can study a far longer time period in human history through archaeology; (b) Archaeology can help us study history of all human groups, whether they have written records or not; (c) Material culture may result from random action, without conscious planning. The remains of material culture mainly provide the hardware of the human past, such as housing, food and clothing. Archaeologists face, however, difficulties in reconstructing the software of the human past, such as ideology and belief systems.

Archaeologists must have a good command of various methods to speak of the human past on the basis of this material culture. Therefore, university teachers must educate students in the field of archaeology based on a two-stage plan. The first stage is learning technical methods for studying the past (survey, excavation, and recording

methods on sites and in laboratories). The second stage is a methodological study for reconstructing the human past on the basis of material culture.

Generally speaking, people have a tendency not to record and keep documents on events that were troublesome for themselves and for their own societies. Unpleasant events, such as drug abuse and massacres, are not only unrecorded but also intentionally hidden. In contrast, archaeological materials sometimes reveal these unpleasant events, as it is almost impossible not to leave any material trace of human activity. Even intentionally hidden materials survive, and may be discovered by archaeologists in later ages. Archaeological materials are just like hard evidence in a modern judicial court, and must be accepted as undeniable evidence for the study of history. Therefore, archaeology can play a role in the study of history of any period and society.

As an example, until recently, the Ainu, an indigenous people of the Japanese Archipelago, were considered to be simple hunter-gatherers, who lived in a rich natural environment, without sophisticated iron technology. However, recent archaeological excavations at Ainu sites revealed that they had agriculture and iron technology before the *Shakushine* Revolt against the Japanese government in the 17th century. Archaeological studies also revealed that the *Satsumon* Culture, which had agriculture and iron technology, had been the predecessor of the Ainu culture. Ainu archaeology revealed that there had been various human groups amongst ancient Ainu societies, and that the image of simple hunter-gatherers without iron technology was a creation of the Japanese people in the Edo period (17th to 19th centuries). The Ainu themselves did not leave any historical documents. If we try to study and discuss the Ainu history on the basis of historical documents, we have to depend on those written by the Japanese and Europeans. This means that we would see Ainu history through the eyes of non-concerned parties. If we want to reconstruct Ainu history on the basis of their own materials, archaeology is the most important discipline for it.

In addition, some aspects of cultural heritage or artifacts are utilized as the symbols of ethnic and national identity. The study of history often awakens a sense of ethnicity and the accomplishments of ethnic groups. Sometimes, it inspires people. However, we must also note that history as well as archaeological sites have often been overlaid by many facets thereof. We must note that the same cultural heritage has also represented opposite symbols in different human societies. Therefore, we must carefully consider history from various viewpoints. Multifaceted thinking on history is the most important point in archaeology education in universities.

(4) History of Art

Art history is a field of study to aim at a better understanding of the culture and society of the past through the examination of artifacts, in particular, works of art and craft. Art history thus shares a common interest with archaeology in its aim to know about human

behavior in the past by examining physical objects (material culture). Goals of learning art history are: (a) gaining a better understanding of any particular artifact(s) ; (b) by understanding them, reaching a deeper understanding of the people who created and appreciated them as well as the culture and society in which they were produced.

Art history has so far accumulated various viewpoints and methodologies that would make it possible, beyond a subjective appreciation of art, to know more about art, think better about art, and find a better way of discussing art on a firm basis. Art history has a prospective field of study that might encompass the whole sphere of visual culture developed in any society of any specific age.

Art history is also committed to constructing world art history in a global perspective in which one can gain an appropriate understanding of intercultural relations to overturn the national history of art that has long functioned as a cultural ideology of a nation-state. The framework of national history of art, however, is ineffective to reconstruct the context that mediated cultural exchanges within an area that extended over a number of existing nation-states. Although an alternative framework for an effective argument is yet to be proposed, some recent arguments have inspired a persuasive discussion on interregional cultural exchanges with a positive intention to dissolve the framework of national history of art. An example of such arguments is that of Prof. Seinosuke Ide, in which he discusses interregional cultural relations between China and Japan focusing on Buddhist paintings imported from China to Japan. In the ages before the medieval period the canonical nature of Chinese art was so absolute that one can reconstruct lost works of Tang China from extant works of the contemporary Tenpyō period or 8th century Japan. In contrast, characteristics of Buddhist paintings of Song and Yuan China do not always look identical with those of the Kamakura period or 12th and 13th century Japan, while works of the former remained canonical to those of the latter. Consequently one cannot reconstruct lost works of the former from those of the latter, but, instead, one can observe in their relation a selective reception in three forms, that is, imitation, exaggeration, and rejection. Closely examining more than five hundred extant works of Buddhist painting of Song and Yuan China imported to Japan, one will find on both sides, China and Japan, a specific context according to the three forms of their relationship. Then one will be able to recognize a dynamic 'many-to-many' relationship that allows heterogeneity on both sides, not a homogeneous 'one-to-one' or 'one-to-many' relationship.

Although the range of discussion this example encompasses is limited to a specific region, time, and genre of art, it provides an effective model for the understanding of interregional relationships that is expected to contribute to historical discussion of art in a global perspective. Historically speaking, interregional relationships between the sender and the receiver of information have been, in most cases, unsymmetrical. The reason that this model of discussion is effective lies in the possibility that it would provide a promising discussion based on a mutual understanding of the heterogeneity inherent in both sides.

Those who learn art history are required to gain an ability to draw accurate information from physical objects they examine. Physical objects are such material as those that contain analog information inside, while literal documents consist of digital information. For this reason, those who learn art history need to gain an ability to carefully observe an object they study and a sensibility to keenly examine it. They are also expected to understand not only the values that relics from the past or cultural properties bear for our society but also the significance of an effort to hand them down to posterity and the social role that museums and archives have played to preserve them.

(5) History of Science

History of science is a discipline that deals with scientific recognition and activities from the historical point of view. It is the study of the historical formation and changes of various sciences. Its main research objects are the natural sciences (physics, chemistry, biology, geology, astronomy &c.) and also mathematics, medicine, experimental psychology, experimental economics. It investigates how those scientific disciplines have been formed historically and under what mechanism they have been changed.

In the case of history of science, unlike general history, many students lack the prerequisite and background knowledge necessary to understand it. Today in the entrance examination of many Japanese universities, there is no science subject for non-science students, while only one science subject is compulsory for science students.

Therefore, in the university education of history of science, careful selection of materials and adequate arrangement of lessons ought to be considered, taking account of students' level of scientific knowledge.

One educational purpose of history of science is to increase students' understanding of scientific knowledge and scientific activities. To enhance science literacy, the history of science is very useful to non-science students as well as science students. To learn the historico-social formation process of fundamental scientific theories (the heliocentric theory, theory of evolution, theory of relativity &c.) is helpful to understand scientific thinking and scientific method. To learn the historical formation process of the scientific spirit itself is helpful to the formation of the scientific spirit and the cultivation of character of students.

The historical development process of science is complex. The following historical facts relating to the heliocentric theory show it typically.

(a) Heliocentric theory was also present in ancient times.

(b) According to the heliocentric theory, the earth rotates one cycle per day on its own axis. Then people on the equator move in 24 hours more than three times the earth's diameter. Its speed amounts to more than one thousand kilometers per hour. The ancient natural philosophers thought that it was ridiculous and, therefore, the

heliocentric theory was wrong.

(c) As far as naked-eye observation is concerned, the Ptolemaic geocentric system and the heliocentric system have equivalent prediction- and explanatory-power.

(d) Copernican heliocentric theory had been known before the publication of Copernicus' book *De revolutionibus orbium coelestium* in 1543. But Copernicus was not condemned as a heretic by the Catholic Church. Unlike Galileo, he had a good relationship with the Catholic Church. He became a canon of the cathedral chapter of Frombork. It was 1616 or more than 70 years after Copernicus' death that the uncorrected *De revolutionibus orbium coelestium* was banned. *De revolutionibus orbium coelestium* was amended because of its utility for calendrics. A corrected version was allowed to be used.

The above facts show the historical complexity of the relationship between science and religion and the socio-cultural complexity of scientific activities. Those facts clarify the theoretical importance of the scientific distinction between relative motion and absolute motion. They also suggest that scientific activities are unified empirical and theoretical activities.

In this sense, the history of science education fosters the students' ability to see things from different perspectives and appropriately respond to socio-cultural diversity and historical changes. Therefore the history of science education is of great significance as a subject of general education in universities.

(6) History of Technology

History of technology is the study of the historical formation and changes of various technologies. In other words, it is a discipline that deals with 'things' (tools, equipment, machines), 'knowledge' (technological ideas, technological knowledge, technological recognition, technological thoughts), and 'activities' (technological activities, technological innovations) from the historical point of view. Technology plays a more important role in modern society. Therefore, the history of technology education is of great significance for science students as well as non-science students.

History of technology deals with the formation and changes of technology- mediated artifacts (industrial products, agricultural products &c.). Current forms of artifacts are determined by various social interests and habits, moral and law, available technological resources and investment in the past.

The following historical facts show that technology has socio-cultural diversity and has been constrained by various socio-cultural interests.

(a) In 1900 there were more electric cars than gasoline cars in the United States. The electric vehicles were one of the products based on the leading technology of the

early 20th century. They were defeated in the subsequent competition. But they begin to attract social attention again.

(b) Today household appliances and industrial equipment are designed to use direct current (DC). The DC transmission system has achieved the significant improvement by the development of power electronics based on the semiconductor devices. In spite of this, the Alternating Current (AC) transmission system is universal. And in Japan the power grid operates on two different frequencies. The frequency in West Japan is 60Hz and that in East Japan 50Hz. Therefore the electric power interchange between East and West Japan could not be performed successfully at the time of power shortages after the Great East Japan Earthquake of 11 March 2011.

The above facts are the historical examples of the technological path-dependency, the technological lock-in. And they suggest that it is necessary to take account of the system of various technologies and the difference between product technology and manufacturing technology.

The history of technology education fosters students' ability to see things from different perspectives and appropriately respond to technological innovation and social changes.

Furthermore in the history of technology education it should be taught that technological development has positive and negative effects on society. On the one hand, technological development is useful to improve social life, but on the other, it produces new social problems.

For example, the development of rice milling technology in Edo-period Japan (17th to 19th centuries) caused the switch of staple food from unpolished rice to white rice. Generally speaking, white rice is a progress from the gustatory perspective, but from the nutritional point of view, it is not a progress, as rice milling removes many nutrients from unpolished rice. In the Edo and Meiji periods, Japanese people obtained not only energy but also nutrients mainly from rice. Under such historical circumstances, rice milling technology caused the reduction of vitamin B_1 intake and therefore the increase of beriberi disease patients. In the Edo period beriberi was called 'Edo wazurai' (Edo-sickness) and became a big social problem. In the Meiji period about 6,000-10,500 people annually died of beriberi.

To talk about the past of technology in this way is also to talk about the future of technology. By understanding the history of technology from the multi-faceted perspective, people can see what results the today's technological choices will bring about in the future.

In the above sense, the history of technology education is of great significance for general education in universities.

(7) Legal History (including Gender History)

There are two meanings in teaching/learning the history of law (legal history). One is to teach/learn the history of the law as a legal education [1], and another is to teach/learn the law in the history as a history education [2]. There are three aspects in the former [1]: (a) legal history as a branch of jurisprudence; (b) historical thinking in each law field; (c) history education as an introduction to legal education in the faculty of law. Here it is focused particularly on the history of law in the meaning of [1]-(c) and [2]. It is very significant for students to discuss legal topics in history learning, in which gender topics as the outcome of the development of gender history are included.

In the *Reference Standard for Legal Education in University*, three kinds of person to be educated are mentioned: (a) lawyer with a multipronged point of view; (b) leader in each field with legal-minded thinking based on critical ability; (c) citizen with strong sensitivity to human rights, to train whom might be not only the aim of legal education but of all educations in university. In the following, several examples are given as discussion topics about 'the development and limit of the human rights protection in modern law'.

The history of human rights protection is one of the most important subjects in the history of mankind. The Constitution of Japan (1946) is a typical law that is based on such a world-wide process of human rights protection, being written from a global view. 'Article 97**:** The fundamental human rights by this Constitution guaranteed to the people of Japan are fruits of the age-old struggle of man to be free; they have survived the many exacting tests for durability and are conferred upon this and future generations in trust, to be held for all time inviolate.' Such clauses as follows are included in the preamble to the Constitution: The sovereignty of the people is 'a universal principle of mankind' and 'we recognize that all peoples of the world have the right to live in peace, free from fear and want'. 'We believe that no nation is responsible to itself alone.' The Constitution of Japan is not only the declaration of parting from the inhumanity in the prewar legal system of Japan, but also the result of the attainments in world history.

In Germany, the Weimar Constitution (1919) guaranteed a social right for the first time in the world. However, the Nazis denied 'legally' all human rights guaranteed by the Constitution through exercising the emergency power, which was established in the same Constitution. It also committed 'legally' genocide by means of many laws and ordinances which the government enacted (Enabling Act of 1933). The German Constitution (1949) starts from 'Human Dignity' (Article 1). It means the serious reflection on the Nazis. Thus, if students learn and discuss the historical fact that human rights were easily infringed and deprived, their level of awareness concerning human rights protection must be noticeably enhanced.

Laws in different society and culture have a mutual influence on each other, so that law in a country is developed and changed (so-called 'reception of law'). As for Japan,

the *Ritsuryō* codes were adopted from China in the Nara period (8th century), which were 'the means to rule'. On the other hand, the Western law introduced from Europe in the Meiji era (19th century) was rights-centered law. There was no word corresponding to 'right' in Japanese language at that time. The term '*kenri'* (right) was newly coined with other legal terms in the translation work of several French codes. As the result of *Minpōten-Ronsō* (disputes over the Civil Code), the Japanese law model was converted from French law as a product of the revolution to German law with strong academic characteristics. After that, Japanese law became highly specialized and diverged from the people. How did and does such a history of law reception impact on the legal consciousness and the sensitivity to rights of Japanese people? It might be a suitable topic of historical discussion and global comparison.

The French revolution (1789), 'the Declaration of the Rights of Man and of the Citizen' (1789) and French codes of Napoleon's era (1804-1810) are the basic items in a high school world history textbook. They are also important themes in legal history because they belong to the origin of modern law. It is, however, recently pointed out that exclusion based on gender was essentially immanent in these modern laws.

Women were not included in the subject of 'liberty, equality, fraternity' which was the slogan of French Revolution. It was Olympe de Gouges who criticized this in her *Declaration of the Rights of Woman and the Female Citizen* (1791). She exposed that 'the Declaration of the Rights of Man and of the Citizen' was not for the humankind in general, but only for the male excluding the female. If they compare the two Declarations and discuss the difference of the texts, students can understand the legal status of women in those days. It is quite obvious that each French code was full of patriarchy. The adultery in the penal code was based on the double standard of sexuality, which means that men had the freedom of sexuality, but the sexuality of women was controlled strictly. If they take these into consideration to reexamine modern law and discuss what kind of principle was working in modern civil society, students can find out the fact that modern society was based on public-private dualism, which was inseparable from the gender role model that public matters (politics and economy) should be done by men and private matters (family) by women.

The legal status of women is improving gradually, starting with the acquisition of the suffrage since the beginning of the 20th century. Gender-Mainstreaming, which is the movement of making women and men equally participate in the decision concerning politics and economy, has become strong in global society since the middle of the 1990s. However, as concerns the subsumption of women, there is still a large gap between North and South and discrimination against women on the excuse of culture and history has not come to end. It is one of the most important global problems for the 21st century to abolish sexual violence and abuse against women in civil wars. It is possible for students to imagine the present limit of human rights protection and to discuss 'new human rights', only after they know the history of such exclusion and subsumption.

Legal texts are a historical material relating to the history of human rights protection. So as to live together in the globalized civil society, it is necessary to understand correctly the historico-cultural context of treaties and laws, whose values are reflected in their words or phrases. It is indispensable to teach/learn the basic knowledge of history and to train historical thinking in order to make a student/oneself the citizen who is sensitive to human rights.

