

The Development and Quality Assurance of Graduate Education

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Graduate Education Expansion

Japan's graduate school system was described by Burton Clark in 1993 as an "empty show window" (Clark, 1993). The description implied that while there certainly existed a system of graduate schools, defined in fact by the "school education law," but with an organization and curricula that were quite inadequate.

Graduate school education in Japan before the 1990s, especially in the fields of humanities and social sciences, took the form of an "apprenticeship" to train a professorial successor in an extraordinary way. The personal relationship between the master and pupil was important. The master does not teach nor help pupil to learn, but the pupil absorbs the master's professional knowledge and technique as in the traditional world of arts and crafts. The apprenticeship can exist only if the master accepts a very small number of pupils. If the number of pupils were to increase, the master would have to invent a more efficient way of preparing a successor.

This world of the graduate school in Japan before the 1990s imposed a quantitative limit on its size. As Figure 1 shows, the number of students enrolled in Japanese graduate schools over the period 1955 to 1990 consistently increased, but never exceeded 100,000. But subsequently, the number suddenly expanded and showed a great leap. During the ten years from 1990 to 2000 the number of graduate students more than doubled

The recent development of academic research and the needs for human resources with professional expertise, led the Ministry of Education in the early 1990s to publish

the “Science and Technology Basic Plan” and to implement a special policy for the development of graduate schools. As a result, the number of students in graduate schools has increased, now to a level of over 250,000 full-time students enrolled in graduate schools.

Figure 1 # of Graduate Students

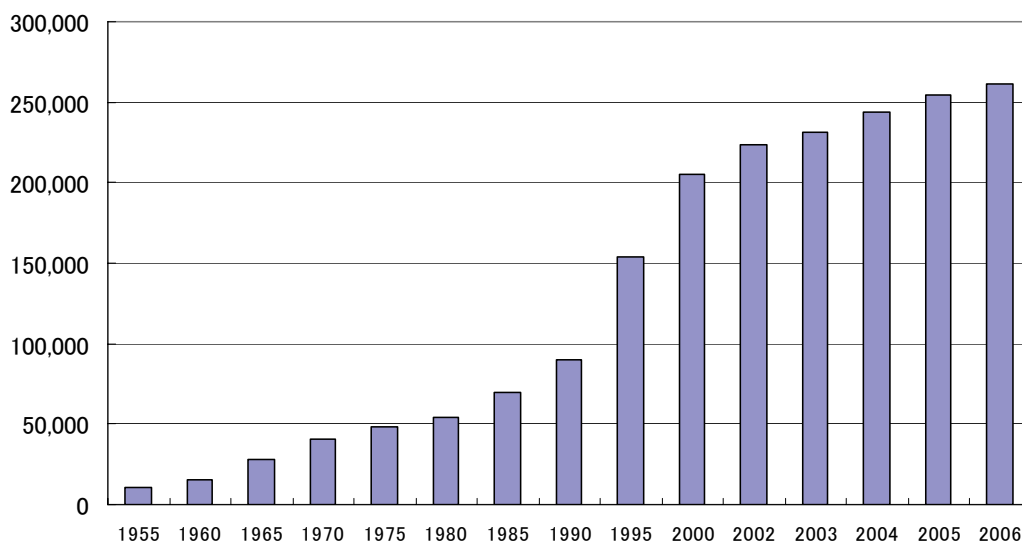


Figure 2 shows the proportion of graduate students in the total undergraduate and graduate student population. Before 1985 the proportion had never exceeded four percent. This small percentage was consistent with a continuation of graduate education as an apprenticeship. Figure 2 indicates the rapid growth in the proportion through the 1990s and by 2006 graduate students had come to constitute nine percent of total student numbers. The increase of graduate students in the 1990s changed and continues to change the structure and function of graduate education in Japan.

Even so, although Japanese graduate education expanded in the 1990s, by international comparison the proportion of graduate students is still low. Figure 3 compares the number of graduate students per 1,000 inhabitants in seven countries. It shows that on this *per capita* basis the number of graduate students in Japan is about a half of that in the US, France, and the UK, only one third that in Korea with respect to full-time students. Similarly, the proportion of graduate students to undergraduate students shown in Figure 4 is also lower in Japan than in other countries with the exception of Russia.

