Learning Histories and Careers

The Outcome of *Kosen* (National Colleges of Technology) Education

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Although research on "learning histories and careers" is an interesting theme that highlights links between educational and labor policy, it is an area in which much is still unknown. Based on the experience of analyzing a survey of graduates from national colleges of technology (*kosen*), which we conducted in 2015, I decided to propose research tasks connected with "learning histories and careers" through a series of questions. Here, I will introduce the results of analysis on the following four questions. First, I will measure the output of education in *kosen* colleges and consider factors that will improve this output. Next, I will focus on the knowledge and skills of active engineers, rather than knowledge and skills when graduating, and will examine how adult competence is formed. Third, I will verify the question of whether *kosen* education enriches careers after graduation, taking account of adult competence. Finally, I will pose the question of how to grasp the diversity of learning histories and careers.

I. Introduction

Japan's institutes of tertiary education include a unique type of school not widely known to the public, called "national colleges of technology." From here on, I will use the Japanese term *kosen* (abbreviated from *Koto senmon gakko*) when referring to these colleges. Unlike the standard four-year university education system, which accepts senior high school graduates (aged 18), *kosen* colleges are institutes of tertiary education that accept junior high school graduates (aged 15). For the next five years until age 20, these students are trained in practical skills needed by society.

There are now 51 national *kosen* colleges across Japan. The first was established in 1962, and most of these colleges have a history of more than 50 years, and still, the overall number of *kosen* students is not that high. While around 90,000 students enter the engineering faculties of four-year universities every year, the total number entering *kosen* is only about 10,000, or a mere 1.6% of the 610,000 students entering university as a whole. Thus, *kosen* colleges have only a minor presence as institutes of tertiary education responsible for training engineers, and their existence is little known among junior high school students. In

fact, junior high school students who consider advancing to *kosen* tend to be rather unique individuals who have had a strong interest in technology since their childhood.

Though rarely a topic of general conversation, *kosen* colleges are held in high esteem by some specialists in engineering education and in sites of manufacturing, where value is placed on the strengths of their practical education oriented toward a curriculum of experiments and practical learning. Meanwhile, praise for *kosen* education seems to be increasing overseas rather than in Japan, and the Japanese abbreviation *kosen* is often used and understood internationally. Sir Howard Newby, one of the reviewers in an OECD team that came to review Japan's policy on tertiary education, had this to say on the subject: "*Kosen* education is wonderful. I was impressed. But I think the problem is that university and particularly graduate school education is weak."[1] In the review team's report, published in 2009, *kosen* colleges are again praised as being admired internationally and being high-quality, innovative institutes of tertiary education (OECD 2009).

Despite such high international acclaim, however, this type of school is not very well known domestically, and though praised for the high quality of education; there is no evidence to prove how a *kosen* education actually enriches graduates' careers. For *kosen* to develop further still, it is vital that they open a broad dialog with society and seek critique from a diverse range of stakeholders, rather than resting on praise from a narrow spectrum. To this end, it would be wise to start by clarifying the outcome of *kosen* education to date and to convey its output to society.

With this intention in mind, "*Kosen research*" was launched as part of the "Innovative Japan Project by *Kosen*" supported by the Program for Promoting Inter-University Collaborative Education of the Ministry of Education, Culture, Sports, Science and Technology. Existing research with the aim of "researching *kosen*" seems to have been limited to *Careers of kosen graduates and kosen education* (JIL 1998). Inspired by this research, we decided to broaden the scope of research subjects and empirically clarify the connection with graduates' learning histories and career formation. With the help of 13 *kosen* colleges across Japan, we carried out a graduate careers survey in 2015, receiving responses from around 3,400 respondents aged between the late 20s to under 60. The outcome of this joint research by seven researchers was reported in two symposia.[2]

The research study on "learning histories and careers" is an interesting theme that highlights links between educational and labor policy, and has become a focal point for discussion on educational reform. Although there is valuable existing research by economists and pedagogists (Matsushige, ed. 2004; Nakahara and Mizokami, eds. 2014), it is an area in which much is still unknown. Our *kosen* Research includes not only themes unique to *kosen* but also universal output common to tertiary education. If the outcome of *kosen* education that is so highly acclaimed at home and abroad could be used as a benchmark, the nature of universal problems currently afflicting tertiary education could be made clear.

