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Message from the Editor-in-Chief

Dear Colleagues,

According to Teich (1977), the close relationship between technological and social change itself helps to explain why any given technological development is likely to have both positive and negative effects. These effects are as follows:

1. Technological advance creates a new opportunity to achieve some desired goal.
2. This requires alterations in social organization if advantage is to be taken of the new opportunity.
3. Which means that the functions of existing social structures will be interfered with.
4. With the result that other goals which were served by the older structures are now only inadequately achieved (Teich, 1977).

Consider three views on the role of technology in society. First, technology is an unalloyed blessing for man and society. Technology is seen as the mother of all progress, as holding the solution to most our social problems, as helping to liberate the individual from the clutches of a complex and highly organized society, and as the source of permanent prosperity; in short, as the promise of utopia in our time (Teich, 1977). Second, technology is an unmitigated curse. Technology is said to rob people of their jobs, their privacy, their participation in democratic government, and even, in the end, their dignity as human beings. Teich also notes that technology is seen autonomous and uncontrollable, as fostering materialistic values and as destructive of religion, as bringing about a technocratic society and bureaucratic state in which the individual is increasingly submerged, and as treating, ultimately, to position nature and blow up the world (Teich, 1977).

A third view of technology differs from the previous characterizations as ultimately good or bad. It argues that technology as such is not worthy of special notice, because it has been well organized as a factor in social change at least since the Industrial Revolution. It is unlikely that the social effects of computers will be nearly so traumatic as the introduction of the factory system in 18th-century England, because 1) research has shown that there has been no significant change in recent decades in the time period between invention and widespread adoption of new technology, and 2) improved communications and higher levels of education make people much more adaptable to new ideas and to new social reforms required by technology (Teich, 1977).

A society should respond to the opportunities produced by technology for productive and positive development. Unfortunately, societies sometimes hinder people from developing or utilizing a particular technology. For example, high level decision makers may think that the cost of a technological development is too high, or companies may conclude that some technologies will not be favorable for maximum profits.

Therefore, there is an interaction between technology or technique and society. We can see this effect anywhere in our society. For example, computer development aids society to organize work, association, company, and others to save time and money. It means that technology provides society with new opportunities to design all things well.

The Turkish Online Journal of Educational Technology (TOJET) is a refereed international online journal sponsored by Sakarya University, Governor State University and TASET (The Association of Science, Education and Technology). The main mission of TOJET is to diffuse how to use technology in education all over the World.

TOJET greatly appreciates the valuable contributions of the editorial board who have acted as reviewers for one or more submissions of this issue. TOJET's reviewers are drawn quite widely from all over the world with a concentration for this issue on the Europa, USA, Asia, Turkey, and others.

TOJET is interested in academic articles on the issues of educational technology. The articles should talk about using educational technology in classroom, how educational technology impacts learning, and the perspectives of students, teachers, school administrators and communities on educational technology. These articles will help researchers to increase the quality of both theory and practice in the field of educational technology.

TOJET will organize the 14th International Educational Technology Conference (IETC 2014) on September 03-05, 2014 at AIC in Chicago, USA. The web page of IETC is “www.ietc.net”.

Call for Papers

TOJET invites article contributions. Submitted articles should be about all aspects of educational technology and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET. All authors can submit their manuscripts to tojet.editor@gmail.com for the next issues.

January, 01, 2014
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3-DIMENSONAL AND INTERACTIVE ISTANBUL UNIVERSITY VIRTUAL LABORATORY BASED ON ACTIVE LEARNING METHODS

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ABSTRACT
The purpose of this study is to develop a 3-dimensional interactive multi-user and multi-admin IUVIRLAB featuring active learning methods and techniques for university students and to introduce the Virtual Laboratory of Istanbul University and to show effects of IUVIRLAB on students'attitudes on comminucation skills and IUVIRLAB. Although there are many computer simulations and virtual laboratory applications, the model introduced in this study has a uniquecharacteristics in terms of being a 3-dimensional, interactive virtual laboratory that enables students to learn in cooperative groups, and is the first in its kind due to its qualities of enabling multi-admin. and multi-user operation, having a special software compatible to run on ipad, iphone,

android and smart phone platforms, and having been designed on the basis of active learning approaches. A survey was used in order to determine the views of students about and students stated quite positive views about IUVIRLAB implementation.

Keywords: active and collaborative learning, new communication technologies, innovation, education, e-learning

1. INTRODUCTION

In terms of rendering education and teaching more meaningful and lasting, a wide variety of teaching materials are utilized for emphasizing on the fundamental points of topics, and keeping students' interest, attention and eagerness for learning high. Within the education process, the necessity of presenting information through various means gives providence to the utilization of new information technologies instead of the conventional educational tools and materials (Isman, Kaput, 1991). The primaries of these are the materials prepared with the aid of computers. Because computers are capable of saving, processing and displaying a great number of information. Furthermore, the capability of computers to present information in visual, audial forms and through interactive means creates a great potential for education (Ornstein and Lasley, 2004). Effective use of computers within the educational process increases the quality level of educational materials.

Virtual laboratory programs are defined as programs that are adapted according to the students' and teachers' needs, and that integrate modeling, simulation and information technologies in order to create an environment of high interaction. In addition to this definition, virtual laboratory programs are also defined as highly interactive and educational computer tools that include multimedia, audio, images and videos and that run according to a certain logical sequence and within mathematics rules (Guzzi, 2005). According to another definition, virtual laboratories are environments developed to provide students with the means to access experiments at the desired place and time, and to make education with mobile tools possible (Alkouz et al., 2008). Yet another definition describes virtual laboratories as interactive learning environments that utilize computer technologies, simulations and various learning technologies in order to carry the face-to-face laboratory activities into the digital medium (Scheckler, 2003). On the other hand Prieto-Blázquez et al. (2009), who set forth a new definition by examining and synthesizing several conducted studies, defined virtual laboratories as interactive virtual learning environments that are adapted according to students' and teachers' needs and that embody all pedagogical, technological and human-specific resources in order to perform applied experiments. These programs also include a software system, Simulator and smart teaching systems (Scherp, 2002). Virtual laboratories are simulations of real laboratories. Their most prominent feature is a highly interactive user interface. In a virtual laboratory program, the user can move objects, use laboratory equipment and carry out experiments by using mouse and keyboard. In short, virtual laboratories can be described as simulation-based multimedia (Scherp, 2002). Jeschke (2001) reported the characteristic features of a virtual laboratory as being virtual, complex, flexible, structuralist, an experimental approach to intangible objects, trial-error approach, 7/24 accessibility and reliability. Examining these characteristic features shows that these programs can be used in creating the ideal environments that will help learning and teaching. The criteria required to be included by a virtual laboratory in order to realize all these characteristic features are reported as follows:

- Criteria concerning the menus, icons and links used in simulation programs,
- Criteria concerning the text format included by simulation programs,
- Criteria concerning the instruction and help functions used in simulation programs,
- Criteria concerning the audio and visual narration used in simulation programs,
- Criteria concerning the colors and visual elements used in simulation programs,
- Criteria concerning the design of the animations used in simulation programs, and
- Criteria concerning the design used in presenting the results obtained from simulation programs (Nikoukaran, 1998; Serra, 1999).

On top of these, Jensen (2004) also added the criteria of drag-moving objects, orientating by selecting models and pressing on control panels, rotating models, playing animations as desired, text panels, communicating through audio and video, and viewing presentations at all times and as many times as desired through a virtual projector.

While the short-term objective of virtual laboratory programs is to provide a supplementary method for real laboratories, their long-term purpose is described as to actually replacing real laboratories (Jeschke, 2001). In addition, virtual laboratory programs are also in demand in cases where complex, expensive, difficult, labored and hard to comprehend technical experiments are to be carried out (Scherp, 2002). Being a necessity in education also in pedagogic terms, virtual laboratory environments enhance students' problem solving skills,

support investigative learning scenarios, adapt to individual learning methods, support supplementary learning scenarios, demonstrate the effects of other areas through applications, increase students' motivation and encourage teamwork (Jeschke, 2001).

In addition to these, virtual laboratory environments provide 7/24 accessibility by removing the barriers of time and location, do not require learners to be gathered in a physical location, bring along cost saving, enable high levels of interaction, enhance learners' motivation and eagerness to learn, provide safe experiment and monitoring opportunities and allow life-long learning (Yang, 2003; Leung, 2001; Kolokotronis, 2003; Nikoukaran, 1998; Sung and Hwang, 2013).

Virtual laboratory programs have not become widespread as much as they were intended to be due to the limited number of producer and software developer companies, the difficulty and time consumption of the production process and the high cost of software (Jensen, 2004). Also the physical conditions (hardware, supplementary software, etc.) that are necessary for using virtual laboratory programs in a correct and fit for the purpose way need to be met. It is reported particularly for internet-based virtual laboratories that, users' motivation levels tend to fall due to long waiting durations caused by slow network connections (Bowman, 2002). Due to all these reasons, teachers who plan to carry out courses through virtual laboratories have to consider the possible problems concerning technical inadequacies, lack of face-to-face communication and the consequent falls in students' motivations, and have to take the necessary measures (Jensen, 2004).

The studies conducted in the recent years indicate that the active learning applications carried out in learning centers enhance students' interest, attitude and motivation concerning the course as well as the success of learning, and also make positive contribution to the development of students' social qualities (Linder, 1993; Marioni, 1989; Wandersee, Mintes and Novak, 1994). Active learning is a learning process where the learner bears the responsibility of the process, is provided with the opportunities of making decisions and self-regulation concerning various aspects of the process and is pushed to utilize its mental abilities through complex educational tasks during learning (Acikgoz, 2003). Theoretical bases of active learning rest on constructivism and its variant in the field of learning, cognitivism (Acikgoz, 2003). According to cognitivism, the student adds what is newly seen or heard on top of those that are already known. By organizing and categorizing information the student develops, tests and interprets hypothesis, in a sense structures knowledge (Acikgoz, 2003). As it can be understood from this, constructivism and cognitivism address the learning process rather than the teaching process, and set forth various related explanations and suggestions. Active learning emerged as a consequence of some researchers concerning what students should do in order to be able to structure knowledge. In terms of information processing, constructivism establishes the basis of active learning.