Figure 2 % of Graduate Students in Total Students

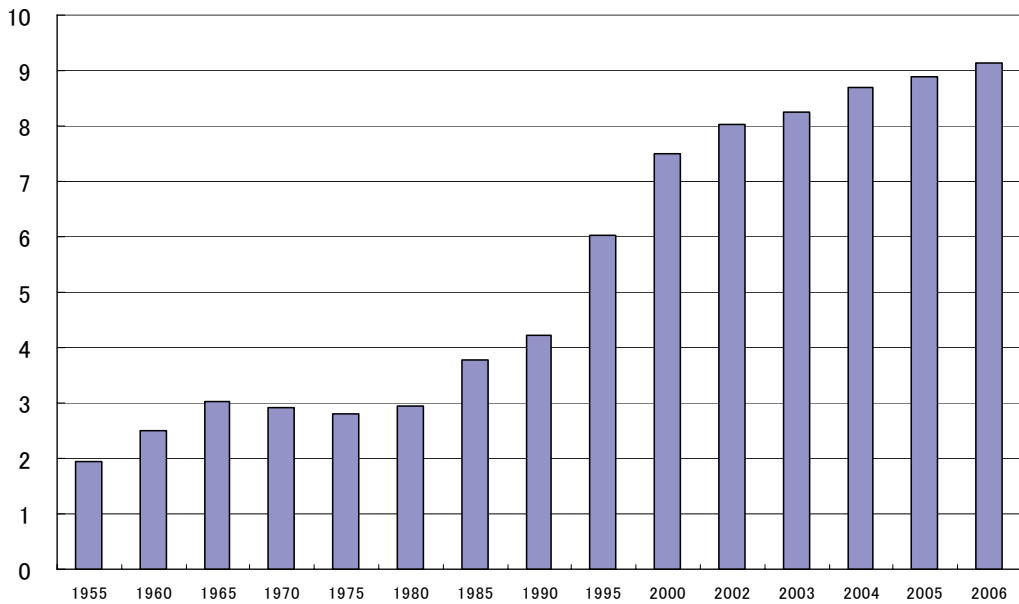


Figure 3 Graduate Students per 1,000 Habitants

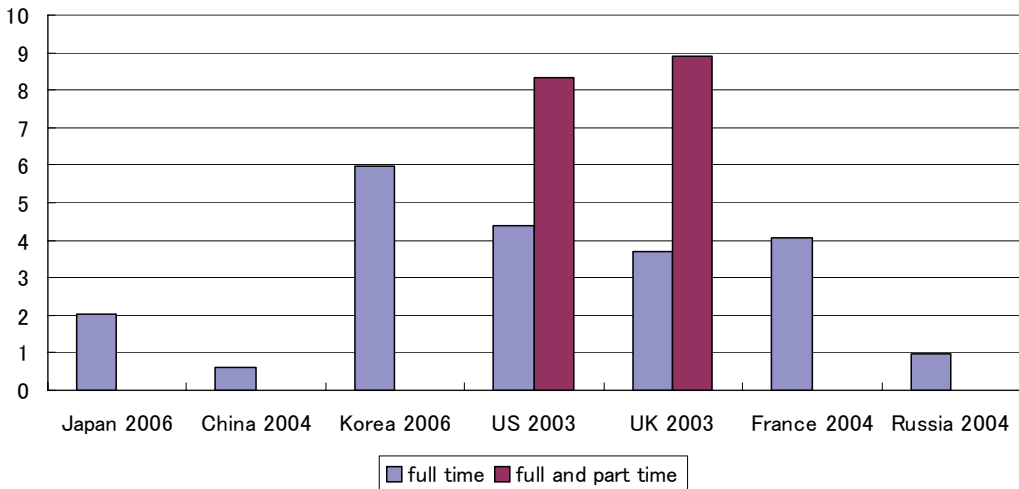
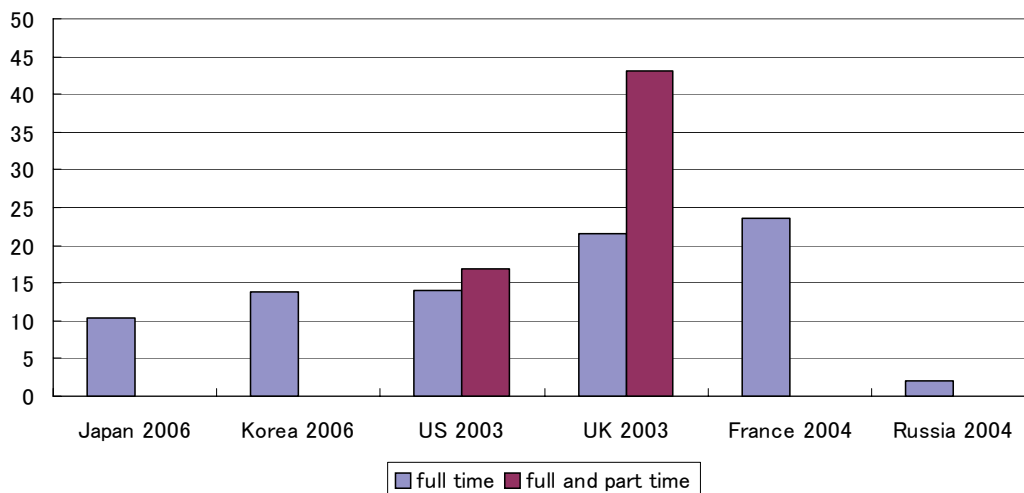


