The Comparison about Self-awareness of Skills for Using a Saw of the Regional Characteristics of three kinds of Schools

Shinichi HARADA
Faculty of Education
Kyoto University of Education, 1 Fujinomori-cho, Fukakusa Fushimi-ku Kyoto, 612-8522, Japan

Satoshi FUJIKAWA
Graduate School of Education
Hokkaido University of Education, 9, kitakaido-cho, Asahikawa-shi, Hokkaido, 070-8621, Japan

Shigeki ANDO
Faculty of Education
Kyoto University of Education, 1 Fujinomori-cho, Fukakusa Fushimi-ku Kyoto, 612-8522, Japan

Abstract- In this paper, the authors conducted a survey at three public junior high schools with different types of community and family environments, on the subject of students' motivation for learning production (monozukuri) and self-awareness of skills for using a saw in technology education in junior high school. As a result of the analyses and consideration, more experienced students in production indicated higher motivation for learning in production and higher consciousness to learn production. In addition, with respect to self-awareness of skills for using a saw, a tendency was found for male students to feel more competent and female students to have a strong sense of fear or weakness. These characteristics between male and female students were the same among three schools. These indicated that experience in using a saw or in production at home affects the ability to form competent awareness when using a saw.

Keywords – Learning production, Motivation to learn, Self-awareness of Skills for Using a Saw

I. INTRODUCTION

Since the academic year of 2012, the Curriculum Guidelines for Japanese Junior High School have been fully implemented, and technology and home economics education (hereinafter referred to as "technology education") have consisted of four compulsory subjects: "A. materials and processing," "B. energy conversion," "C. biological cultivation," and "D. information." In technology education, education in production was planned and designed based on scientific and other knowledge and has been carried out in such forms as the creation of specific products by the use of physical and other skills [1]. (Hereinafter, education in the design and production of products by the use of wood, metals, plastics, etc. is defined as "education in production" in a narrow sense.)
Education in production has been carried out, centering on "A. materials and processing." It can be inferred that the students, who study production formally for the first time, might feel competent, anxious or afraid when using tools such as a saw.

As a series of studies relevant to this paper, we conducted a survey and analysis on how students' experiences in production until they enter junior high school influence their motivation for technology education classes and self-awareness of skills for using tools. Here, self-awareness of skills is awareness that students effectively deal with a

challenge of using tools in learning production. In addition, we determine the scale of the awareness by reference to three scales: Self-efficacy (whether or not students have the confidence to use tools), outcome expectancy (prediction of outcomes that will arise when using tools), and outcome value (prediction on the importance of using tools). These scales are defined by Nakai and other authors to measure the level of a conclusive factor [2]. According to the survey and analysis, with respect to motivation for learning production, it was found that female students tend to want friends and teachers to be involved with them while learning production. As for self-awareness of skills for using tools, female students have a strong sense of fear or weakness when using a saw, hammer, or drill. It was also found that experience in using tools at home or in primary school before entering junior high school is a factor for reducing fear or anxiety. These findings indicate that proper demonstration on how to use the tools and devising guidance that reduces student's anxiety are important for learning production [3]-[6].

To recognize the students' actual consciousness more specifically, it is important for teachers to grasp students' motivation for learning production and self-awareness of skills for using tools in technology education. In addition, in order to conduct a survey on the self-awareness, we use tools commonly used for learning production in technology education and arts and handicrafts in elementary schools, and a well-known tool, the saw.

To generalize this knowledge, therefore, it is indispensable to carry out research and analyses on motivation for learning in production and self-awareness of skills for using a saw in several schools. For carrying out guidance in technology education, it is significant to grasp the motivation for learning in production and psychological characteristics of the students from different community and family environments when using tools.

This study attempts to compare the motivation for learning in production and self-awareness of skills for using a saw among schools. For this purpose, we conducted a survey in three public junior high schools with different community and family environments, and then analyzed and considered the results.

II. RESEARCH CONDUCTED

A. Research target and when it was conducted

As seen in Table 1, a survey was conducted for 876 students (460 Male and 416 Female) of junior high school A in Kyoto-shi, junior high school B in Kyoto prefecture, and junior high school C in Hiroshima prefecture. It was carried out from May 2012 to April 2013. School A is a middle-size school located in northwest Kyoto-shi.

