

# Generic Support System Prototype in Eduinformatics for Students Selecting a Seminar

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**Abstract**—This study examines a generic support system prototype in eduinformatics for students selecting a seminar. We have proposed a new inter-disciplinary field called Eduinformatics. It is a combination of the fields of education and informatics. Earlier in 2017, we examined students' submission system and procedure and the result of actually employing this system to match students with specific seminars and teachers. Results revealed several issues with this first prototype system. Therefore, we developed a generic support system prototype in eduinformatics for students selecting a seminar, to improve the earlier model.

**Keywords**—information and communication technology, ICT, mini seminar, generic support system

## I. INTRODUCTION

Approximately 15 years ago, the human genome consortium comprising several researchers worldwide, sequenced the entire human genome. The human genome

includes three giga base pairs. Several informaticians joined the human genome project, appending the two fields of computers and informatics to this project because the original researchers found it impossible to analyze the data manually. This phenomenon led to the creation of a novel interdisciplinary field called bioinformatics, because it combines the two fields of biology and informatics.

Recently, higher education research has increased significantly. Additionally, the establishment of Institutional Research (IR) has been promoted in Japanese universities. This situation is similar to the era when bioinformatics was being developed. This is especially true since extensive educational research is "evidence-based" similar to evidence-based medicine. However, this type of research is extremely difficult to conduct employing conventional pedagogical techniques alone. Higher education will develop dramatically if researchers can apply informatics to their data, for example, statistics, artificial intelligence (AI), machine learning, data science, and so on, just as biology developed considerably

with the advent of bioinformatics. Recently we proposed a new field called “Eduinformatics” in higher education [1]. In this study, we focus on first-year education.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) reported that 501 universities in Japan—71%—had introduced first-year education in 2006 [1]. Nearly 90% of the University of Japan proposed first-year education in 2015 [2]. This implies that most Japanese universities had provided first-year education. Japan First-Year Education (JAFYE) began in 2008. JAFYE has been influential in increasing first-year education. Unlike normal courses, the purpose and content of first-year education varies considerably between universities. This is based on the 2009 Kawaijuku report on first-year education [3]; Kawaijuku is a famous corporation promoting higher education in Japan.

The first aim of Kawaijuku report is development of self-management and time management skills such as campus life and study habits. Second aim is remedial education. Third aim is understanding academics. Fourth aim is understanding ethics. Fifth aim is building relationships within the university. Sixth aim is obtaining study and academic skills such as writing a report and literature review methodology. Seventh aim is obtaining assessment methods such as critical thinking and communication skills. Eighth aim is modifying the passive learning attitude of high school to an active learning, self-study attitude at university.

This report examines the sixth aim to the eighth aim. To achieve these aims, Kobe Tokiwa University began a mini seminar on first-year education last year. The university is currently conducting university reforms [4] and began general education this year [5]. The mini seminar is a part of general education. Kobe Tokiwa University has two faculties and three departments. The Faculty of Health Sciences includes the Department of Nursing and Department of Medical Technology. The Faculty of Education includes the Department of Child Education. This year there are approximately 350 first-year students at Kobe Tokiwa University.

The mini seminar is similar to graduation research. The mini seminar was conducted with first-year students. Altogether 27 professors and associate professors managed four to eight students. Each teacher provided their professional theme to students (Table I).

The total number of students was approximately 350. This raised the question of how to combine faculty and students. First, students specified their first four choices of teachers. Second, mini seminar management members divided the students among the teachers based on the information submitted. This is the second year that the mini seminar was being conducted. We had only two or three hours to select teachers once students submitted their choices. We predicted a maximum of 350 student submissions. Our university follows the semester system. The mini seminar was conducted during both the first and second semester. Therefore, students were required to submit first-choice to fourth-choice of teachers for both first and second semester, simultaneously.