As one of the orientations concerning active learning, cooperation-based learning has a substantial part in active learning model. That is because cooperation-based learning enables the implementation of many principles of active learning. In education through cooperation-based learning, the teacher aims to have the student be aware not only of itself, but also of the other students. At this stage students learn to share, wait for their turn and care about others. Through structured activities, they learn about how others think in cooperation, react to problems and develop their spoken language skills in small groups. It is set forth that, in terms of academic success, cooperation-based learning produces more positive results for all groups of age in comparison with both competitive and individual learning methods (Demirel, 1996). Basic characteristics of cooperation-based learning require group members to be aware of that the group is a whole and that every member has responsibility in terms of the success of the group. Since in addition to student-teacher interaction also student-student interaction is included in this learning approach, a higher level of learning takes place. Cooperation based learning minimizes students stress by creating an environment where they can feel safer and more confident. It makes it possible to individualize education. It enables individuals to attain the behavior of solving all challenges together. It contributes to the development of students' critical thinking, problem solving and creativity skills. Enables the teacher to consult students in a more effective and productive way (Demirel, 1996; Grabinger, 1996).

Istanbul University Virtual Laboratory (IUVIRLAB); has a unique characteristic and is a first in its kind in terms of being a 3-dimensional, interactive laboratory that will enable students to learn in cooperative groups. By means of its multi-user and internet-accessible nature, the produced virtual laboratory has a diffirenst innovative approach to present e-learning techniques since whics is designed in a way suitable for the use of all active learning approaches that can be carried out with cooperative groups (Barkley, 2005).

2. PURPOSE

The purpose of this study is to develop a 3-dimensional interactive multi-user and multi-admin virtual laboratory featuring active learning methods and techniques for university students and to introduce the Istanbul IUVIRLAB concerning the topics of Magnetic Field and Magnetism. In practice, it is estimated that this virtual laboratory will increase students' success levels, enable them to correctly structure concepts and enhance their critical thinking and problem solving skills, as well as their capability to associate physics with their daily lives. Although there are many computer simulations and virtual laboratory applications that have been implemented in the area of physics today, the present study has a unique characteristic and is the first of its kind in terms of being a 3-dimensional, interactive virtual physics laboratory that will enable students to learn in cooperative groups.

The active learning approaches on which the study is based are problem-based learning in cooperative groups, cooperative learning, project-based learning, inquiry-based learning, research-based learning, learning through invention. As known, such instructions based on cooperative learning groups that minimizes the occurrence of those unpleasant situations and maximizes the learning and satisfaction that result from working on a high-performance team.By means of its multi-user and internet-accessible nature, the virtual physics laboratory produced was designed in a way suitable for the use of all active learning approaches that can be carried out with cooperative groups (Barkley 2005).

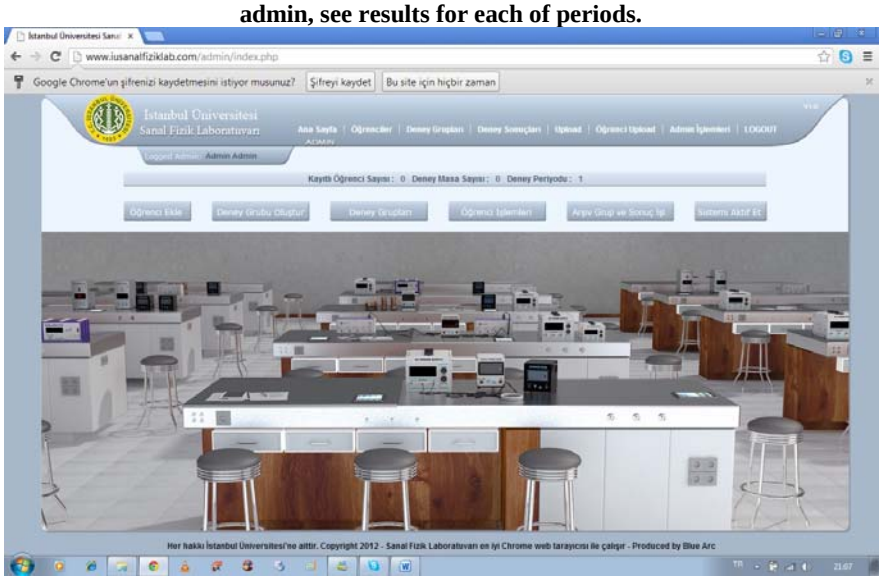
3. STRUCTURE OF IUVIRLAB:

In this section, the structure and functions of the virtual physics laboratory will be presented.

3.1. Administrator Panel:

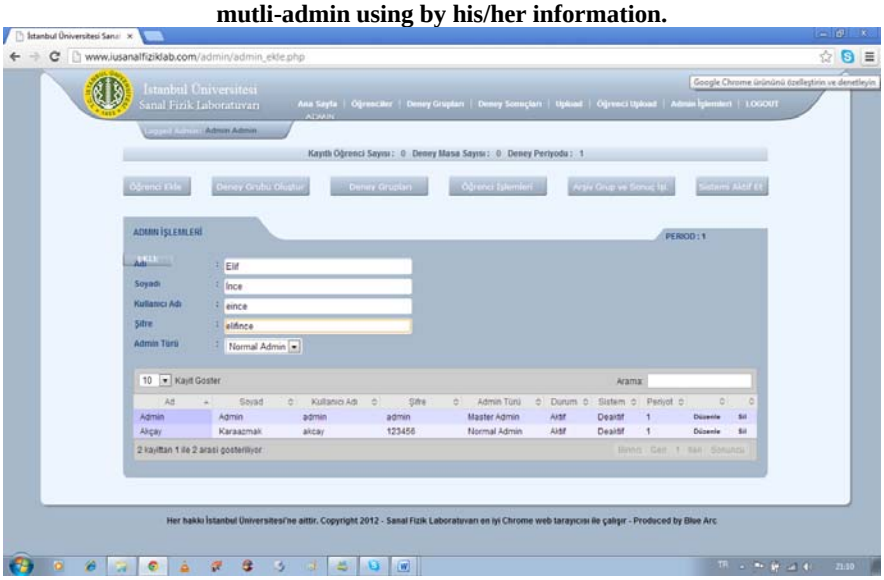
In this study, the system has a single master-admin. Fig. 1 shows that master-admin. panel and its parts such that the master-admin can define (add/delete/edit) multi-admin information.

Fig.1: A screenshot from Master-Admin control panel. In this panel, admin can add/delete/edit multi-admin, see results for each of periods.



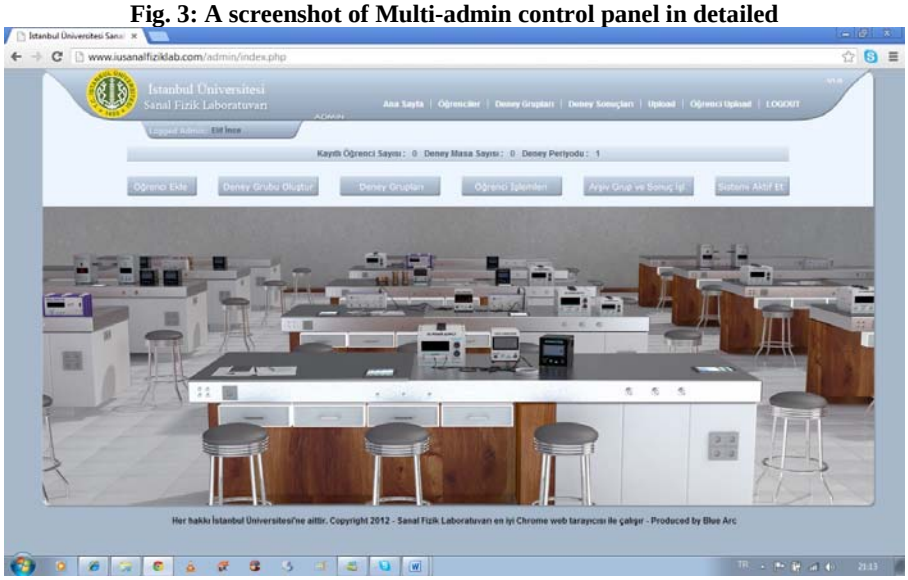
With multiple applications, multiple administrators can be defined for enabling different departments of universities or schools to conduct laboratory studies. The editing multi-admin. panel is shown in Fig.2 in detail.

Fig.2: Multi-admin identification page on the Master-Admin control panel. Master-admin can determine mutli-admin using by his/her information.



Each multi-admin can add/delete/edit students' information, define a username and password for each student, select group members and group's experiment at the beginning of periods, see the results of the groups, activate the system. A multi admin control panel screenshot is shown in Fig. 3.

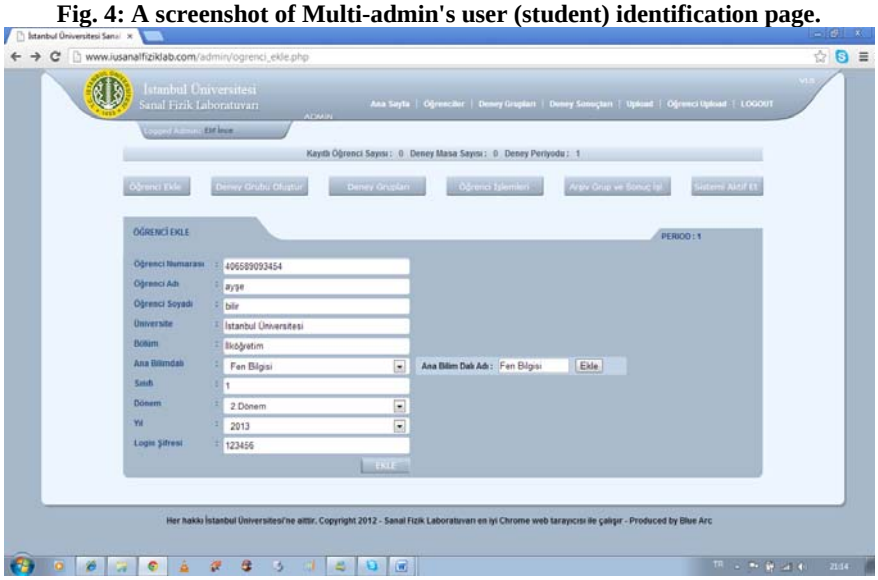
Fig. 3: A screenshot of Multi-admin control panel in detailed



The tasks to be performed by the multi-admin in order to render the system operable are listed below step by step:

- With the defined username and password, the multi-admin logs into the http://www.iusanalfiziklab.com/admin/ website and adds users (students) and the information pertaining to the students into the database. The multi-admin's user (student) identification page is shown in Fig.4. The multi-admin can add students to the database including the students' number, name-surname, university, division, class, semester and year information.

Fig. 4: A screenshot of Multi-admin's user (student) identification page.



- Student information can be changed at all times. The page where the multi-admin regulates the changes in user (student) information is presented in Fig.5-1 and Fig.5-2, respectively.

Fig.5-1: A screenshot of the page where multi-admin regulates the changes in user (student) information.