Rural landscapes and newly developed residential areas are mixed around the school and there are also large supermarkets, factories and office districts. It is a relatively small area with a long history, being adjacent to the Kyoto city center, tourist spots in rich natural environments, and other areas. There are relatively more two-income families in this area, which has a strong tendency to depend on school for study, club activities, and other aspects. School B is a middle-size school located in south Kyoto prefecture adjacent to Nara-shi. This school was established in 2011 by separation due to the increase in the number of students as a residential area was newly developed in the school district. It is currently a quiet residential area in a calm atmosphere and many families are devoted to education. On the contrary, the students in this residential area tend to have a weak connection with the old communities as there are also the cases where they moved from other prefectures. School C is a small-size school in a rich natural environment, which is located in the area east of Hiroshima prefecture and adjacent to Okayama prefecture. As the geographical features, the residential areas and cultivated land are stretched in plateaus from 400 to 700 m of altitude, there are very few flatlands, and the majority is sloping land. Dairy farming and viticulture are popular, traditional performing arts such as kagura are succeeded from the elders to the younger generation, and thus the connection with the community tends to be very strong. With respect to the teachers in charge of technology education at each school, those at schools A and B have more than 20 years of teaching experience and the teacher at school C is a part-time teacher with less than 5 years of teaching experience.

TABLE 1. SURVEY TARGETS

Junior High Schools	Sex	First-grade		Second-grade		Third-grade		Total（N）	
School A	Male	55	118	65	133	83	132	203	383
	Female	63		68		49		180	
School B	Male	96	180	70	155	74	123	240	458
	Female	84		85		49		218	
School C	Male	4	10	9	16	4	9	17	35
	Female	6		7		5		18	

B. Research method and the contents of the research

Students wrote their answers in the questionnaire sheet that they received. The content of the research on the motivation to learn production in technology education and self-awareness of skills for using tools is as follows.

The questions were set as: (1) Experience of production at school or at home, (2) Motivation for learning in production classes [7], [8], (3) Consciousness towards learning production, (4) Self-awareness of skills for using a saw. Answers to the questions were selected from among choices. With respect to the questionnaire sheet, we prepared 4-choice answers, and after the survey, we converted the choices into numbers: If the answer to a question was “Yes, I think so,” it was allocated 4 points; “I somewhat think so:” 3 points; “I somewhat think not:” 2 points; and “I do not think so:” 1 point.

Three teachers who had more than 20 years of teaching experience in technology education carefully considered the appropriateness of the above items and prepared the questionnaire sheet.

III. RESEARCH RESULTS

A. Experience of production at school or at home

As Figure 1 indicates, schools B and C score higher than school A in “Having experience of failure,” and a significant difference is discernible. In addition, as Figure 2 indicates, it can be seen in all three of the schools that students tend to have a lot of experience in using a saw when they were from 9 to 12 years old. It was also found that 8.6% (75 students) of all the surveyed students do not have any experience in using a saw. The students without experience in using a saw accounted for 16.2% (62 students) at school A, 2% (9 students) at school B, and 11.4% (4 students) at school C, which highlights the fact that school A particularly has a higher percentage.

Fig.1. Experience at school or at home (by school)