In this case, we had to contend with a maximum of 2,800 (=  $4 \times 350 \times 2$ ) teachers simultaneously. We had examined education employing the theoretical model [6], mathematical model [7], and statistics [8]. Additionally, we developed Information and Communication Technology (ICT) support systems for Faculty Development (FD) [9]. Moreover, we had described eduinformatics. Several problems regarding combinations exist in the education field, for example is curriculum and so on.

Therefore, we decided to develop a support system for students selecting a seminar. There are some courses similar to mini seminar at our university. We attempted to construct a versatile support system to apply to these courses. We had reported on the first prototype system using information and communication technology to match students with chosen seminars and teachers earlier [10]. In this report, we described students’ submission system and procedure and the result of actually using this system to match students with chosen seminars and teachers in 2017. The results help us understand the problems with the first prototype system.

We decided to alleviate the problems with this system. Our intention is that several people can use this system. Therefore, we have to consider a tradeoff between convenience and versatility. In this case, we decided versatility is more important than convenience.

This report cannot describe the actual results of using this system to match students with chosen seminars and teachers in 2018 since it is currently March 2018. We will be employing this system to match students with chosen seminars and teachers in April 2018. Our future works will report these results.

TABLE I. THEME OF FRESHMAN SEMINAR

Being human
Dementia
Introduction to Human Anatomy
Genetic modification
Support for community-dwelling elderly by college students
Think about the current world
Communication design
Explore the path that aims at a higher level in a medical career
Beginning of translation
Lifestyle and disease
Ethics viewpoint
Sex education by peer support
Exploring children's behavior
Animal-derived infection
Sports and the world
Preventive services in super-aged society
Science communication
Psychological Theories of Love
Introduction to Montessori education
What is life?
To live and happiness
Symbiosis
War/Civil war and globalization/global health
Material research of stories
Introduction to genes
Yutori kyoiku: Designed to relieve the pressure on students and broaden their perspective and creative abilities
The power of yeast
Introduction to cell mechanism

	A	B	C	D	E	F	G	H	I
1	Time Stamp	Department	Student ID	Student's Name	Teacher of seminar	First-choice	Second-choice	Third-choice	Fourth-choice
2	4/10/2017 12:17:23	Department A	Student ID 001	Student's Name 001	Teacher's name 20	Teacher's name 20	Blank	Teacher's name 17	Any seminar of 1st period on Friday
3	4/10/2017 12:21:54	Department A	Student ID 002	Student's Name 002	Teacher's name 20	Teacher's name 20	Blank	Teacher's name 14	Any seminar of 1st period on Friday
4	4/10/2017 12:11:25	Department A	Student ID 003	Student's Name 003	Teacher's name 14	Teacher's name 20	Teacher's name 11	Blank	Blank
5	4/11/2017 15:03:56	Department A	Student ID 004	Student's Name 004	Do not take	Do not take	Blank	Blank	Blank
6	4/10/2017 16:34:05	Department A	Student ID 005	Student's Name 005	Do not take	Not selected	Not selected	Not selected	Not selected
7	4/11/2017 14:26:00	Department A	Student ID 006	Student's Name 006	Do not take	Teacher's name 14	Blank	Blank	Blank
8	4/11/2017 12:28:09	Department A	Student ID 007	Student's Name 007	Do not take	Teacher's name 14	Not selected	Not selected	Not selected
9	4/11/2017 12:57:01	Department A	Student ID 008	Student's Name 008	Do not take	Not selected	Blank	Blank	Not selected
10	4/11/2017 15:05:07	Department A	Student ID 009	Student's Name 009	Do not take	Blank	Blank	Blank	Blank
11	4/11/2017 12:39:58	Department A	Student ID 010	Student's Name 010	Do not take	Teacher's name 18	Teacher's name 14	Blank	Blank
12	4/10/2017 12:20:38	Department A	Student ID 011	Student's Name 011	Do not take	Teacher's name 13	Teacher's name 08	Blank	Blank
13	4/9/2017 22:41:26	Department A	Student ID 012	Student's Name 012	Do not take	Blank	Blank	Blank	Blank
14	4/11/2017 10:00:33	Department A	Student ID 013	Student's Name 013	Do not take	Teacher's name 18	Not selected	Not selected	Not selected
15	4/11/2017 11:34:44	Department A	Student ID 014	Student's Name 014	Do not take	Teacher's name 14	Teacher's name 11	Teacher's name 07	Not selected

Fig. 1. Students Former Data.