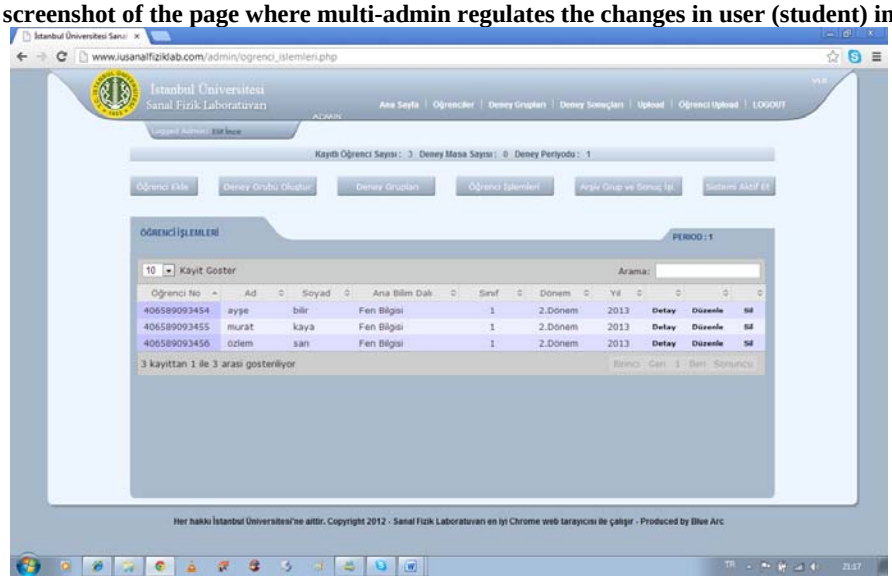
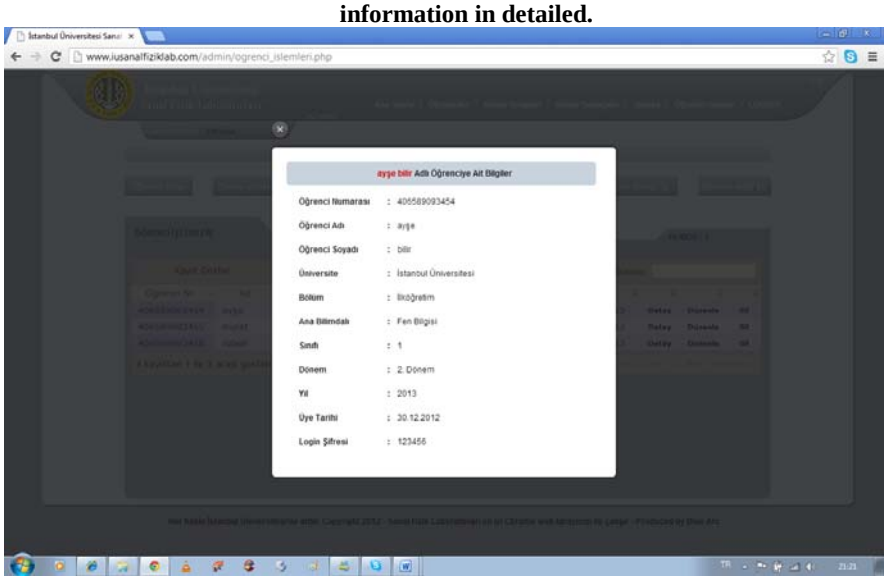


Fig. 5-2: A screenshot of the page where multi-admin regulates the changes in user (student) information in detailed.



- After students are added, the multi-admin adds the experiment to be carried out and the group of each student to the user table and creates the experiment groups. These steps can be seen in Fig.6-1, Fig.6-2 and Fig.6-3, respectively.

Fig. 6-1: A screenshot of the page from where multi-admin enters students into experiment groups

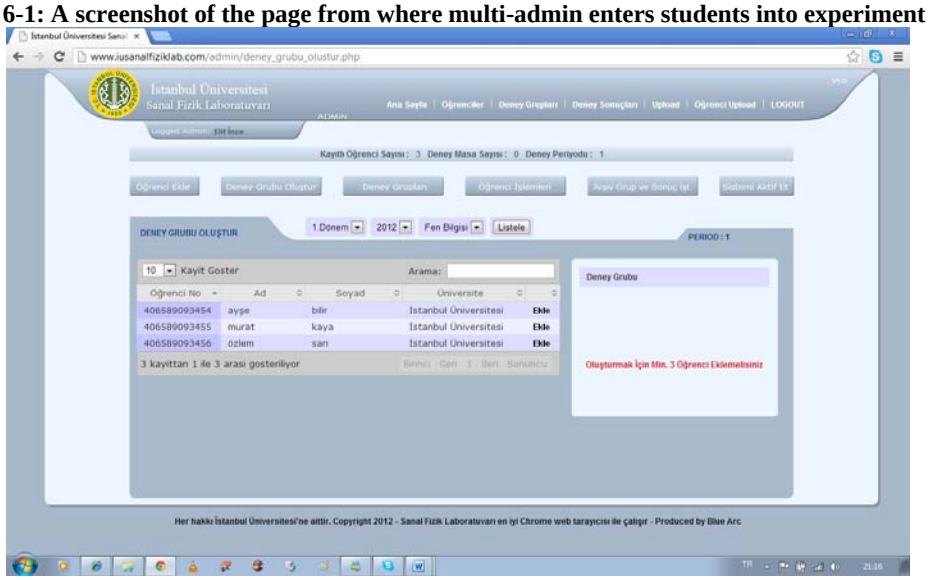


Fig. 6-2: A screenshot of the page from where multi-admin enters /edits students into experiment groups

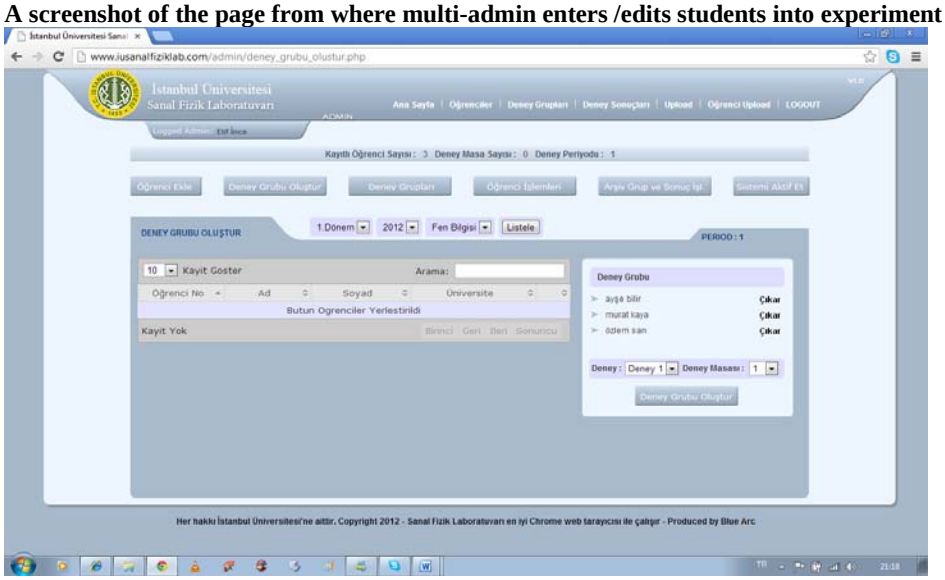
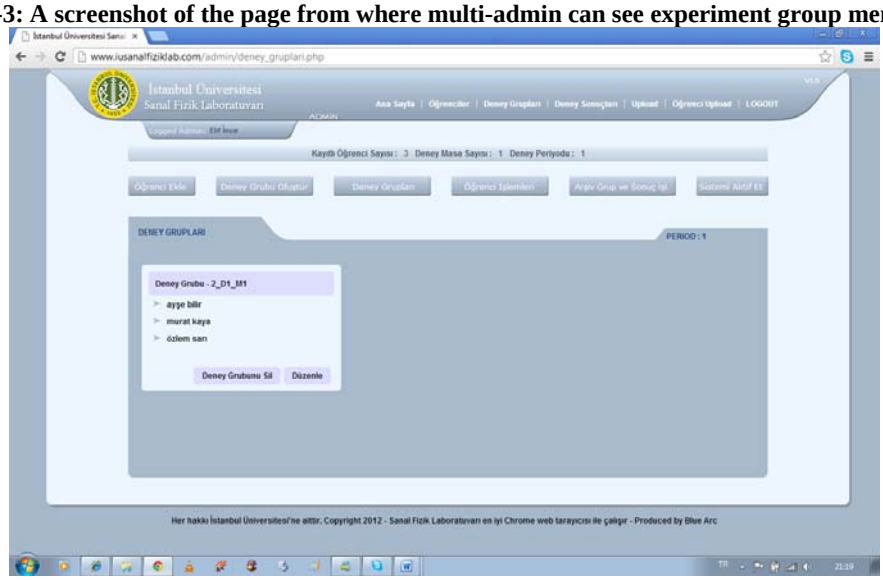
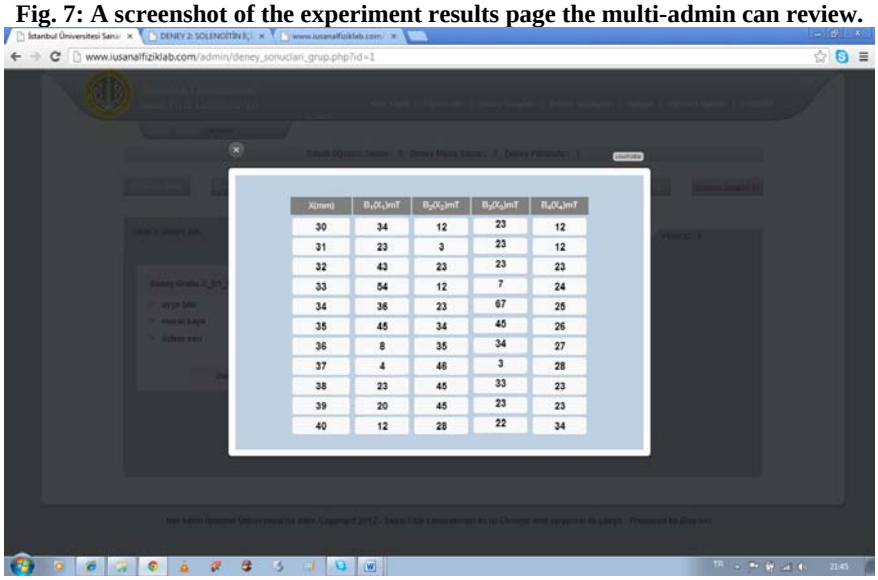


Fig. 6-3: A screenshot of the page from where multi-admin can see experiment group members.



