



Necessity and Proposal of Fourth Developmental Stage Education of The Montessori Method in Japanese Science University

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Abstract

“YUTORU Education” was taught at elementary and junior high schools in Japan from 2002 to 2010. It was an experience-oriented educational policy for Japanese students to train spontaneous thinking skills, modifying the “Knowledge-packed education” that had been conducted since the 1970s. Educational institutions in Japan have reduced the learning time and content of elementary and junior high schools, aiming at the growth of both study and spirit in children, and students have received an “education that fosters the ability to live”. The last generation educated throughout the course of compulsory education is now 24 years old – 2nd-year master’s students, on their way to becoming a working people with a positive attitude towards studying in college. However, today’s students tend to be very vulnerable to mental pressure especially for boy students in science majors. Because they received affirmation from others in their desire for education, they were also sensitive to denial, strong in self-revelation, and anxious about the need for authentication in the real world, and the inconsistency between their age and mental independence. Their moratorium is often long because they can’t get away. We believe that metacognition and one-on-one dialogue with science high school and university students and teachers are useful as support in their life choices in study and research. The Montessori method considers that the fourth stage of development, is not important, that is, education at the 18-24 stage of development. We think that it is stage to recognize, and that developmental support at this stage is important. It is time to reconsider this stage in the field of education in Japan, which will continue for the next 10 years until the generation who received the last “YUTORU Education” in 2012 is a member of society.

Keywords: science university education, Montessori method, moratorium, self-development, certification desire.

1. Introduction

For about 10 years, since 2002, the Ministry of Education of Japan revised the conventional cramming education and introduced "YUTORI Education: Cram-Free Education" [1]. The purpose of this education is to provide students with the “fostering the ability to live” and increase the time for acquiring “thinking skills”, and introduced The class system, which was open from Monday to Saturday, was changed from Monday to Friday. and general subjects other than major subjects. The generation who attended elementary through junior high school, which is the compulsory education period in Japan, in this " YUTORI Education " are now in the second year of a master's program or working. Although they have a strong desire a self-assertive and desire for recognition they tend to step into society without being able to integrate themselves. These tendencies are particularly strong for science students, and it is difficult to adapt to society and business due to the decrease in basic skills due to the drastic reduction of class time in Japanese language, arithmetic and mathematics, and the spread of the Internet and SNS. This education mimics that of Western countries. Especially the third stage of the “Montessori Method” [2] is similar to “Active Learning”. Unlike many other teaching methods that do not discuss education for people 18 or older, the Montessori Method is rare in that it defines a fourth stage, from 18 to 24 years, but does not require education at this stage [3]. However, we believe that support in the fourth stage of education as the final stage of development is important in the educational progress of Japanese aged 15 to 24 years, especially in science study.

2. YUTORI Education

The YUTORI Education generation were born in 1996-2003, and as of 2019, those aged 16 to 23 are eligible. After World War II, education in Japan was greatly reformed, and the YUTORI Education system was tried and improved on several times. In Japan, what was introduced in 2002 is generally called the "YUTORI Generation" [4]. This education system aimed at cultivating "fostering the ability to live" and increased the time to acquire "thinking ability" compared to the past crammed education in Japan, a two-day weekly system (from Monday to Friday), and general subjects other than major subjects [5]. Due to the two-day work week system, class hours were greatly reduced, with language,



arithmetic and mathematics affected the most. For example, the number of KANJI learned, which is unique to Japanese culture, was reduced, and in arithmetic, the method of finding the trapezoidal area was reduced and the pi was simplified to 3 [6][7]. And this caused various problems for students.

3. YUTORI Education

As an advantage of YUTORI Education, the increased number of vacations allows students to work on lessons tailored to their individual interests. The purpose of the introduction, and at the time of the introduction, bullying and school refusal were temporarily reduced, and the number of people who took care of others increased. And so on. These are in line with the intentions of the Japanese Ministry of Education. However, fostering the ability to live and finding and solving issues independently were not linked. The school denied comparisons with other students to maintain student self-esteem and introduced both absolute and teachers' subjective assessments in communication, so that students have developed a dual standard thinking tendency between reality and ideal. The leader among the students has disappeared.

The tendency of students to go to cram school has increased due to the decrease in academic ability due to the reduction of classes with essential content. Along with that, the tendency to go to private classrooms has increased. In addition, Students spent less time teaching and teaching with their closest adult parents [7][8]. There were also many problems with academic ability. For example, teachers were struggling with the contents of the "general subject" and could not achieve the stated goal of "acquiring their thinking skills". In addition, because the number of Japanese language classes was reduced. As a result, because students did not develop the ability to think in mother's language, they could not do basic thinking in other subjects [4].

4. Science Students In The YUTORI Generation

In YUTORI Education, in arithmetic and mathematics, which are the basis of science subjects, the unit of the trapezoid area calculation method was omitted, and $\pi = 3$ was given. The method of calculating the area of a trapezoid is indispensable for introducing thinking that is the basis of graphic problems, and its lack has caused problems such as the inability of science university students to calculate the area of trapezoids and sectors. Further, these students did not understand the process of substituting integers with the assumption that pi is an infinite rational number. For these reasons, as a result, there are many students who do not understand the essence of things and have completed compulsory education without basically learning to think about things [10] [11].

However, contrary to the idea that the science thinking of the YUTORI Generation is not nurtured, enrolment rate in science is increasing. The influence of the Japanese government's promotion of science and the media is also conceivable, but it seems to be somewhat different from the reason why students before the YUTORI Generation became interested in the nature of science subjects [12].