Figure4 % of Graduate to Undergraduate Students



Backgrounds for Graduate Education Expansion

There were several reasons for the expansion of graduate education in the 1990s. The Ministry of Education had begun to pay special attention to the development of graduate school education and to develop policy from early in the 1990s. The driving force for their attention lay in the perception of a strong need for the development of science and technology, which is regarded as the key to economic growth and welfare of the nation in the modern world. This need was expected to be fulfilled through the development of the graduate school. The current rapid change toward implementation of a knowledge-based society now requires an increase not only of scientists and engineers but also of other graduates with high-level professional expertise derived from advanced training provided by graduate school in areas such as law, accountancy, business administration, and clinical psychology.

In addition to the economic and utilitarian demands at national level, globalization of the economy has also stimulated development of graduate education. Japanese industries have built production plants in many foreign countries and, both overseas and in Japan, more and more Japanese workers have been employed by foreign firms and more foreign workers employed by Japanese companies. This globalization of the economy has raised the demand for graduates with high level international communication skills and knowledge as well as engineering and business expertise.

Globalization of higher education itself has contributed to development of the

graduate school. Numbers of foreign students, mainly from Asian countries, have increased rapidly since the 1980s and increasingly scholars move between countries and institutions. Excellent foreign students and scholars expect to have excellent graduate education and superb research environments. So there has been a need to provide world class facilities and graduate education, with its implication of standardization of curricula and requirements for completion.

International competition in education and research at graduate level has also stimulated the reform of graduate education. To the inherent competitiveness of academic research are now added mass media reports of the competition between researchers, especially in biology, medical sciences, IT, nano-technology, space engineering, and physics, to achieve world-first findings or discoveries. And those involved in higher education are now interested in the ranking of university education and research levels according to surveys published by The Times Higher Education Supplement and the US News and World Report. Thus the quantitative size of graduate schools was and will be expected to increase due to the need for increases of scientists and engineers, professionals with advanced specialized skills, increased enrollment of working people, adult graduate students, and foreign students.