(8) Economic History

The economy is the domain of society on which theoretical analysis has developed the most. Hence, in studying and teaching economic history, we should consider how to incorporate insights from economics into history. Conventionally, Marxist economics was widely used as a theoretical framework for understanding and describing economic history, especially in Japan. Consequently, economic historians made great efforts to identify stages of economic development, such as the transition from feudalism to capitalism. However, in recent years, neoclassical economics, game theory, and econometrics have been extensively applied to economic history research in the US and Europe, and this trend has affected Japan. These recent approaches have brought about new perspectives in economic history.

These new perspectives include the role of trade associations, which operated in the premodern world. Although guilds in Europe and their counterparts in Japan (*kabu nakama*) had various functions, they were typically regarded as organizations designed for monopolizing markets. However, recent literature has focused on their role in governing market transactions. Specifically, game-theoretic analysis of the role of merchant coalitions in the medieval Mediterranean world has had a profound effect on the study of economic history. According to this research, the coalitions enabled merchants to credibly threaten any employed agent found cheating a coalition member with multiple punishments. This research is influential because it establishes the credibility of threatening multiple punishments by showing that this was compatible with the incentives of each coalition member. In other words, participating in multiple punishments constitutes a game-theoretic equilibrium.

This function of trade associations was not limited to the medieval Mediterranean world. Historical documents show that *kabu nakama* played a similar role in *Tokugawa* (Edo) Japan. For example, an article from the Osaka salt merchants' association code of the early 18th century prescribed that if a broker cheated an association member, all members should suspend transactions with that broker. Another example is an article from the Kiryu district textile manufacturers' association from the early 19th century, which prescribed that any weaver found to have stolen thread would receive no further orders from any association member.

It is necessary to test empirically whether these associations provided an institutional

basis for market transactions through the threat of multiple punishments. There is empirical evidence of this for premodern Japan. In the middle of the 19th century, under the so-called *Tenpo* Reform, the *Tokugawa* Shogunate prohibited *kabu nakama*. Documents suggest that such prohibition adversely affected financial and commodity markets. Moreover, quantitative analysis suggests that the prohibition of *kabu nakama* reduced economic growth and adversely affected price arbitrage.

The role of trade associations constitutes a useful case study for undergraduate students of economic history. By examining the role of trade associations using historical documents and economic theory in class, one can motivate students to think deeply about, and understand economic history.

(9) Political History and History of International Relations

Political history is an academic discipline that recognizes and historically narrates political phenomena. Political phenomena indicate the activities that groups of humans perform for their management, including the making and implementation of decisions relating to the whole group (cf. *Reference Standard of Political Science Education*). Therefore, political history is a discipline that aims at the stable continuity of human groups, and the description of the history of the institutionalization and integration of such communities.

Generally, political history constitutes a fairly important, core part of the study of history. Especially, as the roles of citizens and states have become more and more important since the last decades of the medieval age throughout the pre-modern, modern and contemporary eras, the role of political history has become more and more significant as well.

On the other hand, when we entered the era of globalization after the end of the Cold War, the range of sovereignties aiming at the stable continuity of human groups became distant from politics and expanded towards economy, environment and regional security; therefore, the role of political history became limited, and at the same time the importance of the history of science and global history increased.

When we think about the study of political history, it is a discipline focusing on the following topics: (a) awareness of the sovereignty concept; (b) construction of common ideas and values; (c) institutions and systems of communities; (d) acquisition of civil rights free from the authorities. It is also a discipline showing the priority of citizenship, the order of law and institutions; that is, the concept of democracy and the tensions between authorities and citizens, or the opposing relations between power and power. Political history is also the study of various values and identities, conflicts of people with different interests, and after all their reconciliation and integration.

By studying the history of political thought, theories, politics of international communities and comparative politics, the investigation of political history becomes

more complex and comprehensive, and the diversity of values can be also recognized. Through political history, we are able to learn how people overcame conflicts and struggles, how they established unified systems, orders and values, and how the order of law, the theory of justice, freedom, equality, democracy and institutions came into existence and grew.

Furthermore, we can learn from political history that even though we simply refer to people as 'citizens', each nation and region's customs, values, ideologies and forms of governance differ greatly, and we cannot impose our values on other countries.

We can also learn about the process of the clash of values, ideas and religions, about the extension of power and the setting of new boundaries – often in remote areas –, about armed conflicts concerning resources, territories or security, and about the establishment of international institutions, international organizations and the international legal system for resolving such situations.

In that sense, it is possible to say that political history and the history of international relations are among the basic academic disciplines. Therefore, in order to study political history, it is insufficient to just simply memorize facts in chronological order.

First of all, and above all, what kind of political history did a certain country experience, and what stage of development is it standing at? Secondly, how were sovereignty, freedom, equality, democracy and citizenship acquired? Thirdly, how can power be exercised more democratically, or what else can we do? We have to consider such questions ourselves.

When the Franco-German common history textbook was translated, we could see that both countries' instructors did everything they could to include many questions and points of discussion at the end of each chapter, in order to show the difference of values between the winner and the loser nations. In the textbook, historical materials such as the Constitution of the German Empire and the Civil Code of the French Revolution were cited, and the book also covered questions such as why conflicts and the war happened even though each country aimed at establishing a better system and institutions, what the purpose of each country was in that period, what created a gap between ideals and reality, how different ideas of justice clashed, and what the limits were, &c.

Certainly, there is also real pleasure in world history or in the history of international relations, which studies the connections among the phenomena of various regions.

We can either agree or disagree with a value different from ours, but even if we cannot accept it, having mutual tolerance leads to peace and stability. This is fundamental when learning about political history, the history of international relations and the history of countries that all have different orders, values and academic systems.

5-2 Assessment of Learning Outcomes

In the case of this type of history teaching/learning concentrated on discussion, the method of assessment of learning outcomes will necessarily differ from that of the ordinary lecture and seminar. The principal factors of assessment in the ordinary lecture and seminar will be: (a) correct reading of source materials; (b) logical reasoning to conclusion, &c. In the case of history teaching/learning concentrated on discussion, however, the most important factor of assessment is the process of discussion. In the first place, one or two students will make presentation on a specific topic, and then will ensue an exchange of questions and answers between the presenter(s) and participants. Then free discussion will be organized by the student in the chair. The teacher will pay careful attention to the discussion, and will try to clarify the points, if necessary. The factors of assessment in this process will be: (a) the quality of the presentation; (b) the relevance of responses to questions of participants; (c) the ability of the chair student to organize discussion; (d) contribution of participants to discussion, &c.

6 Development of Citizenship Awareness through History Learning

Knowledge about the politics, economies, cultures, environments, and other aspects of various societies of the past is vital for each and every citizen to understand in great detail the circumstances in which they live within the constantly changing world. Moreover, this knowledge is very significant for their participation in democratic society and the formation of democratic qualities they will need to contribute to its development. Based on this awareness, fostering of citizenship is the shared aim of the study of history at universities in: (a) liberal arts education (general education); (b) specialized courses; (c) teacher education courses.

Firstly, liberal arts education, in which every student is registered while majoring in various academic disciplines, is directly responsible for this task of fostering citizenship. Therefore, upon the foundation of the historical knowledge cultivated in primary and secondary education, students must be encouraged to know a more diversified view of the history of the world. It is also important to give them opportunities to understand the social functions that history accomplishes in the contemporary world. Through this sort of learning, students are expected to acquire tolerance for cultures and values different from their own, and also an attitude of continuously studying history throughout their future lives.

Secondly, in specialized courses, such as the department of history, are required the deep research-type learning within the narrower scope of respective academic fields. First of all, under a specific theme, students are to collect previous research works and critically examine them. Then, they must set a specific research subject and appropriately collect, analyze, and interpret a range of historical materials with various

characteristics. Finally they must correctly express their findings in writing and other ways, and be able to respond appropriately to questions and criticism. Acquiring this sort of basic method of historical research leads to the development of high-level citizenship qualities, such as critical investigation of diverse materials, distinguishing factual and value judgments, logical thinking and power of expression, and sensible responce to criticism.

Thirdly, teacher education courses have a particularly heavy responsibility for the task of fostering citizenship through the study of history. As there are many young people who do not proceed to universities, history education in primary and secondary schools is very important for them. Teacher education courses are responsible for training students to be primary and secondary school teachers who will have an adequate ability to teach history. In teacher education courses, it is important to encourage students to acquire the ability to consider the children's stages of intellectual development and the environment that surrounds them. Specifically, for students not majoring in history, it is necessary to secure sufficient opportunities to study the basic research methods of history. Then, for all students, it is necessary to ensure that they can acquire the methodologies necessary for history teaching which makes children qualified to analyze various materials in a multifaceted manner.

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REPORT

REFERENCE STANDARDS FOR CURRICULUM PREPARATION FOR QUALITY ASSURANCE OF UNIVERSITY EDUCATION BY ACADEMIC FIELD

SOCIAL WELFARE SCIENCE FIELD

June 19, 2015

Science Council of Japan
Sociology Committee

Social Welfare Science Field Reference Standard Study Subcommittee

This report has been prepared and published based on the results of the deliberations of the Social Welfare Science Field Reference Standard Study Subcommittee of the Sociology Committee of the Science Council of Japan.

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Abstract

1. Background of the preparation

In May 2008, the Science Council of Japan received a request addressed to the Chairperson of the Science Council of Japan from the Director of the Higher Education Bureau of the Ministry of Education, Culture, Sports, Science and Technology: "Regarding Deliberations Concerning Quality Assurance of University Education by Academic Field." In response, the Science Council of Japan established a special-purpose committee called Quality Assurance of University Education by Academic Field Study Committee in June 2008. After conducting a series of deliberations, the committee completed the report *Concerning Quality Assurance of University Education by Academic Field* in July 2010 and then submitted it to the Ministry of Education, Culture, Sports, Science and Technology in August 2010. This report proposed the enactment of reference standards for curriculum preparation of specific academic fields as a method of ensuring quality of education by academic field. Because reference standards for the social welfare science field have already been prepared, they will be released to the public to be used in various areas, including universities that establish curricula in this academic discipline.

2. Overview of the report

(1) Definition of social welfare science

Social welfare, which is the focus of social welfare science, consists of "social welfare policy" and "social welfare practice." The former deals with problems that require support from society, among other problems that people face in their daily lives, by ensuring the availability of public resources to solve such problems and providing and defining policies, such as specific improvement plans or management organizations (below, "policy"). The latter includes actions directed specifically at individuals and families with problems and developmental actions directed to regions and society (below, "practice"). Based on these concepts, social welfare science is, first, an academic discipline that systematically investigates the reality of social welfare policy and practice that asks why such a reality exists, including its contradictions, and second, proposes the best way to pursue the well-being of society in which everyone can live without inconvenience in a way that pursues the well-being of diverse individuals.

(2) Unique characteristics of social welfare science

The first unique perspective of social welfare science is that it divides social welfare as an entity into policy and practice and treats it as a system in which these two aspects interact. The second unique perspective entails that the entity, which is social welfare as a system relating policy and practice, is grasped along with values and norms that penetrate it. The uniqueness of social welfare science as an academic discipline is based on the multifaceted perspective of its dual strategies: clarifying the system that relates policy with practice and investigating the relationship between the entity and values. Such a multifaceted perspective of social welfare science has been formed historically through debates concerning the essence of social welfare science. Social welfare science goes beyond research and education concerning ethics, knowledge, and techniques required by experts in social welfare. It plays a role in presenting directions in problem resolution, including new values to concerned parties, organizations, groups, and members of the public, which have diverse values and interests, by academically clarifying and building a body of data about systems in which policy and practice are mutually interrelated. Social welfare science is related closely to severe problems in daily life and bears responsibility to reveal such problems to society while clarifying processes that link the pursuit of individual well-being, including the well-being of people facing these problems, in the pursuit of societal well-being.

(3) Basic qualifications that students of social welfare science should master

Social welfare science students should master "welfare mentality," meaning, the ability to pursue and explain individual and societal well-being based on the links between them. This welfare mentality tends to be grasped as a "gentle heart" or "caring heart." However, welfare mentality as it is used here is a qualification necessary to personally fulfill a social role based on values, such as respect for humanity.

We can define six abilities that are characteristic of social welfare. These abilities are obtained through social welfare science education: 1) ability to help with priority given to respect for the individual, 2) ability to discover and universalize problems in daily life, 3) ability to coordinate and develop social resources, 4) ability to contribute to the operation of social welfare, 5) ability to protect rights, and 6) ability to develop society by enhancing the individual strength of people. In addition to these abilities, students should also master general abilities, such the ability to: 1) seriously consider the lives of each member of society and accept diverse values, 2) adopt human rights-based perspective to notice problems like discrimination or social exclusion, 3) listen to what others say to gain awareness of the problems that they face and clarify each of these as a problem of society, 4) work daily as a citizen to manifest one's citizenship, 5) participate willingly in various activities of civil society to contribute to the improvement of quality of life of many people, and 6) cooperate with others to help build a more tolerant and pluralistic society.

(4) Basic concepts of methods of learning and evaluating learning results

Social science welfare education, which is conducted by applying and organically linking various learning methods, can cultivate students' welfare mentality, including knowledge of and skills related to values, ethics, theories, and methods concerning the pursuit of individual and societal well-being. It is also important to form close links with not only universities but also other related organizations and the region while participating in related education with neighboring disciplines, such as sanitation, medical science, nursing science, and pedagogy. The achievements of specialized education in social welfare science provided through such diverse learning methods include many qualifications that cannot be measured simply in terms of total quantity of knowledge. The evaluation of learning results requires the application of an evaluation method that sets individual study goals based on each situation and diverse indices and approaches.

(5) Linking specialized education and general education related to nurturing citizenship

In modern society, which faces growing public problems including the realization of a tolerant and pluralistic society, social welfare science has an important role to play in general education intended to nurture citizenship. Based on general education that provides knowledge and skills commonly demanded across boundaries between academic disciplines, specialized social welfare science education is relied on to train facilitators who will support civic organization and development in an actual society.

[6] Future challenges to social welfare science education

In social welfare science education, academic advance and professional career courses are broadly diversifying. These courses demand globalization through efforts that ensure standardization and transparency of education and interchangeability of qualifications in relation to the outside world. We must examine the contents of this education by considering these two trends in social welfare science education.

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1. Introduction

The percentage of students advancing to four-year universities has passed 50% and universities are riding a wave of universalization as they enroll diverse students. These trends not only create differences in scholastic ability but also signify an increase in the number of adults and students who seek non-traditional careers. Education must appropriately satisfy such diversified student needs. Universities also accept many foreign students. Therefore, in addition to the standardization of the contents of education and educational levels among universities in Japan, the universities face a demand for globalization, that is, to establish educational contents and levels shared with overseas universities. The way education in social welfare science should respond to such circumstances is being called into question.

Social welfare science education began as an expert professional development education. Many students who received such education obtained national qualifications as, among others, licensed social welfare workers and psychiatric social workers, to lead careers as professionals in social welfare. However, others who completed social welfare science education found work in conventional companies. The percentages of students in the two categories have differed greatly among universities, but it is necessary to lump both groups together and clarify the capabilities and skills that all students specializing in social welfare education must master.

Considering the above circumstances, it is necessary to provide basic education to all students of social welfare education in Japan and study the contents of education that will meet the even more diverse student needs based on basic education. Thus, in the 22nd Term of the Science Council of Japan, the first Social Welfare Science Field Reference Standard Study Subcommittee was formed on May 21, 2013. This committee studied the abovementioned issue during seven subcommittee sessions. As an ad hoc measure in the 22nd Term, the subcommittee disbanded. A second subcommittee with the same name was formed in the 23rd Term and continued the deliberations. Based on its first deliberations, there was a conclusion that social welfare science education must be conducted by a method described in the remainder of this paper. We hope that the deliberation results will be reported and serve as a guide to the provision of education by social welfare science-related academic departments and faculties.

2. Definition of social welfare science

Social welfare, which is the focus of social welfare science, consists of “social welfare policy” and “social welfare practice.” The former deals with problems that require support from society, among other problems that people face in their daily lives, by ensuring the availability of public resources (materials and services) to solve such problems and providing and defining policies, such as specific improvement plans or management organizations (below, “policy”). The latter includes actions specifically directed at individuals and families with problems and developmental actions directed to regions and society (below, “practice”).