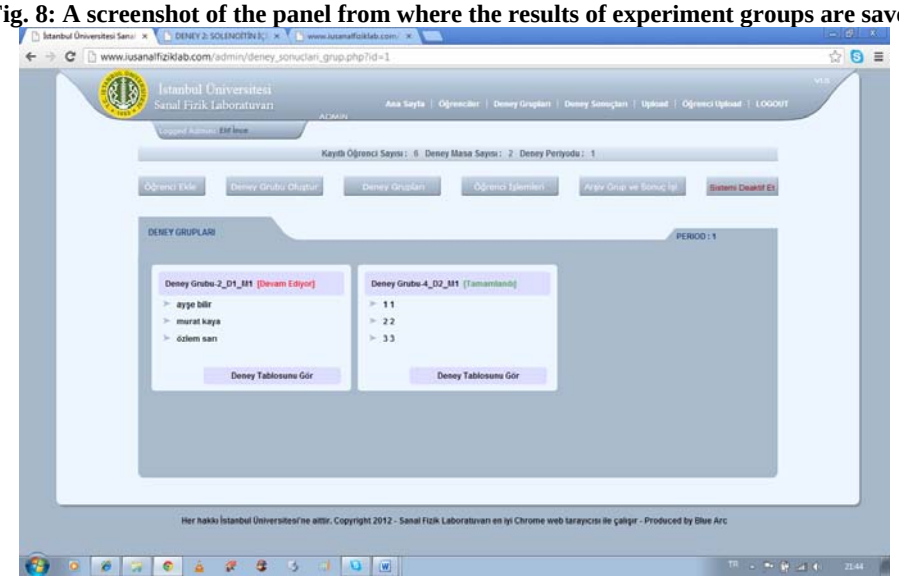
- After the multi-admin activates the system, all users can login to the related experiment directly,
- At the end of the first experiment period, the admin deactivates the system and any user that logs in after this sees the message "Laboratory is closed".
- When the multi-admin decides to initiate the next experiment period, he or she clicks on the "next period" button and the system automatically appoints an experiment group and experiment to all users.
- After the experiment is completed, the multi-admin can monitor experiment results from the experiment table view as shown in Fig.7 below.

Fig. 7: A screenshot of the experiment results page the multi-admin can review.



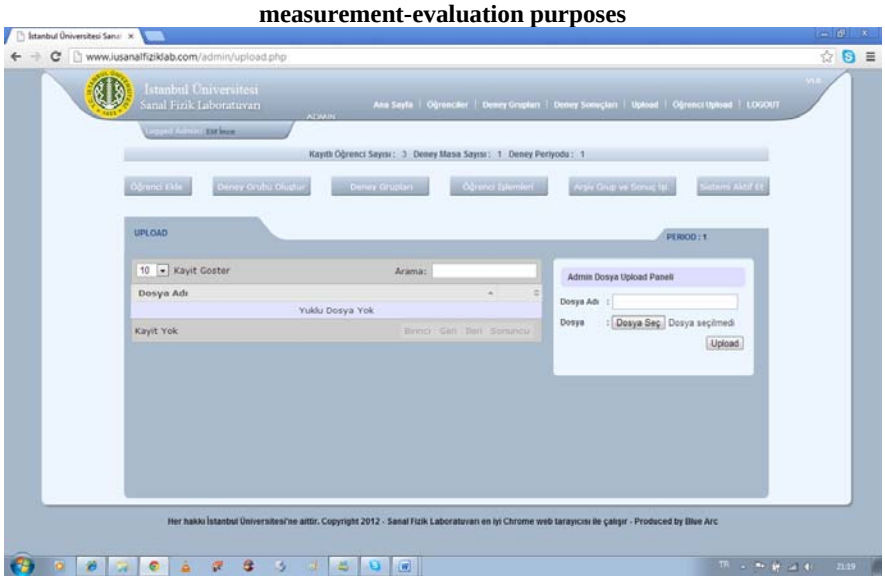
- For each user, the system saves experiment tables in the database. A screenshot of the panel from where the results of experiment groups are saved is presented in Fig.8.

Fig. 8: A screenshot of the panel from where the results of experiment groups are saved



- The multi-admin can assign homework to users concerning the experiments realized and perform measurement-evaluation. For this purpose an upload-download section is included in the system. From here, the multi-admin can upload new homework and download finished assignments. The measurement-evaluation page is presented in Fig.9.

Fig.9: A screenshot of the upload page from where multi-admin can assign homework for measurement-evaluation purposes



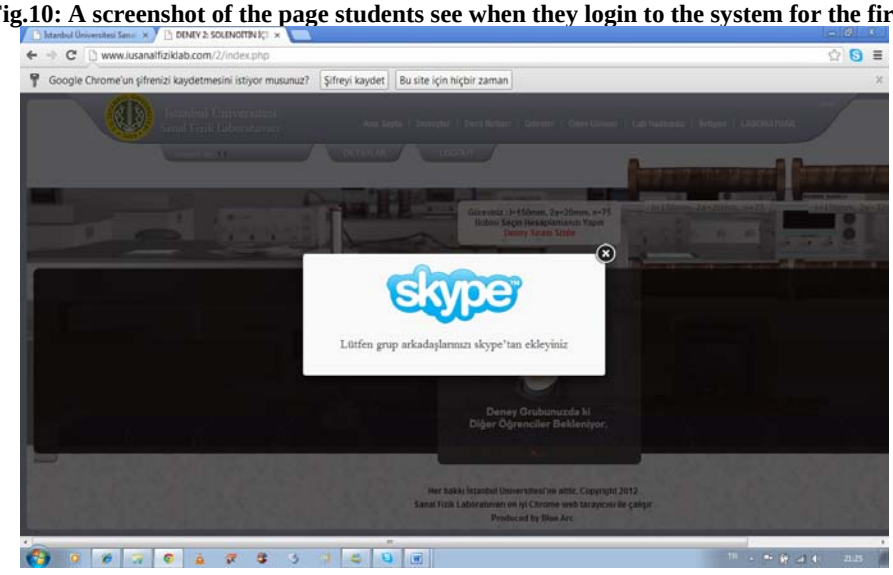
3.2. User (Student) Panel:

The multi-admin introduces the users, i.e. the students in this application, to the system by entering their names, student identification numbers, university, department, grade, semester and password information. With the username and password provided by the multi-admin., only users can access to the system. When users login, the experiments they will carry out and the other users they will carry out the experiment with are all defined. The information necessary for each user are as follows:

- With the usernames and passwords assigned by the multi-admin., students login to the system from the address http://www.iusanalfiziklab.com/. Information concerning the laboratory, experiments, how the laboratory is to be used and the experiment groups are provided in the user page.

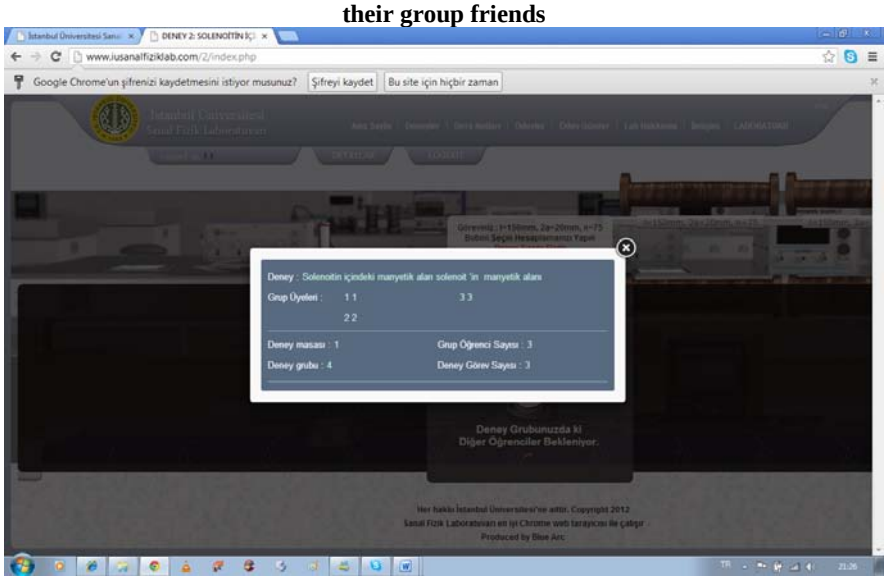
- In order to initiate any experiment, the minimum number of users defined for each experiment needs to be logged in. A minimum of 3 users is required for each experiment, while the maximum number of users is 4. Information concerning the experiments (which students form a group and which experiments are to be made) is shown in the Details section. In this way, students are enabled to conduct the experiment while communicating and discussing through Skype for collaborative learning. Students see a "Connect via Skype" notice when they login to the system for the first time as shown in Fig.10.

Fig.10: A screenshot of the page students see when they login to the system for the first time



- Students also access group members' information from the "Details" section as shown in Fig.11.

Fig. 11: The screen accessed from the "Details" section and from where students reach information on their group friends



- After a minimum of 3 users are connected to the experiment in question, the system assigns a task for each user. There are at least 3 tasks for each experiment. In the case where 4 users connect to an experiment of 3 tasks, the fourth user can be the "observer". They solely observe the experiment. If there are 4 tasks defined but only 3 users connected, then the first user will perform 2 tasks.

- The task command on the screen of each user is different. During the experiment, the system notifies each user concerning the tasks they need to perform. While a user performs a task, he or she observes all changes in the laboratory such as advancing and value increasing and the experiment table of the group. These screens are demonstrated in Fig.12-1, Fig.12-2 and Fig.12-3, respectively.