The new need for graduate education has changed the system of the Japanese graduate school. Graduate courses have traditionally been developed by being attached to undergraduate courses in the same university. However this basic structure has not met the new needs for graduate courses. So since the 1990s new types of graduate schools have been established without the traditional one to one connection between undergraduate and graduate courses in the same institution. Some seven types of new graduate program are to be found now in Japan:

- 1) universities offering only graduate programs (14 universities) : these institutions do not provide any undergraduate courses;
- 2) distance learning graduate schools (18 universities) : graduate education is provided by web, TV, video, and prints by regular mailing.
- 3) evening graduate schools (25 universities) : these are mainly for adult students with full time employment status;
- 4) joint graduate schools with private research institutes (105 universities) : a university and a private corporation can jointly establish a graduate school;
- 5) professional graduate schools (93 universities) : in April 2003 a new graduate school system was established to provide practical education for various professional fields; these graduate professional schools were established in areas such as law, business administration, technology management, accountancy, public

policy, public health, clinical psychology, intellectual property; a new professional graduate school for teacher training will start from 2008;

- 6) joint graduate schools (11 universities) : two or more universities can jointly establish graduate schools which cover special fields of study, usually those with high costs and small demand but which are necessary for society, such as veterinary medicine;
- 7) a super joint graduate school : a graduate school established by eight national, public, and private universities is planned to open in 2010 to provide programs in education and research in the areas of natural sciences and engineering.

Directions for Graduate School Education Reform

The Central Council for Education has played an important role in deciding the future directions of Japanese graduate education. Under the Ministry of Education, the Central Council for Education consists of leaders from various groups, such as business, academia, arts and sports, and advises the Ministry about the future directions and policies for Japanese education. The Central Council acknowledges the importance of graduate schools for human resource development with high capabilities and in 2005 published a reform plan for graduate education “Graduate School Education in the New Age—Towards Development of Internationally Attractive Graduate School Education”.

The Report tacitly denies the apprenticeship model of graduate education and emphasizes that graduate school education should be based on course-oriented systems that have defined educational goals, specified terms of study and structured curricula. The Council seeks clarification of the objective of each graduate course, and organization and implementation of systematic educational programs that lead to degrees. Moreover, the Council aims to establish an evaluation system for graduate schools, able to participate in international activities for quality assurance, and supports the formation of centers of excellence in world class education and research.

In its report, the Council distinguishes four functions of graduate schools:

- 1) fostering researchers with rich creativity and excellent research/development abilities: this can be identified as a research training function;
- 2) fostering professionals with advanced specialized skills with highly specialized knowledge/abilities: this provides professional education.
- 3) fostering academics who combine credible education and research ability: this function emphasizes a requirement for both teaching and research as abilities of

academics.

- 4) fostering advanced and well-educated human resources that can offer a variety of support to the knowledge-based society: this can be regarded as a commitment to advanced liberal arts education.

According to the Council's report, graduate school should provide three types of course:

- 1) doctoral courses, to cultivate high-level research abilities and rich scientific knowledge sufficient to enable graduates to undertake independent research activities as a researcher or for active participation in various fields in society that require higher level expertise;
- 2) master's courses, to nourish wide and deep scientific knowledge and cultivate research abilities and excellence appropriate to permit a graduate to perform a major role in highly specialized occupations;
- 3) professional degree courses, designed to equip professionals in designated disciplines with advanced specialized skills across a wide variety of courses for post graduate students and working people and to cultivate highly specialized knowledge and abilities that are internationally valid.

Course-Oriented Programs leading smoothly to the Award of Degrees

In the 1960s and 70s college graduates enjoyed a good employment situation due to the rapid economic growth. Japanese industries, which adopted a life-long employment system, provided employees with on-the-job training, sometimes at a level higher than that available in graduate school. But post-graduate students, with masters' or doctors' degrees sought employment only in the academic market as teaching and research staff in higher education institutions; in contrast, students with bachelors' degrees had opportunities to be employed in the wider labor market including manufacturing and service industries or government service.

Thus graduate education had functioned as academic training for succession to a supervising professor. This meant that students began to study their research topic in their master's program through one to one training by their supervising professor: lectures and other classes by teachers other than their supervisor in the master's course were considered as less important. Neither masters nor doctoral courses could be regarded as well organized or structured.

