National Survey of Japanese Universities on IT Education
Overview of the Entire Project and Preliminary Analysis

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Abstract: We are conducting a national survey of Japanese universities on IT education under the support of Japanese Mistry of Education. This paper describes the overview of the survey project and preliminary analysis of the survey result. The survey is composed of five different types: (1) survey of IT education as a major field of study, (2) survey of IT education as a part of a major field other than IT, (3) survey of general IT education for college students belonging to all faculties, (4) survey of IT education for the students willing to have a licence to be a high school teacher on IT, (5) survey of computing environment for IT education. The survey contains various questions about outline of the educational program, educational contents and achievement level for independent topic, students, teaching staff, educational environment and future plan. We collected about 3,000 answers from 650 universities using a Web-based survey system. The survey covers 85% of the Japanese universities.

1 INTRODUCTION

Information technology (IT) is an essential topic for university education. Not only the departments majored in IT, non-IT departments also require IT education. In Japanese universities, there are four types of IT education illustrated in Figure 1.

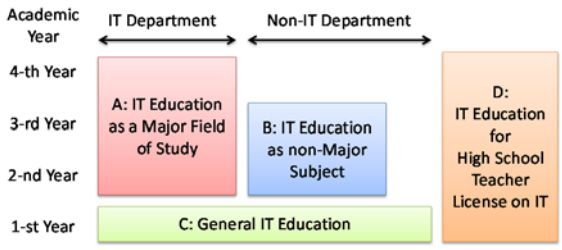

Figure 1: Typical Organization of IT Education at Japanese Universities.

A. IT education at a department or a course majored in IT discipline
B. IT education at a non-IT department or a course as part of their major field of study
C. General IT education for all university students typically at the first or second academic year
D. IT education for the students willing to have a high school teacher lisence on IT education

For type A departments (IT departments), ACM and IEEE Computer Society published a series of computing curricula recommendations such as CC2005 (ACM, 2005) and CS2013 (ACM, 2013). Information Processing Society of Japan (IPSJ) also developed computing curricula standard J07 (IPSJ, 2008) based on CC2005. However, currently there is no standard for IT education of types B and C. Although the Japanese government established a regulation for type D education, the regulation is quite simple compared with the recent curriculum standards.

IPSJ is currently working to develop curriculum recommendations for the above types of IT education. To this end, we conducted a Web-based survey of Japanese universities. The survey contains IT education of types A-D as well as computing environment for IT education. The survey result will be utilized to understand the current situation of IT education at Japanese universities and to develop the new IPSJ curriculumn recommendations and national policy for IT education in Japan.

Science Council of Japan (SCJ) published the "Reference Standard of Informatics for University Education" in March 2016 (Hagiya, 2015). Our survey utilizes the reference standard as a common body of knowledge (BOK) to investigate topics of IT education at Japanese universities. We expect to compare various types of IT education in a uniform

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manner through the common BOK. Our survey is actually the first national level survey on IT education at Japanese unversities.

This paper describes the overview of the survey project and the preliminary analysis result of the collected data.

2 SURVEY TYPES AND QUESTIONS

In this section, we explain the survey types and the outline of the questions collected in each survey type. Since survey types A to D covers various types of IT education, the survey questions are almost the same. However the survey questions for type E is focused on computing facilities for IT education.

2.1 Survey Type Description

Survey type A is prepared for IT education at a department or a course majored in IT discipline. Education program of such department or course focuses on IT so that the major portion of the educational contents is contained in the "Reference Standard of Informatics for University Education". An IT department or an IT course is expected to develop IT professionals.

IT education is necessary even at a non-IT department. Survey type B is prepared for IT education at a department not majored in IT discipline. Since there are quite many departments of this type, we allow that a faculty containing several non-IT departments can respond to the survey as a delegate of these non-IT departments.

Survey type C is prepared for the general IT education typically at a university or a faculty. General IT education is provided as an interface between high school IT education and college level IT education. Thus it is commonly provided for all students belonging to both IT departments and non-IT departments.

Survey type D is prepared for the students willing to have a high school teacher licence on IT education. In Japan, the Ministry of Education accredits education programs of this type using the national regulation as the evaluation criteria. Only the accredited programs can issue high school teacher licensure.

Survey type E is prepared for the educational computer system at a department, a faculty or a university. Educational computer system includes servers, LAN infrastructure, PCs, various types of educational software and educational contents. It is essential to support IT education particularly for skill development.

2.2 Questions for Survey Types a to D

The questions for survey types A to D are almost common. The following is the list of questions for these surveys.

- Names of university, faculty, department and course
- Position of the respondent (education committee member, secretariat staff, faculty member, etc.)
- Program Organization
  - ✓ Day time, Night or Remote program
  - ✓ Category of the course such as engineering, science, social science, humanities, etc.
  - ✓ Corresponding J07 domain such as computer science (CS), computer engineering (CE), software engineering (SE), information systems (IS) and information technology (IT)
  - ✓ Required number of credits for graduation
  - ✓ Number of subjects
- Achieved knowledge/skill level and the number of students for each knowledge and/or skill item. Knowledge/skill levels are defined as illustrated in Tables 1 and 2.
- Enrolled Students
  - ✓ Academic year
  - ✓ Number of students
  - ✓ Student's choice of career after graduation
- Teaching Staff
  - ✓ Number, educational background, specialized field, tenure of faculty members
  - ✓ Number and workload of support staffs
  - ✓ Number and workload of teaching assistant students
- Educational Environment
  - ✓ Computer system
  - ✓ Student's own PC
  - ✓ Utilization of student PC at class
  - ✓ Educational programming language
- Other Topics
  - ✓ Future plan
  - ✓ Strength of the education program
  - ✓ Utilization of IT certification and/or qualification
  - ✓ Special topics

Table 1: Knowledge Level Description.