Fig.12-1: A screenshot of the screen the 1st student sees while performing his or her task during the experiment

Fig.12-2: A screenshot of the screen the 2nd student sees while the 1st student is performing his or her task during the experiment

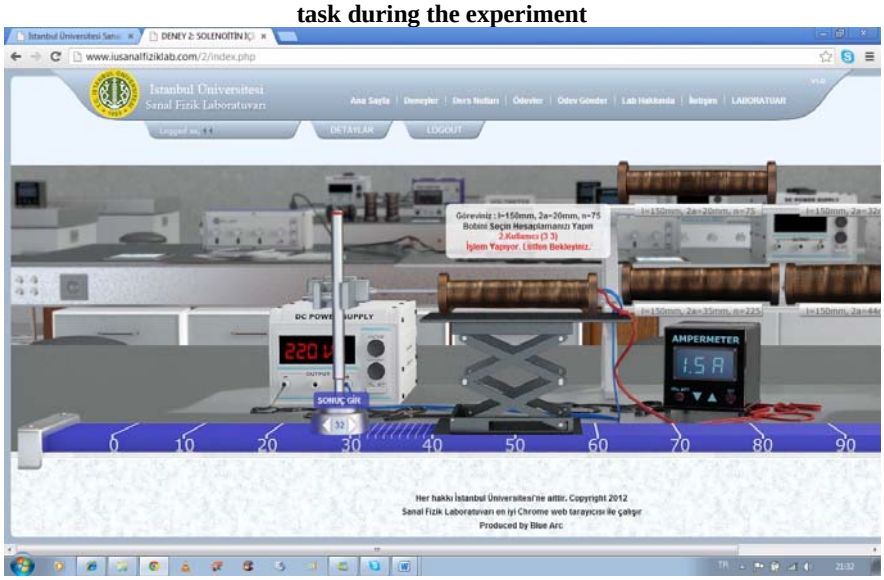
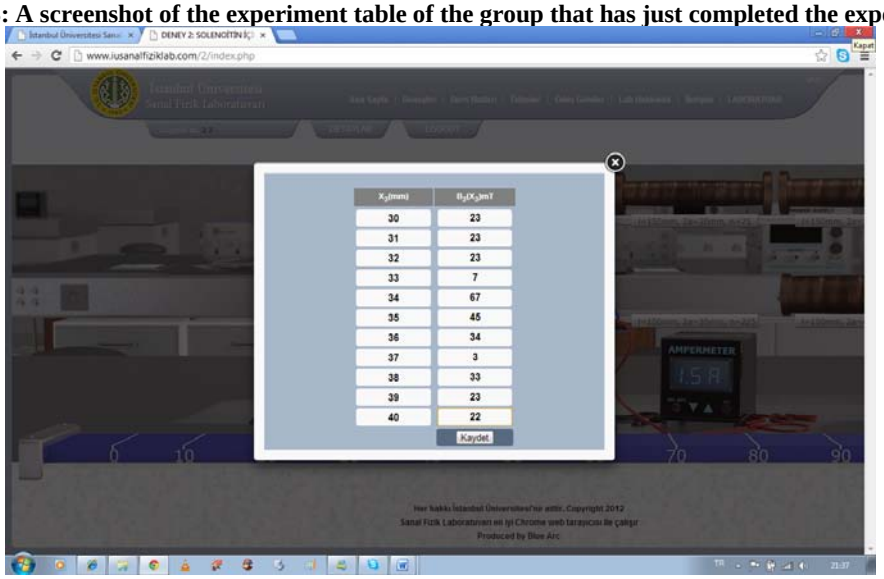
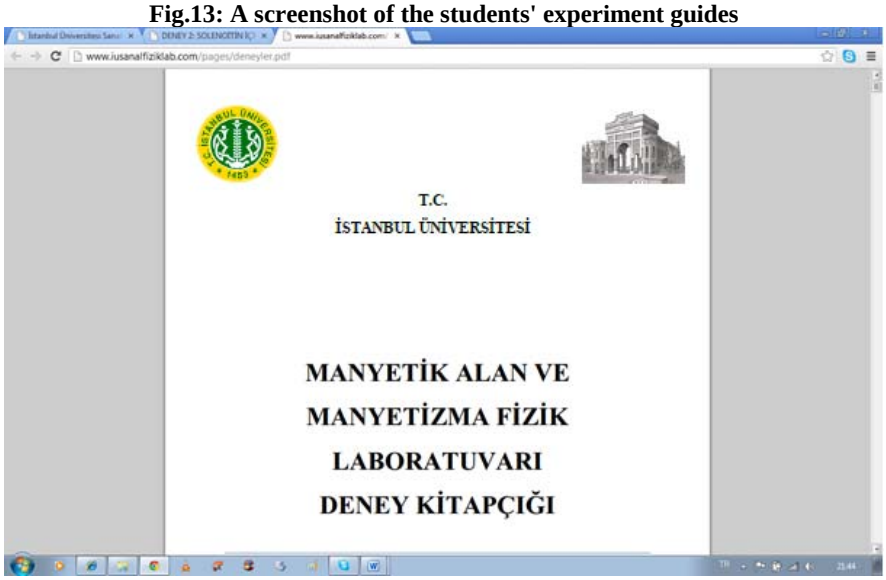


Fig.12-3: A screenshot of the experiment table of the group that has just completed the experiment



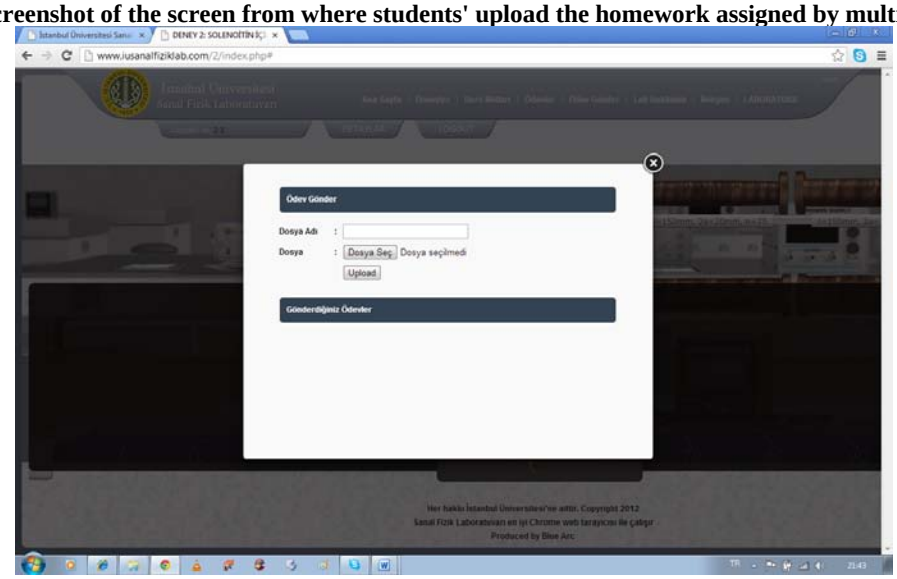
- Users can view all information, details and formulas concerning the experiment by opening the experiment guide in the "experiments" section in his or her own page as shown in Fig.13.

Fig.13: A screenshot of the students' experiment guides



- The multi-admin can assign homework to users concerning the experiments realized and perform measurement-evaluation in terms of active learning approaches. For this purpose, an upload-download section is included in the system. From here, the multi-admin can upload new homework and download finished assignments. A measurement-evaluation page for students was presented in Fig.14.

Fig.14: A screenshot of the screen from where students' upload the homework assigned by multi-admin.

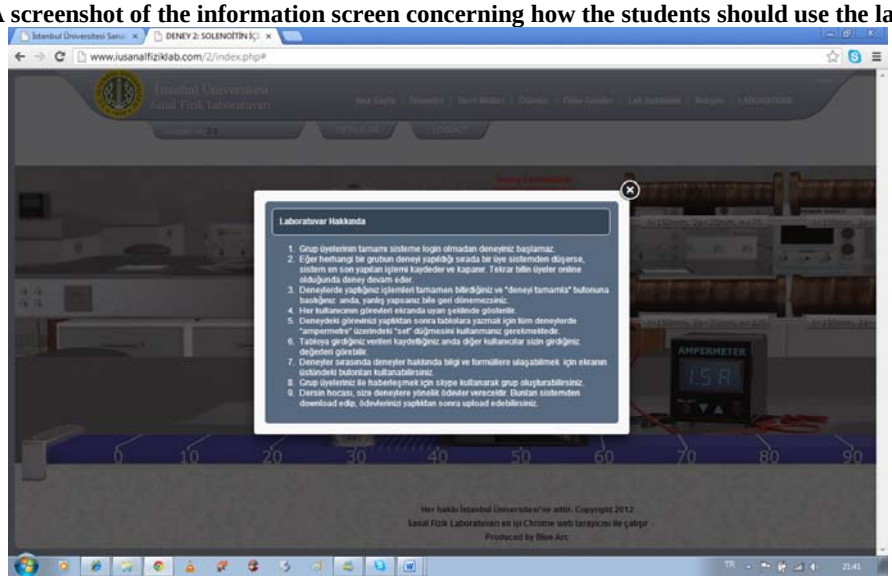


- In case one or more users go offline during the experiment, the message "waiting for other users" is displayed and the experiment resumes when all users are online again.
- After the group completes an experiment, it cannot do anything related to that particular experiment before the admin allows for the next period. In this case, users see the "experiment completed, view experiment table" message and can only see the experiment result table when logged in. The experiment result table can be seen by students for their own group as demonstrated in Fig.15.

Fig.15: A screenshot of the experiment result table the students see after the evaluation concerning their own group.

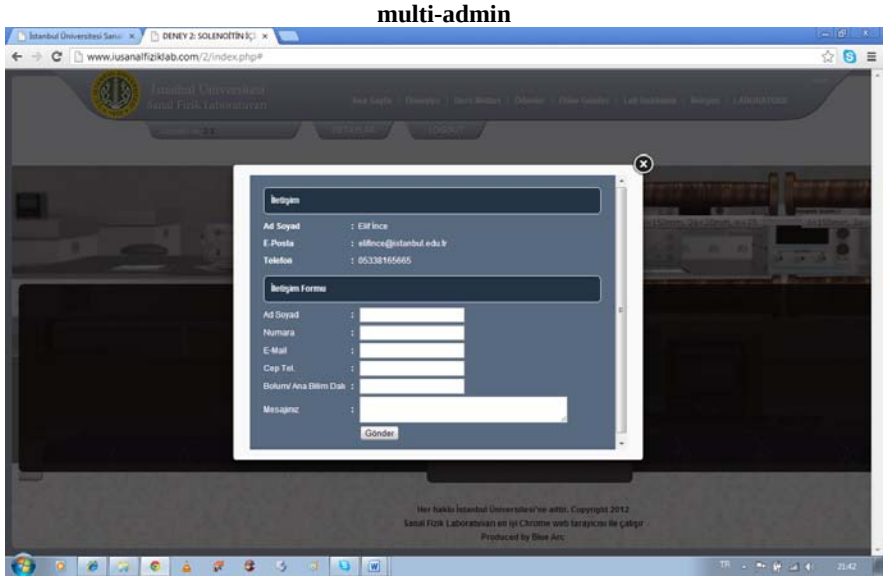
- The user (students) panel also includes information onscreen concerning how the students should use the laboratory as shown in Fig.16.

Fig.16: A screenshot of the information screen concerning how the students should use the laboratory



- A communication page, for cases where students need to communicate with multi-admin., was constructed in the user panel and can be seen in Fig.17.

