

[Kakenhi Essay]

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A Quest for Fundamental Knowledge with Breadth and Depth

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On the subject of JSPS grants-in-aid for scientific research, I would have to say my strongest memories derive from an undertaking on the theme, “Kankyo to no kankei de jocho to natta idenshi no taika ni yoru seibutsu no shinka” (“Evolution by Loss of Genes that Have Become Redundant in Relation to Changing Environments”). This was a project approved for a Grant-in-Aid for Scientific Research (S) in 2004. Although I had applied for assistance on the understanding that this project would be a culmination of the research work I had performed up to that point as well as an innovative step forward, I was more pleased to learn that it gained high marks as an undertaking designed to link with multiple fields rather than limit itself to a single, specialized domain. That sense of satisfaction led me to think about academic research and graduate-level education in a world where science and technology has become increasingly segmented and specialized.

One venture of the JSPS is its Summer Program. If we trace that program back to its roots, this year will mark its 20th anniversary. Twenty years ago, JSPS’s total grants-in-aid budget for scientific research was finally approaching 100 billion yen, a scale in line with long-established goals. It was around this point in time that graduate schools began expanding quantitatively on a prioritized basis. The summer program is a two-month event under which researchers throughout Japan host visits by doctoral and postdoctoral researchers from five leading Western countries: the US, UK, France, Germany, and Canada. To date, the program has served over 100 participants each year and functioned as a vehicle for invaluable academic and cultural exchange with young researchers from Europe and North America. From the early days, I was involved in the implementation of program-related orientation sessions and presentations of research findings and found this program to be a useful forum for international comparisons with Japanese doctoral students. One significant difference had to do with their maturity as future researchers in terms of a couple of basic traits: namely, their mental preparedness and the breadth and depth of their knowledge of the fundamentals.

Incidentally, in its July issue (No. 552) this year, the Institute for the Development of Higher Education (IDE) ran a feature article on the current realities of graduate school education in Japan. In that article, Deputy-Director General Yutaka Tokiwa struck a strongly sympathetic chord in me with his view that, in an age of globalization, Japanese graduate schools will inevitably face the task of expanding education that transcends the boundaries of individual specializations. This sense of sympathy also extends to Masao Maruyama's criticism of Japan saying that it is an "octopus pot society" where each Japanese is alone in his or her pot, cut off from others, only linked by a piece of rope that holds all the pots together. Of course, the increasing subdivision and specialization of academic learning had been subject to strong criticism even before Maruyama's time. For example, the lecture that Soseki Natsume gave in Akashi on "*Doraku to shokugyo*" ("hobbies and occupations") is well-known. In it, he contended that academics and experts who treat increasingly subdivided fields of knowledge and learning as their specialties or hobbies are oblivious to the world outside their own areas of study or research. This was the reason Soseki rejected the title of "doctor." His insistence on the matter reportedly caused quite a stir in the sold-out lecture hall at the time. However, Max Weber also makes a valid point: namely, that those who devote themselves solely to the realm of knowledge and learning will be able to fulfill the goals of their profession in the long run and experience the joys of that achievement only if they totally seclude themselves within the confines of their specialty. At the end of the day, the challenge will require knowledge of a certain depth and breadth that is difficult to acquire in parallel. In any event, there is a limit to the level of knowledge that any one individual may command but in this context, Tokiwa puts everything into perspective with the following point. After the Great East Japan Earthquake and tsunami disaster of March 2011, members of the academic and scientific communities in Japan diligently applied the perspectives of their respective expert fields but displayed a lack of coordination that exposed the inability of the nation to apply its total power. Albeit conceding the limits of individual knowledge, our modern social structure treats the coordination and fusion of different fields of cutting-edge knowledge as essentials.

The novelist Hermann Hesse was another person that studied the nature of individual knowledge. In *The Glass Bead Game*, the novel that earned him the Nobel Prize in Literature, Hesse notes that all Castilian institutions and citizens must be aware of only two goals or ideals. In other words, they should strive for vitality and resilience in their specialties and personal lives by achieving complete mastery of their respective fields and constantly striving to establish and maintain close connections with other fields. If by analogy we take this utopian view of Castilian society and apply it to

Japanese universities, graduate schools, and research institutions, Hesse's remarks serve in unmodified form as a set of respectable guidelines for the individual as well as a foundation for the linkage and consolidation of knowledge. I think this viewpoint deserves even more emphasis at the application screening stage for the grant assistance that forms the basis for research endeavor in Japan.

Establishing connections between one's own field and other fields demands breadth and depth in basic knowledge. Doctoral programs offer an excellent opportunity to acquire that breadth and depth, and education programs in general need to integrate mechanisms that facilitate the same thing. Comprising one such framework at the national level is the Research Fellowship for Young Scientists DC (PD) through which the JSPS supplies Grants-in-Aid for JSPS Fellows. Currently at Sokendai, 37 of the researchers in our doctoral courses and eight engaged in postdoc work have received support of this kind, thus allowing them to pursue their research on an independent basis. Incidentally, in academic year 2010 we created a President's Award, which, as an additional source of support, is designed to encourage thesis research with acquisition of the educational and research goals of academic mastery and broad-based perspective in mind. Eligibility is not that different from the JSPS research fellowship for doctoral course (DC) students and is open to researchers in the first or second year of their doctoral research. Special attention is given to research accomplishments made during the master's program; specifically, the achievements must not be a result of work performed as a research assistant to one's academic advisor. In that sense, candidates are rigorously evaluated in terms of their research autonomy or independence.

Traditionally, the title of "doctor" applied to individuals with deep and broad knowledge; it was not meant to refer to those with perspectives so narrow that they have no comprehension of things outside their chosen field. Given this understanding, the goal expected of graduate school education should be simple and clear: namely, to cultivate scholars worthy of the title. The pursuit of doctoral research backed by broad and deep basic knowledge not only provides society with fresh knowledge that at times can lead to innovations; it is also an effective approach to the education of future researchers that will excel on the global stage. The nature or quality of the education that doctoral students receive prior to concentrating on their doctoral research is an issue at the graduate school education level. As education reform and changes in awareness continue to evolve, I hope that Japan's graduate schools will produce talent capable of competing on a level commensurate with doctoral candidates in other advanced industrial nations.