Social welfare originated in relief activities conducted in various forms in premodern times. However, since the emergence of the modern civil society, it has become more systematic and evolved into a social system to resolve social problems created by industrialization.

In modern civil society, out of respect for people’s freedom and autonomy, solutions to daily life problems that people face have been left to individuals and families. However, entrusting such solutions to self-help has created circumstances antithetical to human rights and social justice, which modern society prioritizes along with freedom and autonomy, while failing to solve any social problems. Moreover, social unity and solidarity have been threatened by ignoring social problems. Therefore, welfare state policies were formed as a method to not only give relief to deal with existing poverty but also prevent its diverse risks.

Nevertheless, even when a system that prevents poverty risk is universally implemented, problems that this system has destroyed will eventually reappear. Taking the present age as an example, the falling birth rate and aging of society and expanding advancement of women in society, among others, have

clearly shown the limits of family care excessively dependent on women, resulting in the need for a work-life balance, socialization of child support, and nursing care for older adults and people with disability. Employment also becomes increasingly mobilized by the globalization of economy; unemployment and unstable employment among young and middle-aged workers have become problems, revealing the limits to welfare state policies, such as social insurance-based preventive systems, and reviving the problem of poverty. As single-person households increase in regional societies, solitary deaths and other symptoms of the loss of social bonds now pose serious challenges.

Societies in which every member enjoys well-being are now found only in utopian fantasies. Nevertheless, a society in which it is not possible for every member to pursue his or her own happiness is unequable. Social welfare aims for a tolerant pluralistic society in which people with diverse values can all pursue their own well-being and that establishes social conditions that permit the latter to occur. Social welfare activities are, specifically, social policies dealing with challenges that obstruct diverse self-help brought by social change. The practice of these activities develops individualized concrete supports and new social resources in each region or society.

Social welfare science is, first, an academic discipline that systematically investigates the reality of social welfare policy and practice formed, as explained above, to ask why such a reality exists, including its contradictions. Second, it is an academic discipline that proposes the best way to pursue societal well-being in which everyone can live without inconvenience and in a way that helps pursue the well-being of diverse individuals.

The Science Council of Japan offers many proposals for better academic disciplines and improved societies. However, the *Desired Form of New Technology—in Search of Genuine Science for Society—* (2017, Standing Committee on Desired Form of Technology) states that academic disciplines must unify the "investigation of that which exists" (science for understanding) and "investigation of that which is desired" (science for design), and that which science for understanding can verify are "factual propositions," and that which science for design can verify are "value propositions"[1]. In this sense, social welfare science seamlessly handles science for understanding and design. It is correct to say that while purposes and goals are at the heart of social welfare science, values are created, and goals are realized.

Social welfare, which focuses on science, is a research domain available in other academic disciplines (sociology, economics, business administration, jurisprudence, political science, philosophy, psychology, medical science, health science, etc.). As such, social welfare science can be called an interdisciplinary field, except that it is a science with social welfare as its direct theme and analyzes concrete systems or methods of practice that form social welfare. At the same time, this field verifies comprehensively the purposes and norms that penetrate social welfare, reveals values that social welfare should realize, and designs policies and practices to realize these. Social welfare science has been studied as a unique academic system. Additionally, early child care and education and nursing care and welfare can be positioned as fields closely linked to it.

In other countries, policy and practice are clearly demarcated. In certain cases, these two concepts form an academic system where policy is defined as "social policy" and practice as "social work." Generally, the sphere where social policy is handled encompasses pension; other income guarantees; and health, medical treatment, housing, employment, educational, and social care services. In contrast to this sphere, social welfare science in Japan is marked by an emphasis on the interrelationship of policy and practice, even though there have been disputes over whether policy or practice is dominant.

Learning social welfare science is beyond obtaining knowledge, technology, and ethics needed for professional social welfare work, to be able to provide the foundations necessary to nurture citizens who master "welfare mentality." Students adopting welfare mentality pursue individual and societal well-being that is needed by general workers, respect individuals, and revere diversity while contributing to the realization of a tolerant and pluralistic society based on social solidarity.

3. Unique characteristics of social welfare science

(1) Unique perspectives of social welfare science

Dividing social welfare as an entity into policy and practice and treating these two concepts as mutually interacting systems is the first perspective unique to social welfare science. During the early days of social welfare science, the essence of social welfare was disputed. The major point of contention was whether its essence should be viewed as theory or practice. Today, the importance of focusing on their correlation is pointed out. For example, policies that resolve socially the difficulty of self-help require those for problem definition, ensuring resources, system design and operation planning, and setting conditions for qualification of users (those implemented by not only the national government but also regional and private bodies). However, if the difficulty of diverse self-help manifests in individuals for the time being, its discovery or consultation is premised on policy; in the field where specific policies are implemented, individual practice must be executed. Its practice is, on one hand, is relied on to play a role in realizing the aims of policy but, on the other hand, connotes the role of feeding back problems that have been abandoned by policy and methods contradictory to policy while adopting the position of individuals or families that have experienced such problems. Specifically, there is a demand for the development of new programs or social resources based on scientific grounds, or the actualization of welfare service needs of residents grounded on regional welfare practice and the enactment of regional welfare plans based on participation by residents.

Treating social welfare science as an interrelated system of policy and practice is founded on the dualism of problems: a problem is a problem of an entire society and, at the same time, in the daily lives of individuals. Social welfare science is treated this way, that is based on the aforementioned dualism, to not only resolve problems afflicting individuals (pursues individual well-being) but also play a role of strengthening social solidarity premised on the pursuit of the well-being of diverse individuals (pursuit of societal well-being). Thus, policy and practice must unavoidably build an interrelated system as they pass through a number of stages, and include the potential to show directions of criticism and improvement of policy in their relationship. In this way, policy and practice strengthen the autonomy of individuals.

The second perspective is that it clarifies the substance of social welfare as a system linking policy and practice, along with the values and norms that penetrate social welfare. Both policy and practice, which constitute the reality of social welfare, are founded on diverse values and norms; the meaning of these values and norms in society changes alongside societal structures. For example, interpretations of human rights and social justice described earlier are diverse and include conflicts with the norms of modern civil society, that is, freedom and autonomy. Clarifying and studying critically the substance of social welfare as a system linking policy and practice is also an inquiry conducted to determine the kinds of values that penetrate social welfare. Proposing social welfare as it should be is likely to propose new values or interpretations.

Thus, the inherent properties of social welfare science as an academic discipline can be said to stand on the multifaceted perspective of its two strategies: clarifying a system linking policy and practice and pursuing the links between its substance and values.

(2) Roles of social welfare science

The establishment of social welfare science started with education to train experts to implement social welfare. Social welfare education (at that time "social work education") in universities started with the establishment of the Social Work Laboratory in Shukyo University (now, Taisho University) in 1918, followed by the introduction of curricula in Toyo University, Japan Women's University, Meiji Gakuin Senior High School, and Doshisha University. As wartime control advanced during the Sino-Japan war, these curricula were temporarily abandoned or reorganized and then revitalized after the war. Under the guidance of the GHQ during the occupation, American social work was introduced and the provision of curricula and on-the-job training for social welfare experts (social workers) was promoted. In 1954, the Japanese Society for the Study of Social Welfare was founded (present membership: 4,911 as of March 2015). National qualifications were established by the 1987 enactment

of the Certified Social Worker and Certified Care Worker Act, followed by the 1997 Psychiatric Social Workers Act (Number of certified social workers: 185,749; psychiatric social workers: 67,896, as of March 2015). A total of 224 four-year universities and higher licensed specialist vocational schools have training curricula for certified social workers (including cases of multiple curricula in the same school, results of the 2015 licensed social workers qualifying exam).

As this shows, the historical roles of social welfare science were to study and teach ethics, knowledge, and technologies needed by social welfare specialists. Today, however, its role is not limited to these activities, because policy and practice of social welfare are not borne only by social welfare specialists. Various concerned sectors are also involved, including people facing life problems and groups formed by these people, regional residents, private nonprofit organizations, private profit-making organizations, local government bodies, and the national government. The mass media and average citizens are deeply interested in the specific desirable forms of social welfare. Their values and interests differ, but social welfare science plays a role in demonstrating the directions of solutions, including new values based on the technological clarification of systems of interrelated policy and practice and accumulation of data. Social welfare science is deeply involved in severe life problems, such as poverty, abuse, social exclusion, discrimination, severe disabilities and illness, and isolation. It bears responsibility to present such problems to society and to clarify the process by which the pursuit of individual well-being, including the well-being of people facing problems, is linked to that of societal well-being.

4. Basic qualifications that social welfare science students should master

(1) Basic knowledge and understanding that should be mastered through the study of the social welfare field

The unique characteristics of social welfare science are that it clarifies social welfare as a system linking policy and practice and that it investigates the relationship of its substance and values. However, social welfare students must pursue individual and societal well-being, understand both are mutually related, and comprehensively grasp how to solve problems of individuals and realize solidarity of society. The ability to explain this is through the concept of welfare mentality. This concept tends to be grasped as a “gentle heart” or “caring heart.” However, welfare mentality in social welfare science is a qualification necessary to personally fill a social role based on values, such as respect for humanity.

The first quality needed to pursue individual well-being is respect for and a full understanding of the diversity of people who are part of society. This quality permits the mastery of the concept of valuing mutual human rights and freedom to explain the meanings of empathy and solidarity. The structure, which actualizes life problems, must be understood from the relationship of an individual’s physical and psychological aspects with social aspect, such as politics, economics, and culture. By focusing on various life problems that emerge in the interaction between individuals and society at the point of association of individuals with society to study this relationship, it is possible to explain that inequalities in modern society create exclusion and form various social gaps caused by essential differences between people (e.g., gender, age, illness, and disabilities) and changes in societal structures.

As this shows, a major characteristic of the study of social welfare science is that it is the investigation of dynamic clinical knowledge by noticing challenges appearing before one’s eyes and understanding these as problems related to the structure of society and, in this way, grasping the challenges that people face in their daily lives as their problems using their social resources. It is possible to gain welfare mentality through the cycle of learning: academic study of theory, history, legal systems, and learning in the field.

(2) Basic capabilities that should be mastered through learning this field

[1] Capabilities unique to social welfare science

A person who has mastered welfare mentality gains the ability to recognize or discover people facing life problems. Through consultations with these people, such person can help them utilize services as necessary and, at the same time, find resources in regional society to solve the problems of

individuals and societies, by forming links between various concerned experts, entrepreneurs, and volunteers. These are organized into six points as follows:

a) Ability to help with priority given to respect for the individual

It is necessary to maintain respect for all members of society. Helping people with life problems decide on how to tackle their problems on their own, to maximize the capabilities of these individuals, while maintaining respect for them is the foundation of social welfare from the perspective of the concerned people. It is possible to practice this by learning social welfare science.

b) Ability to discover and universalize problems in daily life

As human lives are diverse and discrete at the same time, they are characterized by mutual dependence with other people and the environments in which humans live. It is possible to discover the needs of people with life problems by studying self-awareness and understanding others. It is possible to universalize a problem, which has been discovered by verifying and analyzing it in detail, based on its relationship with society.

c) Ability to coordinate and develop social resources

As living environments deteriorate, along with changes in socioeconomic structures, isolation and isolated deaths, abuse, consumer damage, homelessness, working poor, and other difficulties with living caused by the weakening of social relationships become problems. In addition to organizations that provide welfare services to manage these problems, it is necessary to unearth the willingness to form latent bonds among residents to actualize and respond to the possibility of behavior that forms links. By "monitoring" a region and studying the creation of networks, it is possible to coordinate various social resources, resolve problems of individuals, and develop new social resources through links with society.

d) Ability to contribute to the operation of social welfare

Social welfare is operated by different groups and bodies, such as the national government, local government bodies, social welfare corporations, health care and medical care organizations, NPOs, welfare industries, consumer cooperatives, mutual help organizations, organizations of concerned parties, and residents' organizations. As public-private links and resident participation progress in a region, it is possible to contribute to the effective and efficient operation of social welfare by studying the elements that make up the organization of social welfare, such as rights, information, personnel, and resources, and studying knowledge and skills related to the operation of social welfare.

e) Ability to protect rights

In recent years, as systems that protect the rights of people with life problems, regional rights protection projects or adult guardianship systems, third-party evaluation systems, and complaint response systems, among others, have been completed, it is possible to obtain advocacy (rights protection) capability to serve as spokespersons for service users, by clarifying their present state and problems and deepening the understanding on human rights. By protecting the rights of individuals, it is possible to provide social conditions that enable individuals to pursue their own well-being.

f) Ability to develop society by enhancing individual strength of people

The social welfare field faces a demand to turn its attention to problems that have been abandoned by policy or escaped the framework of systems to universalize them and support activities that contribute to social change. By prioritizing the independence of individuals and families and developing practice based on evidence according to social justice, it is possible to nurture the ability to simultaneously enhance individual strength of people and develop a new society.

[2] General skills

People who study social welfare science can master welfare mentality that pursues individual and societal well-being and based on their relationship. These include sensitivity to problems and abilities that permit people to take actions appropriate as citizens. This ability has broad and general usefulness, such as the following, in the process of living in society

a) Ability to seriously consider the lives of each member of society and accept diverse values
b) Ability to adopt human rights-based perspective to notice problems like discrimination or social exclusion
c) Ability to listen to what others say to gain awareness of the problems that they face and clarify each of these as a problem of society
d) Ability to work daily as a citizen to manifest one's citizenship
e) Ability to participate willingly in various activities of civil society to contribute to the improvement of quality of life of many people
f) Ability to cooperate with others to help build a more tolerant and pluralistic society

5. Basic concepts of methods of learning and evaluating learning results

(1) Specialized social welfare science education methods

In recent years, the diversifying and advancing level of welfare needs demands that specialist education in social welfare science provides students with more diverse knowledge and advanced specialized techniques than ever before. The curriculum for licensed social welfare worker training plays a part in assuring the quality of specialized education in social welfare science. Such old curriculum was changed in accordance with the partial revision of the Certified Social Worker and Certified Care Worker Act in 2007. The new curriculum includes 22 specified and 16 basic subjects for universities in five subject groups. The number of subjects in the new curriculum registered a sharp increase from that in the older one, which consisted of 12 specified and 6 basic subjects. The Science Council of Japan issued *Concerning Social Welfare Education in the Near Future –To the Reorganization of Specialist Social Work Qualifications* (2008)[2], which proposes the provision of a broad curriculum incorporating, among others, social sciences and humanities and the mutual development of education, research, and practice, by linking diverse trade organizations, experts, regions, and the national government. Meanwhile, the general incorporated association, the Japanese Association of Schools of Social Work (below, "JASSW"), which has studied the core curriculum for social welfare education since it was established, presented an initial proposal of two parallel curricula: a relatively unrestricted social welfare science core curriculum and a more systematic social welfare experts training core curriculum. However, later, for reasons related to certification evaluations, it combined these two curricula into a common curriculum regardless of the orientation of universities and then proposed the Core Curriculum for Social Work Education Based on Social Welfare Science in 2011[3].

These curricula have both played vital roles in assuring the quality of specialist education, but their purpose differs from that of the reference standards that this report presents. The purpose of "Reference Standards" used in this report is grounded on circumstances where academic career courses of students have diversified; it aims not to directly present external standards governing the content of education but to define the basic capabilities that all social welfare science students should master. These standards will be provided so that universities can refer to them when independently and autonomously considering the goals or contents of study in accordance with their educational philosophy and the actual state of each university. Therefore, the reference standards do not essentially conflict with the above core curricula. Each university is free to apply them selectively.

Based on such premises, we will discuss specialist education methods for social welfare. Specialist education in social welfare science is given by applying various methods, including lectures, practice, practicum/fieldwork, graduation thesis, and thesis guidance. To acquire the capabilities and general skills unique to social welfare science, the following characteristics of each method must be considered upon its use:

[1] Lectures

Lectures must provide students with knowledge of many topics (including the basic philosophy and principles of social welfare science as well as its historical development and ideology); the actual state of social welfare problems and how they surfaced (including related causes); laws and systems related to social welfare; characteristics of users who require social welfare practice; and values, ethics, theories, and methods related to the practice of social welfare. In light of social welfare science's unique characteristics, which involve a multifaceted approach (i.e., clarifying the relationship between policy and practice and investigating the relationship between substance and values), it is not enough to simply acquire the aforementioned knowledge as separate categories of knowledge. By relating such knowledge to one another, lectures should nurture students' insight so that they understand the linkages of these knowledges, as well as their mental power for them to investigate problem-solving methods separately in the spheres of policy and in practice. To take historical research (i.e., the study of the philosophy of social welfare and related laws and systems, as well as the way the latter change to adapt to the changing state of society), it is useful to present lectures that incorporate the perspectives and achievements of case studies. In case studies, the process of problem resolution in each of the individual cases is analyzed.