With this in mind, I decided to propose research issues related to "learning histories and careers" through a series of questions. Here, I will introduce the results of analysis on the following four questions. First, I will measure the output of education in *kosen* colleges and consider factors that will improve this output. Next, I will focus on the knowledge and skills of active engineers, rather than knowledge and skills when graduating, and will examine how adult competence is formed. Third, I will verify whether *kosen* education enriches careers after graduation, taking account of adult competence. Finally, I will pose the question of how to grasp the diversity of learning histories and careers.

II. What are the factors that improve learning output upon graduation?

I would like to start by examining the output of education as the starting point of vocational careers. Although measuring output is in itself a major task, we focused on three types — "academic record," "school satisfaction" and "generic skills when graduating." On generic skills, we set indicators for universal skills that should be mastered as engineers in any specialist field, and asked to what degree the students

had mastered "skill in grasping the essence of a problem from an experiment," "skill in creating things while thinking them out for yourself," "skill in finding new ideas and solutions," "cooperation skills" and "presentation skills" **when they graduated** from school (using a five-point scale from "sufficiently mastered" to "had not mastered at all"). In this paper, I will base my discussion on the assumption that the mean points of these five generic skills represent the qualities demanded of all engineers in common.

What I would first like to introduce is how the three types of output are determined. Educational output is determined through collaborative and mutual efforts between teacher and student, but because the circumstances on the teacher's side could not be researched, I measured the effect of the student's own effort and learning opportunities on output. For this, I used the following 18 variables.

1. Variables before entering *kosen*
   "Liked machines, robots, electric appliances, etc. at junior high school" (response chosen from a four-point scale)
   "Grades in the third year of junior high school" (five-point scale from "near the bottom" to "near the top")
2. We asked how enthusiastic the students had been during their *kosen* days (on a four-point scale from "very enthusiastic" to "not at all enthusiastic") with regard to the following eight areas.
   "Lectures in specialized subjects" / "Experiments and practical learning in specialized subjects" / "Graduation research" / "General education subjects in humanities and social sciences" / "General education subjects in sciences" / "English learning" / "Factory practical learning and internships" / "After-school activities"
3. "How many of the specialized subjects were so enjoyable that they excited you?" (four-point scale from "none" to "more than half").
4. Evaluation of *kosen* life (four-point scale from "very applicable" to "not at all applicable" on the following four topics)
   "Received specific individual instruction" / "Life was carefree as there were no entrance exams to take" / "I was lucky to have good teachers" / "I was lucky to have good friends"
5. Frequency of reading books at school (mean frequency for the following five genres)
   "Philosophy" / "History" / "Literary fiction" / "Specialist publications" / "Business"
6. Self-study hours per week (average for the five years)
7. Employment dummy variable (after graduation, enter employment = 1, continue studies = 0)

Table 1 shows the result when the three types of output are made dependent variables and multiple regression analysis is performed to see what impact the above 18 variables have. To avoid excessive complexity, only a standardized coefficient (standardized partial regression coefficient) is shown. The empty boxes represent variables that do not have a statistically significant impact (significance probability 5% or more [p value>0.05]). One may conclude that the larger the value of the standardized coefficient, the greater the impact on the output (variables with a standardized coefficient greater than 0.048 have a p value of less than 1%).

As the Table 1 shows, the difference between the three types of output appears conspicuously in the size of the coefficients and the empty boxes, which is more interesting than was imagined. Let us first look at the academic record. Of the factors determining the academic record, the coefficients are largest for "enthusiastic about lectures in specialized subjects." Students are not only enthusiastic about specialized subjects but also about "general education subjects in sciences," "graduation research" and "English learning."

Furthermore, while the figure for "self-learning and study hours" is high, this is unrelated to having "good teachers" or "good friends." Students with a good academic record appear to be learning

Table 1. Differences in factors determining the three types of output (figures represent standardized coefficients)

		Academic record	School satisfaction	Generic skill upon graduating
Characteristics before entering *kosen*	Liked machines, robots, etc. at junior high school	-.055		.096
	Grades in the 3rd year of junior high school	.050		
	Enthusiastic about lectures in specialized subjects	.312		
	Enthusiastic about experiments and practical learning in specialized subjects			.169
	Enthusiastic about graduation research	.075		.100
	Enthusiastic about general education subjects in humanities and social sciences			-.048
	Enthusiastic about general education subjects in sciences	.161		.045
	Enthusiastic about English learning	.044		
	Enthusiastic about factory practical learning and internships	-.049		.106
	Enthusiastic about club or circle activities, etc.		.104	.100
Frequency of exciting subjects	Proportion of exciting specialized subjects		.079	.095
	Received specific individual tuition		.046	.083
5-year education learning life	Life was carefree as there were no entrance exams to take		.169	.044
	I was lucky to have good teachers		.129	.079
	I was lucky to have good friends		.317	.100
Frequency of reading books	Frequency of reading books at school (except manga)		-.057	.103
	Self-study hours at school	.105		
Pathway	Employment dummy (enter employment = 1 / continue studies = 0)	-.122		-.067
	R2 adjusted for degrees of freedom	.336	.285	.323

