

A COMPARISON OF STUDENTS' CONSCIOUSNESS TOWARD INFORMATION EDUCATION AMONG JUNIOR AND SENIOR HIGH SCHOOLS IN JAPAN, KOREA AND CHINA

Takenori Motomura¹, Jun Moriyama²,
Kazuhiro Sumi³ Toshikazu Yamamoto⁴, Yuji Kudo⁵

¹Gunma University Faculty of Education, Gunma, Japan

²Hyogo University Graduate School, Hyogo, Japan

³Saga University Faculty of Culture and Education, Saga, Japan,

⁴Saitama University Faculty of Education, Saitama, Japan

⁵Ibaraki University Faculty of Education, Ibaraki, Japan

The purpose of this study is to analyse students' knowledge and attitude that are related to information technology between Japan, Korea, and China. We conducted the survey on Japanese, Korean and Chinese students in both junior and senior high school. As a result, we found the differences Japan, Korean and Chinese students as follows: 1) There was a not difference thinking Japanese, Korean and Chinese students in their future prospects about the relationship between PC and the self. 2) The motivation for acquisition of the utilizing abilities of information in Japanese students were higher than that in Korean and Chinese students except "Information Science" in junior and senior high school students. 3) All of the Knowledge score that is related to information in Japanese students was lower than that in Korean and Chinese students (both junior and senior high school). Based on these results, directions of curriculum development for systematic Information Technology Education were discussed.

1. Introduction

The purpose of this research is to compare the students' consciousness toward information education among junior and senior high school in Japan, Korea and China, in order to examine the future direction of systematic information education from an international viewpoint.

In Japan, information education, named "Information basic" domain, as general education was started from 1989 in technology education of junior high school.

After that, in order to aim at training of the "Abilities for Information Utilizing(MXET)" (including the practice ability of ICT, Scientific understanding of ICT, and Attitude to take part in Information society) redefined in 1997, the subject named "Information" had started in the high school from 2003, and the revision of new information education which results in a common subject "Information" had restarted from 2013^{[1],[2]}. Because the progress of social computerization is remarkable in the meantime, it is important to consider about the system of Information education in this society.

The method of grasping the situation of Information education from an international viewpoint is mentioned as the one approach of it. However, such cross-national researches are not performed adequately. In this research, after taking required teacher consciousness, a curriculum, etc. into consideration on ^[3] and the comparative study of foreign countries based on the curriculum evaluation based on a student's

consciousness actual condition which writers have advanced, it compared internationally, and we decided to consider the subject of the Information education of our country.

In the case of Japan, education about Information technology is called “Information Education”, and it is found from elementary school to senior high school level as learning contents since 1998. At the elementary school level, “Information education” is one of the cross-curricular themes in an integrated study. Also, at junior high school level, “Information education” is one of the areas in Technology education. There is “Information studies” as a compulsory subject at senior high school level (Ministry of Education, Japan, 1998).



Fig.1 Information education in Japanese Junior High school



Fig.2 Information education in Japanese Senior High school

Also, Korea has a systematic Information technology education from elementary school to senior high school in both technology education and computer study. The main contents of computer study in Korea are "Human and computer", “Basis of computer”, “Word processing”, “Network technology and the internet”, “Multimedia”, and so on (Ministry of Education, Korea 2008).



Fig.3 Information education in Korean Senior High school

Also, China has a systematic Information technology education from elementary school to senior high school in both technology education and computer study.

The main contents of computer study in China are “Computer literacy”, “Computer network”, “Word processing”, “Network technology and the internet”, “Multimedia”, and so on (Ministry of Education, China 2008).



Fig.4 Information education in Chinese Senior High school

We will try to consider a problem of the information education which compared considered the teacher awareness or the curriculum internationally based on evaluation for the actual situation of the learner’s consciousness^[3]. This research will take up Korea and China which is similar by a cultural aspect of Japan.

2. Method

We tried to compare the students’ knowledge and attitude toward Information technology between Japan, Korean and China in junior & senior high school.

2.1 SUBJECTS

The survey was carried out from 2010 to 2011 as follows. The detail of the subjects was shown in Table 1.