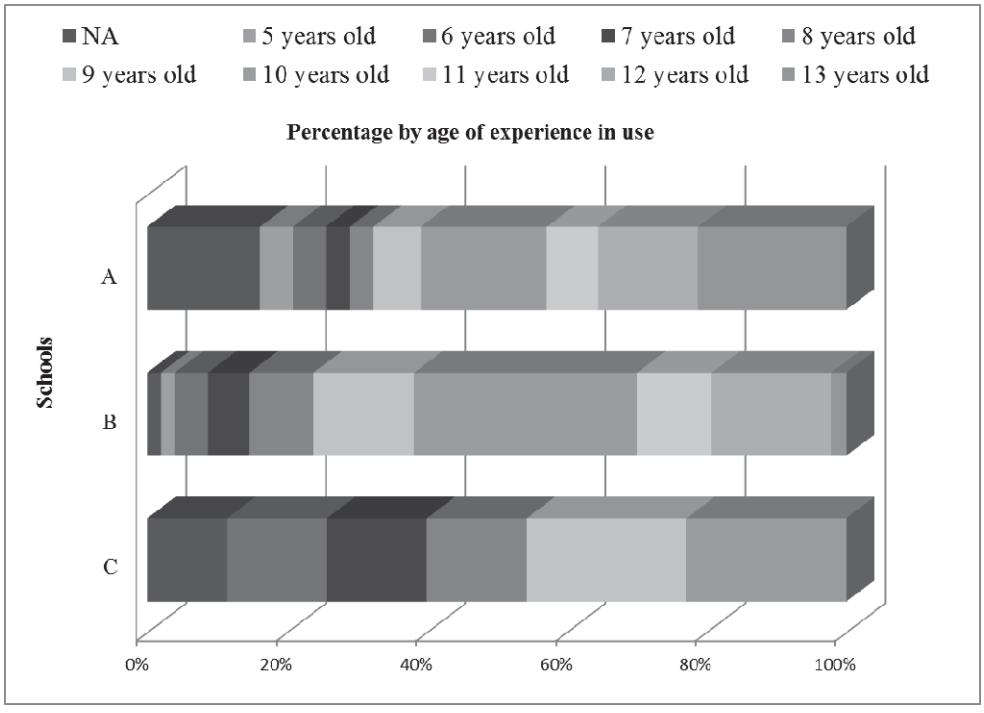

Fig.2. Experience in using a saw (by school)

B. Motivation for learning production

Table 2 shows the average score of each school on "motivation for learning in production." In comparison to school A, schools B and C score higher on "Production desire," "Cognitive conflict," and "Challenging thinking," and a significant difference is discernible. It indicates that the students at schools B and C with rich experience in production have higher motivation for learning in production. Besides, with respect to "Support requests," no significant difference is discernible among three schools.

TABLE 2. MOTIVATION FOR LEARNING IN PRODUCTION (AMONG SCHOOLS)

Categories	School A		School B		School C		p-Value
	Mean	SD	Mean	SD	Mean	SD	
Production desire	3.22	0.59	3.40	0.56	3.30	0.52	0.00 **
Support requests	2.72	0.63	2.78	0.67	2.62	0.54	0.18 ns
Challenging thinking	2.39	0.63	2.55	0.73	2.73	0.54	0.00 **
Cognitive conflict	2.79	0.63	2.96	0.63	2.84	0.57	0.00 **

Variance analysis (NA), *p<.05, **p<.01

C. Consciousness towards learning production

Table 3 indicates the students' consciousness towards learning production. In all categories, schools B and C score higher than school A, and a significant difference is discernible in almost every category.

TABLE 3. CONSCIOUSNESS TOWARDS LEARNING PRODUCTION (AMONG SCHOOLS)

Categories	School A		School B		School C		p-Value
	Mean	SD	Mean	SD	Mean	SD	
Cooperation with friends is fun	3.39	0.71	3.58	0.66	3.74	0.44	0.00 **
Cooperation with friends is troublesome	3.37	0.75	3.52	0.72	3.63	0.55	0.01 **
I can create a work procedure and work accordingly	3.19	0.74	3.37	0.75	3.49	0.61	0.00 **
Even if I cannot receive practical training	3.38	0.75	3.49	0.74	3.43	0.61	0.10 ns
The practice starts at preparation and ends at cleaning up	3.36	0.70	3.53	0.69	3.49	0.70	0.00 **
Preparation and cleaning are troublesome	2.79	0.97	2.84	1.05	2.97	0.82	0.53 ns
I will make use of the practice in my future life	2.93	0.80	3.08	0.79	3.14	0.88	0.01 *
Because it is pointed out, I hate it	2.87	0.82	2.96	0.91	3.14	0.65	0.10 ns

Variance analysis (NA), *p<.05, **p<.01

D. Self-awareness of skills for using a saw

Table 4 indicates self-awareness of skills for using a saw by school. Schools B and C score higher on "Able to use a saw" than school A, and a significant difference is discernible. No significant difference can be seen in other categories. The results show that the fact that students without experience in using a saw account for a high percentage at school A can be considered as a factor.

As seen from Table 5 to Table 7, between male and female students, male students score higher than female students in all three schools, and a significant difference is discernible in almost every category at schools A and B. Moreover, female students have a stronger sense of "fear" or "weakness" towards using a saw than male students, which corresponds to the results of preceding surveys [3]-[6].

