The Factors that Influence Technical High School Students' Self-Concept Based on Their Learning Goal Orientation in Japan

Kazunori Shimada
Faculty of Education and Welfare Science, Oita University, Japan

Hideaki Shimada
Faculty of Education, Shinshu University, Japan

Jun Moriyami
Graduate School of Education Hyogo University of Teacher Education, Japan

Keiji Yamada
Osaka Prefectural Board of Education, Japan

*Corresponding author: shimada-kazunori@oita-u.ac.jp

ABSTRACT

The purpose of this study was to examine the effects of technical high school students' learning goal orientation on their self-concept. This longitudinal study tracked the students for three years. The subjects in this study were a random sample of 347 students who entered technical high schools in Osaka and Tottori prefecture in April 2012. The data were analyzed using ANOVA and multiple regression. The key result of this study found that the ego orientation has a negative effect on the attitude toward professional skill development and attitude toward social values. In addition, the study also found that students who have had a high level of self-concept at the time of school entrance but as the time goes by their consciousness of professional development and social values were declined as the school year increases. Thus, it is critical to improve the technical high school curriculum in terms of enhancing the students' motivation toward professional development and social skills.

Keywords: Technical high school students, self-concept, learning goal orientation, longitudinal study, Japan

INTRODUCTION

The purpose of this longitudinal study was to examine the effects of students' learning goal orientation on their self-concept during the three-year period (2012 – 2105). In Japan, junior high school graduates enter senior high schools upon passing entrance examination. Almost all students (98.3%) continue to high schools after completed their junior high school education. Senior high school students can be classified into the three streams in Japan: (1) general education, (2) vocational education, and (3) integrated education. About 72.4% of students enter general senior high schools, 22.4% enter vocational senior high schools, and 5.2% enter integrated program in senior high schools (Ministry of Education, Culture, Sports, Science & Technology Japan, 2012). After high-school graduation, more than 80% of the students continue their next stage of education such as university, junior college or vocational college. In fact, there are several types of vocational senior high schools

including technical high schools, commercial high schools, agricultural high schools and so on. These schools offer many specialized subjects in addition to the general subjects. More than 43.6% of the students obtain a job after graduation (Ministry of Education, Culture, Sports, Science & Technology Japan (2012). In this study, we focused on the technical high school students.

During the high economic growth period of the 1960s, skilled Japanese engineers in manufacturing companies had made an invaluable contribution to a broad range of Japanese industries, such as the automobile industry, information technology industry, and electrical industry. However, recently, there has been a challenge regarding Japanese technology due to the transfer of production bases and the aging of senior engineers in Japan. In addition, the Japanese aging population is rapidly increasing. Therefore, it is important that the senior engineers should assist in the education of the young engineers. Moreover, technical high schools play an essential role in producing future generations of skilled workers and engineers in Japan. The aim of technical high schools is to train young engineers to support the technological society of Japan. Specialized courses are offered as part of vocational education program at the high school level 10th to 12th grades. The courses include mechanical engineering, electrical engineering, information technology, and civil engineering. It is expected that the students would learn specialized knowledge and skills in these courses (Ministry of Education, Culture, Sports, Science & Technology Japan, 2008).

STATEMENT OF THE PROBLEM

Several empirical studies have pointed out the critical problems with the curriculum of technical high schools in Japan. For example, Hasegawa (2010) concluded that the education standards in technical high schools were rather poor based on his 30-year survey. In his research, the surveys were carried out at technical high schools in 1976, 1987, 1996 and 2005. Based on the results of the surveys, he pointed out that the academic credits of "practical subjects" have decreased. Practical subjects are representative lectures of technical high school education in Japan. Also according to his results, contents of production activity style in practical subjects increase, while at the same time, the contents of theoretical and experimental domains decrease. Tanaka (2005) argued that the ideal high degree of professionalism in technical education has dropped to a low level, recently. Based on his research, academic credits of specialized subjects in technical high school have decreased from the 1970s. In addition, Shimada et al. (2007) study found that as the school year increases, students' consciousness of professional skill development goes down. This trend suggested that students' motivation to lifelong learning decreases after they graduate from technical high schools. Furthermore, Shimada et al. (2012) carried out a text-mining analysis based on the 777 students' responses regarding students' self-esteem at the time of school entrance. Table 1 showed the results of the Shimada et al. (2012) study. The top three domains that were rated highly by the technical school students included: expectation for after graduation (60.0%), followed by motivation to learn specialized knowledge and skills (58.0%), and motivation to take specialized (technology) subjects (42.0%). Thus, the students have had high motivation to learn specialized vocational subjects at the time of school entrance.