- Japan**- 266 students (Tokyo162, Chiba 104) of junior high school, candidates are 158 high school students (Ibaraki Prefecture) in Japan.
- Korea**- 99 students of junior high school and 117students of high school in Korea (Kiyosu).
- China**- 100 students of junior high school and 101 students of high school in China (Dalian)

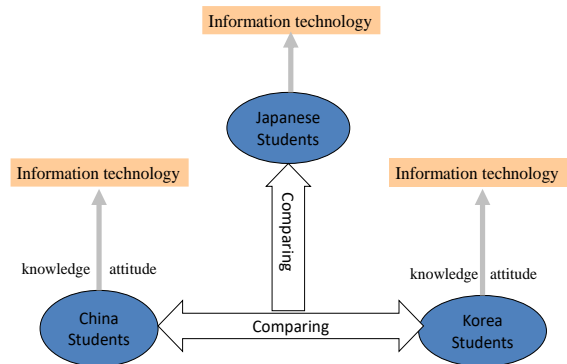


Table 1 Subjects of the survery

Japanese	Boys	Girls	Total
Junior High School Students	126	140	266
Senior High School Students	98	60	158
Total	224	200	424

Korea	Boys	Girls	Total
Junior High School Students	88	11	99
Senior High School Students	63	54	117
Total	151	65	216

China	Boys	Girls	Total
Junior High School Students	52	48	100
Senior High School Students	28	73	101
Total	80	121	201

2.2 Items

(1) Items for grasping students' consciousness about ICT

Items of the question which ask for junior and senior high school students' consciousness about ICT was set up in order to acquire basic information.

The future prospects about the relationship between PC and the self

Students choose one from:

- “I want to become Profession in ICT engineering”
- “I want to use ICT as tools in general job”
- “I want to use ICT as tools in daily life and hobby”
- “I don't have any idea about relationship between PC and my future life”

(2) Items for grasping students' motivation for acquisition of "Abilities for Information Utilizing"

In order to grasp the students' motivation for acquisition of abilities for information utilizing as the target of Information education of Japan were investigated (4 point scale).

The concept of acquisition of abilities for information utilizing includes three viewpoints; the practice activities of information technology, the scientific understanding of Information technology, and the attitude which takes part in the Information society.(MXET)

Motivation for acquisition of the utilizing abilities of information

Students answered by 4-point scale to the following items:

- “I want to promote my Practical Skills of IT”
- “I want to promote my Scientific Understanding of ICT”
- “I want to promote my Attitude to take part in Information Society”

(4: Very much 3: very 2: a little 1: less)

(3) Items for grasping students' self-evaluation of own knowledge level about ICT

In order to grasp the students' self-evaluation about knowledge level, technical terms concerned with ICT were prepared as the items. Categories of knowledge items includes “Information System”, “Practical Operation”, “Network Technology”, “Social impact of ICT”, and “Information ethics and Security” (5 point scale). (see Table 2 (Junior High School), Table 3 (Senior High School))

Table2 Categories of Knowledge Items (Junior High School)

Categories of Knowledge Items				
Information System	Practical Operation	Network Technology	Social Impact of ICT	Information Ethics and Security
·OS	·Icon ·CG	·URL, Web page	·Computer network	·computer virus
·Server	·Image scanner	·E-mail	·User name	·Copyright
·Software	·www & Internet	·Domain		·Password
·To digitalize	·CD-ROM	·Network		·User ID
·Display	·Application software			
·Hardware	·keyboard			
·Hard disc	·data using the internet			
·File	·CD, DVD ·cell			
·Folder	·database ·USB			
·Mouse	·draw type software			
	·to digitalize			
	·spreadsheet software			
	·use a printer			
	·Presentation software			
	·Programming			
	·Word Processing			

Table 3 Categories of Knowledge Items (Senior High School)

Categories of Knowledge Items				
Information System	Practical Operation	Network Technology	Social Impact of IT	Information Ethics and Security
<ul style="list-style-type: none"> •binary, hexadecimal •AND, OR, NOT •CPU •OS •compression, extraction •analogue, digital •arithmetic and logic unit, storage unit, microprocessor •Client Server System •quantization •Charge Coupled Devices •IC •pixel •file format 	<ul style="list-style-type: none"> •CD-ROM •jpeg, png,gif •animation •text file •draw type software •database •How to use Powerpoint •multimedia •WWW •category search, keyword search •search engine 	<ul style="list-style-type: none"> •HTML, tag •IP address •LAN •POP server •TCP/IP •URL, Web •Protocol •compound conditions 	<ul style="list-style-type: none"> •online shopping •Media of communication •media literacy •digital divide •electronic commerce •ENIAC •ETC •IT •car navigation system •techno stress 	<ul style="list-style-type: none"> •encryption •computer virus •intellectual property right, Industrial Property •Compliance(Information ethics) •copyright, patent •credibility of information •network crime •fire wall