[2] Practice

Practice is broadly categorized as interpreting documents or data through discussions in small groups to scientifically understand social welfare theory and problems. It is also categorized as gaining understanding of the process of practice and mastering diverse support methods and techniques from cases of actual social welfare practice. The former aims to achieve simultaneous mastery of investigation methods and presentation skills. Investigation methods include quantitative and qualitative investigation methods; the former requires the mastery of statistical analysis techniques, whereas the latter analyzes qualitative data obtained through field work or interviews. These two methodologies should be learned. As the latter category of practice, students learn methods of comprehensively assessing the interaction between users and the social environment and support techniques required for each type of practice through, among others role playing and cases studies. Regarding practice intended to master such support techniques, considering assembly line methods, communication systems, and the diversification of educational methods that currently transform university education, it is necessary to conduct human education that treats students as individuals and incorporates internal growth that serves as the foundation of support.

[3] Practicum/fieldwork

The diversification and increasing complexity of the problems solved by social welfare have evoked the importance of practicum/fieldwork in various practice sites and regions. Practicum/fieldwork sites are not limited to organizations and facilities recognized by the certified social welfare work curriculum but have expanded to include NPOs or NGOs, which have deployed advanced practice method inside and outside of Japan, disaster regions, depopulated regions, and overseas. Through practical fieldwork in these settings, students can learn through personal experience the state and needs of individuals and societies with different cultures and in different environments. Students also investigate the best policies and forms of practice needed to pursue the well-being of people and societies. Through these learning processes, students can nurture their ability to relativize the best form of social welfare to establish through links with diverse values, histories, cultures, resources, systems, policies, and practices; they can also strengthen their ability to develop social welfare policies and practices adapted to the needs of an existing society.

[4] Graduation thesis and thesis guidance

Specialist education in social welfare science requires clarification and understanding of diverse elements that form humans and society, as well as clarification of the mechanisms that create problems. Social welfare policies and practice are evaluated and developed based on such understanding. Therefore,

each student is required to prepare a thesis in which he/she clarifies problem consciousness, focuses on the problem posed, interprets knowledge and theory through searching for and reading documents, uses different statistical data, and applies appropriate social survey methods to clarify, analyze, and consider actual circumstances. Through these processes, students can systematize the knowledge they have obtained through their undergraduate education and cultivate their logical organization ability while nurturing their ability to explain these knowledges to other people.

Providing each subject or method by organically linking them while performing mutual feedback can give students a dynamic clinical knowledge. Participation style learning where social welfare is practiced both inside and outside of Japan demands close links with not only university educators but also organizations and regions that practice social welfare. In addition, comprehensive regional care systems must be established and a team approach must be adopted through cooperation between many organizations and professions. Therefore, it is important to teach not only social welfare science but also how it relates to adjacent sciences, such as health care science, medical science, nursing science, and pedagogy.

(2) Evaluation perspectives and methods

Evaluating specialist education in social welfare science characteristically reflects the unique characteristics of social welfare science while maintaining common features with evaluation in other social sciences.

For example, in the domain of specialized professional education in social welfare science, national examinations for licensed social welfare and psychiatric welfare workers are conducted. Their results become part of output evaluation. However, certain students do not aspire to complete specialized professional education, whereas others do not take the national examinations. There are also limits to evaluations based on the multiple-choice examination method. Evaluating specialized education in social welfare science conducted by diverse methods is multifaceted and complex in both the output and process aspects. This is so because the capabilities that should be obtained by study in the social welfare science field described above are established as overall capabilities finely demarcated as necessary in each situation; these capabilities also include many elements that cannot be evaluated simply according to the total quantity of knowledge.

To take “ability to help with priority given to respect for the individual” as an example, it is finely categorized as the ability to build trusting relationships through empathetic communications, ability to assess needs of individuals and select and implement effective support methods in cooperation with others, ability to make effective evaluations while monitoring the state of implementation of support, ability to improve and develop support methods, and ability to understand and practice team approach by many organizations and professions to develop support. To evaluate the state of acquisition of such abilities, it is necessary to set items to be evaluated for each domain or challenge and evaluate the process incorporating the individuality of the student and challenge. The present licensed social welfare worker training curriculum mandates the provision of an environment permitting the evaluation of individual processes by, for example, limiting the number of students that each lecturer can handle in classes conducted to teach support techniques; however, it would probably be advisable to study the setting of specific learning goals and effective evaluation methods for other educational methods. Below, we wish to give an overview of the characteristics of evaluation perspectives and methods by educational method.

[1] Lectures

The degree to which lectures impart knowledge concerning the basic philosophy or ideology of social welfare science and laws and systems related to social welfare is confirmed. There is a demand for the use of methods of evaluating student insight to analyze and explain links between individuals and society related to specified phenomena and student mental power to analyze problems and induce

measures to solve problems based on these categories of knowledge. At the same time, premised on the understanding of knowledge of values and ethics, theory and support methods in the domain of social welfare practice and their application to specific cases and situations must be evaluated.

[2] Practice

Whether or not students can interpret documents or data is confirmed through practice in small group discussions and from reports. At the same time, it is possible to evaluate one's understanding of different outlooks or one's own point of view through a detailed study of the contents of discussions or reports. The presentation of data is probably evaluated at the same time as the learning process. Regarding support techniques, the improvement of the quality of a student as a support giver (meaning, the improvement of his/her empathy) is evaluated alongside methods and skills by assessing cases and preparing support plans. Such quality is evaluated in addition to a student's understanding of himself/herself and others, which is the premise for support.

[3] Practicum/fieldwork

Practicum/fieldwork is intended to comprehensively and practically cultivate the abilities required according to actual places and situations, and it is more difficult to evaluate this than other methods. Actual problems are individually unique and fluid, and they lack universally correct answers. The object of evaluation is the overall process through which each student places himself/herself in such a situation to analyze it and challenges to try and apply suitable support through the relationships between users, practicing organization, professionals, and regional society. For the evaluation, supervision by teachers, interviews with students, keeping records, and feedback from site leaders or other concerned persons are important. Such a series of evaluations must be performed comprehensively while integrating self-evaluations of internal transformation of students and evaluations by outside experts, including site leaders, in addition to evaluations by university professors.

[4] Graduation thesis and thesis guidance

A graduation thesis is evaluated based on the importance and originality of its problem consciousness or focal point, appropriateness of its hypothesis, collection and organization of past research, suitability of its methodology, clarity and consistency of the structure and argument of the thesis, significance and usefulness of its results, and suitability of its Japanese language expression. The object of evaluation of thesis guidance is the learning process culminating in the composition of the thesis.

Each university must autonomously and continuously evaluate such processes to ensure the quality of education regarding each subject and method.

6. Relationship between general and specialist education in the cultivation of citizenship

(1) Cultivation of citizenship and social welfare science education

As the birth rate falls, society ages, and globalization advances accompanied by growing social problems, such as discrimination, poverty, and social isolation, the realization of a tolerant and pluralistic society in which people can lead their lives in regions they are accustomed to inhabit while ensuring quality of daily lives has become a communal challenge. Until now, social welfare has been developed as practice intended to build tolerant and pluralistic societies in which people with diverse values can pursue their own well-being and to provide social conditions necessary to achieve this goal and provide or develop support for individuals and regions. It is also probably correct to say that the roles played by social welfare science in dealing with communal challenges, including the building of tolerant and pluralistic societies, become increasingly important if based on such circumstances. Moreover, building a tolerant and pluralistic society is, of course, not achieved solely by social welfare specialists; it demands the understanding and participation of diverse organizations and people. Teaching

social welfare science from such perspectives is relied on to cultivate citizens endowed with welfare mentality.

(2) Relationship of general and specialist education in social welfare science

The Science Council of Japan describes historical circumstances demonstrating civic education that is intended to nurture citizenship as necessary because of "the danger that a trend to excessive specialization might undermine people's common foundation values, which support a democratic society."[4] Citizenship as it is used here refers to "preparedness and action to tackle a society's communal challenges through links with others in different positions with different backgrounds." Social welfare science is, as already stated, an academic discipline that aims to build a tolerant and pluralistic society in which each person can pursue his or her own well-being while respecting the dignity and diversity of people. If we assume such perspective, social welfare science probably should play a specified role in general education that cultivates citizenship. Specialized education in social welfare science is required to not only cultivate citizenship but also train facilitators (people whose role is to encourage participation of citizens) to support organization and development of citizenship in an actual society by pursuing theories and methods that promote its development.

If so, what is general education that cultivates citizenship in undergraduate teaching of social welfare science? As stated above, basic knowledge and understanding that should be acquired through the study of social welfare science equals the mastery of welfare mentality that pursues individual and societal well-being by using necessary social resources and understanding problems and challenges faced in daily life in their relationship with the social structure. Thus, the foundations of various academic disciplines concerning individuals and society must be widely obtained. For example, it is necessary to have a basic understanding of domains, such as psychology, philosophy, jurisprudence, political science, sociology, economics, health science, and others that improve communication capabilities and areas of natural sciences, which include welfare engineering and information science required to create a barrier-free society. General education, which provides knowledge and techniques that must be shared across boundaries between academic disciplines over such a wide range, can cultivate the ability to view affairs from different perspectives. Alternatively, general education can also cultivate the ability to make all-encompassing judgments, relativize the position of social welfare science among academic disciplines, and deepen the understanding of the social, communal significance or individuality of or the limits and challenges to social welfare science. Additionally, based on the synergistic effects of general and specialist education, it is possible to explain the contents of social welfare science to make them clearer to people who are not specialists while cultivating citizenship that permits a posture and actions tackled through links with other people in different positions and with varying backgrounds. As proposed by the Science Council of Japan, it is not possible for general and specialist education to be mutually unrelated. When a student having an undergraduate degree engages with real-world experiences, he/she does so as a citizen in as much as a professional having a specialist education does so. Our aim should be to unify general and specialist education in a single person, and to provide universities with a curriculum that permits the realization of this goal.

7. Future challenges to social welfare science education

(1) Universalization and globalization of social welfare science education

Social welfare science education is universalizing within Japan and must globalize in its relationship with the world outside of Japan. The former refers to universalization, meaning, the diversification of the form of career paths of students as they advance in school and seek employment; it also means the fluidity of the relationship between universities and employment[5]. The latter refers to globalization, which is the process of conducting internationally shared university education by providing education that is the common core at universities in every country of the world as called for by the Bologna Declaration [6]. The contents of social welfare science education must be examined in light of these two trends.

[1] Directions of social welfare science in response to universalization

Universalization in university education signifies not simply that a higher percentage of the population is entering university but that diverse students enter and graduate from a university, diversifying the course of their academic and occupational careers. In social welfare science, it means that the aspirations of students have become more diverse than in the past, ranging from those with high aspirations and specialization who hope to become social workers to those who will learn social welfare science and then work in ordinary occupations. Universalization demands education that will meet the needs of not only students who graduate from high schools to directly enter university, as in the past, but also an increasing number of other types of students, including adults returning from the world of work and foreign students. Even among students aspiring to become specialists, in addition to conventional students who aspire for a specialization (e.g., they want to work in social welfare facilities or regional bodies offering consulting services), there has been an increase in the number of people who are attracted by the activities of international NGOs or domestic NPOs and others who aspire to work in city planning or start up a social welfare business. Social welfare science education must be reformed in response to the advancing universalization.

[2] Directions of social welfare science education in response to globalization

In Europe, since the Sorbonne Declaration of 1998 [7] and Bologna Declaration of 1999, the quality of university education has been ensured, degree systems unified, and mutual recognition of qualifications has progressed. The globalization of social welfare science education demands systems that permit the movement of students and faculty through increased international compatibility that matches the levels of education in other countries while ensuring transparency of the contents of education and guaranteeing the quality of education. In turn, promoting compatibility of social worker qualification systems is a future challenge.

In Europe, the interchangeability of social work education and qualification systems has been studied, and a social work qualification compatibility system has been established between the United States and Canada. While social work qualifications in the United States and Europe are definitely certified primarily by universities, the qualifications for licensed social welfare and psychiatric social workers in Japan are managed by the national government under the law[8]. In light of this difference, the question of how social welfare science education in Japan should respond to the advancing globalization is now being considered. In fact, with no other country having recognized Japan's national qualifications for social welfare workers, a qualification interchangeability system does not exist. Japan was the earliest Northeast Asian country to establish national qualifications for social welfare workers. However, even South Korea, China, Taiwan, countries that later established similar qualifications, have neither revealed their education systems or education content to one another nor conducted any studies intended to search for common educational contents. Therefore, it is necessary to examine the position of Japan's social welfare science education in Northeast Asia from the perspective of globalization. Many foreign students, particularly from China, South Korea, and Taiwan, are studying at social welfare colleges, requiring the establishment of an education system ensuring that such students can be guaranteed continuity in both research and practice upon returning to their home countries.

(2) Future roles of social welfare science education

The roles of social welfare science education must change to adapt to the universalization and globalization of universities explained above. This means that in addition to training personnel with welfare mentality as a common foundation, specialist training that matches the needs of diverse students is also promoted. Therefore, the foundations of social welfare science education for all students must be the cultivation of personnel with the: [1] ability to help with priority given to respect for the individual, [2] ability to discover and universalize problems in daily life, [3] ability to coordinate and develop social resources, [4] ability to contribute to the operation of social welfare, [5] ability to protect rights, and [6]

ability to develop society by enhancing individual strength of people; and to reconsider the subjects of lectures, practice, and practicum/fieldwork in an effort to enhance such basic abilities. In addition to the present subjects, which are required to train licensed social welfare and psychiatric social workers, subjects concerning the history and ideology, among others, of social welfare are also important. As a result, it will be possible to provide an education that can cultivate welfare mentality, which is the core of social welfare science in both students who will work as specialists and students who will work in ordinary companies.

Meanwhile, the specialist employment aspirations of students entering universities have diversified, demanding a response to meet their diverse needs. However, it would be extremely costly and difficult for each university to respond independently to such diverse needs. This requires each university to prepare its own unique curriculum suited to its educational philosophy and admissions policy to respond to the diverse specialist aims of students receiving social welfare science education throughout Japan. Examples of specific required curriculum items are international NGO theory, NPO theory, social welfare service business establishment theory, senior citizen service industry management theory, city planning theory, and social development theory.

It is also necessary to adapt to globalization by attempting a study of, among others, the contents of national qualifications for social welfare workers in Japan with reference to social worker training education in the United States and the European Union, which is the global standard. This would expose a problem with cultivation education in Japan, namely, the extremely low number of hours of practical work, but efforts must be made to organize challenges faced in Japan, including the significance of practical work so that it is closer to the global standard. As countries in Northeast Asia with similar qualifications, Japan, South Korea, China, and Taiwan must deepen their understanding of qualification systems and curriculum contents in other countries so that the contents of their educational systems are as similar as possible. At the same time, this process improves the quality of each country's social welfare science education. Specifically, these four countries must first establish information exchange mechanisms and then begin to promote work that will clarify both common and unique features of their respective educational systems and contents. Such efforts will, in turn, open the way to interchangeability of qualifications and, in addition, pursue the ability of not only students and faculty but also qualified workers to move between countries. It is also necessary to promote the study of mechanisms that will allow foreign students who received their social welfare science education in Japan, which accepts a particularly large number of students from other countries of Northeast Asia, to apply the knowledge and techniques they mastered in Japan in their home countries upon their return.