Table 1: Self-esteem at the time of school entrance

11 consciousness-categories	Appearance frequency	
Expectation for after graduation	466	60.0%
Learning motivation for specialized knowledge and skills	451	58.0%
Motivation for specialized (technology) subjects	326	42.0%
Motivation for qualification acquisition	319	41.1%
Motivation for school life	219	28.2%
Motivation for making things	174	22.4%
Motivation for extracurricular activities	164	21.1%
Negative self-image	99	12.7%
Impression as a technical high school student	92	11.8%
Feeling about technical high school (rule, human-relations)	66	8.5%
Positive self-image	36	4.6%

N=777

METHODOLOGY

Subjects and Instrument

The subjects in this study were a random sample of 347 students who entered technical high schools in Osaka and Tottori prefecture in April 2012.

Section A: Students' learning goal orientations in technical high schools

In this longitudinal study, two sets of questionnaire were used. Questionnaire A (Students Learning Goal Orientation) was constructed based on the instrument used by Yajima and Arai (1994). And the second instrument – Questionnaire B (Students' Self-Concept) was designed based on Shimada et al. (2007). Questionnaire A consists of 23 items with four types with regard to goal orientation: task orientation, ego orientation, cooperative orientation, and competitive orientation. The scale is composed of T1 - task orientation (items 1 to 6); T2 - ego orientation (items 7 to 13); T3 - cooperative orientation (items 14 to 18); and T4 - competitive orientation (items 19 to 23). Students responded to those items using a 4-point Likert scale (4 = strongly agree; 3 = agree; 2 = disagree; and 1 = strongly disagree). Also, items 2, 4, 5, 14, 16, and 17 were reversely scored.

Table 2: Survey of students' learning goal orientation

No.	Question items
1	When I learn something interesting during class, I want to check not only the textbook but also other materials.
2*	When an interesting question is raised, I ask other people about it immediately, and then I want to see the answer immediately.
3	When I study, I want to solve interesting question, regardless of whether they are academically relevant or not.
4*	I do not want to do experiments that require every day observation, because it is too much trouble.
5*	I want to study only the things that I want to know.
6	I want to break the problem down to find other solutions, even if I have already solved the problem.
7	It is important to learn that I was able to solve the problem that was not possible, no matter what others say.
8	When the problem that I think I am able to solve is wrong, I become ashamed.
9	When I study, it makes me happy to be able to solve problems that were not possible before, no matter what others say.
10	I want to solve difficult problems which I could not solve before.
11	I want to try hard to score well on a test, regardless of how others scored.
12	I want to read adult-oriented books more than I want to read books for middle-school and high-school students.
13	When I face a difficult question, I want to try to solve it, regardless of others.
14*	After school, I do not want to teach people how to solve questions which they do not understand.
15	When I face a difficult question, I want to solve it through team work.
16*	Even if the teacher shows an interesting question, I do not feel the need to solve it, because it does not relate to academia.
17*	After I solve a question, I do not feel that I need to teach it to a friend who cannot solve the same question.
18	When I study, I work together with others who want to be able to solve the same problem.
19	I want to challenge other people to try to solve problems which they are not able to.
20	When I solve a difficult problem, I want to be the only one who is able to solve it.
21	When I study, it is important that I am the only one who can solve the problem that other people cannot solve.
22	When I face a new problem, I want to break it down quicker than other people.
23	I want to try to study hard at home in order to become better academically than other people.