Level	Knowledge Level Description
0	Not taught (unnecessary or already taught)
1	Not taught because of the time limitation or because the level of the contents is too high.
2	Taught at class. Students know each term.
3	Taught at class. Students can explain the meaning of each term.
4	Taught at class. Students can explain relationship and/or difference among related terms.
5	Taught at class or graduation research project. Students can teach related domain or subject of the terms to the others.

Table 2: Skill Level Description.

Level	Skill Level Description
0	Not taught (unnecessary or already taught)
1	Taught at class with simple exercise
2	Taught at class with some exercise. Students can perform the topic if detailed instructions are provided.
3	Taught at experiment with more complex exercise. Students can perform the topic with simplified instructions
4	Students perform combined research theme containing the topic so that the students can autonomously perform the topic.
5	Students perform combined research theme containing the topic and the students can teach how to perform the topic to the others.

2.3 Questions for Survey Type E

The following is the list of questions for survey type E, educational computer systems.

- Name of university, faculty and department
- Contract
  - ✓ Rental term and fee per month
- Hardware and Software
  - ✓ Number of PCs or terminals
  - ✓ Education software such as OS, office software, communication software, multimedia software, IDE, database, modelling tool, learning management system (LMS)
  - ✓ Digital contents for education
- Administration
  - ✓ Faculty members and staffs
  - ✓ Student assistant
  - ✓ Committee
  - ✓ Outsourcing
- Other Topics
  - ✓ Future plan
  - ✓ Strength of the computer system
  - ✓ Special topics

3 SURVEY PROCESS

The survey is carried out in three phases: preparation, survey and review. The preparation phase ended on October 2016. The survey phase started at the beginning of November 2016. We distributed the survey to the 750 universities in Japan and responded to the inquiries from the universities. The survey phase ended on December 26, 2016. Currently we are in the review phase which started on January 2017.

3.1 Preparation Phase

We utilize a web-based survey system named “cresie” (Kakeshita, 2011) for this survey (Figure 2). Cresie is designed as a general purpose survey system to collect various types of data using web forms and Excel worksheets.

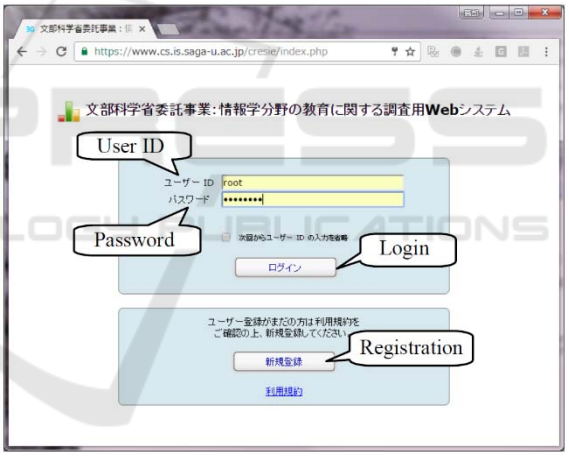


Figure 2: The Survey System cresie.

Cresie allows defining a list of questions composed of a question title, a question text, a data type and default value of the response etc. Such definitions are stored in a MySQL database. These questions are shown to the respondent using a web-form. Most of the questions listed in Section 2 are represented by this means. We prepared the definition of the questions using Microsoft Excel and stored as CSV files. The CSV files are uploaded to the database to set up the cresie system.

Cresie also allows defining a body of knowledge (BOK) and knowledge/skill levels. Then a respondent can download an Excel file to answer the achievement level of each of the BOK item with the

number of students who learned the BOK item.

After defining questions and setting up the cresie system, we prepared formal request letters to the universities, faculties and departments associated with the request letter from the Ministry of Education. Such formal request is essential in order to increase the response ratio of the survey.

We also prepared user's manual of the cresie system and the detailed explanation document for each question of the survey. We also prepared an FAQ on the web. These documents are uploaded to the Web so that the respondent can easily read or download the documents (Figure 3). Such documents are important to reduce the number of inquiries to us during the survey period.

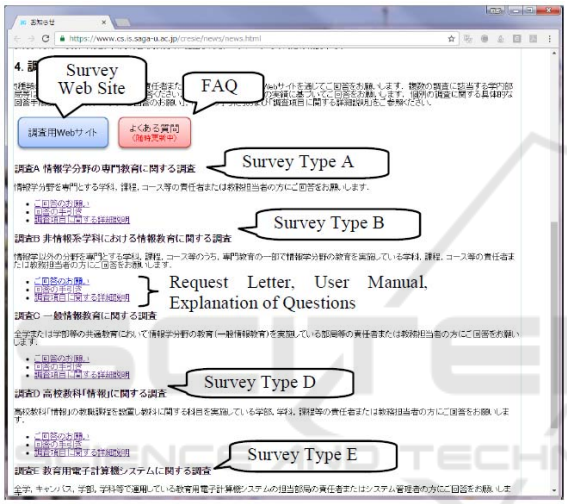


Figure 3: Web Links to the Related Documents.