However in its reform plan, the Council emphasized the importance of course work by which a student can systematically get credits in a range of subjects, and cultivate the basic background to areas related to the main subject. The schedule for a

course-oriented program includes standardization of credits obtained in graduate courses. Previously, each graduate school had calculated credits for fieldwork, laboratory work, seminars, and other components differently so there was no national standard against which credit was accumulated. Further, in most graduate schools, a research-based master's thesis constituted a degree requirement. The Council advises abolition of this requirement so that a master's degree can be awarded simply on the basis of completing the credit requirements of the program. The Council also proposes to increase the flexibility of the master's program through introduction of major and minor fields of study and of joint degrees.

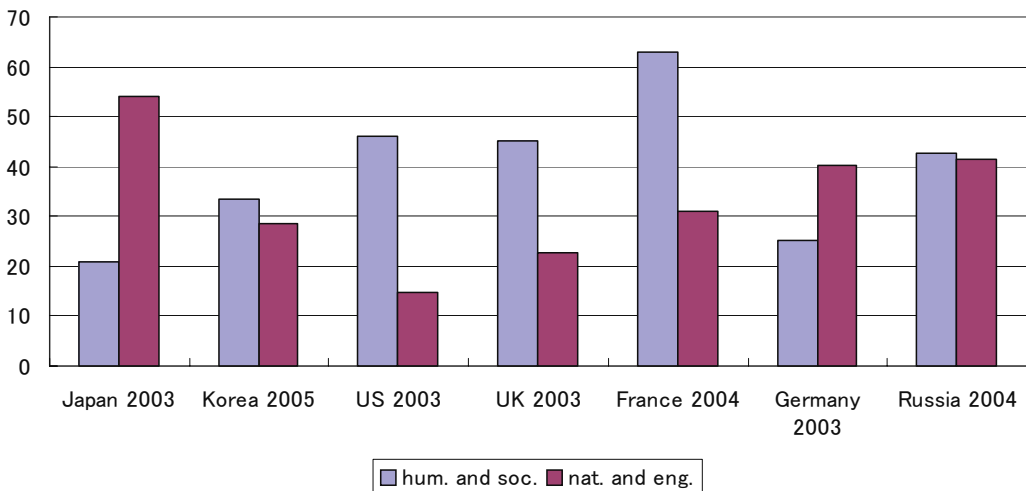
The Report of the Council also addresses the need to reform the process and management of education in doctoral courses through systematic curricula for the five years of a doctoral degree: measures such as reviewing admission methods and course work, provision of guidance in thesis writing, and arrangements for examination of doctoral dissertations. It also proposes establishment of short-term doctoral courses.

These recent reforms of graduate schools seek to facilitate effective contributions to building a knowledge-based society and to promoting the international recognitions and reliability of the courses and awards. To achieve these ends, the Council seems to emphasize the educational function of graduate school in fostering human resources equipped with rich scientific knowledge rather than researchers with only narrow specialized expertise.

One of the characteristics of advanced academic degrees awarded in Japan is that majority are in the areas of physical and biological sciences, engineering, agricultural sciences, and medical sciences: a much smaller percentage receive degrees in humanities and social sciences. In 2002, more than 42,000 received master's degrees in the sciences and technologies, while about 16,000 were awarded in humanities and social sciences. At doctoral level, the trend is even clearer: only 986 got degrees in humanities and social sciences while more than 9,000 received doctorates in natural sciences.

Figure 5 compares the distribution of master's and doctoral degrees awarded according to fields of study in seven countries. In France the proportion for humanities and social sciences is about double that of the natural sciences and engineering; in contrast, in Japan the proportions are reversed with more than 50% awarded in the natural sciences and engineering but only 20% in the humanities and social sciences.

Figure5 % of Degrees Aswarded by Study Fields



For promoting international recognition and reliability of Japanese graduate schools, the Ministry of Education encourages the completion of postgraduate degrees within the standard terms of study. Especially in the humanities and social sciences, the doctoral degree used to be awarded to well-established scholars who had already published many research papers and accumulated other research achievements. In order to implement the changes sought by the Council, the definition of the doctorate degree needs to be changed from that of “honor or reward” for established scholars to a “certificate of competence” to teach or research. But by itself, this may cause a problem in the quality required for a doctoral dissertation and the doctoral degree.