TABLE 4. SELF-AWARENESS OF SKILLS FOR USING A SAW (AMONG SCHOOLS)

Categories	School A		School B		School C		p-Value
	Mean	SD	Mean	SD	Mean	SD	
Able to use a saw	3.31	0.76	3.48	0.68	3.40	0.55	0.00 **
Difficult to use a saw	2.85	1.04	2.75	1.03	2.91	0.04	0.30 ns
Bad at using a saw	2.70	0.97	2.74	0.98	2.74	0.92	0.84 ns
Get nervous	3.18	0.97	3.13	0.97	3.46	0.70	0.14 ns
Afraid of being injured	2.70	1.06	2.55	1.06	2.80	1.05	0.09 ns
Not difficult to use a saw after becoming accustomed to using it	2.98	0.96	3.13	1.02	3.11	1.08	0.11 ns
Afraid of being not able to cut straight	2.29	1.05	2.24	1.06	2.23	0.94	0.80 ns

Variance analysis (NA), *p<.05, **p<.01

TABLE 5. SELF-AWARENESS OF SKILLS FOR USING A SAW AT SCHOOL A (BETWEEN MALE AND FEMALE STUDENTS)

Categories	Male		Female		p-Value
	Mean	SD	Mean	SD	
Able to use a saw	3.43	0.65	3.17	0.84	0.00 **
Difficult to use a saw	3.06	0.98	2.60	1.05	0.00 **
Bad at using a saw	2.90	0.89	2.43	0.98	0.00 **
Get nervous	3.29	0.91	3.06	1.03	0.02 *
Afraid of being injured	2.81	1.06	2.56	1.05	0.02 *
Not difficult to use a saw after becoming accustomed to using it	3.05	0.99	2.91	0.93	0.13 ns
Afraid of being not able to cut straight	2.45	1.07	2.10	0.99	0.00 **

N=383, Variance analysis (NA), *p<.05, **p<.01

TABLE 6. SELF-AWARENESS OF SKILLS FOR USING A SAW AT SCHOOL B (BETWEEN MALE AND FEMALE STUDENTS)

Categories	Male		Female		p-Value
	Mean	SD	Mean	SD	
Able to use a saw	3.45	0.70	3.51	0.65	0.35 ns
Difficult to use a saw	2.97	0.97	2.51	1.04	0.00 **
Bad at using a saw	2.85	0.90	2.61	1.04	0.00 **
Get nervous	3.26	0.95	2.99	0.98	0.00 **
Afraid of being injured	2.70	1.08	2.39	1.01	0.00 **
Not difficult to use a saw after becoming accustomed to using it	3.28	0.98	2.97	1.05	0.00 **
Afraid of being not able to cut straight	2.40	1.08	2.06	1.01	0.00 **

N=458, Variance analysis (NA), *p<.05, **p<.01

TABLE 7. SELF-AWARENESS OF SKILLS FOR USING A SAW AT SCHOOL C (BETWEEN MALE AND FEMALE STUDENTS)

Categories	Male		Female		p-Value
	Mean	SD	Mean	SD	
Able to use a saw	3.53	0.51	3.28	0.58	0.18 ns
Difficult to use a saw	3.06	0.97	2.78	1.11	0.43 ns
Bad at using a saw	2.82	0.73	2.67	1.09	0.62 ns
Get nervous	3.53	0.62	3.39	0.78	0.56 ns
Afraid of being injured	3.06	0.90	2.56	1.15	0.16 ns
Not difficult to use a saw after becoming accustomed to using it	3.29	0.99	2.94	1.16	0.35 ns
Afraid of not being able to cut straight	2.53	0.84	1.94	0.94	0.07 ns

N=35, Variance analysis (NA), *p<.05, **p<.01

IV. CONCLUSION

We conducted a survey on motivation for learning in production, self-awareness of skills for using a saw, and other aspects at three public junior high schools with three different types of community and family environments, which was followed by analyses and consideration. According to the results, the students at schools B and C, who had rich experiences in production, such as using a saw, had higher motivation for learning in production and a higher consciousness towards learning production. In addition, with respect to self-awareness of skills for using a saw, male students felt more competent and female students tended to have a strong sense of fear or weakness. These characteristic between male and female students were the same among the three schools. This is the same as that identified by previous studies by the authors [3]-[4]. Moreover, with respect to the category “Able to use a saw,” as schools B and C scored higher, it is inferred that experience in using a saw or in production at home affects the ability to form competent awareness when using a saw.

These indicate that it is important to grasp the motivation for learning in production and psychological characteristics when students use tools, in order to develop better “education in production.”

Furthermore, it is considered that not only appropriate guidance from teachers on how-to use tools such as saws when learning production but also practical and experiential learning activities can serve as a factor to improve the students' feelings of competence and reduce their sense of fear or weakness.

In the future, we will conduct a survey at several junior high schools to further generalize this knowledge. In addition, we will pursue the way of guidance that will enable students in junior high schools with differing community and family environments to learn the usefulness of learning production in technology education.

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