3.2 Survey Phase

There are about 750 universities in Japan. We sent the formal request letter to the secretariat office of each university by postal mail. Then the request letter is distributed to all the faculties and departments of the university. Each university, faculty, department or course responds to the survey questions in the following procedure.

1. The respondent downloads the cresie user manual from the web.
2. The respondent selects appropriate survey type and registers to the cresie system corresponding to the selected survey type.
3. The respondent log-in to the cresie system and fills the answer columns to the web-based questions. (Figure 4)
4. The respondent downloads Excel file to represent the educational achievement of the program. (Figure 5)
5. The respondent fills the knowledge/skill level and the number of students at each BOK item represented in the downloaded Excel file. (Figure 6)
6. The respondent uploads the filled Excel file to the cresie system and log out from the system. (Figure 5)

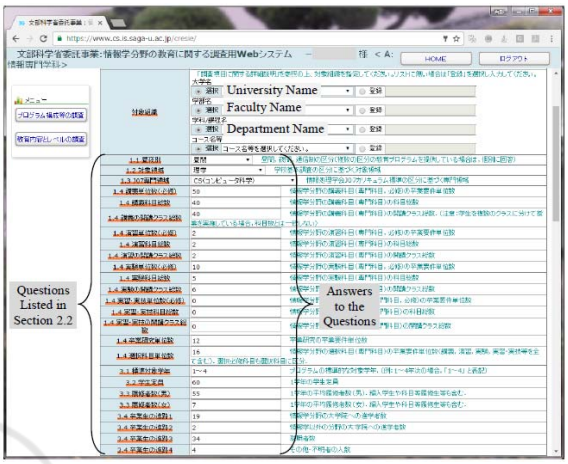


Figure 4: Web Form for the Survey.

Figure 5: Web Form to Download/Upload Excel Files.

We request each university, faculty, department or course to register to the cresie system independently for each survey type. For example, an IT department may register three accounts corresponding to type A, D and E surveys. This is because an IT department often has an accredited program for high school teacher licensure on IT and an educational computer system of the department.

It sometimes happens that a university has several IT departments. In such a case, each department is requested to register to the cresie system independently.

As we have noted in Section 2.1, a faculty may consists of an IT department and several non-IT departments. In this case, the faculty may merge the non-IT departments and register to the system as a delegate representing the non-IT departments. Then the faculty responds to the type B survey.

Even the Ministry of Education does not recognize all departments and courses while the ministry recognizes all universities and faculties.

Nor the ministry does not recognize which faculty or department are performing IT education. Thus we distributed the request letter to every faculty and department, and ask them to register to the cresie system by their own.

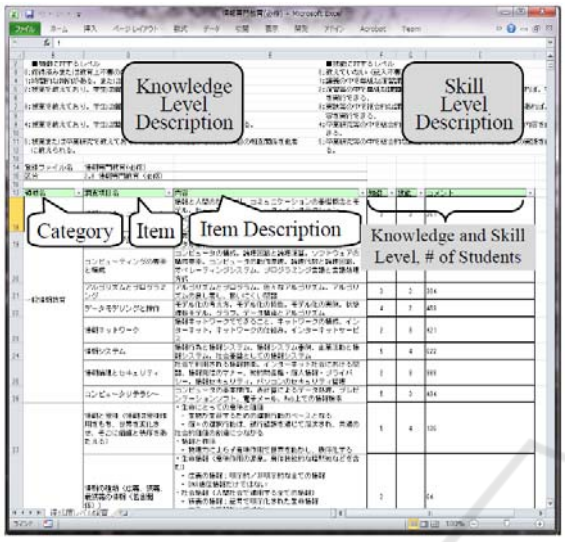


Figure 6: Representing Educational Achievement using Excel Worksheet.

The BOK items defined in the Excel worksheet (Figure 4) contains 90 knowledge/skill items which are defined based on the "Reference Standard of Informatics for University Education" (80 items) and a BOK of general IT education (10 items). The BOK covers all topics of IT education so that specific domains such as CS, CE, SE, IS and IT can be mapped to the BOK. This is important to clarify relationship among different domains (Kakeshita, 2014).

The respondent is requested to complete the Excel worksheet shown in Figure 6 with the knowledge/skill level and the number of enrolled students corresponding to each BOK item. There are the cases when a BOK item is taught at several subjects or exercises with different levels. In such cases, we require the respondent to merge the achievement of multiple subjects or exercises to fill the Excel worksheet. The merge rule is as follows.

- The number of students is calculated by the sum of the numbers of students of the corresponding subjects and exercises.
- The representative knowledge/skill levels are defined using the levels with the largest number of students (i.e. the mode values) among the achievement levels of multiple subjects or exercises. The number of students of multiple subjects or exercises is classified based on the achieved level in order to calculate the representative level. In the case that there are more than one mode values, the median value is used instead.