autonomously and independently rather than through study based on instruction from a teacher. Combined with another characteristic, i.e. that there are many students who had good grades at junior high school and enter university after graduating, the learning style of students with excellent academic records comes into focus. Their characteristics are also very evident in the two variables with the minus sign. They did not like "machines, robots, etc., at junior high school" and were not very enthusiastic about "factory practical learning and internships" while enrolled at *kosen*. Rather than practical engineers, they could be called theorists.

Quite in contrast to these theorists, those with high levels of school satisfaction leave nothing but empty boxes, indicating no relation with their enthusiasm about the subjects taught. They are only enthusiastic about after-school activities. The largest coefficient is provided by "was lucky to have good friends," and they seem to have enjoyed a "carefree life." Nevertheless, a high level of satisfaction does not only arise from a life unrelated to study. There were many "exciting subjects" for these students, who feel lucky to have had "specific individual instruction" and "good teachers." Moreover, satisfaction levels were not related to their characteristics before entering *kosen*, but were affected by opportunities and conditions after entering.

The third output, generic skill, differs greatly from both academic record and satisfaction levels. These students liked robots and machines at junior high school, were more enthusiastic about experiments, practical learning and graduation research than about lecture subjects, and were also enthusiastic about factory practical learning and internships. In other words, they were positive about aspects seen as the strengths of *kosen* education, and about key subjects for becoming practical engineers. Not only that, but many of them also liked after-school activities and reading books, had a wide range of interests, and felt lucky to have had "specific individual instruction," "good teachers" and "good friends." Nevertheless, they

appear to have had no interest in general education in humanities, which is flagged as negative. Although the values of the standardized coefficients are small, this suggests the need to consider ways of improving general education in *kosen*.

Students are diverse, with different characteristics before entering *kosen*, different learning interests, and different interests in the curriculum; they use the official curriculum of subjects and the hidden or unofficial curriculum in campus life depending on their respective interests. Although ways of dealing with learning opportunities will differ greatly from individual to individual, the three cases seen in Table 1 are not limited only to *kosen* but would appear to be iconic student types seen in any campus. Those with excellent academic records could be seen as studious theorists, while those with high satisfaction levels are the friendly type who value their human relationships and have a highly cooperative nature. Students with good generic skills, meanwhile, are the practical types who have a strong interest in experiments, practical learning and creating things in sites of manufacturing. Moreover, since the results show that these three types correspond to the three types of output, they are also proof that the diverse curriculum of *kosen* education definitely has a positive influence on students' learning output.

III. How is adult competence in current occupations formed?

Next, let us move away from output upon graduating and turn our focus on the **current** skills of graduates who are now working in the field. A decline in academic ability among young people is often raised as a hot topic in school education, but the academic ability (= practical ability) of working adults is rarely brought into question. A decline in the practical ability of working adults (referred to below as "adult competence") should be a more serious social problem than that of academic ability among young people. Alternatively, even if academic ability in schools were to decrease, there would be no need to worry as long as adult competence did not fall.

Recently, there have been increasing calls for the basic skills that students should have mastered by the time they graduate from university, but it is strange that the industries making these calls do not question their own adult competence. This is a conundrum that has puzzled me for many years. The reason why adult competence is not questioned must be, more than anything, that it is difficult to measure. Recognizing the impossible, I deliberately set a bold question: "To what extent do you think you currently have mastery of the knowledge and skills shown below?" I set ten options for knowledge and skills, including "specialist knowledge on your main subject at school" and "knowledge on society and economy." Here, however, I calculate the average points for how much the respondents think they have **current** mastery of the "five generic skills" introduced above, and will refer to these averages as adult competence for engineers.