3) Future directions of social welfare science research and education

If future social welfare science education is revised so that it improves the basic abilities that all students must master as explained above, social welfare science research will expand its range, conscious of the basic abilities that students must master. Social welfare science researchers and educators will, therefore, conduct research and education from broader perspectives, permitting the establishment of a research and education field, with the participation of researchers from other fields. Offering diverse educational curricula to train personnel aspiring to have a career as specialists, expanding its range beyond the conventional category of social welfare science, will make researchers and educators who meet this need indispensable. Therefore, it will be necessary to attract them into research in this new sphere and strengthen links with researchers and educators in other fields.

Moreover, responding to globalization by promoting further international comparative research on the contents of and problems in social welfare science education, including the present state of social welfare, will ensure international interchangeability. The general incorporated associations, namely, Japanese Association of Schools of Social Work, Japanese Association of Schools of Certified Social Workers, and Japanese Association of Schools of Psychiatric Social Workers must cooperate with educational facilities around the world to search for aspects that can be shared with reference to

standards in Europe and the United States. In particular, concretely promoting efforts to ensure common features of qualification systems in Northeast Asia is a study challenge.

To implement social welfare science education of this kind, education must merge practice sites with educational ones. Several universities have already established parallel social welfare facilities and consultation bodies. It is necessary to study positioning such facilities and bodies installed in parallel not only as practice bodies but also as auxiliary bodies where students can study and train throughout their four years at university. It is also necessary to establish linked facilities and bodies and study ways to link them to educational and practice settings.

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[7] The Sorbonne Declaration is the *Joint declaration on Harmonisation of the Architecture of the European Higher Education System* adopted by education ministers of France, Germany, Italy, and the United Kingdom on May 25, 1998.
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[8] The general incorporated association Japanese Association of Schools of Social Work report, namely, *Social Welfare Promotion and National Examination Center Subsidy Project, Report on Research on the Core Curriculum that Contributes to Improvement of Quality of Welfare Workers* (2013), contains detailed descriptions of approval of social workers in the United States and the United Kingdom.

(Reference document 2) Record of deliberations of the Social Welfare Science Field Reference Standard Study Subcommittee

Twenty-second term
2013
July 26: Meeting of the Social Welfare Science Field Reference Standard Study Subcommittee (First)
Selection of officers and study of significance of reference standards and study challenges
October 1: Meeting of the Subcommittee (Second)
Study to define social welfare science
November 27: Meeting of the Subcommittee (Third)
Concept of reference standards for social welfare science

2014
March 3: Meeting of the Subcommittee (Fourth)
Study to prepare the original draft of reference standards for social welfare science
April 14: Meeting of the Subcommittee (Fifth)
Study to prepare the draft report on reference standards for social welfare science
May 30: Meeting of the Subcommittee (Sixth)
Holding a public discussion of the reference standards for social welfare science
June 23: Meeting of the Subcommittee (Seventh)
Preparing for the public discussion of the reference standards for social welfare science
July 21: Meeting of the Subcommittee (Eighth)
Concerning the contents of the discussion at the public discussion
September 6: Meeting of the Subcommittee (Ninth)
Study of the final draft of reference standards for social welfare science

Twenty-third term
2015
February 2: Meeting of the Subcommittee (First)
Final confirmation of the report on reference standards for social welfare science
May 22: Meeting of the Committee on Assurance of Quality of University Education by Field in Japan (First)
Approving the report "*Reference Standards for Curriculum Preparation for Quality Assure of University Education by Academic Field: Field of Social Welfare Science*"

(Reference document 3) Public symposium

Assuring Quality of University Education in the Social Welfare Science Field
—Concerning Reference Standards for the Social Welfare Science Field in Undergraduate Education—

Sponsor Science Council of Japan, Sociology Committee, Social Welfare Science Field Reference Standard Study Subcommittee
Supporter Japan Association of Schools of Social Work

Date/times: July 21 (Mon.), 2014, 10:00–12:00 (Reception opens at 9:30)
Venue: Taisho University Chapel (3-20-1 Nishisugamo, Toshima-ku, Tokyo, 170-8470, two-minute walk from Nishisugamo Station on the Toei Mita Line)
Reception on the date of the symposium: Advance registration is unnecessary. Admissions is free of charge.

(Program)
(Symposium Chairperson)
Junko WAKE (Member of the Science Council of Japan, Professor, Graduate School of Humanities, Tokyo Metropolitan University, Vice Chair of the Social Welfare Science Field Reference Standard Study Subcommittee)
 10:00–10:10 Opening Remarks
Masakazu SHIRASAWA (Member of the Science Council of Japan, Professor, Graduate School of Gerontology, J.F. Oberlin University, Chair of the Social Welfare Science Field Reference Standard Study Subcommittee)
 10:10 – 10:30 Subcommittee Report "Concerning the Proposed Reference Standards for the Social Welfare Science"
Shinya IWASAKI (Member of the Science Council of Japan, Professor, Faculty of Social Policy and Administration, Hosei University, Manager of the Social Welfare Science Field Reference Standard Study Subcommittee)
 10:40–11:50 Panel Discussion
(Chairperson)
Koichi KANEKO (Member of the Science Council of Japan, Professor, Faculty of Sociology, Toyo University, Manager of the Social Welfare Science Field Reference Standard Study Subcommittee)
(Panelists)
Akemi SOEDA (Chairperson of the Japanese Association of Social Welfare Academic Societies, Professor at Kanto Gakuin University)
Takayuki HIRANO (Association of Operators of Welfare Universities, Vice-president of Nihon Fukushi University)
Hiroshi MIYATA (Delegate to the National Social Welfare Corporation Operators Conference)
(Designated Speakers)
Iwao OSHIMA (Chairperson of the Japan Association of Schools of Social Work, Special Member of the Science Council of Japan)
Kazuhiro ICHIKAWA (Councillor of the Japanese Association of Schools of Certified Social Workers, Member of the Reference Standard Study Subcommittee)
Togaku ISHIKAWA (Chairperson of the Japanese Association of Schools of Psychiatric Social Workers, Special Member of the Science Council of Japan)
 11:50 – 12:00 Summary and Closing Remarks
Shirasawa Masakazu (given above)

Report

Reference Standards for Curriculum Organization to Guarantee Quality in Each Field of University Education

Physics and Astronomy

October 3, 2016

Science Council of Japan

Committee for Physics

Subcommittee for Examination of Reference Standards in the Field of Physics

This report summarizes and publishes the results of discussions by the Subcommittee for Examination of Reference Standards in the Field of Physics, Committee for Physics, Science Council of Japan.

Members of the subcommittee are as follows:

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Chairperson	Setsuko	Tajima	(Member of the Third Committee)	Professor, Graduate School of Science, Osaka University
Vice chairperson	Toru	Eguchi	(Cooperating member)	Specially Appointed Professor, Rikkyo University
Secretary	Hiroshi	Shibui	(Cooperating member)	Professor, Graduate School of Science, Osaka University
	Sadanori	Okamura	(Cooperating member)	Professor, Faculty of Science and Engineering, Hosei University
	Hiroyoshi	Sakurai	(Cooperating member)	Professor, Graduate School of Science, The University of Tokyo
	Hiroyoshi	Rangu	(Cooperating member)	Professor emeritus, Tokyo University of Agriculture and Technology
	Junpei	Ryu	(Cooperating member)	Professor, Faculty of Education, Kagawa University
	Shozo	Suto	(Cooperating member)	Professor, Graduate School of Science and Faculty of Science, Tohoku University

This report was written in collaboration with the Physical Society of Japan and the Astronomical Society of Japan.

In preparation of this report, the following persons were in charge of administration:

Secretariat	Yasuhiko	Ishii	Counselor (Director for Scientific Affairs II)
	Shima	Matsumiya	Assistant to the Counselor (Director for Scientific Affairs II)
	Miyuki	Nishikawa	Specialist Attached to the Director (Director for Scientific Affairs II)

Summary

1. Background

In May 2008, the President of the Science Council of Japan received a request from the Director General, Higher Education Bureau, Ministry of Education, Culture, Sports, Science, and Technology, to summarize discussions about how to guarantee the quality of university education in each field. In response to this request, the Science Council of Japan established the "Committee for Examination of How to Guarantee the Quality of University Education in Each Field" in June 2008, which held repeated discussions. In July 2010, the committee's response to the Director General's request was summarized in a report titled "How to Guarantee the Quality of University Education in Each Field," which was submitted to the Ministry's Higher Education Bureau in August 2010 [1][2].

In that summary, the committee proposed that a reference standard for curriculum organization in each field should be formulated as a method to help guarantee the educational quality in each respective field. After submitting that proposal in response to the request, the Science Council of Japan held ongoing discussions about how to formulate the reference standards in various fields [3].

In the fields of physics and astronomy, the third Committee for Physics had discussed how to formulate standards. The committee requested first-stage discussions to the Physical Society of Japan and the Astronomical Society of Japan, both of which have departments for discussing education in their respective fields. Based on the answer to this request, the Science Council of Japan started the discussion by establishing the "Subcommittee for Examination of Reference Standards in the Field of Physics" under the Committee for Physics in April 2015. About the same time, the Physical Society of Japan and the Astronomical Society of Japan held symposiums on the respective reference standards and gathered opinions from those concerned. In the subcommittee, members deliberated repeatedly, referencing the discussions in these symposiums. The current report summarizes the results of the subcommittee discussions. Because physics and astronomy have been developed as complementary sciences, they share many common parts in university education. Given their common root, reference standards for the two fields were summarized in the same report.

2. Contents of the report

(1) Definition of physics and astronomy fields

The fields of physics and astronomy are defined as scientific fields in which the mechanisms of the phenomena that occur in nature around us and their background principles are explored based on the facts obtained experimentally and through observation and in which the obtained knowledge is used in an attempt to understand the versatility in the wider world beyond nature in a narrow sense. The results of the physics not only satisfy our intellectual desire but also promote technological development and productive lives. In astronomy, research subjects are further expanded to include space to the end of the universe and time to the beginning of the universe. Thus, astronomy has a significant influence on our worldviews as a science where an attempt is made to understand various phenomena in the universe and the origin of the universe itself.

(2) Characteristics unique to physics and astronomy

The following are examples of basic goals of physics and astronomy: (i) to attempt to understand the natural world on the basis of basic laws, (ii) to describe the basic laws using the language of mathematics, (iii) to aim to model and quantitatively predict natural phenomena, (iv) to consider experiments and observations occupying an important place in, and the necessary technology as an important part of, science, and (v) to divide theory from experiment. Regarding nature, central to both physics and astronomy is the concept of hierarchy of materials from elementary particles to the entire universe. Related to this concept, it is also important to recognize that the basic laws of nature have a scope of application within each hierarchy. Furthermore, astronomy is considered one of the oldest sciences. Astronomical phenomena and their study have greatly influenced the development of human intelligence as well as culture and science—through mythology and legends; politics; philosophy; religion; worldview; customs; agriculture; calendar; clock time; and navigation and satellites. As a result, astronomy is particularly important in exchanges with the other research fields and with society in general.

(3) Basic knowledge that students studying physics and astronomy should aim to obtain

In undergraduate-level physics and astronomy courses, students should obtain knowledge of the central concepts in basic subjects such as mechanics (including statistical mechanics), thermodynamics, electromagnetics, special relativity, and quantum dynamics. They should also become skilled in experiments, observations, and calculations. Students should additionally study elementary particles, nuclei, physical properties, optics, fluids, elastic materials, plasma, and biophysics. In astronomy, students should also learn the hierarchical structure of the universe, the origin of elements and materials, the history of astronomy, and changes in views of the universe.

Through these studies, students obtain skills unique to various fields, such as the ability to rewrite a problem in physics in mathematical form, to plan and conduct experiments and observation, and to summarize the results in a report. Students also obtain generic skills such as the ability to extract and solve problems, to have an objective and relative perspective, to communicate, to collect information, to use information and communications technology, to study as an individual and as part of a group, and to judge ethical values.

The abilities thus acquired are useful in all areas of society. Therefore, not only is the vocational significance of the obtained skills considerable, but also students who have studied physics and astronomy are actually active in various occupations.

(4) Basic concepts of methods of learning and methods for evaluation of what has been learned

Like mathematics, physics also requires the accumulation of sequential study. Thus, for students to obtain knowledge, lessons must be organized in an appropriate and systematic order. In addition, unlike mathematics, physics and astronomy are sciences whereby natural phenomena are studied based on experiment and observation. Thus, to understand natural phenomena, experiment and observation must be combined with theory. Typical educational components include lectures, accompanying exercises, experiment and observation, and graduation research. The most basic method for evaluating student achievement is conducting various written examinations, such as midterm and end-of-term exams and interim tests. Another good method for student evaluation is the use of experimental reports or notebooks.

(5) Relation between professional education and liberal-arts education for fostering citizenship

By studying physics and astronomy as part of general liberal arts, students in other science courses and those in liberal-arts courses can obtain abilities to critically consider, to earnestly face the nature, and to consider from the viewpoint of the whole universe. They also obtain the ability to respect the other students while respecting independence through the collaboration learnings in experiments and seminars.

On the other hand, graduates of courses related to physics are aware of their limited abilities in communication, in knowledge of science fields other than physics, such as law/economics, and in knowledge about empathetic appreciation. To compensate for these limitations, liberal-arts education is indispensable.

Contents

1. Introduction

Because physics is a subject taught in high schools and the terms of astronomy and space are often mentioned in newspapers, the general public seems to have a rough idea of physics and astronomy. However, it is not widely known how and to what extent universities teach these subjects. One of the characteristics of physics is that a well-ordered academic progression from classic to present day has been constructed, and the content and order of topics that should be taught are clear. Therefore, in most Japanese and overseas universities, the concepts that should be learned by future specialists in the field are taught from lower to upper grades systematically under this implicit understanding. Therefore, the reference standards discussed in this report are summarized from iterative discussions concerning the characteristics of scientific fields, the knowledge and skills that should be obtained, and methods for learning and evaluation.

From looking back at the history of science as an area of human inquiry, it can be said that physics and astronomy are among the oldest scientific fields. Note that in each ancient civilization, there was a calendar made by observation of stars. Celestial bodies have commonly been objects of interest for mankind since ancient times. Because they have been deeply related to our life, research on celestial bodies has played an important part in the development of civilization and culture. After the 16th century, modern science—particularly physics—began by solving the mysteries of celestial motion and the movement of falling bodies, and eventually, expanded research subjects to everything around us, thereby developing while seeking to discover the fundamental principles of natural phenomena. The achievements of physics led to the development of engineering as an important field and have promoted the development of science and technology in general, resulting in laying the foundation of our present civilization. However, when one looks back at the history of physics, it must be remembered that it not only brought about positive outcomes, such as comfortable living, but also posed a great threat to our survival in terms of negative consequences such as weapon development and pollution.

Astronomy has developed as a science whose subjects of interest are the universe and its celestial bodies. People's curiosity and romance in relation to the universe are endless even today and are reflected in the number of reports on topics concerning space and celestial phenomena and in the popularity of public observatories in various places.

Thus, physics and astronomy have the same roots and have developed as complementary basic sciences. There are few domestic universities that have separate departments for physics and astronomy. In most Japanese universities, the subject of astronomy is taught as part of physics education. Even in overseas universities, there are many departments named Physics and Astronomy. This is because there are many parts that are common to both subjects in undergraduate courses. Accordingly, the present reference standards are summarized as knowledge that should be learned by undergraduate students in both fields.

As academic fields that challenge the limits of human knowledge, physics and astronomy will continue to play important roles in the future. By reconsidering the academic system and its characteristics and by clarifying the knowledge to be obtained in undergraduate courses, it is expected that the present reference standards will be useful for high-school teachers and students to know what lies beyond high-school graduation. In addition, we hope that they will encourage employers to hire those who have studied physics and astronomy as part of their education.

For earth and planetary science, a field related to physics and astronomy, independent standard references have been formulated by the Committee on Earth and Planetary Science of the Science Council of Japan. Also, the Astronomical Society of Japan is preparing a publication concerning dissemination of educational knowledge in the field of astronomy; it is to include not only specialized science courses but also a liberal-arts curriculum and outreach to the general public.