90 BOK items are defined in the Excel worksheet and the respondent has to calculate the representative knowledge level and skill level for each BOK item according to the above rule. Such calculation is a complex and time consuming task. Thus we developed an Excel macro (Figure 7) in order to merge multiple Excel worksheets each of which represents achievement levels of a single subject or exercise.

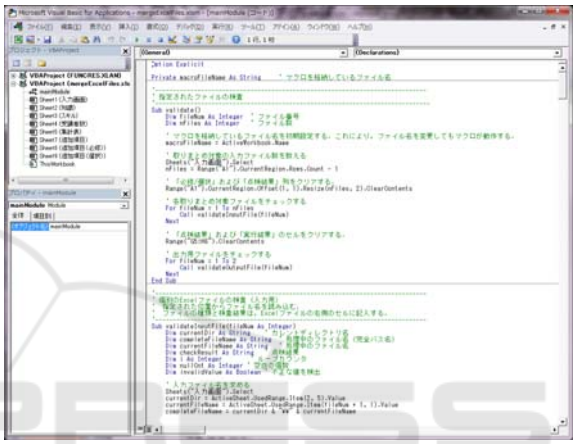


Figure 7: Excel Macro to Merge Multiple Excel Worksheets.

The Excel macro is distributed using the survey web site so that the respondent can freely download and execute the macro to merge the Excel worksheet collected from the faculty members. Thus the macro is useful to reduce the workload of the respondent. The macro also provides checking functions for the data values contained in the Excel worksheet so that it is useful to reduce the mistakes in the Excel worksheets uploaded to the survey system.

In order to respond to the inquiries from the universities, we prepared a mailing list for the inquiries and appointed 5 members to respond to the inquiries. Each of the members is assigned a survey type or account management to distribute the handling workload. We also asked the secretariat office of the Information Processing Society of Japan to provide a telephone number to receive the inquiries.

3.3 Review Phase

The review phase contains three types of checking. They are the checking of registration and survey

type, the checking of the answer to the survey questions, and the checking through comparison with existing public data. The checking is essential to ensure reliability of the collected data and the analysis result.

The checking of the registration and survey type is performed at the end of November 2016 just after the deadline of the registration to the cresie system. The following points were checked among the registered accounts.

- Existence of the registered university name
- Registration from an educational institution other than university or college providing a bachelor degree
- Erroneous registration to each survey type including registration of an entire university or a faculty to the system for survey type A. Table 3 represents acceptable combination of typical registration for each survey type.

Table 3: Acceptable Combination of Typical Registration and Survey Type.

Survey Type	University	Faculty	Department	Course
A	×	△	○	○
B	△	○	○	○
C	○	○	×	×
D	×	△	○	×
E	○	○	○	×

We notified the registered accounts other than the above acceptable combination and confirmed the survey type. In Table 3, "○" means acceptable, "×" means unacceptable. If we find a "×" combination, we requested to correct the survey type. "△" means acceptable in a special case so that we requested the respondent to add explanation about the reason of survey type selection.

The checking of the answer to the survey question is performed to verify correctness and consistency of the answer. The following is a list of checking rules.

- Multiple registrations to the same combination of survey type and registered university, faculty, department and course names
- No Excel file is uploaded to the system.
- Although Excel file is uploaded to the system, the number of students is not reported.
- More than three Excel files are uploaded.
- In survey type A for IT department, the amount of credits for IT education is less than 25% of the required amount of credits for Japanese universities.
- The number of classes is less than 2, which means that almost all subjects are closed.
- The required credit for graduation research is less than 2, which is quite rare in Japanese universities.
- The number of faculty members is less than the required number defined in the criteria for Japanese universities.
- The number of students is less than 10, which means that the department or course is quite small as an independent education program.
- In survey type C for the general IT education, knowledge or skill level for a particular BOK item is 5, which can be regarded as too high considering the teaching time and academic year.
- Unrealistic answer values (such as 9999) for some questions.

We notified the registered accounts whose answers meet the above checking rules, and requested a confirmation or correction of the answers.

At the time of writing this manuscript, we are waiting for the response from the registered respondents. The final paper will contain the analysis result based on the confirmed and updated data.

Finally we compared the registered accounts with existing public data listed below in order to estimate the response rate.

- Member of the Council of Informatics Departments in Science and Engineering (DI Council)
- Accredited departments from the Japanese government to obtain high school teacher license on IT education

We contacted the member departments of the DI Council which did not register to the survey system. We expect them to answer the survey soon.

4 SUMMARY OF THE SURVEY

4.1 Overall Response Rate

Table 4 summarizes the response rate of the three types of Japanese university issuing bachelor's degree. Among 758 Japanese universities, 86.7% answer to at least one survey type. National universities are founded and financially supported by the Japanese government. Since the survey is supported by the Japanese Ministry of Education, the response rate of the national university is the highest among the three university types. Public universities are founded and supported by local government such as prefecture or city. Majority of

the Japanese universities are private universities. Private universities are also financially supported in part by the Japanese government while preserving independence. We guess that the response rate of private university is the second highest because of this background. In Table 4, N/A means that the requested universities are quitted or do not provide IT education. These universities are included to calculate the response rate.

Table 4: Response Rate Summary (Overall).

