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PHYSICS EDUCATION AT AN EVENING COURSE OF A JAPANESE UNIVERSITY

Kazuo Umemura
Department of Science Division II, Tokyo University of Science, Tokyo, Japan
meicun2006@163.com

Akihiro Tomura
Department of Science Division II, Tokyo University of Science, Tokyo, Japan

Abstract

The evening undergraduate course of Tokyo University of Science (TUS) accepts 360 students every year. A predecessor school of this course was established in 1881, thus, the evening course has a 137-year history. Furthermore, this is the only evening school at the Faculty of Science in a Japanese university at present. Although the evening course has provided an opportunity for higher education in the natural sciences for citizens who graduated from high school, new demands for lifelong education in the evening course have now appeared. This paper statistically summarizes the present situation of science education in the evening course, and then discusses the future of the evening course.

Keywords

Evening Course, Higher Education, Science, Physics

1. Introduction

The importance of lifelong education has been recognized in Japan because of the extension of the lifespan and decline in the birthrate (Choi & Yang, 2012; Doyon, 2001; Hori &

Cusack, 2006; Hoshino, Nakayama, Iwasa, & Zarit, 2010; Makino, 2013; McCormick, 1989; Nojima, 1994). Various types of cultural schools for citizens have been established according to the demands on lifelong education (Maehira, 1994; Ogawa, 2013).

Some universities have had evening courses for working students from the early stages of modern university education in Japan (Iwanaga, 1994; Okubo, Matsushita, Takakuwa, Yoshioka, & Nitta, 2016). At the beginning, citizens joined with these evening schools for self-development although the schools did not provide any academic degrees. Later, one of the main purposes of the evening courses was to provide bachelor's degrees for working students who had already graduated from high school (Wen & Kobayashi, 2001).

Recently, university entrance rate in Japan has dramatically increased; the rate of attendance was 52.6% in 2017 (MEXT, 2017). As 780 universities existed in Japan in 2017, many high school students who wanted to study at universities could join the undergraduate courses of some universities. Because of this situation, many of the evening undergraduate courses of Japanese universities have closed over the past 20 years. In fact, in the case of evening courses in the natural sciences, only those of TUS have survived until now although several evening courses also continue in the engineering field.

Nevertheless, there are new demands for the evening courses at universities. For example, some students join evening courses after graduating from other universities. Their purpose in studying evening courses is not to obtain a bachelor’s degree; instead, they are motivated by an interest in lifelong education. This paper summarizes these new demands on evening courses in Japanese universities, and then discusses the future of these evening courses.

2. The Importance of Lifelong Education in Japan

Figure 1 shows an annual estimate of the 18-year old population in Japan presented by the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT). Although the number of 18-year-olds was 2.05 million in 1992, it has gradually decreased. It was 1.20 million in 2017, thus, it has reduced by nearly half in the past 25 years. Furthermore, it is expected that the same population will decrease to 0.69 million in 2065. There is no sign of a decline in this trend although the Japanese government has taken various measures to reverse the decrease.

The number of universities has been continuously increasing while the population of Japan has now decreased. Although the number of universities stood at 245 in 1960 (72 national

universities, 33 public universities, and 140 private universities), this number increased to 780 in 2017 (86 national universities, 90 public universities, and 604 private universities) (MEXT, 2017). Public universities are established by local governments such as cities and prefectures. Of the private universities, 257 cannot meet their school capacity because of the decreased number of applicants in 2016. As it is clear that the population of Japan is decreasing, there will be difficulties in the continuation of these universities.

Figure 2 shows the historical data for the university entrance ratio in Japan. The ratio reached 56.8% in 2017, thus more than half of Japanese join some university. One of the major reasons for the increase in the university entrance ratio is the increase in the entrance of women.