2. Definition of the fields of physics and astronomy and the history of their development

Physics and astronomy are academic fields in natural science, and their roots go back to research by ancient civilizations on the movement of celestial bodies. Physics and astronomy, as modern science, began in the latter half of the 16th century and have developed to the present day while constantly expanding the scope of understanding natural phenomena, while making it increasingly difficult to define physics and astronomy in the 21st century. One summary definition could describe them as academic fields that explore the mechanisms of natural phenomena, that discern background principles based on facts obtained by experiment and observation, and that seek a versatile understanding of the wider world beyond the narrow sense from directly obtained knowledge. Behind this definition is the basic assumption that natural phenomena can be described by a mathematically expressed law. The spirit of physics may be in explaining the natural world uniformly with as few simple basic laws as possible. The achievements of physics not only satisfy the intellectual desires of human beings but also promote the development of technology and enrich our lives. Astronomy has expanded to research objects in space to the ends of the universe and in time to the beginning of the universe. Thus, it has had a great influence on our worldview.

Looking back at the history of the development of physical concepts serves to clarify the basic definition of such academic fields. Physical concepts such as philosophy go back to Aristotle's cosmology and kinetic theory in ancient Greece, the principles of buoyancy (Archimedes' principle) and of the lever, etc. However, physics was not based on experiment and demonstration until after the 16th century.

The beginning of physics was concerned with how celestial bodies move and how materials on the Earth move. From the late 16th to the early 17th century, Kepler compiled three laws of planetary motion based on the precise observations by astronomer Tico Brahe. At about the same time, Galileo developed a concept called the experimental method, in which a person works to clarify the nature of mechanisms. Through such experiments, together with demonstrations, he developed theories on the isochronism of the pendulum and on the motion of a free-falling body. He also developed the law of inertia, which states that if there is no external force, a stationary object will remain stationary, whereas a moving object will move in a straight line at a constant velocity.

In the latter half of the 17th century, laws describing such movements of celestial bodies and of objects on the ground were unified by Newton. In 1687, he published the most basic laws, known as the three laws of motion and the law of universal gravity. He showed how all forms of motion (Kepler's three laws, Galileo's pendulum isochronism, free-falling motion, etc.) can be completely derived from these basic laws. At the same time, Newton developed the differential–integral theory and a method to study natural phenomena using differential equations. This served to complete mechanics, whose application made it possible to predict the motion of planets and

objects.

The 18th century was a time of great progress in technology, leading to industrial revolution. During this time, the steam engine improved by Watt played a major role in society and generated questions concerning the types of natural laws involved in processes where heat generates mechanical force. Accordingly, thermodynamics was systematized as three laws on the basis of the work by Carnot, Helmholtz, Thomson (Lord Kelvin), and Claudius. Energy, absolute temperature, entropy, and other concepts in current use were derived from thermodynamics. In the latter half of the 19th century, the concept of free energy was introduced by Helmholtz and that of chemical potential was introduced by Gibbs. These concepts made it possible to discuss a wide range of phenomena, including chemical reactions, based on thermodynamics. Soon after that, thermodynamics was further systematized, giving rise to statistical mechanics, which was based on atoms and molecules constituting gaseous, liquid, and solid substances.

At about the same time, electricity and magnetism began to be studied. In 1864, Maxwell proposed equations for describing the most basic laws governing electromagnetic phenomena. Known as the Maxwell equations, they systematized previously discovered laws, such as Coulomb's law, for electric charges, Ampere's law for magnetic force acting between two conductors, and Faraday's law of electromagnetic induction. It was also found that all electromagnetic phenomena can be understood in a unified way using the Maxwell equations and Lorentz force, which expresses the force acting on electric charges by electric and magnetic fields. Besides completing the description of electromagnetics, the Maxwell equations also predicted the presence of electromagnetic waves, which was confirmed by Hertz's experiment in the late 19th century. Furthermore, the velocity at which electromagnetic waves were transmitted could be determined by Maxwell equations. Because the calculated electromagnetic-wave velocity was close to that of the observed velocity of light, light was also considered to be a type of electromagnetic wave. These results demonstrated that electricity, magnetism, and electromagnetic waves (light) can be described uniformly by Maxwell equations. Electric appliances such as motors and refrigerators used in daily life today use technologies based on electromagnetism.

From the latter half of the 19th century through the beginning of the 20th century, when light was found to be a type of electromagnetic wave that could be described by the wave equation, the search for a medium that conveys light, later known as ether, and a discussion about its properties were pursued in earnest. Einstein's special relativity theory considered that the velocity of light is constant, assumed that the laws of physics were unchanged from the world where Galileo's law of inertia held, and served to explain the experimental results. Unlike other physicists, Einstein devised a theory that rejected the existence of ether. From his theory, it followed that a strange phenomenon (Lorentz contraction) occurs whereby in a moving coordinate system, time seems to be delayed and the length seems to be contracted with respect to those in a stationary coordinate system, and such changes seem to hold in both coordinate systems. Considering gravity, Einstein also proposed the general theory of relativity, which is more fundamental than Newton's universal law of gravitation. Still actively investigated today, Einstein's general theory is closely related to controversies surrounding the origin and evolution of the universe.

The other important theory developed from the latter half of the 19th century through the beginning of the 20th century is that of quantum dynamics, which concerns multiple natural phenomena that were discovered one after another but could not be explained by conventional mechanics, electromagnetics, thermodynamics, or statistical mechanics. An example concerns the relation between the intensity of light (electromagnetic wave) emitted from a blast furnace and its frequency. Planck explained it by a formula which assumes that the energy of light (electromagnetic waves) is exchanged discretely rather than continuously, and Einstein further explained this so-called photoelectric effect by the so-called light quantum hypothesis, which assumes that the light itself is a type of quantum (particle). Experimental observation demonstrated the duality of light, whereby light simultaneously has characteristics of both waves and particles. On the other hand, J..... Thomson's discovery, the electron, likewise came to be considered to have both particle nature and wave nature, as later explained by Bohr's quantum hypothesis concerning atomic structure together with de Broglie's relational equation (also known as the material wave hypothesis). This hypothesis was later verified by the diffraction of electrons in a crystal. As basic laws unifying these formulae and hypotheses, Heisenberg's matrix mechanics (including the uncertainty principle) and Schrodinger equations were independently proposed, thereby completing quantum mechanics, which explains the microscopic phenomena at the level of atoms and molecules and is a basic theory in modern physics. Starting with the discovery of transistor effects, quantum mechanics has led to various applications and operating proposals for electronic devices and lasers. Although quantum mechanics has been actively studied down to the present day, no phenomenon that cannot be explained by quantum mechanics has been found in the microscopic world.

The basis for elucidating phenomena occurring in the universe is considered to be known or unknown natural laws, including physical laws. In space, there are extreme physical states that cannot be realized on ground. In addition, the maximum known spatial scale has been found to be 10^{26} m (13.8 billion light years), and the longest time scale discovered so far is 13.8 billion years (but only in the past direction). Observations of the universe often lead to new understanding of known natural laws and the discovery of completely new laws. For example, the recent discovery of dark matter and dark energy has led to new developments in physics.

As a result of such historical development, the research fields of present-day physics and astronomy have been differentiated and further detailed as particle physics, nuclear physics, astronomy/astrophysics, solid-state physics, atomic and molecular physics, nanophysics, plasma physics, fluid physics, nonequilibrium-system physics, biophysics, photon quantum science, calculational physics, earth and planetary physics, history of physics, and physics education.

As an academic field that explores the basic laws of nature, physics is strongly related to other natural sciences such as chemistry, biology, and earth science. Also, the field of physics is widely expanding as a basis of engineering. This is because the various academic fields involved are governed by uncompromising physical laws, so functional materials used by human beings cannot be developed from natural products without a deep understanding of the basic laws dominating nature. For example, the double helix structure of DNA, which is the central concept in modern biophysics, was determined by experiments using X-ray diffraction, which was the most advanced research method in physics at that time in the mid-20th century. Also, quantum mechanics played an important role in the development of chemistry. These facts are good examples of the contribution of physics to other academic fields. In addition, physics has always had a mutually cooperative relationship with these other fields: new discoveries and technological developments in different fields have led to the search for new physical phenomena. Moreover, as seen in the emergence of physics applied to the studies of social phenomena and the economy, physics is now not limited to the natural world in a narrow sense. Also, astronomy has been developed as an interdisciplinary research field that has become more closely related to chemistry, biology, earth and planetary science, and environmental science. In high-school science, content close to astronomy is included in earth science. However, as described in current reference standards, the subject of astronomy in the university undergraduate curriculum is close to that of physics. As described in the Introduction to these standards, earth and planetary science is summarized by independent reference standards, although its contents are closely related to those of physics and astronomy.

3. Notable characteristics of the fields of physics and astronomy

Modern society cannot survive a day without the achievements of technology supported by science. Physics and astronomy, as academic fields, serve as a foundation of society and have a great impact on the ways of society and people's lives. Through a logical way of thinking (physical thinking) in physics and astronomy, we have come to reasonably comprehend the world (human beings, society, and nature) and realize a rich life through science and technology. This chapter summarizes how to recognize the world of physics and astronomy (human beings, society, and nature) and how to participate in this world while providing the notable characteristics of each field. This summary will form the basis of knowledge that all students who will study the subjects in the following chapters should acquire.

(1) Basic components and characteristics of physics and astronomy

① Basic laws

Physics is a precise science that is logically composed of experiments and theories. It aims to understand the natural world with a few key physical quantities, such as energy and momentum, and the basic laws governing them. One of the characteristics of physics is that it is a universal law where a few basic laws in physics widely hold in the natural world. In mechanics, for example, Newton's equation of motion (the second law) can predict not only the motion of stars and the galaxy but also the strength of machines and buildings that are used in our daily lives. In addition, laws in thermodynamics can describe chemical reactions.

② Mathematics as a language

One of the notable characteristics of physics and astronomy is that the basic laws are described in mathematical terms. A key reason why physics and astronomy have succeeded in describing the natural world is the use of a strict language, termed mathematics. In addition, the basic laws are generally described in the form of differential equations. The essential reason for such a description depends on the properties of space (time) in the natural world. If a proximity interaction, where a change in a physical quantity at a point (time) is determined by the physical quantity at the nearest-neighbor point (immediately before the time), is expressed in mathematical terms, the expression inevitably shows the form of a differential equation. Moreover, the translational symmetry of time and space for relativizing the origin is expressed by a differential equation. Just as the case in which Newton and Leibniz established the differential integral theory, the development of mathematics has so far promoted the development of physics and astronomy. Conversely, the development of physics and astronomy has also promoted the development of mathematics. Owing to such interdependencies, both fields have made great progress.

③ Modeling and quantitative prediction of natural phenomena

In physics, to understand and quantitatively predict natural phenomena from basic laws, discussion is initiated by first simplifying (idealizing) a natural phenomenon. For example, when the movement of an object is analyzed, Newton's equation of motion is solved by first idealizing that the object be a "point" without a size, although the object has mass. Next, the

phenomenon is quantitatively predicted by obtaining the value of the measured physical quantity. Then, the obtained value is compared with the experimental value. If the obtained value is not consistent with the experimentally obtained value, a quantitative prediction is again conducted by considering the object shape. In addition, the occurring phenomenon is understood by comparing the obtained value with the experimental value by further considering parameters such as friction and air resistance. In this manner, we understand natural phenomena by alternately using two phenomena, i.e., the phenomenon modeled by the basic laws and that obtained by the experiment (observed), similar to a pendulum. As far as the object of the experiment and given observation is a physical phenomenon occurring every day, it can be understood by the basic laws in mechanics, thermal/statistical mechanics, electromagnetics, and quantum mechanics. In the field of advanced science, a phenomenon that cannot be understood only by conventional basic laws is also positively explored as a new basic law may be found through such advanced research. Even if a new basic law cannot be found, a profound understanding can be obtained regarding the limitation of conventional laws and their universality. By repeating such work, physics and astronomy are always the most advanced academic fields.

④ Experiment and observation

The most important characteristic in physics and astronomy is that all hypotheses and models can be verified experimentally. As previously mentioned, researchers verify whether a hypothesis or a model is correct by alternately using the hypothesis/model and experimental results. Today, this method is widespread in all fields of natural science. In the case of astronomical observation, where the control of the experimental condition is impossible, the method has a characteristic similar to that of a statistical experiment. In this case, because a statistical treatment is necessary to verify even a simple hypothesis, considerable data are often required. During recent years, examples have been increasing in which simulations using high-performance computers have played a role in experiments in a broad sense.

In physics and astronomy, great paradigm shifts in concepts have occurred many times. Examples of such paradigm shifts are the 1) shift from geocentric to heliocentric theory, 2) the shift of the concept of time and space from Galileo's principle of relativity to Einstein's special theory of relativity, 3) the shift from the concept of classical mechanics in which a particle and wave independently exist to the concept of quantum mechanics dominating the microscopic world, such as light duality and material waves, and 4) the shift of the view of the universe from a static to the Big-Bang-expanding universe. In physics and astronomy, hypotheses and models are proposed in the form of a formula and experimental data are obtained in numeric form. Therefore, an objective and precise verification is possible at the time of such a paradigm shift. Furthermore, such a paradigm shift of basic laws and concepts in physics and astronomy has greatly influenced the humanities and social sciences, including philosophy, as a change in the recognition of nature by human beings.

⑤ Experimental and observational technology

Technology and methods for conducting experiments, measurements, and observations are a part of physics and astronomy. Many important discoveries have been made via the development of new experimental and observational technology. In Japan, for example, neutrinos from supernovae that exploded in Magellanic Clouds were observed owing to the quality improvement in a photomultiplier that can detect extremely weak light. These experimental results have opened new areas of study in physics and astronomy. Furthermore, the invention of a highly coherent (phase-aligned) laser led to not only fundamental research on the physicochemical properties of atoms, molecules, and materials but also various applications such as pick-ups for optical communication/optical disks, metal and semiconductor processing equipment, medical equipment such as scalpels, sighting devices for measurement, and laser pointers used in classes and business lectures. In this manner, technological developments promote the development of measurement technology in physics and observational technology in astronomy. The application of the newly discovered basic laws also promotes further technological developments.

⑥ Division of theory and experiment

Today, it is difficult for one person to simultaneously perform an "experiment/observation" by using the latest technology and "theoretical consideration" performed using advanced mathematics. Therefore, research in physics after the 20th century has been generally conducted by two types of researchers: experimental and theoretical researchers. An experimental researcher develops experimental apparatus and conducts measurements to verify the hypotheses and models. There have been many cases in which advanced experimental apparatus and precise measurements by experimental researchers have led to the discovery of unexpected natural phenomena. However, a theoretical researcher not only uses mathematics as a logical expression tool but also conducts calculations; verifies hypotheses, models, and theories through comparisons with experiments; and proposes laws. Applying existing theories to new phenomena and critically verifying hypotheses used thus far lead to new discoveries. Such a division of theory and experiment inevitably promotes mutual cooperation. It can be said that the research process in which theoretical and experimental researchers study the same problem (subject) in collaboration is a general style today.

(2) Recognition of nature in physics and astronomy

① Hierarchy of the material and application scope of basic laws

Objects of physics and astronomy include from the entire universe to elementary particles that are the smallest unit composing a material. A material is composed of atoms, and an atom is composed of a nucleus and electrons. Furthermore, a nucleus is composed of protons

and neutrons, and a proton or a neutron is composed of quarks that are considered elementary particles today. This structure is understood as the hierarchy of a material.

As basic laws and concepts describing a physical phenomenon, the following theories can be provided: 1) Newton's equation of motion in "mechanics," 2) Newton's universal gravitation law, 3) three laws in "thermodynamics," 4) Maxwell's equations in "electromagnetics," 5) Lorenz's force, and 6) Schrödinger's equations in "quantum mechanics." Furthermore, if a material is moving at high speed near the velocity of light, correction via special relativity becomes necessary.

Generally, a system in which the properties of each atom are reflected is termed a microscopic system, while that which can be treated as a continuous material is termed a macroscopic system. In a microscopic system, a physical phenomenon is described by Schrödinger equations, while Newton's equation of motion describes a phenomenon in a macroscopic system. However, the three laws in thermodynamics can be applied to all hierarchies in nature, including living things. In this manner, basic laws have their own application scope and describe natural phenomena in the target system.