	A	B	C	D	E	F	G	H	I
1	Time Stamp	Department	Student ID	Student's Name	Teacher of seminar	First-choice	Second-choice	Third-choice	Fourth-choice
2	4/10/2017 12:17:23	Department A	Student ID 001	Student's Name 001	Teacher's name 20	Teacher's name 20	Blank	Teacher's name 17	Any seminar of 1st period on Friday
3	4/10/2017 12:21:54	Department A	Student ID 002	Student's Name 002	Teacher's name 20	Teacher's name 20	Blank	Teacher's name 14	Any seminar of 1st period on Friday
4	4/10/2017 12:11:25	Department A	Student ID 003	Student's Name 003	Teacher's name 14	Teacher's name 20	Teacher's name 11	Blank	Blank
5	4/11/2017 15:03:56	Department A	Student ID 004	Student's Name 004	Do not take	Do not take	Blank	Blank	Blank
6	4/10/2017 16:34:05	Department A	Student ID 005	Student's Name 005	Do not take	Do not take	Not selected	Not selected	Not selected
7	4/11/2017 14:26:00	Department A	Student ID 006	Student's Name 006	Do not take	Teacher's name 14	Blank	Blank	Blank
8	4/11/2017 12:28:09	Department A	Student ID 007	Student's Name 007	Do not take	Teacher's name 14	Not selected	Not selected	Not selected
9	4/11/2017 12:57:01	Department A	Student ID 008	Student's Name 008	Do not take	Do not take	Not selected	Blank	Not selected
10	4/11/2017 15:05:07	Department A	Student ID 009	Student's Name 009	Do not take	Do not take	Blank	Blank	Blank
11	4/11/2017 12:39:58	Department A	Student ID 010	Student's Name 010	Do not take	Teacher's name 18	Teacher's name 14	Blank	Blank
12	4/10/2017 12:20:38	Department A	Student ID 011	Student's Name 011	Do not take	Teacher's name 13	Teacher's name 08	Blank	Blank
13	4/9/2017 22:41:26	Department A	Student ID 012	Student's Name 012	Do not take	Do not take	Blank	Blank	Blank
14	4/11/2017 10:00:33	Department A	Student ID 013	Student's Name 013	Do not take	Teacher's name 18	Not selected	Not selected	Not selected
15	4/11/2017 11:34:44	Department A	Student ID 014	Student's Name 014	Do not take	Teacher's name 14	Teacher's name 11	Teacher's name 07	Not selected

Fig. 2. Students data after firstchoice.

	A	B	C	D	E	F	G	H	I	J
1	Fixed number	5	7	6	5	7	8	4	5	5
2	Teacher's name	Teacher's name 01	Teacher's name 02	Teacher's name 03	Teacher's name 04	Teacher's name 05	Teacher's name 06	Teacher's name 07	Teacher's name 08	Teacher's name 09
3			Student ID 062	Student ID 063	Student ID 065			Student ID 091	Student ID 134	Student ID 056
4			Student ID 069	Student ID 066	Student ID 067			Student ID 109	Student ID 152	Student ID 072
5			Student ID 076	Student ID 071	Student ID 070			Student ID 156	Student ID 179	Student ID 119
6			Student ID 107	Student ID 084	Student ID 073				Student ID 189	Student ID 141
7				Student ID 085	Student ID 074				Student ID 205	Student ID 147
8				Student ID 086	Student ID 075					Student ID 151
9				Student ID 087	Student ID 077					Student ID 166
10				Student ID 088	Student ID 078					Student ID 192
11				Student ID 090	Student ID 079					Student ID 200
12				Student ID 096	Student ID 080					Student ID 201
13				Student ID 097	Student ID 081					Student ID 208
14				Student ID 098	Student ID 082					
15				Student ID 099	Student ID 083					

Fig. 3. First-choice after firstchoice.

