

Speech at the Working Lunch “Cooperation between Academia and Business”

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Thank you for the introduction. It is a great honor for me to have the opportunity to speak at this prestigious STS Forum for the second consecutive year. In keeping with the session’s theme, I will take a look at some of the issues of higher education at universities. And during the discussions later, I will talk about some of the collaborations that NEC is currently undertaking.

Science and technology have a heavy responsibility to help solve the various issues that humans face, such as the energy and environmental problems represented by global warming. Universities and other institutions of higher education have the role of educating future scientists and engineers. In Japan, however, we are witnessing more and more students drifting away from scientific and engineering fields. As shown in Appendix 1 in your handout, a total of 78,000 students enrolled in science and engineering at national, public, and private universities in 2005. This is a 14% decrease compared with 2001, when about 90,000 students enrolled. Out of the 12,000-student decrease, the 11,000 at private universities is significant.

This phenomenon is not limited to Japan. Similar trends can be seen in the US. The results of a survey published by the Computing Research Association, an American organization comprised of over 200 scientific and research institutes in the field of computer research reported that there were 12,500 new students majoring in computer science and computer engineering in 2005. This figure represents a 21% decrease from the previous year, when there were about 16,000 new students in those fields. Looking only at computer science courses, there was a 50% decrease in enrollment over five years, from 16,000 new students in 2000 to 8,000 in 2005, as shown in Appendix 2.

For example, at MIT, the number of new students majoring in computer science dropped from 385 in 2001 to 200 in 2004. And at Stanford, the number dropped 30% in two years,

from 170 in 2001 to 120 in 2003.

The reasons that students are drifting away from the sciences may differ by country. In Japan, some people point out one possible reason. Under the current university entrance exam system, even students who really like science avoid it in university because a cramming style of science education is forced on them during preparations for their entrance exams. Other factors can even be seen after graduation from university. Examples include the level of income in related manufacturing industries, the harsh working environment in the information service and software industries, and the general lack of significant recognition by employers.

A similar situation has arisen in the US. Computer science is a field that offers great rewards to researchers and scientists. For instance, computers help to solve the riddles of the history of the universe and contribute to the development of human culture. However, awareness tends to focus on the practical aspects of computers. So, this field is seen by the general public as being less attractive than ecology and chemistry, which seem to present great and unlimited possibilities.

Now I would like to take a moment to look at the problem of deteriorating academic skills among university students. A certain Japanese research group conducted a survey of 11,400 professors and assistant professors at 600 departments in about 400 universities. In response to the question "How much of a problem is the deterioration of academic skills in your department?", 61% of the instructors said, "It is a problem; in some cases, the class cannot meet its objectives."

Looking at a breakdown of the responses by academic division, the highest ratios were in the science and engineering divisions at 75%. Conversely, the ratio was only 38% in medical divisions, where studies are highly specialized and there are clear job opportunities after graduation.

The most serious problems can be seen in science classes in the first year after enrollment. Particularly in the case of physics, the conditions for completing high school courses have diversified due to the negative curriculum effects of the current university entrance exams. This has resulted in a huge variation in academic skills among new students. So, it is no longer possible to conduct uniform physics classes for all students.

Some university instructors analyzed the factors behind these problems. They included (1) low motivation to tackle problems independently, (2) a lack of the ability to think logically and to express ideas clearly, and (3) a lack of Japanese language skills, leading to an inability to understand basic course content.

Speaking from the perspective of a company hiring university students, I have recently seen a decrease in the number of graduates from science and engineering departments who are able to think logically about complex problems. The time spent as an engineer after entering a company is far longer than the time spent as a student. And different positions require different types of individuals and different skills. Employees are requested to acquire new skills after they enter the company through lifetime in-house and external training programs. I expect our employees to improve themselves and to become more adaptable during their lives. In this regard, I expect university education to help students strengthen the foundation for their future needs.

Today, the education in engineering courses has become increasingly fractionalized. In addition, students will face different demands after entering a company, that is, the ability to integrate diverse, complex knowledge to create new value. As an example, even if a student wants to study nanotechnology, it is difficult to find an appropriate university course.

Moreover, the frameworks of technology are changing significantly. The borders between fields are disappearing. Thus, education must take a more interdisciplinary approach. We are no longer able to apply precise definitions to fields such as mechanical engineering, applied chemistry, and electrical engineering. Universities should make a greater effort to emphasize their own characteristics.

And industry needs to put more effort into fostering talented personnel, for example, by designing and implementing university-based training programs or by participating in joint research and development activities at collaborative laboratories designated as centers of excellence, which combine the knowledge and wisdom of both industry and academia.

With the dropping birthrate in Japan, we have to raise the bar, that is level of education and foster truly outstanding engineers to maintain our international competitiveness in industry. In closing, let me say that what is truly needed right now is education that will

offer a wide range of training, including extensive scientific and technical knowledge as well as knowledge of the humanities and the social sciences that helps students develop insight into the future.

Thank you very much.