	University Type			Total
	National	Public	Private	
# of Requested Universities	82	86	590	758
# of Registered Universities	79	73	499	651
N/A	0	0	7	7
Response Rate	96.3 %	84.9 %	85.6%	86.7%

4.2 Response Rate Analysis for Each Survey Type

Table 5 summarizes the number of answers for each survey type. It is often the case that an IT department (Type A) is running a program to have a high school teacher licence on IT education (Type D). Thus the numbers of answers to these two types are relatively similar.

Table 5: Number of Answers for Each Survey Type.

Survey Type	University Type			Total
	National	Public	Private	
A	84	35	177	296
B	302	64	632	998
C	96	69	574	739
D	85	18	235	338
E	128	73	368	569
Total	695	259	1,986	2,940

Comparing the Type A registration and the list of Council of Informatics Departments in Science and Engineering (DI Council), we found that 127 departments are registered to survey type A. Since 151 departments have registered to the DI Council, 84.1% of them respond to the survey. Although there is no formal list of IT department in Japan, we shall use this ratio as an estimated response rate of survey type A. At the same time, we can recognize that the DI Council only covers 42.1% of the IT departments or courses in Japan. The total number of students of the registered department or course is 25,419 per academic year. Among them 20,962 students are male and 4,457 are female.

As in the case of survey type B, there is no formal list of non-IT departments or faculties in Japan. However, the total number of university students per academic year is 626,865 according to the national statistics in 2016. The total number of students of the registered faculties and departments for survey type B is 87,261 for a single academic year. The number can be regarded as a lower bound of the number of students learning IT subject at non-IT departments. Although the response rate of survey type B is not expected to be high, the collected data is useful to understand typical IT education at non-IT departments.

In case of survey type C, the total number of students of the registered universities is 247,112 for a single academic year. Compared with 626,865, the total number of university students for a single academic year, at least 39.4% of the university students are taking the general IT education. The response rate of survey type C is expected to be higher than that of survey type B.

There are 521 accredited departments to obtain high school teacher license on IT education according to the Web site of the Ministry of Education, Japan. Among them, 340 departments (65.3%) answer to the survey. Although the number does not match to the value in Table 5, this is because some of the answers contain more than one department.

Table 6: Response Rate Summary (Type D).

	University Type			Total
	National	Public	Private	
# of Accredited Departments	107	17	397	521
# of Registered Departments	75	14	251	340
Response Rate	70.1 %	82.4%	63.2%	65.3%

The detailed response rate is illustrated in Table 6. The response rate of the private university is not high because we requested that only the department having enrolled students to answer the survey. The number of students willing to have a high school teacher licence on IT education is not many because of the market reason. In case of the public universities, the accredited education course will be quitted if there are not enough students enrolled. However national universities tend to retain the accredited course according to the instruction from

the Ministry of Education from the viewpoint of social responsibility. The difference of the response rate is observed under such background.

The response rate for Type E survey (Educational Computer System) is summarized in Table 7. The number of registered universities does not match to the value in Table 5 since more than one educational computer system exists in some universities. The response rate of the national university is the highest because of the difference of financial background.

Table 7: Response Rate Summary (Type E).

	University Type			Total
	National	Public	Private	
# of Requested Universities	82	86	590	758
# of Registered Universities	73	53	311	437
Response Rate	92.4%	73.6%	62.6%	67.4%

4.3 Inquiries from the University

We have received 544 inquiries from the university. Among them, 494 were received during the survey phase. 50 were received during the review phase. Figure 8 illustrates the number of inquiries at each day, which will be useful to estimate the workload to respond to the inquiries of a large scale survey like ours.

The request letter for the survey is sent on Oct. 28, 2016 so that we received the first inquiry on Oct. 31. The deadline of registration to the survey system was on Nov. 11 so that we received many inquiries before that. After that we received a constant number of inquiries about the questions. The survey was closed on Dec. 26 so that we received more inquiries than usual about deadline extension on that day. The inquiries after the deadline are about the feedbacks based on the checking of the survey answers.

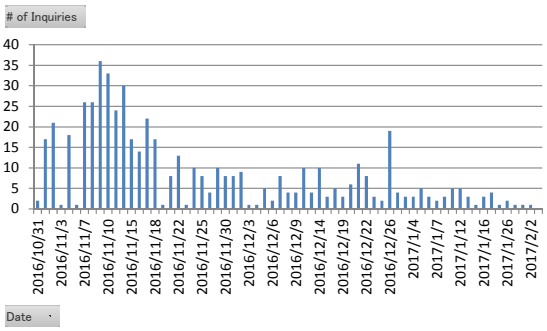


Figure 8: Number of Inquiries from the Universities.

5 PRELIMINARY ANALYSIS OF THE SURVEY RESULT

In this section, we present a preliminary analysis of the survey result. More detailed result will be published as separate papers for each survey type.