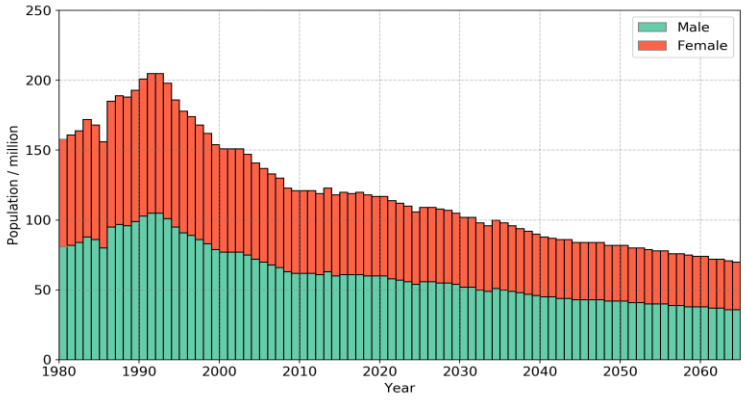

Figure 1: *18-year-old population change*

Source: Adapted from the "School Basic Survey" (MEXT, 2017) and the "Population Projection for Japan: 2016–2065" (IPSS, 2017).

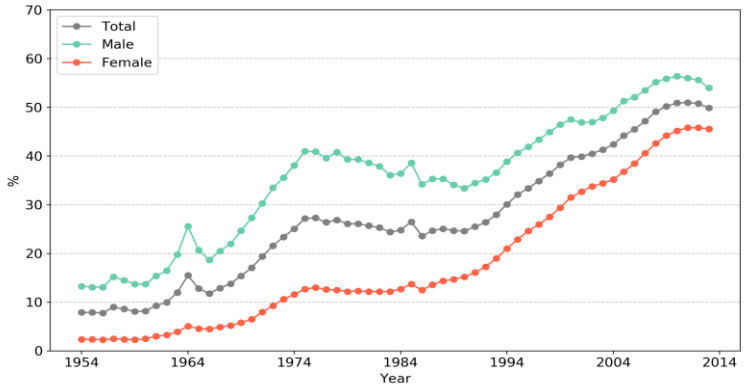

Figure 2: *Ratios of 18-year-old students who enrolled in colleges or universities*

Source: Adapted from "School Basic Survey"(MEXT, 2017),"Toukei Youran" and "Kagaku Toukei Youran"(MEXT, 1956-2017).

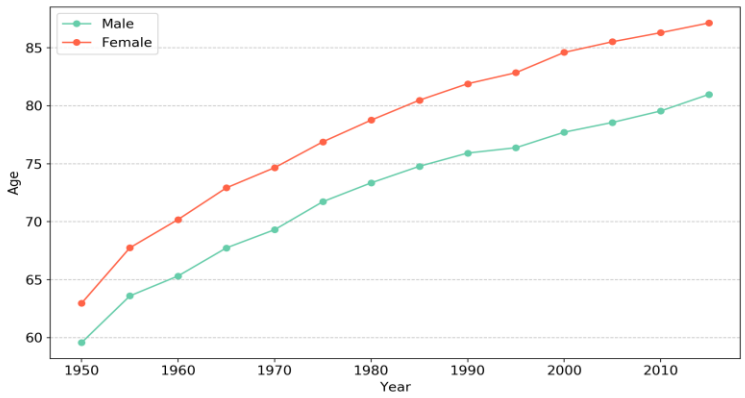

Figure 3: *Average lifespan change*

Source: "Kanni-Seimeihyo"(MHLW) (2016)

Figure 3 shows the change in the average life span in Japan in every five-year period reported by the Ministry of Health, Labour and Welfare of Japan (MHLW). The average life span of Japanese men and women was 50.66 and 53.96 years in 1947, respectively. The values were increased to 65.32 for men and 70.19 for women in 1960. Furthermore, the life span values reached 80.98 and 87.14 for men and women in 2016, respectively. MHLW estimates that these ages will rise to 84.95 for men and 91.35 for women in 2065 Considering that the usual retirement age in Japan is 65 for most people, they can expect 25 to 30 years free from work after their retirement. Hence, lifelong education becomes of greater importance (Sekiguchi, 1994).