I will now introduce one reply to the question of how this adult competence is formed. Table 2 shows

Table 2. Determinants of adult competence (current generic skill) (R^2 adjusted for degrees of freedom = 0.198)

Model	Non-standardized coefficient		Standardized coefficient	Significance probability
	B	Standard error	Beta	
(Constant)	1.497	.104		.000
Kosen grades / Year 4-5	.054	.009	.103	.000
Kosen life in general / Satisfaction	.218	.019	.198	.000
Years of work experience	.023	.006	.341	.000
Years of work experience^2 / 100	-.053	.013	-.359	.000
Lifelong learning frequency points	.214	.033	.124	.000
Current reading frequency	.345	.036	.182	.000
Number of friends to consult (with)	.142	.013	.192	.000

the results of multiple regression analysis using adult competence as a dependent variable (based on a case in which generic skill upon graduating is removed from the explanatory variables, since the correlation coefficient between current generic skill and generic skill upon graduating is high).

Although the points shown in Table 2 are simple, they are very thought-provoking. First, academic record and satisfaction levels both help to improve adult competence. It may be self-explanatory that the academic record has a positive effect on adult competence as engineers. In Japan, however, the comment that the academic record during school years serves no purpose after graduation is often made in the media, and many students seem to believe it. If only for that, we need to focus on the fact that the academic record improves adult competence in working situations. Besides this, the large effect of satisfaction levels, perhaps even more than the academic record, is astonishing.

In addition to this analysis, satisfaction levels during school years have been shown to have a positive effect on various aspects of careers after graduation. School satisfaction is not the same as the evaluation when enjoying leisure visits to theme parks, for example, but is an indicator evaluating campus life as a whole over the five years. I think schools need to pay more heed to the importance of graduating with a sense of satisfaction.

Second, to improve generic skills in society, it clearly emerges that not only study during school years but also years of work experience and the frequency of lifelong learning and reading books are important as well. It is certain that years of experience in actual working situations increase the skills needed for work; this fact is reflected in the results in Table 2, suggesting the appropriateness of this measurement formula. The square of years of experience is negative because the effects of the number of years depict a parabola opening downward. Estimating the number of years when generic skills are largest only from the effects of years of experience (0.023) and the squared effect (0.053 / 100) gives a result of around 22 years. In other words, the prime working time is 22 years after graduating from *kosen*, or around age 42.

The formation of skills is affected not only by OJT based on work experience but also by learning outside work. This is evident in the effects of the frequency of lifelong learning and reading books. In addition to this, "The number of friends I can consult when I have problems at work" is another factor that increases skills as working adults. To use terms favored by sociologists, social capital is useful in forming human capital.

Tertiary education for raising the quality of engineers or for developing human resources who could enter society and be useful is often discussed. However, imposing excessive burdens and responsibilities on school education alone would merely serve to disrupt environment of education. Education during the years at *kosen* definitely has a positive effect on the skills of working engineers, while at the same time, the skills needed in the field are not acquired through knowledge and skills from school years alone. On the understanding that the true image of the much-praised *kosen* education appears in Tables 1 and 2, I think it will be productive to compare this with the output from other institutes of tertiary education, and to discuss the range of educational reform that schools can achieve.

IV. Does education enrich future careers?

In terms of system theory, the impact of educational system output on socio-economic systems outside education is called the outcome. As such, improving incomes through education is a pecuniary outcome of education, while job satisfaction, health and others are non-pecuniary outcomes. The reason why a drop in academic ability becomes a social topic must be that a decline in academic ability is thought to be accompanied by significant social impact. The skills of working engineers also represent one such outcome; these skills form parametric variables and have an impact on income and job satisfaction.

Considering educational outcomes at the level of individual lives, the question arises as to whether learning at school enriches future careers. Let me introduce two approaches related to this question. The first is to analyze behavior with focus on career path selection and vocational career; namely, what sort of

students enter the colleges, how they study, and where they find employment. These patterns of behavioral choices are directly linked to the social evaluation of *kosen* graduates.

My joint researcher Yoshitaka Hamanaka has published a valuable report on this point (Hamanaka 2016).[3] In society, it seems to be generally thought that the social evaluation of *kosen* graduates is lower than it used to be. According to Hamanaka's analysis comparing graduates by generation up to age 60, however, this kind of "*Kosen* demise theory" is not supported. As evidence for that, the report makes it clear that "The academic ability (junior high school 3rd year grades) of students entering *kosen* has hardly changed in 30 years," "It is not true that the academic ability of those entering employment has decreased because the ones with excellent grades advance to university; in fact, hardly any change can be seen in the grade distribution of main course graduates entering employment" and "The employment rate in large corporations is as high as ever, and there is also no change in the proportion of 80% finding employment in technical professions," among other findings.