Fig. 17: A screenshot of the communication page used in case that students need to communicate with multi-admin



3.3. Structure of The System:

In this study, the tasks performed by the system are as follows:

- The Master-Admin. Enters the user name and password information of the multi-admin to the database.
- Each multi-admin enters student information, usernames and passwords to the database.
- When the system is activated by the multi-admin, all users can login to the related experiments.
- At the end of the first experiment's period, the multi-admin deactivates the system and any user that logs in after this sees the message "Laboratory is closed".
- When admin decides to initiate the next experiment period, he or she clicks on the "create the groups for the next experiment" button and the system automatically assigns the groups and experiments of all users (names of experiments change without changing experiment tables; for instance experiment 1 - table 1 becomes experiment 2 - table 1 in the next experiment).
- In order to initiate any experiment, the minimum number of users defined for each experiment needs to be logged in. A minimum of 3 users is required for each experiment, while the maximum number of users is 4.
- After a minimum of 3 users are connected to the experiment in question, the system assigns a task for each user. There are at least 3 tasks for each experiment. In cases where 4 users connect to an experiment of 3 tasks, the fourth user can be the "observer". In cases where 4 users connect to an experiment of 3 tasks, the fourth user can be the "observer". They solely observe the experiment. If there are 4 tasks defined but only 3 users connected, then the first user will perform 2 tasks.
- The task command on the screen of each user is different. During the experiment, the system notifies each user concerning the tasks they need to perform.
- In case one or more users go offline during the experiment, the message "waiting for other users" is displayed and the experiment resumes when all users are online again.
- Multi-admin can assign homework to users concerning the experiments realized and perform measurement-evaluation. For this purpose, an upload-download section is included in the system. From here, the multi-admin can upload new homework and download the finished assignments.
- The system stores all experiment tables in the database.
- After the group completes an experiment, it cannot do anything related to that particular experiment before the admin allows for the next period. In this case, users see the "experiment completed" message and can only see the experiment result table when logged in.
- As distinct from other virtual physics laboratories, in the software of the virtual physics laboratory in question, flash and java applications were not used. Instead, a special software that can run on IOS, iPad, iphone, android and smart phones was developed with html 5 software code in order to meet the requirements of the day. As is known; mobile learning technology based on ios devices are essential for education (López et al., 2013). Screenshots of the Virtual Physics Laboratory running on iPad and IOS, android (smart phone) software are presented in Fig. 18-1 and Fig. 18-2, respectively.

Fig.18-1: A screenshot of the Virtual Physics Laboratory running on ipad and IOS software

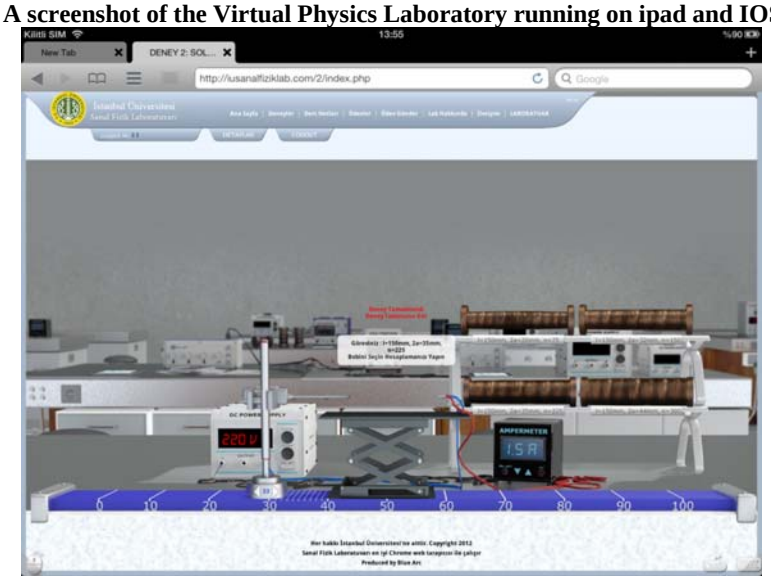
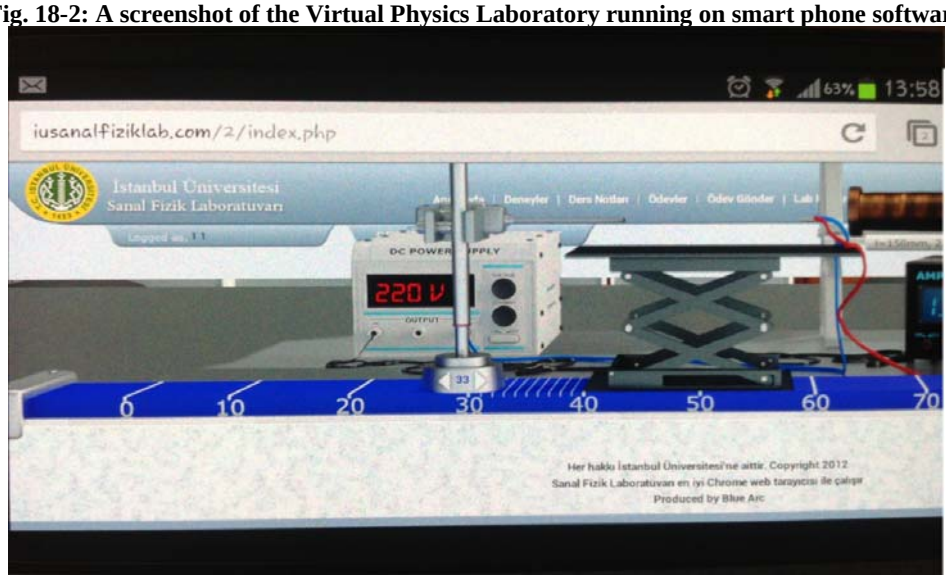


Fig. 18-2: A screenshot of the Virtual Physics Laboratory running on smart phone software



4. TREATMENT OF IUVIRLAB

The participants in this study were 60 first-year undergraduate students (average age 19-20 years). They were from the science teaching department in a public university in Istanbul, Turkey. The scientific backgrounds of the students were similar.

The IUVIRLAB includes 4 experiments concerning magnetic fields and magnetism. These experiments are; examination of the magnetic field of a solenoid, magnetic field within a solenoid, magnetic induction, and electromagnetic resonance. Before the IUVIRLAB application, students were informed about the structure of the virtual laboratory, how to use it, how to enter the website, how to see their group friends.

Students were added to the system from the Admin panel of the IUVIRLAB, passwords and the collaborative groups of each student were determined. During application students entered the "www.iusanalfiziklab.com" web address which was determined for teachers; they communicated on-line via Skype and Twitter both with their group friends and system administrator. For the application to be as realistic as possible, experiments were carried out for 4 weeks.

5. SURVEY RESULTS

In order to determine the views of students about IUVIRLAB applications, the researchers developed a 5-point Likert type survey (I certainly agree, I agree, Neutral, I disagree, I certainly disagree) composed of 48 questions regarding content, view, usage (computer, smart phones, iPad) and application (collaborative learning groups). The students' answers to the survey questions are presented in Table 1.

Table 1. Percentages of students' views determined by survey

ORDER	QUESTIONS	I certainly agree (%)	I agree (%)	Neutral (%)	I disagree (%)	I certainly disagree (%)
1	Interactive laboratory experiments are as effective as real laboratory experiments.	40.0	33.3	16.7	6.7	3.3
2	Interactive laboratory experiments are satisfying.	35.0	26.7	16.7	16.7	5.0
3	Visual elements used in interactive laboratory experiments increase interest towards the course.	18.3	38.3	26.7	11.7	5.0
4	Interactive laboratory experiments are a waste of time.	0.0	6.7	28.3	45.0	20.0
5	Interactive laboratory experiments enable permanent learning.	26.7	28.3	28.3	16.7	6.7
6	Interactive laboratory experiments are student-centered.	30.0	25.0	21.7	16.7	6.7
7	Interactive laboratory experiments are boring.	0.0	10.0	35.0	45.0	10.0
8	I lost track of time during interactive laboratory experiments.	15.0	38.3	33.3	11.7	1.7
9	I think interactive laboratory experiments make me lazy.	0.0	11.7	26.7	45.0	16.7
10	Interactive laboratory experiments increase motivation.	30.0	36.7	16.7	6.7	10.0
11	Interactive laboratory experiments increase success.	33.3	31.7	18.3	16.7	0.0
12	Interactive laboratory experiments increase interest towards the course.	28.3	26.7	28.3	10.0	6.7
13	Interactive laboratory experiments are entertaining.	36.7	30.0	25.0	6.7	1.7
14	Interactive laboratory experiments are repelling.	0.0	8.3	21.7	43.3	26.7
15	Interactive laboratory experiments increase creativity.	36.7	21.7	33.3	6.7	1.7
16	Interactive laboratory experiments influence attitude towards physics laboratories positively.	46.7	16.7	23.3	10.0	3.3
17	Interactive laboratory experiments enhance visualization of physics problems.	30.0	26.7	21.7	16.7	5.0
18	Interactive laboratory experiments enable understanding the subject more easily.	45.0	15.0	28.3	10.0	1.7
19	Interactive laboratory experiments may increase problem-solving skills.	51.7	21.7	18.3	6.7	1.7
20	Interactive laboratories have good screen readability.	43.3	20.0	20.0	10.0	6.7
21	Commands in interactive laboratories associate their own tasks functionally.	40.0	21.7	18.3	13.3	6.7
22	Signs/buttons in interactive laboratories associate their own tasks functionally.	43.3	26.7	15.0	11.7	3.3
23	Screen colors of interactive laboratories help concentration.	38.3	36.7	20.0	5.0	0.0
24	Design and operation logic of interactive laboratory sites have educational value.	33.3	28.3	23.3	10.0	5.0
25	Interactive laboratory experiments enable learning through experience and practice environment.	31.7	33.3	23.3	8.3	3.3