In addition, natural phenomena occurring in a nucleus have been clarified by the theories developed based on quantum mechanics. During the development of physics and astronomy, it has been found that there are few materials composed of atoms among the components of the universe, and most materials are the so-called dark matter and dark energy, which cannot be explained by the hierarchy of known materials. In this manner, physics and astronomy are progressing such that we can more deeply understand nature.

② Formation of a worldview and cosmic perspective

Since ancient times, physics and astronomy have been closely related to our worldview (cosmic perspective) and philosophical thought. Proposals for a new cosmic perspective, such as the heliocentric theory (Copernicus turn), discovery of galaxies and galactic systems, and discovery of an expanding universe are based on the achievements of physics and astronomy. We cannot forget that the origin of versatile elements that are the components of all materials, including living bodies, is the nuclear fusion reactions in fixed stars and supernova explosions. Furthermore, if we find another "Earth" among planets outside of our solar system, and find an evidence of living things, this would have a great influence on our worldview.

Astronomy is considered to be among the oldest sciences, together with music, rhetoric, grammar, logic, mathematics, and geometry. It has been inseparable from the development of human civilization such as agriculture, the calendar, and navigation. Historically, astronomical phenomena and their discussion have greatly influenced human intelligence and further development of civilization and science through mythology, legends, politics, philosophy, religion, worldviews, customs, agriculture, calendars, clocks, navigation, and satellites.

(3) Characteristics unique to astronomy: Interaction with other research fields and society

① Characteristics as a comprehensive science

Astronomy is a comprehensive science in which physics, chemistry, mathematics, computer science, and statistics are used as research means. Unlike mathematics, physics and chemistry, which explore the "immutable truth," the targets of astronomy are history and origin of the universe (the beginning of the universe and the Sun and their future) in which we live. Therefore, astronomy has a close relation with biology, earth science, and environmental science. Moreover, astronomy is a science that is connected to history, as well as a science in which various advanced technologies such as radio engineering, optics, infrared engineering, X-ray/gamma ray, space vehicle technologies, and large-scale simulation by supercomputers are used.

② Research activities open to society generally

Astronomy is a field in which amateur astronomers and students (students in junior high school, high school, and college) can produce excellent research results comparable to those obtained by specialists. The field of astronomy started a "junior session" mainly for high-school students at an academic conference where specialists presented their research results. This junior session was a great success. In addition, because astronomy has a characteristic that the same celestial bodies can be observed from many locations throughout the world, global cooperative research including the general public is actively conducted. Furthermore, considerable observational data are available to the public and research papers can be searched and referenced. For these reasons, even in developing countries, researchers and the general public are in an environment where they can conduct specialized research.

③ Outreach

Astronomy is a science that attempts to answer the central mysteries of our intellectual curiosity, such as the beginning of the universe and the origin of life. Recognizing this characteristic of astronomy and astrophysics, researchers and teachers in this field tend to actively conduct outreach activities. Because the general public has a strong interest in space, such outreach activities are generally favorably received.

In this manner, outreach activities in astronomy significantly contribute to fostering general public and student interest in science.

(4) Aims of modern physics and astronomy

Physics and astronomy attempt to answer our fundamental questions, such as "How did our universe originate?" (origins of the universe) and "What is matter composed of?" (origins of

matter). It would be important in understanding the notable characteristics of modern physics and astronomy to obtain a bird's eye view of the latest research fields and their goals, which are the developmental history of physics and astronomy described in the definition. Not all basic laws have been discovered, and further endeavor continues to rely on the basic laws already discovered.

① Elementary particle physics

This science aims to clarify the origin of elementary particles, the universe, and space time and complete the ultimate theory that explains matter and space time using a unified fundamental law.

② Nuclear physics

This science aims to elucidate the creation and evolutionary process of matter in space in which various nuclei are produced from quarks via hadron particles such as protons and neutrons.

③ Astronomy and astrophysics

These sciences aim to clarify the structure, origin, and future of the universe and the evolution of matter and celestial bodies in space. Furthermore, the search for living things in the universe is seriously undertaken.

④ Solid-state physics

Multi-body effects of atoms and electrons induce various physical phenomena. This science aims to clarify the nature of materials and engage in the search for new materials. Thereby, it also aims to create new functional materials.

⑤ Atomic, molecular, and nano-physics

These sciences aim to perfect the elucidation of quantum mechanics, practical application of quantum information processing technology, and further development of nano-science and technology.

⑥ Plasma-, fluid-, nonequilibrium system-, and bio-physics

These sciences elucidate dynamism and disorder phenomena for fluids including plasma and nonequilibrium systems such as living things. Thereby, they aim to clarify the entire picture of changes in the natural world. Furthermore, they aim at wide-range applications such as realization of fusion power generation and research on biological and economic phenomena.

⑦ Photon quantum science

This science aims at interdisciplinary research in fields ranging from fundamental physics to green-life innovation using light (photons).

⑧ Computational science

This science aims to represent all natural phenomena in computers, as well as to control chaotic phenomena such as plasma and turbulence and design new materials and quantum functions.

⑨ Study of science and astronomy education

These aim to realize effective education while clarifying the learning process of physics

and astronomy by incorporating the results of cognitive science and neuroscience.

In this manner, advanced research in physics and astronomy is not only promoting research in these fields themselves but also providing great intellectual stimulation to humankind. In addition, they are strongly linked to the technological development that led to, and sustains, modern society.

4. Basic knowledge that students studying physics and astronomy should aim to obtain

In this chapter, the basic knowledge that needs to be acquired by students who specialize in physics and astronomy is described. The purpose of studying physics and astronomy varies depending on the presently enrolled university courses, future courses, and future occupations. Based on the description in this report, there is need for appropriate curricula in each university and for each faculty.

(1) Basic knowledge and understanding required to be obtained through the study of physics and astronomy.

① Basic concept of the structure of curriculum in physics and astronomy

(A) Indispensable condition for curriculum construction

Physics and astronomy are academic fields logically constructed by experiment and theory. Therefore, it is important to conduct both the theoretical aspect of learning, to understand the basic laws, and the experimental aspect, to understand the relation between basic laws by experiencing natural phenomena through both experiment and observation.

Although the basic laws are briefly expressed mathematically, their essence is understood with difficulty. Applying a law to versatile nature results in new concepts, which in turn yield a new advanced mathematical expression if expressed precisely. Studies in physics are cumulative, from fundamental subjects to applied subjects. Thus, the curriculum needs to be well-structured to enhance systematic learning.

The main purpose of experiments and observations in undergraduate courses is not to discover or verify new natural phenomena, but to experience natural phenomena, further experience the discovery process of a new law, and learn the basic method of application. From well-organized lessons utilizing experiments and observations, students can understand the essence of the associated basic laws.

Furthermore, in the study of astronomy, it is essential to have a good understanding of perspectives of the universe, the world, and the global environment, as well as the human sustainability from a global viewpoint. Since such a study does not involve accumulations, and unlike physics, the curriculum is flexible, early studies can enable the students to cultivate a wide range of scientific views.

(B) Bachelor courses and education in physics and astronomy

Based on the differences in the academic syllabuses, as well as in the mathematics applied, the undergraduate physics education can be divided into the followings categories: (a) liberal education, (b) science education (including engineering and teachers' training courses), and (c) physics specialized course education. Furthermore, in astronomy-specialized courses, besides the physics-specialized course equivalent, educational courses unique to astronomy are also required.

As with science education generally, the academic curriculum forms a multilevel hierarchical structure. In engineering, for example, although physics is considered a basic science, the contents of many textbooks are re-written so that they can be applied in real problems. To design an electric circuit, students study textbooks on electric circuits based on electromagnetics. To deal with an advanced new problem, students may need to return to the pertinent basic electromagnetics. Such scenarios occur in education faculties as well. In science education other than physics-specialized courses, curricula that fully consider characteristics unique to physics are also essential.

In liberal education, for liberal-arts students, it is desirable to let students conduct experiments and observations in addition to teaching lessons only in mathematical terms. This is because students who studied physics and astronomy with neither good experimental experience nor observation tend to have nothing beyond an ideological understanding.

(C) Object and principles of present reference standards

In this section, the basic knowledge of physics-specialized courses presented in (B) is first described based on the above background. Then, we seek to make it available for all physics students, including (A) and (B), by choosing the appropriate basic knowledge. The basic contents of this section include mechanics, thermodynamics/statistical mechanics, electromagnetics, spatial relativity, quantum dynamics, and experiments/observations. Understanding of the basic laws governing these subjects and their applications is required. Additional content concerning elementary particles, atomic nuclei, physical properties, optics, fluids, elastic bodies, plasma, biophysics, and astronomy/universe are chosen as appropriate.

② Required knowledge and understanding

Considering the aforementioned definition of physics and astronomy and its unique characteristics, there are not many important concepts that form the basis of physics and astronomy. Moreover, the number of basic laws associated with the field is limited. However, it is difficult to understand the essence of the basic concepts, and hence, additional experiments applying advanced mathematics are required. Furthermore, it is necessary to imagine a wide scope of application of the field knowledge throughout the universe. The knowledge and understanding to be acquired for this purpose are listed below.

1) The ability to systematically understand the basic laws and concepts of forces and motions: This involves the understanding of principles of velocity, acceleration, and Newton's "three

laws of motion," as well as the motion of matter in a macroscopic system.

2) The ability to understand the laws of conservation of physical quantities (energy, momentum, and angular momentum) and their application in the explanation of motions of matter.
3) The ability to understand the nature of waves and to explain wave phenomena such as superposition, interference, and diffraction. The ability to derive wave equations from basic laws, as well as to solve them. It also involves an understanding of the principles of traveling waves and standing waves.
4) The ability to understand the three laws of thermodynamics, and to explain thermal phenomena: This involves the ability to explain absolute temperature, the energy conservation law, irreversible processes, and entropy, and their applications in thermal phenomena.
5) The ability to understand thermal phenomena in terms of atomic and molecular motion, and to explain the methods of statistical mechanics. In addition, an understanding of entropy, classical statistical properties (Maxwell Boltzmann distributions), and quantum statistical properties (Bose–Einstein distribution and Fermi–Dirac distribution) using the above methods, and their applications in the corresponding phenomenon.
6) The ability to understand Maxwell equations, which explain electromagnetic phenomena dependence upon electrostatic fields, static magnetic fields, and time. Also, the ability to explain electromagnetic phenomena as well as the Lorenz force. The ability to explain the concepts of "field" and proximity interaction.
7) The ability to construct and understand the mechanism of electric circuits for the measurement (experimental observation) of physical quantities.
8) The ability to understand the basic assumptions of spatial relativity and the relation between time and space, which holds in two inertia systems derived from spatial relativity. Also, the ability to explain natural phenomena observed in matter moving at high speed, close to the velocity of light.
9) The ability to understand Maxwell equations, and to explain the nature of light. Also, the ability to explain the propagation (reflection, refraction, and transmission) of electromagnetic waves represented by light.
10) The ability to understand Schrödinger equations, and to explain the atomic structure as well as the motions of atoms and molecules in microscopic systems. In addition, the ability to explain the principles and empirical rules, such as the uncertainty principle, which govern the microscopic system, and to explain physical quantities and physical states using the concepts of quantum mechanics.
11) The ability to explain the principles of basic procedures for, and the methods of, experiments and observations, and to conduct them as well. To understand the essence of the physical phenomenon being measured by the experiments or observations.
12) The ability to explain the history of the concept of physics, and to explain why the theory of relativity and quantum mechanics became necessary.
13) The ability to explain and use the mathematics being applied in physics; to extract

contents that are necessary for physics, such as differential integration, differential equations, vector analysis, linear algebra, statistics, use of complex numbers (complex function theory), Fourier analysis, and group theory; to understand their basic equations; and to explain natural phenomena quantitatively.

14) The ability to analyze experimental results using computers, and to be able to conduct model calculations for the phenomena. Also, the ability to derive and calculate an appropriate model from basic laws, and to quantitatively predict natural phenomena, experimental results, and observation results.

Besides these skills, the following items unique to astronomy are also necessary as basic knowledge and understanding.

15) The ability to explain the hierarchical structure of the universe, from the Earth to the Sun, galaxy, galaxy clusters, large-scale structure of the universe, and the entire universe, as well as to explain the evolutionary path of the universe, from the birth of the Big Bang universe to the present.

16) The ability to explain the origins of elements and materials from nuclear fusion reaction in fixed stars and supernova explosions, and to explain how the Earth and living things are fostered by the energy generated by nuclear fusion reaction in the Sun.

17) The ability to explain the historical background of the fact that astronomical concepts such as calendar were born in ancient civilizations. Furthermore, the ability to explain the medieval Copernican Revolution from the geocentric theory to the heliocentric theory, and to explain the historical transition to the modern space view based on the observed facts, which has been brought about by the invention of telescope.

(2) Basic abilities that should be acquired through the study of physics and astronomy

① Abilities specific to fields

(A) Ability to solve problems in physics and to present the obtained solutions

Students should be able to solve typical problems in physics, acquire rational ways of thinking, and hence, apply appropriate physical laws even to general problems in natural phenomena occurring in reality. Specifically, students should be able to (i) estimate solutions for problems that are difficult to be solved analytically, (ii) reference a solution under extreme conditions, (iii) evaluate the accuracy of obtained solutions by dimensional analysis using the digits of the values as guides, (iv) clarify assumptions and present the answer, and (v) understand the scope of laws and theories.

(B) Ability to use mathematics in the description of physics and astronomy

The ability to understand the method of expressing physics problems in mathematical forms, to understand the principles of modeling in physics, and to understand the role of

approximation.

(C) Ability to plan and conduct experiments and make observations, and to present scientific reports on the results.

1) The ability to understand the roles of experiments and observations in physics and astronomy.
2) The ability to plan experiments and observations.
3) The ability to use experimental apparatuses and observation instruments to obtain experimental and observation data.
4) The ability to conduct data analysis using appropriate techniques.
5) The ability to understand the possible sources of problems by estimating the uncertainties (errors) in experiments and observations.
6) The ability to summarize the results in a scientific report.
7) The ability to consider safety and health in experiments and observations.

(D) Ability to read physics textbooks and papers written in the English language.

Students should be able to read textbooks and academic papers written in English. As physics forms a knowledge system common worldwide, many papers and textbooks are written in English.

(E) What is expected of students to acquire as advanced abilities?

1) The ability to validate the results obtained through experiments and observations using existing theories, by making references to the literature.
2) In a case where a phenomenon cannot be explained, the students must have the ability to analyze the fundamental problems of the phenomenon and to develop hypotheses and models for interpretation.
3) The ability to plan and conduct experiments that can verify the hypotheses and the developed models.
4) The ability to analyze the results of experiments and observations, and then to compare the results with existing theories. Furthermore, the ability to accept, correct, and discard hypotheses and models.

② Generic skill

Students who have obtained bachelor's degrees in physics and astronomy are required to acquire the following generic skills based on the logical thinking methods: the way of thinking that always makes reference to the basics and new perspectives.

(A) Ability to extract problems

Students of physics and astronomy grasp and understand complex concepts. They gain the ability to model a phenomenon by translating detailed data into physical phenomena through logical thinking. Also, they acquire the ability to extract essential problems from these processes.

(B) Ability to have objective and relative perspective

Having learned the vastness of the universe and the fact that various physical states can exist therein, students must be able to always observe and consider objects and phenomena from a broad perspective. They must be able to understand the sustainability of human beings and the Earth from a cosmic perspective.

(C) Ability to solve problems

Students must acquire the skills of problem-solving, and hence, must not only solve problems by typical methods but also propose multiple problem-solving methods, and likewise, be able to find solutions through different approaches.

(D) Ability to communicate and present

Students must acquire the ability to report complex information appropriately and simply through documentation, presentation, and discussion. They must learn how to make appropriate use of technical terms.

(E) Ability to collect information

Students must make individual literature searches from textbooks and papers and collect appropriate information. They must gain the ability to explore essential issues by discussing them with colleagues.

(F) Ability to use ICT technology

Students must learn how to use software, such as appropriate programming languages and other packages. They must acquire the ability to use computer technology and information and communication technology (ICT) in preparing documents and making information searches, numerical calculations, and data analysis.

(G) Ability to study as individuals

Students must acquire the ability to study independently. They must be eager to study voluntarily, setting goals and time limits for themselves. Through group work and discussions, they must become able to interact constructively with others.