The other approach focuses on the relationship between the evaluation of the current job and the learning history. Three types of job evaluation have been cited: (i) "annual income" as market evaluation, (ii) "job title" as organizational evaluation, and (iii) "job satisfaction" as individual evaluation. For finer detail, I would refer you to the report published on the Internet, but whatever analysis is applied, it is certain and beyond doubt that learning during school years enriches careers after graduation.

As an example that illustrates the relationship between education and careers, let me introduce the result of measurement of income functions based on the human capital theory. I will highlight the effects on annual income of *kosen* graduates and the characteristics of the same by dividing explanatory variables into three groups (the bold-lined sections in Table 3).

Table 3. Income functions and current generic skills (R^2 = 0.436 / income is expressed in a logarithm)

Model	Non-standardized coefficient		Standardized coefficient	Significance probability
	B	Standard error	Beta	
(Constant)	4.999	.057		0.000
B.Sc. graduate dummy	.076	.026	.048	.004
M.Sc. graduate dummy	.133	.025	.096	.000
Ph.D. graduate dummy	.113	.060	.030	.061
Other educational background dummy	.035	.082	.007	.666
Years of work experience	.025	.001	.519	.000
Corporate scale of current employer	.099	.006	.313	.000
Technical occupation dummy	.000	.016	.000	.982
No career change dummy	.135	.018	.141	.000
Engineering unrelated dummy	-.154	.022	-.117	.000
Academic record	.008	.006	.022	.203
School satisfaction	.001	.012	.001	.933
Current generic skills	.132	.011	.198	.000

The first group represents the effects of educational background and years of work experience, the basic model of human capital theory. For educational background, I took five-year main course graduates as the standard (= 0) and university faculty graduates and *kosen* special course graduates together as a "B.Sc. dummy," then divided graduate school graduates into an "M.Sc. dummy" and a "Ph.D. dummy." Included in "other educational background" are those who advanced to specialized training colleges after graduating from the main course, or who entered university but dropped out before graduating.

The fact that the coefficient for B.Sc. graduates is 0.076 means that B.Sc. graduates earn 7.6% more than main course graduates do (since this is a coefficient of log income, it can be converted to percentage through differentiation). If they advance to M.Sc. level, there is a 13.3% rise in income. This works out as a mere 3.3% increase per year over the four years from main course graduation to M.Sc. graduation. I call this a "mere" 3.3% because, in both the average image in Japan and trends in other countries, measurements of the relationship between years of education and income show that income increases by between 6% and 9% per year (Yano 2015). Compared to these figures, 3.3% is very small. What makes it so small is the relatively high income levels of *kosen* main course graduates, who provide the standard for the dummy variables. In other words, the market evaluation of *kosen* main course graduates is closer to that of university graduates than to that of senior high school graduates. This result could be said to vindicate Hamanaka's explanation that the "*kosen* demise theory" is not supported.

While one can understand that "other educational background (e.g. university dropout)" is not statistically significant, the Ph.D. dummy is unstable with a significance probability (p value) of only 6.1%; even after advancing to doctoral level, there is no great difference compared to main course graduates, with an increase of only 11.3% despite an investment of seven years. Many Ph.D. graduates tend to become teachers at *kosen* or universities, and this provides proof that teachers' salaries in Japan are not attractive. Though it's easy to laugh self-deprecatingly, the slump in Japanese science seems likely to be prolonged unless the policymakers take this fact seriously.

Another type of human capital formation is years of work experience. Unlike the formation of generic skills, the square of the number of years was not statistically significant, and so I have omitted it. In other words, income is in a linear relationship with the number of years. Even after passing the peak of generic skills at age 42, incomes do not fall but actually rise. This is an interesting paradox as evidence showing the uncertain relationship between skills and income. Although this is an important fact in terms of labor economics, I will merely highlight it as a problem, as it would be dangerous to delve more deeply at a stage when earning power is not adequately measured.

The second group consists of job-related indicators. Here, the employer's corporate scale has a bigger impact than anything. The income disparity between large corporations and small firms is strikingly evident. Although I measured whether *kosen* graduates were working in "technical jobs" or not as a dummy variable, this variable was unrelated. "Career change" is negative, in a typical Japanese structure whereby change does not pay. The practical ability of engineers as specialist professionals is easy to see and evaluate. Consequently, I was expecting that career change would be an unrelated factor, but engineers are also an integral part of the structure of Japanese employment. The other "engineering unrelated dummy" covers those whose current job is "unrelated" to the engineering field they studied at school. While these only account for just under 20% of the total, the result shows that their average income is about 15% lower.