The Council recommends encouraging faculty members to facilitate the award of degrees and to clarify the process of awarding them. It also proposes to admit the submission of dissertations written in the English language for foreign students and to introduce the doctoral candidate system. In a course-oriented graduate program, the role of faculty members becomes more important in course-work through provision of regular teaching, in research supervision, thesis advice and dissertation writing, examination of academic dissertations. To improve graduate education, faculty development (FD) programs need to be promoted at both national and institutional levels. In addition to FD, the Council also supports introduction of evaluation of the educational activities of faculty members through evaluation by students and by achievement of post-graduation employment. It also encourages introduction of faculty employment and promotion on the basis of educational experience and achievement.

However, the emphasis on course-oriented graduate programs may lose the unique system of awarding the degree of “doctor by dissertation” by which researchers in industry or public research institutions can obtain doctoral degrees based on their research achievements without being enrolled in graduate school or completing prescribed coursework. This problem acquires an additional dimension through the development of industry-academia cooperative educational programs among both existing graduate schools and industry and the new types of graduate schools. Such developments are expected to expand through a combination of factors: new opportunities for employment of post-doctorals, provision of new external sources of funding to higher education institutions, and increased demand for research and development programs. The current “doctors by dissertation” system is an important facility in the cooperation of universities with business and industry in fostering human resources and strengthening research and development.

Project Based Funding

Accompanying reform of graduate education, the Ministry of Education has apparently replaced its nominally institutionally flat and equal resource allocation system by one, especially for research support, that is project based and competitive. Since 2002, the 21st Century Center of Excellence (COE) program has subsidized building research bases in order to create world-class research and education centers in designated academic fields, to raise the level of science and technology research, and to develop highly creative human resources. The research fund of the COE program has been allocated to institutions selected on competitive base by third-party evaluation. In four years from 2002, 274 centers in more than ten disciplinary fields at 93 universities were selected and supported; the annual amount of subsidies amounted to over \$300 million dollar. Since 2007 another program, the “Global COE”, has begun to provide support for a more limited number of 63 research projects; and a second scheme, the “Top-Class COE” program has also started with the selection of five institutions.

Several other research funds are allocated on competitively. The largest is Grants in Aid for Scientific Research administered by the Ministry of Education and the Japan Society for the Promotion of Science (JSPS), which accounts for 40% of competitive research funding. These grants are available for a wide range of research topics, research budgets, time, and organization for natural sciences, medical sciences, humanities, and social sciences though the funds are predominantly allocated to natural and medical sciences.

Support for “Basic Research Programs” is provided by the Japan Science and Technology Agency (JST). The JST uses a top-down approach to select research projects in key fields that are considered important to achieve strategic targets specified by the central government. In December 2007, JST decided unprecedentedly to allocate a special research fund to Kyoto University to support induced pluripotent stem (iPS) cell research as an initiative to sustain the international leadership of its research group. Other Ministries, such as Health, Internal Affairs and Communications, and Environment, and other governmental organizations, such as the New Energy and Industrial Technology Development Organization (NEDO), also provide research funds on a competitive basis.

The more competitive research funds have expanded, the more the cost of administration in research institutions has increased. To compensate for this cost escalation, the need for overhead costs has been recognized and now most funds provide up to 30% of their research funds as administrative costs.

In order to promote scientific activities, it is also necessary to support young scientists and doctoral students financially. In the large-scale research project funds, such as CEO, post-doctoral fellows can be employed as researchers on a term-limited basis. The JSPS also provides research fellowships for doctoral students and post-doctoral researchers that include research funds and living allowances. In addition to the regular scholarship program supporting graduate students, the Council plans to increase the funds for young scientists and to provide competitive research funds that can be used for employing teaching assistants and research assistants so that post-doctoral and doctoral students are able to earn stipends.