3. Result

3.1 Students' consciousness for ICT

As a result of the future about the relationship between ICT and the self was summarized in Table 4. It was indicated the differences students' consciousness among Japan, Korea and China in both junior and Senior high schools. Ratio of students in China who think "I want to become professional worker in ICT industry" was higher than that in Japan. Oppositely, Ratio of students in Japan who think "I want to use ICT in daily life as hobby or living tool" was higher than in China. The tendency of Senior high school student was almost same as the Japanese students.

Table4 The feature prospects about the relationship between PC and the self

Junior High School	Japan n=266		Korea n=99		China n=100
Students who want to become Profession in ICT engineering	11 4.1%	(-)	9 9.1%		28 28.0% (+)
Students who want to use ICT tools in general job	67 25.2%		16 16.2%		21 21.0%
Students who want to use ICT tools in daily life	164 61.7%	(+)	68 68.7%		48 48.0% (-)
Students who don't have any idea	24 9.0%		6 6.1%		3 3.0%
$\chi^2(6)=50.67$ p<.01					
Senior High School	Japan n=158		Korea n=117		China n=101
Students who want to become Profession in ICT engineering	8 5.1%	(-)	8 6.8%		19 18.8% (+)
Students who want to use ICT tools in general job	44 27.8%		46 39.3%		34 33.7%
Students who want to use ICT tools in daily life	94 59.5%	(+)	57 48.7%		46 45.5%
Students who don't have any idea	12 7.6%		6 5.1%		2 2.0%
$\chi^2(6)=22.72$ p<.01					

3.2 Motivation for Acquisition of Abilities for Information Utilizing

The average scores of junior high school students' motivation for Acquisition of "Abilities for Information Utilizing" are shown in Tables5. And the average scores of senior high school students' motivation for Acquisition of "Abilities for Information Utilizing" are shown in Tables6.

The all of average scores of “the practice activities of Information technology” and “the attitude to take part in an Information society” in Japan were higher than those in Korea and China. In case of senior high schools, the tendency was almost same as in junior high schools. However, in case of “scientific understanding of Information”, average score in Korea showed the highest in both junior and senior high schools.

Table 5 Comparison of Students’ Motivation for acquisition of “Abilities for Information Utilizing” in junior high School

The contents of Media Literacy		Japan (n=266)	Korea (n=99)	China (n=100)	ANOVA
the practice activities of information technology	Ave.	3.23	2.03	1.66	F(2,462)=219.46** Japan>Korea=China
	SD.	0.73	0.71	0.69	
scientific understanding of information	Ave.	2.59	2.67	1.63	F(2,462)=56.30** Korea>Japan>China
	SD.	0.89	0.76	0.69	
the attitude to take part in the information society	Ave.	2.99	2.20	1.59	F(2,462)=219.48** Japan>Korea=China
	SD.	0.81	0.71	0.67	

4 point scale ** p<.01 LSD method for Multiple comparison

Table 6 Comparison of Students’ Motivation for acquisition of “Abilities for Information Utilizing” in senior high School

The contents of Media Literacy		Japan (n=158)	Korea (n=117)	China (n=101)	ANOVA
the practice activities of information technology	Ave.	3.20	1.87	1.88	F(2,373)=196.24** Japan>Korea=China
	SD.	0.63	0.66	0.64	
scientific understanding of information	Ave.	2.49	2.56	1.94	F(2,373)=18.99** Korea=Japan>China
	SD.	0.86	0.76	0.79	
the attitude to take part in the information society	Ave.	3.01	2.12	1.79	F(2,373)=114.11** Japan>Korea>China
	SD.	0.69	0.66	0.69	

4 point scale ** p<.01 LSD method for Multiple comparison

3.3 Self-evaluation of own Knowledge level about ICT

The average scores of students’ self-evaluation of understanding knowledge about ICT are shown in Tables(7,8) .