*Reverse-Scored Items

Section B: Students' self-concept in technical high schools
Table 3 showed the items in the questionnaire for self-concept. The questionnaire was adapted from Shimada et al. (2007). Previously, Shimada et al. (2007) analyzed the construct of technical high school students' self-concepts and then made a scale of the students' self-concept in technical high schools. The scale is composed of five factors: attitude toward self-discipline (items 1 to 6); attitude toward career development (items 7 to 9); attitude toward professional skill development (items 10 to 14); attitude toward social values (items 15 to 17); and attitude toward self-monitoring (items 18 to

19). Students responded to those items using a 5-point Likert scale (5=strongly agree; 4=agree; 3=not sure; 2=disagree; and 1=strongly disagree).

Table 3: Questionnaire for students' self-concept

No.	Question items
1	I feel that I can handle whatever challenges I am faced with.
2	I always set my own goals and try to achieve them.
3	I am able to analyse various situations more clearly.
4	I am able to work on things with other people.
5	I have become more self-confident.
6	I think I want to participate in an extracurricular activities positively, such as club activities and student council.
7	I have a clear idea of what I want to become in the future, particularly with respect to my career.
8	I think I understand the nature of the job I want to have.
9	I have a specific hope for my future occupation.
10	I am interested in technical things.
11	I think I have acquired knowledge of computers and information technology.
12	I think I have become better able to operate computers.
13	I think I want to participate in study of a high school positively, such as a lesson and training.
14	I think that the knowledge and abilities that I am gaining at technical high school will be useful in my career.
15	I think that it is important to obey social rules.
16	I think I want to challenge of qualification acquisition.
17	I want to get a job in which I can make use of my technological knowledge and abilities.
18	I think I know how people around me feel about me.
19	I think I know myself quite well.

PROCEDURES

This three-year study began in April 2012 and ended in March 2015. Japan's school year begins in April and ends in March, the following year. The survey of the students' learning goal orientation was carried out in April 2012 at the time of school entrance. Then a series of surveys of the students' self-concept in technical high school was conducted in March 2013, March 2014 and February 2015 a total of three times. After the surveys were completed, the researchers were set to identify the status of the students' learning goal orientations at the time of the school entrance. Then, the researchers wanted to determine the differences in the students' self-concept among the three cohorts by using ANOVA. Next, a multiple regression was carried out to the determine the dominant factors that affect the cohorts' self-concept.

RESULTS

For the learning goal orientation, the 10th grade students were asked to complete the Questionnaire A in April 2012. A random sample of 347 students were asked to complete the questionnaires and returned them with 80.4% (279) of the students returning the valid questionnaires. Table 4 showed the results where the students rated highly on their cooperative orientation and ego orientation and low in task and competitive orientations.

Table 4: Situation of students' learning goal orientation at the time of school entrance

learning goal orientation	10th	
T1 task orientation	2.68	(0.39)
T2 ego orientation	2.91	(0.40)
T3 cooperative orientation	2.98	(0.46)
T4 competitive orientation	2.67	(0.53)
(S.D.)		N=279

Students' self-concept for the three cohorts

To determine the differences among the students' self-concepts for the three cohorts, ANOVA tests were carried out. The result indicated that these four factors were most significant, ie., attitude toward self-discipline (F 2,556)=15.78, p<.01), attitude toward career development (F 2,556)=56.15, p<.01), attitude toward professional skill development (F 2,556)=8.10, p<.01), and attitude toward self-monitoring (F 2,556)=7.70, p<.05) (see Table 5). The result of a multiple comparison using the least significant difference test (LSD) showed that the factor average score - attitude toward self-discipline (MSe=3.98), attitude toward career development (MSe=26.00), and attitude toward self-monitoring (MSe=3.62) rose as the school year became higher. Therefore, it was suggested that students' self-concept could be enhanced gradually at the technical high schools through their consciousness that changes as the students mature.

On the other hand, it was shown that the factor average score for attitude toward professional skill development has decreased as a school year increases (MSe=2.43). Interestingly, this finding concurs with the result from the previous research (Shimada et al., 2007; 2012). Thus, it can be concluded that as the school year increases, the factor average score for professional development goes down. The students in the 10th grade may have insufficient professional ability and are thus more willing to develop the required skills. In addition, it was shown that the factor average score for attitude toward social values was non-significant. This result means that the social values were not promoted through three school years.