Quality Assurance of Graduate Education

Providing more opportunities for higher education was always a priority for higher education policy during the second half of the 20th century. But, with a declining birth rate, all those completing high school and who want to go to college can now actually have that opportunity. A new priority policy issue is now quality assurance of higher education. The issue of quality assurance is also related to the impact of globalization of higher education. The Ministry of Education identifies global contribution and cooperation through education and research as a role of the graduate school. So the Ministry attaches importance to ensuring the international validity of academic degrees and establishing an international quality assurance system for universities at both undergraduate and graduate levels.

Over time, there have been basically two ways to monitor quality assurance of higher education in Japan; one is provided as an ex-ante regulation under the law for “Standards for the Establishment of Universities; the other is by regular evaluation after establishment as ex-post-facto checks. As yet there is no clear distinction in quality assurance between undergraduate and graduate programs. Although quality assurance by ex-ante regulation has been the traditional way and ex-post-facto procedures are new, having been introduced following the central government’s regulatory reforms in several sectors. The Ministry of Education is now planning to implement quality assurance of graduate schools by both methods. A new approval system for establishing new graduate schools and departments and regular evaluation after establishment and for existing schools are being introduced.

The “Standard for the Establishment of Universities” was set by the Ministry of Education as an ordinance in 1956 for approval of the establishment of a university. Although formally the Ministry approves establishment of a new university, it is the Council for the Establishment of Universities and School Corporations that examines the application documents. The Council consists of 400 scholars, who are mainly faculty members of national and private universities, so university establishment approval can be regarded as a peer review evaluation. The Council reports to the Ministry on the application that a university submits in order to establish a new university or department. The application includes information on the content of curriculum, the numbers of teachers, the area of land for the school site and buildings, the qualifications of teachers, the system of self-monitoring and evaluation, dissemination procedures for information, faculty development, and so on. The Council evaluates especially strictly the teachers’ qualifications because both the Ministry and the Council consider these to be essential to maintain the quality of university education. They evaluate the degree certifications for teachers, their accomplishments in research publications, teaching experience at universities, and job experience, taking into consideration the subject matter of the courses of which the teacher will be in charge.

In the 1960s and early 70s the demand for higher education was so huge that many private school corporations wanted to establish new universities and to expand existing universities. At that time quality assurance of higher education could be interpreted as quantitative control of the numbers of enrollments and expansion of the numbers of faculty and educational facilities. The Standards for the Establishment of Universities functioned merely to maintain a minimum level of quality in university education and research. This is not a system easily adapted to actively promote quality

assurance and improvement after establishment as it offers no checks subsequent to establishment. Regular evaluation is required for this purpose.

Certified Evaluation Organizations

Regular evaluation is basically carried out by internal self-monitoring or self-evaluation and external third party evaluation. There are three objectives identified for evaluation: to assure quality by evaluating whether education and research activities attain an accepted standard; to improve education and research activities by evaluation of the results; and to supply information on education and research activities to the wider society.

There are three mandatory evaluation activities in Japan. First, in 1999, national, public, and private universities began conducting self-monitoring and self-evaluation to maintain the quality of their institutions. Second, in 2004, the Ministry required all universities across the country to be evaluated by one of the certified evaluation organizations every seven years. Each university has to be evaluated by a certified organization with respect to its education, research, organization, management, and facilities; professional graduate schools have also to be evaluated every five years on their curriculum, teaching staff and other activities. Third, after the national universities were given independent corporate status in 2004, each of them is to be evaluated with regard to achievement of its mid-term targets and plans by the new National University Corporation Evaluation Committee (NUCEC) at the end of the 6-year mid-term period.

Several evaluation organizations have been established and certified: a government agency, the National Institution for Academic Degrees and University Evaluation (NIAD-UE); and voluntary or private organizations - the Japan University Accreditation Association, the Japan Institution for Higher Education Evaluation, and the Japan Association for College Accreditation. The Japan Law Foundation is engaged in evaluation of professional law schools. By April 2007, 140 universities out of a total of 734 had been evaluated by one of the certified evaluation organizations. It is still not apparent what degree of impact the certified evaluation system will make to the reform of universities as its impact has been so recent and limited at this time to only twenty percent of institutions.