26	Interactive laboratory experiments enable each student to learn at his/her own speed.	30.0	33.3	20.0	10.0	6.7
27	Learning takes place in a free environment in interactive laboratories.	10.0	21.7	38.3	20.0	10.0
28	Interactive laboratory environment removes discriminations of gender, social class and geographical hindrances.	38.3	41.7	20.0	0.0	0.0
29	Interactive laboratories are suitable for life-long learning.	38.3	25.0	20.0	11.7	5.0
30	Experiment explanations included in interactive laboratories are sufficient for conducting experiments.	36.7	30.0	16.7	9.7	7.0
31	Experiment booklets in interactive laboratories are sufficient for conducting experiments.	28.3	31.7	30.0	6.7	3.3
32	Interfaces used in interactive laboratories are coherent and logical on all pages.	40.0	25.0	28.3	7.6	0.0
33	Interactive laboratories are suitable for conducting experiments and communicating with collaborative groups.	38.3	38.3	16.7	3.3	3.3
34	Functional properties of experiments included in interactive laboratories are efficient.	36.7	26.7	16.7	10.0	10.0
35	Tasks given to students during experiments in interactive laboratories increase responsibility.	48.3	20.0	8.3	18.3	5.0
36	Tasks given to students during experiments in interactive laboratories enable them learn the subject better.	33.3	33.3	20.0	3.3	10.0
37	Operations carried out by group members being observable by other members during experiments in interactive laboratories is exciting.	43.3	25.0	23.3	6.7	1.7
38	Operations carried out by group members being observable by other members during experiments in interactive laboratories is motivating.	35.0	26.7	30.0	6.7	1.7
39	Analysis of experiment results after interactive laboratory experiments enables group members to evaluate themselves.	36.7	21.7	25.0	10.0	6.7
40	The Skype screen pop-up while entering and Twitter usage in interactive laboratories excite group members.	43.3	26.7	16.7	3.3	10.0
41	Interactive laboratories enable group leaders to be determined on-line.	36.7	28.3	26.7	3.3	5.0
42	It is comforting when group members access academicians on-line in case of any problem in interactive laboratories.	35.0	31.7	20.0	13.3	0.0
43	It is pleasing when students enter interactive laboratories at home.	33.3	28.3	28.3	6.7	3.3
44	It is exciting when students enter interactive laboratories from mobile phone/computer etc...	35.0	31.7	30.0	1.7	1.7
45	It increases motivation when students enter interactive laboratories from mobile phone/computer, etc...	43.3	26.7	20.0	10.0	0.0
46	Experiments carried out in interactive laboratories are realistic.	38.3	36.7	25.0	0.0	0.0
47	I have had no problems while doing experiments in interactive laboratories.	35.0	25.0	10.0	20.0	10.0
48	Interactive laboratory environment restricts the learning of students.	3.3	11.7	31.7	40.0	13.3

As it is seen in Table 1, when the percentage of answers students gave for survey questions is analyzed, students generally stated positive views about IUVIRLAB application in the sense of content, appearance, usage and application. Especially when the characteristics specific to the IUVIRLAB virtual physics laboratory are analyzed; 35% of students stated “I Certainly Agree” for “I have had no problem while doing experiments in interactive laboratories”, 38.6% said “Experiments carried out in interactive laboratories are realistic”, 43.4% said “It increases motivation when students enter interactive laboratories from mobile phone/computer/etc...”, 35% said “It is exciting when students enter interactive laboratories from mobile phone/computer/etc...”, 35% said It is “comforting when group members access academicians on-line in case of any problem in interactive laboratories”, 48.3% said “Tasks given to students during experiments in interactive laboratories increase responsibility”, 33.3% said “Tasks given to students during experiments in interactive laboratories enable them learn the subject better”, 43.3% said “Operations carried out by group members being observable by other members during experiments in interactive laboratories is exciting”, 35% said “Operations carried out by group members being observable by other members during experiments in interactive laboratories is motivating”, 36.7% said “Analysis of experiment results after interactive laboratory experiments enables group members to evaluate themselves”, and 43.3% said “The Skype screen pop-up while entering and Twitter usage in the interactive laboratory excite group members”

Students were asked through which device they enter the IUVIRLAB Virtual Phyiscs Laboratory application; 31 students entered via their computer at home, 24 of them entered via mobile phones, 5 of them entered via iPad; they stated they had no problems with the website during application and those who used a computer during application stated they felt more comfortable since they could read the experiment booklet more easily.

5. CONCLUSION

According to the results of survey which was developed in order to determine views of students about the IUVIRLAB application, students stated that during IUVIRLAB; "They have had no technical problem in interactive laboratories, experiments carried out in interactive laboratories are realistic, it increases motivation when students enter interactive laboratories from mobile phone/computer/etc. and this environment is exciting, it is comforting when group members access academicians on-line in case of any problem in interactive laboratories, tasks given to students during experiments in interactive laboratories increase responsibility and enable them learn the subject more easily, operations carried out by group members being observable by other members during experiments in interactive laboratories is exciting and motivating, and that the Skype screen pop-up while entering and Twitter usage in the interactive laboratory is exciting".

Within the scope of the 3-dimensional interactive, multi-user and multi-admin IUVIRLAB project which includes active learning methods and techniques for university students and which was developed by Istanbul University. In the later phases of this pilot study, the applications of this system on mechanics, electricity, waves, and optics experiments, and realization of the magnetic field experiments generated within the scope of the study are foreseen. Further application of the IUVIRLAB will be used for experiment and control groups in order to analyze their ability to construct concepts correctly and making relationships between physics and daily life and their critical thinking, problem-solving skills. In practice, it is estimated that this virtual laboratory will increase students' success levels, enable them to correctly structure concepts and enhance their critical thinking and problem-solving skills, as well as their capability to associate physics with their daily lives. It is believed that the present study, together with any similar studies to be conducted, will contribute to rectifying the deficiencies of experimental applications in education around the world.

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A STUDY ON READING PRINTED BOOKS OR E-BOOKS: REASONS FOR STUDENT-TEACHERS PREFERENCES

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ABSTRACT
This study tried to determine the preferences of student-teachers on reading printed books or e-books and the reasons for these preferences. Reading printed books and e-books preferences of students are discussed in terms of gender and department variables. 258 student-teachers who are studying in Computer Education and Instructional Technologies (CEIT), Music Education (ME), Preschool Education (PE), Primary School Education (PSE), Social Sciences Education (SSE) and Turkish Language Education (TLE) departments participated in the research voluntarily. The students were asked five survey questions. To evaluate the data percentage, mean, standard deviation and chi-square test were used. According to the answers given to the questions prepared by the researcher, only 20.9% of the students currently read e-books. The rate of e-books reading students is higher in CEIT and Social Sciences Education divisions than the other divisions. In another finding of the study, male students read e-books more than female students. The reading rate of students who prefer reading e-books to printed books is 96.5%, if the hardware and software requirements are met. This choice is analyzed in terms of divisions; CEIT students prefer reading e-books to printed books less than the students of other divisions. Same choice is analyzed in terms of gender; the rate of preferring to read e-books in female students is higher than male students. The reasons for students preferring to read printed books to e-books are: 25.6% "to protect my eye health" and 25.2% "I like holding the book in my hands" are the most given answers. These two responses were given mostly by the students of Primary School Education division. Also, the rate of students who prefer printed books and give "to protect my eye health" as a reason is higher in CEIT division than other departments. "I understand better when I read the book in my hand" preference reason is higher in CEIT students with a rate of 5.5% than students in other departments. The response of “I do not have the technology to read e-books" is 1.6% and "I understand better when I read the book in my hand" response rate is 1.2%. In a further finding of the study, the preference reason "I like holding the book in my hands" as expressed by female students is 30.1%. This rate is 14.6% in male students.
Keywords: E-books, Student-teachers, Reading book, Printed books.

INTRODUCTION

The development of the internet has led to the adding of a lot of concepts starting with “e-“ to our lives. E-mail, e-shopping, e-banking, e-commerce, e-government, e-signatures and e-learning are leading concepts among them. E-books with growing reader/user population are a book format that most of us have heard and used a lot lately because of their long-standing history and the widespread use of information technologies.

With different definitions in the various sources, the e-book definition pertinent to this study is that of an electronic format digitizing one or more printed books or a content completely produced in electronic environment that can be displayed, accessed, published on a desktop computer, on any hand-held device with screen or in any custom-designed electronics. They will of necessity include a book reader hardware and rich text features software (adding bookends, text marking, note taking, etc.) to allow for the same functions performed during traditional reading (Önder, 2010).

E-books can be read with numerous devices and tools. Such as Iriver eBook Reader, Oblio E-Book Plus, Kindle, ReederLITE, reedPAD2, eInk as well as desktops, tablet computers, iPhones and iPads, Blackberry’s, mobile phones, and navigation devices. Some portable music players and Nintendo DS gaming consoles, can also be used to read e-books (URL 1). In fact, it could be said that the increase in the number and types of hardware and software required to read e-books is indicative of the rise in the number of e-books’ readers and e-books released by the publishing industry. In a study conducted to determine the rate of e-books reading, according to the responses of 307 people; 22% stated that they read e-books, 77% stated that they do not (Gürcan, 2010). The users of İdefix Library application service that started in 2010, which allows people to read e-books in tablets increased 4 times to 150,000 people, compared to 2009. The number of e-book devices with e-ink screen technology such as Kindle has reached 40,000 (URL 1). In 2011, the number of e-books published in Turkey was 1314, in 2012 this figure increased to 2928 (Kocatürk, 2013). According to TÜİK (2013a) data, the highest increase in published ISBN-encoded content in 2012 was in e-books with 152.4%. It appears that the development and proliferation of technology will continue to facilitate an increase in the number of e-book readers.

Reading e-books comes with a lot of advantages for users compared to reading printed books. For example; using less paper, e-books take up less space and are easy to carry, searching and note-taking is much easier, the font size can be changed as desired, purchasing is much faster and easier, preservation and protection is simple. E-books can be printed and published in a variety of file formats (HTML, PDF, LIT, PDB, etc.) (Day, 2001; Snowhill, 2001; McFall, 2005; Yıldırım et al, 2011). According to Rukancı and Anameriç (2003); e-books, depending on the technology, can provide enough interaction as between a teacher and a student. It can appeal to students with different learning styles and they can adjust their own reading and learning speed. In addition, it is clear that because of its visual and audio elements, e-books could facilitate learning and teaching, make it more enjoyable and optimise the permanence of learning. This is why the Ministry of Education in Turkey has given great importance to the design and use of e-books within the FATİH Project. In this context, tablet computers were distributed to students in pilot schools. By the time the project is completed all the students and teachers will have had the opportunity to use e-books. For this reason, having knowledge and experience in the use of e-books for student-teachers, who are training to become teachers, is important. The study thus looked for answers to such issues as whether student-teachers read e-books; the relationship of this situation between the different divisions in which they are studying and the role gender plays; reasons and preferences for reading or for not reading e-books or printed books, and whether the preferences change in line with gender and their subject specialism.

METHOD

Model of the Study

This study was conducted using screening technique which is a descriptive research model.

Study Group

The sampling group of the study is 258 students attending Trakya University Faculty of Education, studying in Computer Education and Instructional Technologies (CEIT), Division of Music Education (ME), Division of Preschool Education (PE), Division of Primary School Education (PSE), Division of Social Sciences Education (SSE) and Turkish Language Education (TLE) departments. The students participated in the study voluntarily. Distribution of participating students by gender and the division in which they are studying are presented in [Table 1].