3. Evening Courses of Japanese Universities in Science and Technology

Many evening courses of Japanese universities have been closed for various reasons over the past 20 years. For example, the evening course of Osaka City University stopped recruitment of new students in 2010. One of the major reasons for the closure of their evening course was the decrease in working students. As mentioned above, the ratios of 18-year-old students who enrolled in colleges or universities has dramatically increased. Conversely, the demand for evening courses among workers who have just graduated from high school has decreased.

Figure 4 shows ratios of working students in graduate courses at Japanese universities. In the case of master's courses, the ratios of working students in the social sciences, medical/dental sciences, education, and others are between 20 and 40%. The ratios are higher in all fields in the case of doctoral courses. The data suggest that the demands of lifelong education can be particularly found in graduate courses of Japanese universities despite many evening undergraduate course being closed.

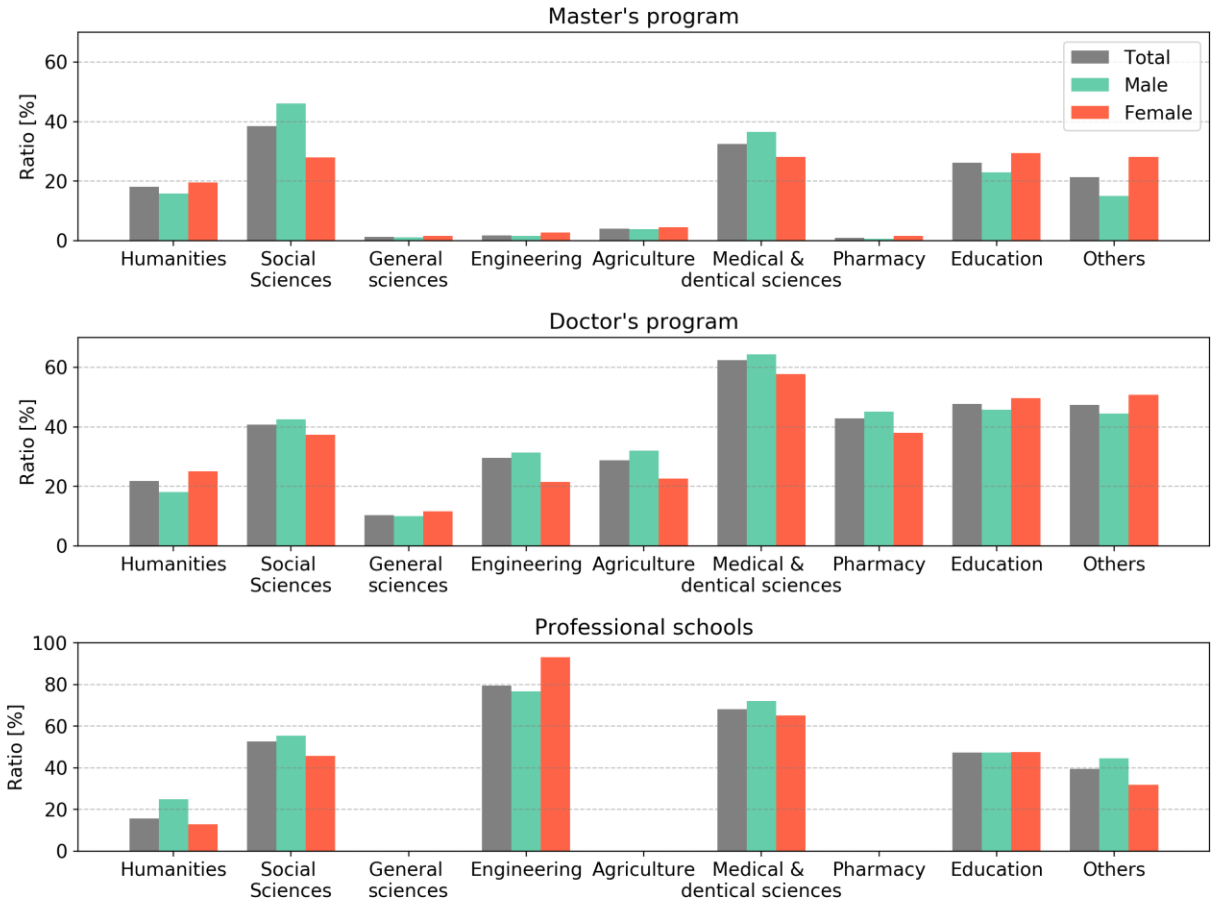

Figure 4: *Ratios of working students*

Source: Adapted from the "School Basic Survey" (MEXT, 2017)