5. YUTORI Education And Montessori Method

No example of YUTORI Education by the Japanese government is given, and we can imagine that it was modeled on the teaching methods of Western countries, we think that the teaching method has a strong similarity to the Montessori Method. First, the stage of child's development was to follow the Japanese education system, and in "YUTORI Education", Japanese government aimed to acquire "investigative power" and "thinking power". A place to "search and explore" was needed. In this regard, YUTORI Education is similar to Montessori Method. In Japan, Montessori Method is often used in early childhood education because it does not match school education, but the third stage as an educational method is closest to "Active Learning" recommended by the Ministry of Education, Culture, Sports, Science and Technology in recent years [13].

6. Necessity For Support Education In The Fourth Stage Of Development

It will take 10 years for the last generation of YUTORI Educated students to graduate. Currently, the second year of working adults or two master's course students have received YUTORI Education in all compulsory education courses. We treat full-YUTORI Generations and those around them as educators, and recognize the need for fourth-stage educational support through dialogue with them.

Montessori describes the urge that adolescents have to evaluate themselves from the outside. She uses the term "valorization". She believed that what the children in the third stage were working on was the building of the adult self in society. She wrote very little about the fourth stage of development, the age of 18-24. She envisioned "the young adult" who had been through Montessori Method up to the third stage, as ready to fully embrace cultural and scientific research [4]. She argued



that there was no need to arbitrarily limit the number of years in university-level research, as cultural research could continue throughout a person's life.

However, in the Japanese YUTORI Generation, students move up to the fourth stage without the education to the third stage she advocated. Not having the Montessori Method, students did not establish the "sense of justice and personal dignity" that we desire in the young adults, but the "sense of justice and personal dignity" of this period became instead so-called "adult situation" and "repression from adults". Students would become "irritated" and might erupt in a claim for justice or as a reaction to adults, and further lead to "confidence without backing or reason". In other words, the mental aging peculiar to the YUTORI Generation is a prolonged third stage, and a slow and long decline.

7. The Need For Support Education In the Fourth Stage of Development: Especially For Science Students

Moratoriums like Chapter 6 are particularly common in Japan for colleges of technology and colleges of science. Japan has a low science girls' population among developed countries [14]. This tendency is even stronger in environments with a high proportion of men, as men tend to communicate only conclusions to others when compared to girls.

In addition, the third stage is consistent with the terms of junior high and high school education in Japan, but "KOSEN: colleges of technology" are 15 to 20 years old and do not match the educational development stage. KOSEN is a Japanese-specific science education institution that provides students with specialized education in engineering, technology, and merchant shipping, and aims to train practical engineers [15]. At KOSEN, students spend five years in an "isolated" environment, as they spend time in only boys and like-minded people. They have less chance to exchange opinions with those with different opinions and thoughts, so they acquire biased thinking. We think that students should be educated in the fourth stage at KOSEN. Many KOUSEN students go on to science universities, and science college students from coeducational high schools have the same syndrome as those from colleges of technology. In this paper, we will call this the "The Science Boy's Syndrome".

The Science Boy's Syndrome is in line with the popular YUTORI Education term of the Internet and SNS of the YUTORI Generation. Their compulsory education time was spent in the "unreal world" on the net, not as learning or experience in the "real world". Therefore, their communication methods are different from those before the YUTORI Generation. For example, there is a sense of familiarity and a sense of understanding in communication on SNS, and communication in smartphones is a reality, and the real world is an unreal world. Montessori did not develop the fourth stage in detail, because most children are growing up before they enter the society at the age of 18, and they grow up to the stage of learning instead of being given. We think that it is. In other words, we should be such places and facilities. However, when students who were underdeveloped in the third stage or had the Science Boy's Syndrome entered the fourth stage, they often worry that they don't know what to do or stop growing. They cannot find their purpose and themselves in college. As teachers of higher education in science, we think it is necessary to support boy students with The Science Boy's Syndrome.

8. Conclusion

Support Education In the Fourth Stage Of Development And The Science Student Boy's Syndrome Of The YUTORI Generation: Dialogue

We propose "dialogue" as appropriate support for the syndrome of boy science students of the YUTORI Generation. Although mass education for people age 18-24 is difficult, it can be implemented through "discussion" in group work at colleges and universities, seminars in laboratories, and individual research guidance. We also think that "dialogue" is useful as an appropriate support method for the YUTORI Generation who is The Science Boy's Syndrome.

As mentioned in Chapter 6, the students are not cutting themselves off and have a desire to communicate with others because they seek communication in the unreal world. Furthermore, in the unreal world, such as SNS, they have strong desire for authentication and self-disclosure.

Their target is "dialogue with adults other than family members in the real world", and support for developing from "YUTORI Generation science student syndrome" to Montessori the young adult is needed. We believe it is effective, and think we should practice it positively and measure the response. We realize that by making rapport between teachers and students based on their personal wisdom, they will be able to accept the real world. It will be 10 years until the YUTORI Generation



graduates from educational institutions, including universities, but the establishment of a holistic self-image through dialogue with adults other than family members in the real world and our educators, can lead to "a sense of justice and a sense of personal dignity" We hope to cultivate this sense of self-esteem through dialogue and continued support for a fourth stage of education for students suffering from the science student syndrome of the YUTORI Generation.

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