5.1 Survey Type A: IT Department

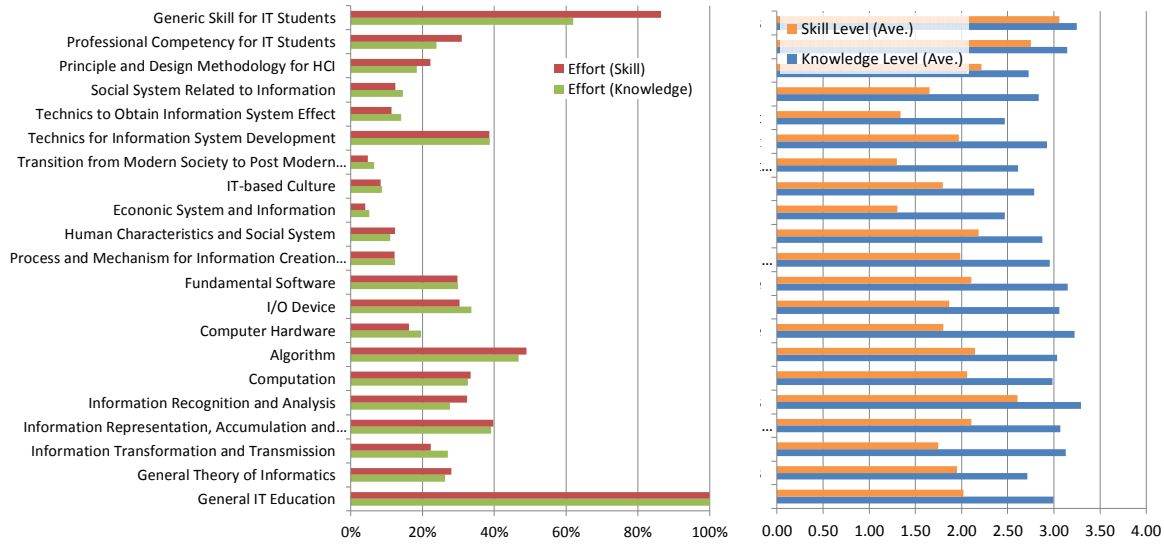
Although we have collected 296 answers, 56 are excluded from the analysis because non-IT departments and invalid answers are detected through the review phase.

The IT major is new compared with traditional academic domains. Table 8 illustrates this fact. For example, computer science (CS) departments are distributed among engineering, physical science and other domains. There are 34 departments which do not belong to traditional academic domains. 87 departments, 36.3% of the IT departments, do not belong to any of the existing computing disciplines. This fact suggests the necessity of developing other computing curricula recommendation for these departments.

Figure 9 represents educational achievement of

Table 8: Number of IT Departments Classified by Computing Discipline and Traditional Academic Domains.

	CS	CE	SE	IS	IT	Others	Total
Engineering	53	25	1	21	13	40	153
Others	5		2		3	24	34
Social Science				6	3	15	24
Physical Science	12			1		3	16
Humanities					2	3	5
Pharmacy and Nursing				3	1	1	5
Art			1		1		2
Education						1	1
Total	70	25	4	31	23	87	240



(a) Effort Ratio (b) Average Achievement Level

Figure 9: Educational Achievement of IT Department (Survey Type A).

IT departments and courses respond to the survey type A.

Fig. 9 (a) is the distribution of effort for each domain of the "Reference Standard of Informatics for University Education" and the general IT education. The effort is estimated by the sum of the number of students multiplied by the achieved level of the students in the submitted answers.

Fig. 9 (b) represents the average achievement level of the same domains as represented in Fig. 9 (a). The definition of the knowledge/skill levels is described in Tables 1 and 2. The averages are calculated among the answers with levels more than 1 using the number of students as the weight. Thus it should be noted that the number of students who achieved the average level is almost proportional to the effort ratio of the corresponding domain.

5.2 Survey Type B: non-IT Department or Faculty

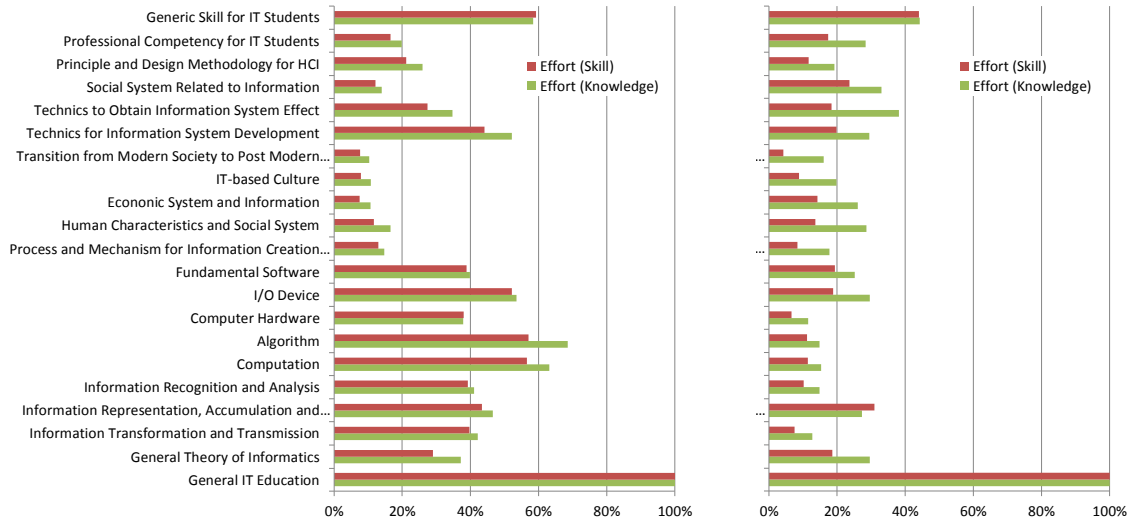
As shown in Table 5, we have received 998 answers for survey type B. Table 9 represents the number of answers and enrolled students at each academic domain. The table also represents the ratio of the number of students at each domain. The total number of students is cited from the national statistics of Japanese universities. The table rows are sorted in the descending order of the ratio.