Table 5: Students' self-concept for the three cohorts

self-concept	10th n=279		11th n=279		12th n=279		F-value df (2,556)		Mse	Multiple Comparison by LSD (p<.05)
F1 self-discipline	3.31	(0.67)	3.43	(0.67)	3.55	(0.68)	**	15.78	3.98	10th< 11th<12th
F2 career development	3.17	(0.97)	3.23	(0.93)	3.72	(0.84)	**	56.15	26.00	10th< 11th<12th
F3 professional skill development	3.59	(0.70)	3.42	(0.69)	3.43	(0.79)	**	8.10	2.43	12th≒ 11th<10th
F4 social values	3.91	(0.67)	3.80	(0.65)	3.82	(0.75)	n.s	2.94	0.93	
F5 self-monitoring	3.14	(0.87)	3.20	(0.80)	3.36	(0.82)	**	7.7	3.62	10th≒ 11th<12th
(S.D.)										N=279 **p<.01

Effects of students' learning goal orientation on their self-concept

Table 6 indicated the effects of students' learning goal orientation on their self-concept, using the multiple regression analysis by the backward elimination method. The analysis was carried out where the condition was set up in which the criterion variable was the self-concept and the explanatory variable was the average score of learning goal orientation. The coefficients of regression regarding the respondents' self-concept were determined for the three-year period. The researchers also set the standard of elimination of explanatory variable from the model, with the non-significant p-value (p >0.20). The results of this analysis showed a significant multiple correlation coefficient for self-concept as follows: attitude toward professional skill development (R=0.15, p<.01) and attitude toward social values (R=0.15, p<.05) (see Table 6). Especially, we confirmed that the factor of ego orientation of learning goal orientation have a negative effect on the factors of attitude toward professional skill development (=-0.15, p<.01) and attitude toward social values (=-0.15, p<.05). Ego orientation is the consciousness of self-betterment and having a strong spirit of challenge for learning. The results showed that the students who possessed high level of these consciousness at the time of school entrance were found to have the consciousness of professional and social values reduced as the school year increased.

Table 6: Effects of students' learning goal orientation on their self-concept

self-concept	learning goal orientation				F-value	df	coefficient of multiple correlation
	task	ego	cooperative	competitive			
F1 self-discipline					-	-	-
F2 career development				-0.08	1.8	df(1,277)	0.08
F3 professional skill development		-0.15**			6.73**	df(1,277)	0.15
F4 social values		-0.15*			6.25*	df(1,277)	0.15
F5 self-monitoring			0.10†	-0.09	2.28	df(2,276)	0.13

N=279 †:p<.10, *:p<.05, **:p<.01

Ego orientation at the time of school entrance

Ego orientation is a consciousness of self-betterment and a spirit of challenge for learning. In this study, the researchers have tried to explore the students situations who have had a high consciousness of ego orientation at the time of school entrance. First, the students were classified into two groups based on the ego orientation data score: those with high ego orientation (n=134) and those with low ego orientation (n=145). Second, the researchers contextualized the students' responses with specific descriptions at the time of school entrance according to Shimada's 11 consciousness categories. Then the differences between each group were determined by using x^2-test. The results of the x^2-test found that there was a significant difference in two categories: learning motivation for specialized knowledge and skills (F=6.28, p<.05), and motivation for making things (F=6.36, p<.05). The results also showed that the appearance frequency rate of both categories rose in the high ego orientation group. The students' concrete description of these categories was displayed in Table 7. The data showed that the students who have had high consciousness of ego orientation at the time of school entrance also have a high aim to become an engineer. However, the data showed that these students projected lower consciousness of professional development and social values during the three-year period.

Table 7: Concrete description of two categories

Category	Students' responses
Learning motivation for specialized knowledge and skills	I want to learn about machines.
	I want to get a specialize electrical engineering
	I want to operate many machines.
Motivation for making things	I want to make a robot.
	I would like to build civil structures.
	I want to make something useful for others.