	A	B	C	D	E	F	G	H	I	J
1	Fixed number	5	3	0	0	7	8	1	0	0
2	Teacher's name	Teacher's name 01	Teacher's name 02	Teacher's name 03	Teacher's name 04	Teacher's name 05	Teacher's name 06	Teacher's name 07	Teacher's name 08	Teacher's name 09
3			Student ID 151	Student ID 067	Student ID 066			Student ID 031	Student ID 011	Student ID 053
4			Student ID 155	Student ID 074	Student ID 071			Student ID 032	Student ID 085	Student ID 064
5				Student ID 078	Student ID 090			Student ID 033	Student ID 087	
6				Student ID 079	Student ID 093			Student ID 038	Student ID 092	
7				Student ID 081	Student ID 096			Student ID 042	Student ID 100	
8				Student ID 082	Student ID 113			Student ID 043	Student ID 105	
9				Student ID 083	Student ID 118			Student ID 044	Student ID 111	
10				Student ID 095	Student ID 123			Student ID 045	Student ID 143	
11				Student ID 104	Student ID 131			Student ID 046	Student ID 168	
12				Student ID 108	Student ID 132				Student ID 190	
13				Student ID 112	Student ID 133					
14				Student ID 114	Student ID 137					
15				Student ID 116	Student ID 199					

Fig. 4. Second-choice after secondchoice.

## II. PROTOTYPE SYSTEM

We requested students to work on Google forms (<https://www.google.com/forms>). Our form had three sections. The first section indicated department, student ID number, and name. The second section indicated the first choice to fourth choice of teachers for the first semester mini seminar. The third section indicated the first choice to fourth choice of teachers for the second semester mini seminar.

We received a CSV file containing this data. The CSV file provided the time stamp, department, student ID number, student name, first choice in the first semester, second choice in the first semester, third choice in the first semester, fourth choice in the first semester, first choice in the second semester, second choice in the second semester, third choice in the second semester, and fourth choice in the second semester.

We prepared two Excel files comprising five sheets. The five sheets were titled "Students Data", "First-choice",

“Second-choice”, “Third-choice”, and “Fourth-choice”. In the sheet titled “Students Data”, any duplicated data was deleted using the time stamp (Fig. 1).

We employed previous Visual Basic for Applications (VBA) macros in our paper [10], subsequently obtaining four sheets (from first-choice to fourth-choice) (Fig. 2). We manually assigned students to their teachers based on these results. This task required constant repetition. To improve this problem, we required plenty of time to assign.

We improved VBA macros to assign students to their teachers automatically. We did not use teacher ID numbers, but we used teachers name strings to find student choice. New VBA macro output students first-choice to the sheet “First-choice” (Fig. 3). In a column of the sheet, first row data was fixed number, second row data was teacher’s name, and third row or subsequent data was student’s ID who chose that teacher’s seminar.

The macro selected students randomly when the number of applicants exceeded the quota and noted the teacher’s name in a cell in the student’s data row of the sheet titled “Students Data”. In this case, the fixed number was 0 in the sheet “Second-choice”. If the number of applicants was less than the fixed number of first-choice, the macro program input the residual limit number as a new fixed number in the sheet titled “Second-choice” (Fig. 4).

In terms of second choice or later, the macro program searched students’ choice except those who had already confirmed their seminar teacher. Owing to this function, we accomplished the task efficiently. If a student selected “Any seminar” or “Any seminar during the 1st period on Thursday or Friday” and the remainder, we manually assigned his/her teacher.

In this paper, we developed a generic support system prototype in eduinformatics for students selecting a seminar. Unfortunately, we could only develop and propose this system in eduinformatics because actual selection will occur next month. In the future, we aim to report the result of employing this prototype system to match teachers and students.

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