The readers can observe that the response ratios of Medicine and dentistry, Physical Science and Engineering are significantly higher than those of the other academic domains. Although the number of students majored in social science is the largest, the number of answers is rather small. Similar tendency can be observed in humanities and education. This fact indicates the difference of effort and/or achievement at each domain. It is often observed that IT education is provided through general IT education for the latter case.

Table 9: Number of Answers and Students Classified by Traditional Academic Domains (Survey Type B).

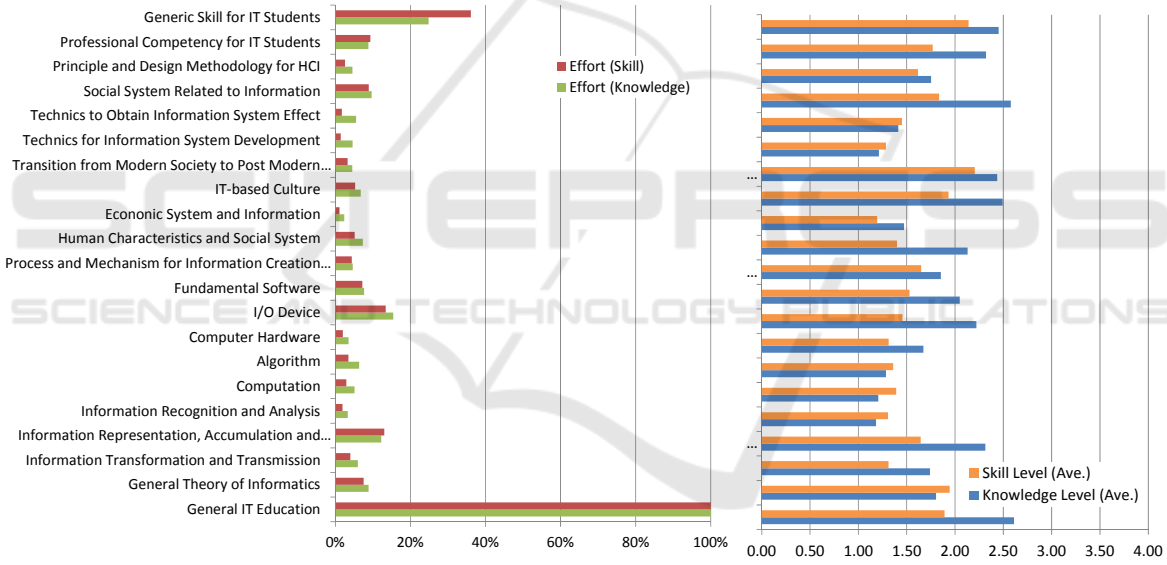
Domain	# of Answers	# of Students		
		Our Survey	National Statistics	Ratio
Medicine and Dentistry	40	3,438	11,765	29%
Physical Science	79	4,969	18,523	27%
Engineering	227	23,151	88,062	26%
Social Science	253	31,428	204,933	15%
Others	102	7,979	56,019	14%
Agriculture	33	1,824	18,042	10%
Pharmacy and Nursing	85	5,734	58,824	10%
Education	56	2,599	46,475	6%
Domestic Science	22	926	17,787	5%
Humanities	82	4,568	88,246	5%
Art	19	645	18,189	4%
Total	998	87,261	626,865	14%

Examine Figure 10 which illustrates average effort ratios of the "Engineering" and "Social Science" for comparison. The effort ratio of the general IT



(a) Engineering (b) Social Science

Figure 10: Effort Ratio of non-IT Department or Faculty (Survey Type B).



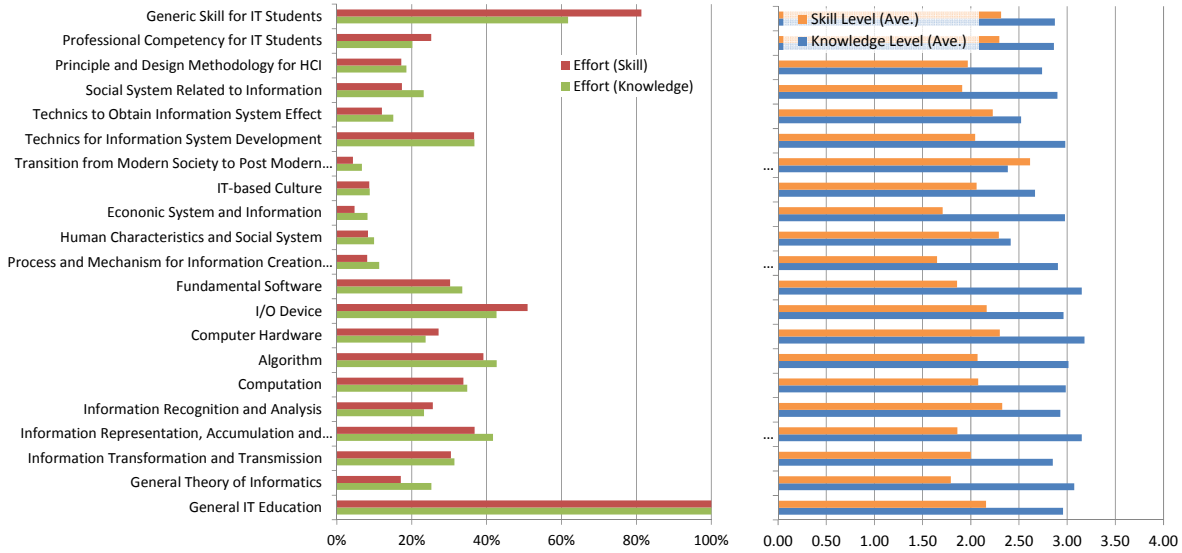
(a) Effort Ratio (b) Average Achievement Level