DISCUSSION

This study reported the issues of students' learning orientation goals and their self-concept at technical high schools in Japan. It was specifically studied the effects of students' learning goal orientation at the time of school entrance and the alteration of their self-concept during the three-year period. The main findings of this study were as follows: the result of this study indicated that four factors were most significant. The result of a multiple comparison using the LSD test showed that the factor average scores of attitude toward self-discipline (F1), attitude toward career development (F2), and attitude toward self-monitoring (F5) increased as the students became matured. However, it was shown that the factor average score for attitude toward professional skill development (F3) has had a lower score as a school year increases. The results of this found that the factor of ego orientation of learning goal orientation has a negative effect on the factors of professional skill development and social values. The results mean that students who have had a high level of the consciousness of ego orientation at the time of school entrance portrayed lower scores in the consciousness of professional development and social values as the school year increases. Furthermore, the study investigated the differences between the two groups those with high ego orientation (n= 134), and those with low ego orientation (n= 145) by using ^{2}-test. The results of the ^{2}-test found that a significant difference between the two categories learning motivation for specialized knowledge and skills and motivation for making things are higher in the high ego orientation group.

Nevertheless, the teachers have also made a strong effort to provide guidance to the students. Further, the teachers have to teach the specialized skills and knowledge to students. However, the time were not always sufficient to teach the students the specialized skills due to the other activities of the schools such as club activities or other things. The teachers also often adjust the level of class for low scholastic ability students. However, the students who have had a high scholastic ability or high orientation become dissatisfied with class because they wanted to learn more advanced level. It means that the failure to live up to expectations of the students even though teachers may be aware of this situation.

CONCLUSION

Based on the empirical data of this study, it is critical to improve the professional skills and social skills of the students in the three cohorts in the technical high school in Japan. The results show that students who have had a high level of these consciousness at the time of school entrance but as the time goes by their consciousness of professional development and social values were reduced as the school year increased. Thus, it is critical to improve the technical high school curriculum in terms of enhancing their motivation toward professional development and social skills. In addition, the educational system of the technical high school in Japan needs to be restructured in order to respond appropriately to students who have a high scholastic ability or high orientation. Finally, it is also important to take proactive steps to improve the students' self-concept during their studies in technical high schools.

REFERENCES

Hasegawa, M. (2010). Issues and changes of curricula of mechanical courses in technical high schools. *Journal of Japan Academic Society for Industrial Education*, 14 (1), 1-10.

Ministry of Education, Culture, Sports, Science & Technology Japan (2008). *Course of study at senior high school.* Tokyo: Government of Japan.

Ministry of Education, Culture, Sports, Science & Technology Japan (2012). *School basic survey*. Tokyo: Government of Japan.

Saito, T., Tanaka, Y., & Yoda, A. (2005). *Assault of technical high schools*. Gakubunsha publisher.

Shimada, K., & Ichihara, Y. (2011). *Relationship between formation process of students' self-concept and career guidance in a technical high school in Japan*. Proceedings of the International Conference on Technology Education (ICTE), Japan.

Shimada, K., Ichihara, Y., & Moriyama, J. (2012). Structure of students' consciousness at the time of entrance technical high schools in Japan. *Journal of Asian Vocational Education and Training*, 5(1), 71-80.

Shimada, K., Moriyama, J., & Matsuura, M. (2007). The structure of students' self-concepts in industrial high school. *International Journal of Technology and Design Education* 17(1), 45-54.

Shimada, K., Moriyama, J., & Matsuura, M. (2006). The effect of production activities in industrial high school "project study" on the formation of students' self-concept. *Journal of Japanese Society of Technology Education*, 48(4), 275-282.

Shimada, K., Moriyama, J., & Shimada, H. (2011). Role of the students' self-concept for their career consciousness in Japanese technical high school. *Journal of Asian Vocational Education and Training*, 4(1), 13-22.

Yajima, H., & Arai, K. (1994). The development of learning goal orientation and its relationship to academic achievement in children. *Tukuba Psychological Research*, 16, 163-167.