4. The New Potential of Evening Courses as a Base for Lifelong Education

The evening undergraduate course of Tokyo University of Science (TUS) is one of the oldest evening courses in Japan. The former school offering this course was established with 20 students in 1881. The school held only evening courses rather than daytime courses. At that time, there were only two schools for the natural sciences in Japan, including the former TUS school.

Although many of the evening courses have been closed, the evening courses of TUS have survived with large numbers of undergraduate students. TUS has eight faculties and more than 20,000 students at present. Table 1 shows the present profiles of the Faculty of Science. The faculties are divided into Division I (daytime course) and Division II (evening course), and interestingly, each division has a faculty head. This may be important to understanding why the

evening course has remained alive until now as Division II can employ suitable professors for evening course education.

Table 1: *Comparison between daytime and evening courses in the Faculty of Science at Tokyo University of Science*

		Quota	Capacity in terms of facilities	Current enrolment	Transferred students from other schools	Graduate school entrance ratio
Div. I (Daytime)	Mathematics	120	420	513	0	27.4
	Physics	120	420	475	0	57.1
	Chemistry	120	420	465	0	71.4
	Applied Mathematics	120	420	472	0	23.8
	Applied Physics	120	420	464	0	55.8
	Applied Chemistry	120	420	462	1	64.4
	Total	720	2520	2851	1	50.1
Div. II (Evening)	Mathematics	120	480	546	43	25.3
	Physics	120	480	535	34	21.6
	Chemistry	120	480	558	36	36.4
	Total	360	1440	1639	113	27.7

Note. Except for graduate school entrance ratio (2016), all data are from the TUS database (2017).

Division I has six departments, and each department accepts 120 undergraduate students every year. Thus, 2,520 students can be accepted for the four-year undergraduate program. Division II has three departments, and each department accepts 120 students per year. The capacity of the evening undergraduate course is 1,440. This suggests that two-thirds of the students in the Faculty of Science belong to the evening course.

There is one significant difference between Divisions I and II. In the case of Division II, more than 100 students join the course as second or third year students. Those students stay one year or more at other universities or similar schools. Some of these students have changed their specializations after their stays at the previous school. Some other students have already graduated from other universities, and then come to the evening courses at TUS to acquire a second specialty. During the first year of the undergraduate course, most universities provide general lectures, such as English and basic mathematics. If the transferred students have already studied such basic lectures at the previous school, they can skip the similar lectures in the evening course. This effectively saves them time. These students are not necessarily working

students. For example, some are retired people. These students provide a new demand for the evening undergraduate course.

In the case of the physics department, the ratio of students who go on to graduate courses was 56.42% and 21.55% for Divisions I and II, respectively, in 2016. One of the reasons for this difference may originate from differences in the financial situation of the students. The annual costs of Division II are almost 70% those of Division I, so some of the students selected Division II because of the lower cost. When someone considers lifelong education, costs are an important factor. In addition, the number of undergraduate students who go on graduate courses has increased both in Divisions I and II. As described in the above section, the ratio of working students to non-working students in graduate courses is high, especially in the Ph.D. program. The evening undergraduate course is now becoming a gateway to lead working students into graduate courses, and especially post-graduate courses. In natural sciences education, basic experimental skills and knowledge that are acquired during undergraduate courses are very important to carry out research. When someone starts lifelong education in the natural sciences in a graduate course, basic training in evening undergraduate courses is effective and necessary. The new demands of evening undergraduate courses are found in combination with graduate courses.

4. Conclusion

We described the present outline of evening undergraduate courses of universities in Japan, and discussed the new demands for evening courses. The importance of lifelong education is now increasing owing to people's long life span, and there are strong demands on graduate courses for working students. The evening undergraduate courses are now gateways for working students to gain access to graduate courses.

Acknowledgments

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