Evaluation for National Universities

The National University Cooperation Evaluation Committee (NUCEC), established under the Ministry of Education, evaluates the achievement of the mid-term goals and plans at the end of six year mid-term goal period of the national universities. NUCEC is engaged in comprehensive evaluation of the national universities but it does not evaluate the whole range of activities. For assessment of their education and research activities it expects to use of evaluation results obtained by NIADUC. NUCEC also monitors progress by the national universities to achievement of their mid-term goals and plans on annual basis, too but these evaluations are restricted to the areas of financial and administrative management: this accords with the idea that education and research need a certain amount of time to demonstrate outcomes and should be evaluated over a rather longer period of time. Consequently, the national universities have already experienced NUCEC's annual evaluation of financial and administration management in 2004, 2005, 2006.

The results of the whole evaluation will be used by the individual universities and NUCEC in setting the mid-term goals and plans for each national university for the next period of 6-years. Even more significantly the results will be used to determine block grant allocations for the subsequent 6-year mid-term period. Although the completion of the initial mid-term period falls in 2009, the actual evaluation will be conducted in 2008 to provide continuity in provision of block grant allocations and definition of the second period of mid-term goals and plans beginning in 2010.

Each national university's self-monitoring and self-evaluation report on the quality of education and research in each of its departments and graduate courses is evaluated by NIAD-UE. The evaluation of education activities covers organization for education, the curriculum, methods for education, educational achievement and employment of graduates. The evaluation of research activities includes performance of research and the activity, publications and achievements of faculty members in each department and graduate school.

In the final stage, NUCEC assesses the overall achievement in implementing each university's mid-term goals and plans across the areas of financial and administrative management and the education and research activities which are evaluated by NIAD-UE. NUCEC will assign grades at five levels and publish them in a final report: the grades will range from "5 points excellent" (achievement of mid-term goals is excellent), to 1 point (much more effort is required to achieve the mid-term goals).

Problems of Quality Assurance and Evaluation

The now comprehensive evaluation system has developed from almost nothing in the 1990s. It is still early to judge the effects of the system but already there have appeared some problems in at least the national universities. First, evaluation activities seem to be time and energy consuming ones for all those who are involved - notably administrators, faculty members at both graduate and undergraduate level and university presidents. For each national university, preparing mid-term goals and plans, conducting self-monitoring and self-evaluation every year and again every six years are extra tasks imposed after the 2004 incorporation reforms. A survey conducted by National University Finance and Management in 2006 revealed that some university presidents and administrative directors expressed the view that evaluation activities take administrators' and faculty members' time and energy which would otherwise have been spent on teaching and research activities.

Second, if a national university does not achieve its mid-term goals and plans, there will be a real possibility that its budget will be cut. This might make universities self-protective and weaken their attitude toward attempting demanding missions: safety might be perceived to lie in specifying easy rather than challenging objectives in mid-term goals and plans. The system of university evaluation was intended to invigorate education and research activities and promote their quality and administrative efficiency. But if evaluation activities are too much demanding and the results of evaluation are used to curtail the budget through failure to achieve fulfillment of objectives, their effect will be limited and "fomularization" - with the implication doing much according to the rules but attempting little - and fatigue will be the major outcomes. This might require some kind of meta-evaluation --- evaluation of the evaluation system: but ironically this would imply additional costs.

Summary

This paper describes the development and reform of graduate education in Japan. The number of graduate students has increased double during the 1990s. The Ministry of Education and the Central Council for Education tried to reform graduate education toward internationally competitive and cooperative since the early 1990s. This paper explains the directions for the reform, the new definition of graduate courses, the introduction of course-oriented program, smooth degree awarding, faculty development for graduate school, and the Centers of Excellence programs. In the

second part of the paper, the quality assurance of graduate education is discussed. After it distinguishes an ex-ante and ex-post evaluation, three types of ex-post evaluation are explained; self-monitoring and self-evaluation; evaluation by certified evaluation organizations; evaluation of national university corporation. Finally it points out the problems of current quality assurance activities.

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