(H) Ability to learn in groups

Students must acquire problem-solving skills through collaborative relations in experiments and academic research. They must discover their strengths and complement others' weaknesses. Hence, they must be able to solve problems that cannot be solved by an individual alone.

(I) Ability to make ethical judgments

Students must understand the implications of various unethical behaviors in scientific research, such as fabrication of data, falsification, and plagiarism, by taking objective and relative perspectives. Students must acquire and exercise a highly developed sense of ethics in science, and in turn, maintain highly developed standards of social ethics.

③ Social and occupational significance of acquired abilities

Learning physics and astronomy is beneficial throughout life. As can be said about any field, the knowledge and skills acquired are very valuable from the perspective of people outside the field. The abilities gained by learning physics and astronomy that are useful in society are as follows: (1) the ability to extract the essence of a problem and model it, (2) the ability to present one's thoughts logically, (3) the ability to understand and use the principles of new technology, (4) the ability to treat and analyze numerical data, (5) the ability to use ICTs such as programming for information and communication, and (6) the ability to always maintain an objective and relative perspective.

In addition, the students can study advanced sciences independently, and consequently, understand, be interested in, and continuously satisfied by the latest discoveries in science. Moreover, the acquired logical reasoning skills and the ability to detach and analyze things from multiple perspectives are useful for students when dealing with various problems faced in their social lives. They can grasp the essence of a problem, present potential solutions, and judge and implement the best possible solution. Furthermore, they acquire the ability to find the best resolution by using a completely new way of thinking.

After graduation, students who have learned physics and astronomy are actively working not only in the narrow sense of researchers at the universities and research institutions but also in various other occupations. Recently, there has been an increase in the number of students getting jobs not only as technical and product developers mainly in manufacturing, information, and communication companies and teachers in secondary education institutions but also in the fields of scientific communication, business consulting, and finance. This is because their abilities in numerical and data analysis are useful for solving problems in these various fields. Furthermore, for management work in any organization, the abilities acquired by learning physics and astronomy, such as the ability to extract and solve problems and to consider situations from an objective and relative perspective, as described above ②, will demonstrate competence. In this way, students who have learned physics and astronomy in university actively utilize the acquired scientific way of thinking and approach rather than only their specialized scientific knowledge.

5. Basic concept of learning method and evaluation method for learned results

(1) Learning methods

Similarly to mathematics, physics is also an academic field that requires the accumulation of skills and knowledge in appropriate order. Therefore, to obtain knowledge, it is necessary to systematically organize lectures. In addition, unlike mathematics, physics and astronomy are academic fields where natural phenomena are explored using experiments and observations. Thus, students of physics come to understand natural phenomena while correlating a theoretical consideration with experimental and observational considerations. The components of typical lectures are "lecture" classes, "practice" classes accompanied by the lectures, "experiment and observation" classes, and "graduation research." In recent years, physics and astronomy

education research has been progressing mainly in the United States as empirical education research rooted in the characteristics of this academic field [14]. Also, in Japan, the number of related academic presentations is increasing based on research and educational trials based on it due to increases in related academic presentations in numerous academic societies related to physics education. In this chapter, the present status of the conventional learning method in Japan is described. To increase the quality of education, we expect universities and faculties to implement our prescribed improvements.

① Lectures

A lecture is an important form of lesson in which students learn fundamental knowledge and concepts in physics and astronomy. In addition, it is a place where students learn ways of thinking and methodology from experienced teachers. Physics and astronomy tend to be taken as a collection of knowledge and concepts. However, the learning methods and ways of thinking are diverse, so students need to learn good examples. If quizzes and experiment demonstrations are conducted, students can easily imagine and understand the basic laws and physical concepts. Furthermore, the selection of appropriate textbooks and understanding how to take lecture notes are also important. In an astronomy lecture, it is also important to provide examples of actual celestial images.

② Problem exercises

The purpose of a lecture is to learn the basic knowledge. Thus, students become able to apply the basic laws to the other problems by solving many good questions in problem exercises. It is desirable to link problem exercises with lectures. Even for the concepts and calculation methods that are difficult to understand by only attending lectures, if teaching assistants (TAs) and education advisers teach, deeper understanding can be obtained by identifying specific issues through direct discussion among students.

③ Student experiment

In a student experiment, students conduct experiments based on the predetermined subjects and learn the relation between natural phenomena and basic principles by specifically experiencing the discovery process of the universality and reproducibility of a phenomenon and unexpected behavior. Students also learn experimental techniques and understand the operative principles of the experimental apparatus through hands-on learning. They gain the ability to imagine the importance of basic principles through a sense of physics. In astronomy, observation practices using telescopes are important.

④ Seminar

Reading in turns and discussions among a few students will allow students to acquire new perspectives on physics, ways of thinking, and ideas. Through this, students recognize the

difference between their understanding and ways of thinking from that of other students. Such seminars also give students a chance to acquire universal ways of thinking on their own. In addition, a seminar is a chance to correct the misguided beliefs and misconceptions that are likely to develop by studying alone.

⑤ Themed research (graduation research)

Imposing graduation research as the culmination of physics and astronomy learning is very significant. In graduation research, students conduct research on single themes by integrating the contents of physics and astronomy that have been accumulated and studied so far, as well as techniques obtained from student experiments. They will experience the flow from problem setting to planning, execution, analysis, discussion, and summary of the experiments. In these processes, students tackle unknown data, which is different from student experiments, where even the results are clearly set up in advance. There are many cases where students notice differences between results from data and conclusions written in textbooks and papers, so it becomes a good opportunity to start thinking about the cause. Even theoretical research provides an important opportunity to investigate approximations and applications beyond the scope of student exercises, and to recognize natural phenomena as the things themselves.

⑥ Extracurricular learning (outside of class learning)

It is difficult to learn physics and astronomy only within the time of a class set in a curriculum. Therefore, it is important that students learn outside of the classroom on their own initiative. Self-learning opportunities, such as problem exercises administered by teachers in charge, will help such learning outside class.

⑦ Other learnings

Besides the abovementioned studies, there are many examples, such as discussion training (tutorials) and voluntary seminars that are conducted at the students' initiative. Using these opportunities, it is necessary to organize appropriate curricula. In particular, tutorials play important roles in the universities in the UK, USA, and Canada but are rarely used in Japan.

(2) Evaluation methods for learning achieved

The evaluation of students' achievements is an important task that fosters the present abilities and gauges the potential abilities of students. There are also many research results pertaining to methods of evaluation, and the utilization of ICT is being considered. Concerning learning in physics and astronomy, in which students understand natural phenomena by linking theoretical considerations with experimental ones, the most fundamental evaluation methods are described here.

① Midterm examination, term-end examination and quizzes

For theoretical considerations, understanding of basic principles, and their adaptation to natural phenomena, essay-type examinations are effective. Such assessments can be used to judge the knowledge and concepts that students have acquired, as well as their abilities in mathematics, logical expression, and answering questions. These assessments can also be used to judge which problems students cannot understand individually. For these purposes, the examination needs to present important questions based on the content of the present lectures, as well as questions that students can logically answer step-by-step.

For examinations using multiple-choice questions, even if an answer is correct, it does not necessarily mean that the student correctly understands the concept or the law. If a student cannot correctly answer when the same concept or law is quizzed in different questions, the student may not have correctly learned the material. These mistakes may be caused by strong preconceptions and misconceptions that originate from everyday sense and experience.

② Experiment report and experiment notebook

Since experiments are classes where students conduct measurements and observations using their own hands, their ability in experiments can be judged, to some extent, from the submitted reports. The students' thinking patterns, as well as their understanding of physics and astronomy, will become clear from the written contents of the reports, limited not only to factors such as purposes and principles of the experiment, methods for organizing and handling experimental data, and flow from data analysis to discussion and conclusion, but also extending to logic, simplicity, completeness, and articulation. It is also important to learn how to take experimental notes. In recent years, using experiment notebooks has been required from the viewpoint of research ethics, so it will be a good training.

Besides these conventional evaluation methods, it is important to introduce new evaluation methods. As an example, there is a rubric evaluation that has been gradually attracting attention and recently adopted as an assessment of students in seminars and graduation research. Students inherently have their own characters with both strong and weak points. Even if a student is good at some subjects and has high overall ability, there are many cases where the student may not excel in some unexpected respect. For the graduation of students, it is required to enhance the evaluation by understanding the strong and weak points of students, so that they develop their abilities in physics and astronomy and obtain knowledge with which they can actively work as competent adults and professionals.

Since evaluation and the goal of study are a pair, the evaluation must clearly present the goal and evaluate the level of the achievement. Also, it must adopt methods to evaluate the ability to achieve the goal appropriately. As for the evaluation methods, there are problem exercises, essay-type examinations, oral examinations, and minutes of group discussion. It is important

that the evaluation is not only a relative evaluation that compares the achievement level of a student with those of the other students but also an absolute evaluation that judges how much an individual student has grown. Furthermore, besides evaluations by teachers, self-evaluation and mutual evaluation among students have significant educational relevance.

Evaluations indicate to students what they should learn and enhance the self-evaluation ability of the students themselves. In this sense, lecture evaluations for teachers are becoming important. For organizing curricula, it is necessary to adopt appropriate evaluation methods by investigating the education policy and its contents.

6. Relation between specialized education and liberal-arts education for development of citizenship

(1) Citizenship fostered by learning physics and astronomy

Besides students specializing in physics and astronomy, when other students in science and liberal-arts courses learn physics and astronomy as general liberal-arts subjects, it is important that they acquire the abilities listed below. It is beneficial for all students who will support the society, economics, and culture in Japan in the future to know that physics and astronomy share a natural philosophical character.

① Critical thinking

People are not necessarily born with a correct perception of nature or other things. Students who have learned physics and astronomy make propositions that are not contradictory to basic principles, through their own observations, and try to form a unified natural view. Such behavior also applies to self-recognition. When students encounter phenomena that are incompatible with their own worldviews, they should thoroughly consider their observations, experiments, ways of thinking, beliefs, and judgements, while at the same time thinking about the reasons for what they are observing. By doing so, they seek to obtain deeper understanding of the phenomena. Students who have acquired such critical thinking skills by learning physics and astronomy cultivate their own ability to judge without being influenced unduly by the thinking of others, and to doubt the obvious with intellectual honesty. If more citizens can think critically, a healthier society will be formed where people are not deluded by pseudoscience, fraud, or false rumors.

② Natural judgement

In the development of physics and astronomy, many hypotheses have been proposed. However, many of them have been disproven by experimental results, i.e., “natural judgements.” No matter how precisely logical and without contradiction a person considers their hypothesis to be, nature may uncover flaws. People who have learned physics and astronomy can better understand and come to terms with nature. In terms of general life skills,

the objectivity of motivation will be cultivated as well.

③ Whole-universe perspective

By better understanding the nature of the universe, a perspective can be born regarding one's own existence, i.e., a human being is a living body on a planet called Earth, orbiting around a fixed star named the Sun, which exists at the periphery of the galaxy 4.6 billion years ago. As a result, the person can understand daily phenomena such as earthquakes, explosions of volcanos, and weather disasters in terms of the nature of the planet called Earth. Furthermore, the person can consider the sustainability of Earth's environment and human being in terms of not only the global perspective (entire Earth) but also universal (whole-universe) perspective.

④ Group work in experiments and seminars

In bachelor courses of physics and astronomy, experiments and seminars are conducted in groups. There, the personal ability of a student and his/her strong and weak points show up clearly. Therefore, education where students understand their own characters and complete experiments and calculations that cannot be performed by oneself in collaboration with the other students will cultivate the spirit to respect the autonomy in discussion and behavior and respect for other students.

(2) Necessity of liberal arts education for students majoring in physics and astronomy

According to the reports on the results of the questionnaire [13] taken by 777 graduates in FY2004 and FY2005 at 45 faculties and 39 universities related to physics and applied physics, it is clear that students are aware of their deficiencies in what they have learned in bachelor courses. These results are consistent with the teachers' observations. (The contents of the education results are described in Chapter 4, (2) ③ Social and occupational significance of acquired abilities.) Here, let us consider the meaning of liberal-arts education while referring to the results of the questionnaires. Besides the curriculum organization, it is also related to the students' own learning goals and motivation.

① Deficiency in communication ability

Graduates regret the lack of development of their abilities of expression in Japanese, conversation and writing in English, self-expression, communication with those who are illogical, and presentation (with humor). For students learning natural sciences, the ability to write papers developed from experiment reports and scientific communication is one of the most essential intellectual abilities in life. Together with the ability to present logically, it has long been considered important to obtain such abilities. Nevertheless, there are some students who consider their abilities in such categories to be poorly developed. Therefore, it is

important to further strengthen education to improve abilities in writing sentences and expressions. For persons moving in international society, English education is important in all fields, including physics and astronomy. The other parts related to productive humanity are fostered not only by the university subjects but also through extracurricular activities.

② Deficiency of knowledge and technique

The items of knowledge and techniques that students themselves feel deficient in are mathematics, chemistry, biology, geology, general engineering, medicine, sociology, computer, law, economics, and finance. As subjects related to the above fields are offered by many of the universities, students can learn by themselves through their own life experience. Students need to acquire the tools to learn by themselves based on lectures in the liberal arts. Each university needs to organize the curriculums to meet such demands. On the other hand, the awareness of students is important as well. This is because, while in university, students tend to think that specialized subjects are important but neglect liberal-arts subjects. Therefore, it is also necessary for the university faculty to actively acquire and develop "stimuli" and teaching methods that sensitize students to the importance of liberal-arts education.

③ Problems in behavior and thinking patterns

Graduates are deficient in understanding sensitive matters, weak in their consciousness of their relationship with society, weak in their ability to get things done based on only impractical discussion (which tends to be limited to abstract discussion), and deficient in their thinking ability toward applications. In the middle of the 17th century, Descartes divided all things in the world into "material" and "spiritual" based on his concept of "Dualism." Historically, this has possessed important meaning, because physics began by focusing on the parts that could be mathematically described after that division. Later, this led to Newton's achievements. To understand that spirit, it is necessary to endeavor to know a person's "heart" through subjects other than physics and astronomy. This will lead to consciousness of their connection with the human society.

As mentioned above, considering the characteristics and history of physics and astronomy described in the present reference standards, there are abilities that can be acquired by learning these subjects. On the other hand, weaknesses may present the result as well. Considering the complementarity and respective importance of the humanities and social science education, it is crucial to provide a broad range of liberal-arts education, including research ethics and the history of science.

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＜Reverence material 1＞ Process of discussion

2015
March 12
Committee for Physics (2nd, Phase 23rd)
Application of the Sub-Committee on Examination of Reference Standards
Selection of the caretaker

April 24
Board Meeting of Science Council of Japan (212nd)
Establishment of Sub-Committee on Examination of Reference Standards

May 22
Board Meeting of Science Council of Japan (213rd)
Selection of the members of Sub-Committee on Examination of Reference Standards in Physics Field

July 20
Sub-Committee on Examination of Reference Standards in Physics Field (1st)
Selection of board members
Formulation of reference standard plan
About future process

September 14
Sub-Committee on Examination of Reference Standards in Physics Field (2nd)
Formulation of reference standard plan

December 25
Sub-Committee on Examination of Reference Standards in Physics Field (3rd)
Formulation of reference standards plan
About open symposium

2016
March 30
Committee for Physics
Approval for the Report of Sub-Committee on Examination of Reference Standards in Physics Field (Plan) "Reference Standards of Curriculum Organization for Quality Assurance in Each Field of University Education, Physics and Astronomy"

August 26

Committee on Quality Assurance in Each Field of University Education (6th)
Approval for the Report "Reference Standards of Curriculum Organization for Quality Assurance in Each Field of University Education, Physics and Astronomy"

＜Reverence material 1＞ Progress of Symposiums

2015

March 21

"Expectations for physics from different fields: Reference standards in the field of physics", The 70th Annual Meeting, The Physical Society of Japan (Waseda University)

July 18

"Quality assurance in universities", Symposium of the Astronomical Society of Japan (the University of Tokyo)

2016

March 19

"Reference standards in physics and astronomy", The 71st Annual Meeting, The Physical Society of Japan (Tohoku Gakuin University)