The final group comprises indicators of learning output. Adult competence, i.e. current generic skill, has a positive effect on income. Moreover, compared to the standardized coefficient, it is the third factor following the two major factors of years of work experience and corporate scale. An individual's self-determined efforts to improve generic skills are more important than educational background, career change, or engineering unrelated factors. Conversely, academic record and satisfaction during school years do not have a significant impact on income. But this must not allow us to conclude that *kosen* learning output does not lead to increased incomes. Table 3 measures only the direct effects of academic record and satisfaction levels on income. This means that, while learning output has no direct effect, it has an indirect effect whereby it follows a path of improving generic skills in active working situations (Table 2). This is the path of school education output → improved adult competence → improved income.

Thinking of Tables 2 and 3 in conjunction, what raises the quality of engineers is school education and learning after graduation, and the output of this is primarily evident as adult competence. A pathway is formed whereby this adult competence causes an increase in income. Because the learning output from

school years is embedded in current adult competence, the direct effect of school education is difficult to see.

We should not overlook the fact that these results represent a phenomenon unique to *kosen*. However, I think the nature of the problems faced by Japan's tertiary education today would become quite clear if we were to conduct a survey of university graduates including those in the humanities, and compare several different responses to the question "Does education enrich careers?"

V. Conclusion: Diversity of learning histories and careers

If we use average-based statistical analysis to answer the questions posed in the three section titles above, the outcomes of *kosen* education are depicted quite clearly. However, the careers of diverse graduates are even more diverse. While *kosen* graduates are reputed to be just as active as university graduates, some also express dissatisfaction, in that, their employment terms are on a par with those of senior high school graduates. Job evaluations are not categorized according to educational background, but are distributed with considerable duplication. If we focus attention on this duplication, not all *kosen* graduates could be described as wonderful; judging from the free statement sections of our questionnaire, dissatisfaction is not infrequently expressed over the half-baked, unstable status of *kosen* graduates.

As we felt that the diversity of learning histories and careers might be lost with average-based analysis alone, in the joint research we also attempted to grasp the diversity of *kosen* graduates. As well as our qualitative analysis of free statement sections, we studied how learning histories and careers differed between (i) graduates working in professions that have a strong connection with their special subject at school and those working in unrelated professions, (ii) graduates who had changed jobs and those who had not, and (iii) graduates with high levels of school satisfaction and those without. The outcome of that research is due to be published in the near future, but in order to understand the diversity of *kosen* education and recognize its strengths and weaknesses, we will need to accumulate analysis from various perspectives.

My focus was on the mechanism whereby dissatisfaction is formed at school, and on subsequent careers. The reason why school satisfaction impacts future careers is that, if a person graduates with a sense of dissatisfaction, that person's adult competence will not improve; good incomes, job titles and job satisfaction will not be achieved. I was very concerned whether dissatisfaction at school is a lifelong legacy cost (negative legacy). What sort of students is more prone to dissatisfaction, what methods to mitigate dissatisfaction exist in school years, and is there any way of eliminating school dissatisfaction after graduating? Questions like this provide a certain angle for considering learning histories and careers. I will briefly introduce one aspect of this here.

Dissatisfaction at school is broadly divided into dissatisfaction with the curriculum and dissatisfaction with social relationships. Of these, dissatisfaction with the curriculum is prone to occur from the time of entering the school, and initiation in the first year is important. Dissatisfied students not only lack motivation to learn, but also the motivation to be involved in extracurricular activities; they are prone to dissatisfaction if they are not "lucky to have had good teachers" or "good friends." Those who have strong academic records despite their dissatisfaction with the curriculum choose to advance to university. It became clear that continued learning after graduation is one measure to improve adult competence and make jobs more fulfilling for students who have graduated with a sense of dissatisfaction at school.

To eliminate dissatisfaction, efforts not only during school years but also in learning after graduation are indispensable. Without this, it is highly likely that the legacy cost of dissatisfaction at school will continue into the long term. In research on dissatisfaction, the importance of learning after graduation may also be highlighted. Especially as this is an age of knowledge-based economy, research that elucidates the relationship between lifelong learning and careers, taking account of learning after graduation as well as learning during school years, is becoming ever more important.

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Notes

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