All of the average scores in China were higher than those in Korea and Japan in Junior high schools.

And all of the average scores in Korea were higher than those in China and Japan in Senior high schools.

It was indicated that junior and senior high school students in Japan could not have enough confidence about understanding knowledge about ICT.

Table 7 Knowledge about the Information technology in Junior high School

The contents of Knowledge		Japan (n=266)	Korea (n=99)	China (n=100)	ANOVA
Information System	Ave.	3.03	3.44	4.43	F(2,462)=76.53** China>Korea>Japan
	SD.	1.09	0.85	0.66	
Practical Operation	Ave.	2.95	3.47	4.30	F(2,462)=86.57** China>Korea>Japan
	SD.	0.97	0.83	0.62	
Network Technology	Ave.	2.98	3.52	4.50	F(2,462)=83.25** China>Korea>Japan
	SD.	1.12	0.81	0.73	
Social impact of ICT	Ave.	3.14	3.56	4.48	F(2,462)=64.79** China>Korea>Japan
	SD.	1.20	0.97	0.72	
Information Ethics	Ave.	3.19	3.65	4.46	F(2,462)=59.10** China>Korea>Japan
	SD.	1.06	0.80	0.64	

5 point scale ** p<.01 LSD method for Multiple comparison

Table 8 Knowledge about the Information technology in Senior high School

The contents of Knowledge		Japan (n=158)	Korea (n=117)	China (n=101)	ANOVA
Information System	Ave. SD.	2.21 0.62	3.46 0.28	2.69 0.25	F(2,373)=82.52** Korea>China>Japan
Practical Operation	Ave. SD.	2.67 0.64	3.49 0.29	3.22 0.35	F(2,373)=32.26** Korea>China>Japan
Network Technology	Ave. SD.	2.08 0.59	3.57 0.16	2.58 0.43	F(2,373)=151.85** Korea>China>Japan
Social impact of ICT	Ave. SD.	2.42 0.87	3.24 0.18	2.89 0.52	F(2,373)=32.62** Korea>China>Japan
Information Ethics	Ave. SD.	2.97 0.53	3.28 0.14	3.47 0.31	F(2,373)=10.98** Korea>China>Japan

5 point scale ** p<.01 LSD method for Multiple comparison

4. Discussion

From the above results, the following two points can be pointed out about the state of the Information education in Japan.

First, it is the little of the learning time of Information education of Japan.

In Korea or China, the information-related contents learn in a curriculum from the stage of an elementary school.

The little of this learning time in Japan is considered to have caused the lack of recognition of the importance of Information Technology in students' future life and career.

Secondly, it is the lowness of intentionality to acquisition of "scientific understanding of Information" in the Information education in Japan.

The students' motivation of acquisition of "*Abilities for Information Utilizing*" in Japan showed the highest among three nations.

However, the motivation for acquisition of "the scientific understanding of Information technology" in Japan was lower than that in Korea.

In addition, students in Japan could not have enough self-confidence about knowledge level.

The students of Japanese junior and senior high school have a possibility of having caught low the degree of serious consideration of "scientific understanding of Information technology" among three viewpoints of "*Abilities for Information Utilizing*" to "the practice activities of Information technology" and "the attitude to take part in the Information society."

"From these considerations, it is suggested that promoting students' motivation and understandings for scientific knowledge of Information technology are important in Japan's Information education in future.

5. Conclusions

The results of this survey can be summarized as follows:

- 1) There was a not difference thinking Japanese, Korean and Chinese students in their future prospects about the relationship between PC and the self.
- 2) The motivation for acquisition of the utilizing abilities of Information in Japanese students were higher than that in Korean and Chinese students except "Information Science" in junior and senior high school students.
- 3) All of the Knowledge score that is related to Information in Japanese students was lower than that in Korean and Chinese students (both junior and senior high school).

In this research, we examined students' consciousness about Information education in junior and senior high school among Korea, China and Japan. However, the findings of this research needs to be considered as the actual condition of the schools selected in this survey. Therefore, the supplementary examination of this research should be required.

Also, we should progress the international comparison investigation for each area where Asian nations differ from a cultural sphere, such as Europe and the United States.

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