Figure 11: Educational Achievement of General IT Education (Survey Type C).

education is high for both domains. However, the "Engineering" departments also focuses on other domains of Informatics such as hardware, software, computer programming and generic skill. The readers can observe that IT education at social science departments is similar to the general IT education. There is a significant difference of the achievement levels between the two academic domains. The average knowledge level is 2.3 at engineering department and 2.1 at social science department. The average skill level is 1.4 at Engineering department and 0.8 at social science department.

5.3 Survey Type C: General IT Education

Figure 11 represents educational achievement of the general IT education. The general education is commonly provided for all university students. Each student usually takes only 1 or 2 subjects, i.e. 2 to 4 credits, during the general IT education. According to our analysis, the teaching contents



(a) Effort Ratio (b) Average Achievement Level

Figure 12: Educational Achievement of Education Program for High School Teacher Licence on IT (Survey Type D).

with high effort ratio are computer literacy, information ethics, security and computer network, digital representation of information, and organization of computer system. The effort to other domains of the "Reference Standard of Informatics for University Education" is minimal because of the time restriction.

The readers can also observe that the effort ratios of social science (Fig. 10(b)) and the general IT education (Fig. 11(a)) are similar. Although it can also be observed that more effort can be assigned to the domain in the "Reference Standard", this can be considered as a reason that social science departments tend to rely on general education.

5.4 Survey Type D: Education Program for High School Teacher Licence on IT

The required amount of credits for an education program for high school teacher license on IT is more than 20 for the IT subject. Thus we often find that an IT department runs such education program as a part of their technical education.

Table 10 illustrates the number of cases that an IT department exists within the university having an education program for high school teacher licence on IT. In case of national and public universities, IT department coexists for about 90% of the cases, although the ratio is lower in the case of private university.

Table 10: Department Summary of Survey Type D.

IT Department in University	University Type			Total
	National	Public	Private	
Exist	77 (89.5%)	15 (88.2%)	173 (73.3%)	265
Not Exist	9 (10.5%)	2 (11.8%)	63 (26.7%)	74

We also analysed the educational achievement of the department belonging to the survey type D (Figure 12). It is similar to the educational achievement of IT department shown in Figure 9, although the achievement levels tend to be lower. We guess that this is the effect of non-IT departments.

5.5 Survey Type E: Educational Computer System

Educational computer system is important to support IT education in order that a student to obtain a high level IT skill. Table 11 shows the overall situation of educational computer system at IT departments (survey type A).

Among 296 IT departments, 17 are non-IT departments. 34 (12.1%) departments have their own computer system administrated by themselves. This ratio is higher at national and public universities. 213 (75.8%) departments are using shared computer system operated by their faculty or university probably due to the financial restriction. 34 (12.1%) departments do not have computer system within their university.

Table 11: Educational Computer System at IT Department.

	University Type			Total	Average Achievement Level	
	National	Public	Private		Knowledge	Skill
IT Department	83	31	167	281	1.63	1.04
Department System	23 (27.7%)	8 (25.8%)	3 (1.8%)	34 (12.1%)	1.67	1.05
Faculty or University System	52 (62.7%)	19 (61.3%)	142 (85.0%)	213 (75.8%)	1.67	1.08
No Computer System	8 (9.6%)	4 (12.9%)	22 (13.2%)	34 (12.1%)	1.20	0.73

Table 11 also contains the average achievement level of knowledge and skill for these three cases. It can be observed that the achievement level is significantly lower both for knowledge and skill in the case of no computer system. Significant difference is not observed between the cases of department system and faculty/university system.

6 CONCLUSIONS

This is the first national survey on IT education at Japanese university. We have collected about 3,000 survey answers from about 650 universities. The response ratio of survey type A can be estimated at about 85% so that the analysis result will be highly reliable.

The survey contains questions about various aspects of IT education as explained in Section 2. The detailed analysis of the answers is still on the way. However the preliminary analysis result described in this paper is still valuable in order to understand the entire picture of the IT education at Japanese university. For example, we can observe that many departments of the different academic domain provide IT education with different distribution of the effort. We also find that many IT departments are established at a cross disciplinary domain of the traditional academic domains.

The final analysis result of the each survey type will be published as a separate paper. The result will be utilized by Information Processing Society of Japan (IPSJ) to develop the new computing education curriculum standard J17. The result will also be reported to the Ministry of Education, Japan as a fundamental statistics in order to discuss future strategy and plan to improve college level IT education in Japan.

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