Table 1: Frequency distribution of students by gender and department

	Groups	Frequency (n)	Percentage (%)
Gender	Female	176	68.2
	Male	82	31.8
	Total	**258**	100
Department	C.E.I.T.	55	21.3
	P.E.	45	17.4
	M.E.	21	8.2
	T.L.E.	27	10.5
	P.S.E.	97	37.6
	S.S.E.	13	5.0
	Total	**258**	100

Data Collection Tools

To collect research data, a form consisting of five questions prepared by the researcher was used. The questions of the form, are: 1. Your Gender? 2. Your Division? 3. Do you read e-books? 4. If your answer is No, what are the reasons you prefer reading printed books to e-books? (Can select more than one option.), 5. If hardware and software requirements are met for reading e-books, which format of the same book do you prefer to read, printed format or electronic format?

Analysis of Data

Data acquired in research were analysed using SPSS 17.0 software program. To evaluate the data, descriptive statistical methods (Number, Percentage, Mean, Standard Deviation) were used. To compare the quantitative data with the relationship between two groups, chi-square test was used.

FINDINGS

According to the responses of student-teachers to the questions in the data collection tool, the following conclusions are reached:

Do you read e-books? 79.1% of the students answered "No", 20.9% "Yes". More than half of the students don't read e-books. Acquired data presented in [Table 2].

Table 2: Frequency distribution: Students' reading e-books status

	Groups	Frequency (n)	Percentage (%)
Do you read e-books?	Yes	54	20.9
	No	**204**	**79.1**
	Total	258	100

What are the reasons for not reading e-books? (Can select more than one option) based on the responses given by student-teachers; "Printed books cost less" reason is the most marked reason with 98.8%. "To protect my eye health" and "I like holding the book in my hands" reasons are other two reasons most chosen. The most important factor students prefer printed books is the cost. The frequency distribution of the students' responses to this question is presented in [Table 3].

Table 3: Frequency distribution: reasons students are not reading e-books

	Groups	Frequency (n)	Percentage (%)
What are the reasons you prefer reading printed books to e-books?	I like holding the book in my hands	65	25.2
	To protect my eye health	66	25.6
	Because it is portable and easier to read	40	15.5
	More realistic	4	1.6
	I get more pleasure	42	16.3
	I like the smell of the book	8	3.1
	I understand better when I read the book in my hands	3	1.2
	I do not have the technology to read e-books	4	1.6
	Printed books are more cost-effective	**255**	**98.8**
	To support authors of printed books	10	3.9

	I get distracted when reading e-books	4	1.6
	Cannot give up the habit of reading printed books	5	1.9
	No reason	43	16.7

If hardware and software requirements are met for reading e-books, do you prefer to read the printed format or the electronic format of the same book? Almost all the students (96.5%) responded with electronic book. The preferred format for reading is e-book, for the students. Students' responses to this question are presented in [Table 4].

Table 4: Frequency distribution of printed books/e-books reading preferences of students, if hardware and software requirements are met

	Groups	Frequency (n)	Percentage (%)
If hardware and software requirements are met to read e-books, do you prefer to read the same book in printed format or electronic format?	**E-book**	**249**	**96.5**
	Printed Book	9	3.5
	Total	258	100

Between the status of reading e-books and the divisions student-teachers study is found significant relationship (X2=15.446; p=0.009<0.05). The question; *Do you read e-books?* 36.4% of CEIT students answered "Yes" and 63.6% "No"; 15.6% of PE students said "Yes", 84.4% of PE students said "No"; 100% of ME students said "No"; 18.5% of TLE students said "Yes", 81.5% of TLE students said "No"; 18.6% of PSE students said "Yes", 81.4% of PSE students said "No"; 30.8% of SSE students answered "Yes", 69.2% of SSE students said "No" [Table 5]. The rate of the students reading e-books in CEIT and PSE divisions is higher than the other divisions.

Table 5: Chi-square test; the relationship between the status of reading e-books and divisions of students

Status of reading e-books	Division														X^2/p
	CEIT		PE		ME		TLE		PSE		SSE		Total		
	n	%	n	%	n	%	n	%	N	%	n	%	n	%	
Yes	20	%36.4	7	%15.6	0	%0.0	5	%18.5	18	%18.6	4	%30.8	54	%20.9	X^2=15.446 p=0.009
No	35	%63.6	38	%84.4	21	%100	22	%81.5	79	%81.4	9	%69.2	204	%79.1	
Total	55	%100	45	%100	21	%100	27	%100	97	%100	13	%100	258	%100	

Between the status of reading e-books and genders of student-teachers is found a significant relationship (X^2=12.687; p=0.000<0.05). 14.8% of female students read e-books, 34.1% of male students read e-books [Table 6]. The rate of male students reading e-books is higher than female students.

Table 6: Chi-square test; the relationship between the status of reading e-books and genders of students

Status of reading e-books	Gender						X^2/p
	Female		Male		Total		
	n	%	n	%	n	%	
Yes	26	**%14.8**	28	**%34.1**	54	%20.9	X^2=12.687 p=0.000
No	150	%85.2	54	%65.9	204	%79.1	

Total	176	%100	82	%100	258	%100	

Between the preference of e-books or printed books and meeting the software and hardware requirements of student-teachers to read e-books there is a significant relationship (X^2=26.338; p=0.000<0.05). 85.5% of CEIT students, 100% of PE students, 100% of ME students, 96.3% of TLE students, 100% of PSE students, 100% of SSE students preferred e-books [Table 7]. Accordingly, the division with the lowest rate of preferring e-books is CEIT.

Table 7: Chi-square test; relationship between preferring printed books/e-books when software and hardware requirements of students are met and their divisions

	Division														
Preference	CEIT		PE		ME		TLE		PSE		SSE		TOTAL		X^2/p
	n	%	n	%	n	%	n	%	N	%	n	%	n	%	
E-books	47	%85.5	45	%100	21	%100	26	%96.3	97	%100	13	%100	249	%96.5	
Printed books	8	%14.5	0	%0	0	%0	1	%3.7	0	%0	0	%0	9	%3.5	X^2=26.338 p=0.000
Total	55	%100	45	%100	21	%100	27	%100	97	%100	13	%100	258	%100	

The relationship between reading e-books or printed books preference when software and hardware requirements of student-teachers are met for e-books and the students' genders is significant (X^2=20.015; p=0.000<0.05). 100% of female students, 89% of male students stated that they would prefer e-books instead of printed books when the software and hardware requirements to read e-books are met [Table 8]. All the female students preferred e-books, presence of slight preference for printed books by male students is observed.

Table 8: Chi-square test; relationship between students' genders and reading printed books/e-books preference when software and hardware requirements of students are met to read e-books

Preference	Gender						X^2/p
	Female		Male		Gender		
	n	%	n	%	n	%	
E-books	176	**%100**	73	**%89**	249	%96.5	
Printed books	0	%0	9	%11	9	%3.5	X^2=20.015 p=0.000
Total	176	%100	82	%100	258	%100	

CONCLUSION AND DISCUSSION

The findings reveal that a large part of student-teachers do not read e-books. Also Woody et al. (2010) reports that even though students have the opportunity to access technology anytime and anywhere they want, there is still a preference for reading printed books. According to Kakırman Yıldız (2012); three generations describe the digital process; digital immigrants, digital hybrids and digital natives. Digital immigrants were born before 1970, digital hybrids were born in 1970-1999 and digital natives were born after 1999. The student-teachers who are the sampling of this study were born in 1990-1994 so the students are digital hybrids. Digital hybrids, try to take advantages of technological facilities but they are not as competent as the digital natives. The paper is much closer and intimate to them. As Duran (2013) quoted the research findings of Jamali et al. (2009), Noordhidawati and Gibb (2008) that because of the reasons of technological deficiencies and not having sufficient knowledge and skills to read e-books, students are not expressing positive attitude and opinion towards reading e-books. In a survey done by the Pew Internet, even though individuals aged 16 and over in Turkey usage rate of e-books has increased from 16% to 23% and a decline in the rate of reading and using printed books (URL 3), it is normal that the sampling of this study is focused on printed books in relation to the digital generations.

In another finding of the study, the student-teachers have indicated that the main reason they do not read e-books is that printed books cost less than e-books. In Turkey, taxes are the biggest obstacle to e-books. VAT (Value Added Tax) is 8% on printed books and 18% for e-books (URL 3; Şahin, 2013). The result is that e-books are costlier than printed books. Also, having the hardware and software required to read e-books warrants additional expenditure. Considering all these factors and the fact that the target audience is still students, who have other educational expenses, it is not difficult to understand the rationale underpinning this result.

The second reason marked by the students for not reading e-books is to protect the wellness of their eye. This finding is consistent with the finding of Duran (2013)'s study conducted with 254 students of the Faculty of Education at Uşak University. In Duran (2013)'s study, the students stated that the most serious distress is eye strain and back pain in spite of many positive sides of reading through the screen. Güneş (2009) in his work called "Efficiency in Screen Reading" indicates that reading on the screen has some difficulties than reading from paper. Screen pages move from top to bottom or bottom to top. The eyes of reader read the lines from left to right horizontally. The eyes vacillate between these two opposing moves during reading, often losing or having difficulty finding the line during reading. In addition, eye movements going back to check for information is difficult in screen reading. In paper reading, eyes go back moving to top lines or paragraphs to check information, from time to time. This process is very difficult in screen reading. Because most of the time, the places to check do not appear on the screen. Therefore to read the information, it is necessary to shift the text to find the related place. This situation limits the movements of the eye and the ease of reading. In short, reading from screen, burdens the reader's eyes. Preferring printed books for the sake of their eyes' health is an indicator that the students who formed the sampling of this study are also conscious technology users.

Other two options most marked as the reasons for not reading e-books are "I like holding the book in my hands" and "I get more pleasure". Abdullah and Gibb (2008) in their research were of the view that when the readers are given the right to choose, they prefer printed version of a book to its electronic version and expressed this situation as the habit of reading from paper (Öngöz, 2011). It can be said that because the student-teachers are digital hybrids, the habit of reading from paper is predominant.

Almost all of the students stated that they would prefer to read e-books instead of printed books when hardware and software needs to read e-books are met. In the students' responses to the previous question, the highest choice was printed books are more cost-effective than e-books. Therefore, reading e-books for student-teachers is costly and cost is an important factor in their preferences.

Segmental distribution of e-books reading students, CEIT and PSE students are the most e-book reading students. The high rate of e-books reading of CEIT students than other departments' students is because the students of CEIT division are more interested in the internet and information technologies, inside and outside of class than the students of other divisions. That both CEIT and PSE divisions' students have a higher rate of e-book reading than other divisions' students can be connected to the program they study or the areas they have special interest in and their ability to find more e-books for their specialism compared to other students.

According to another finding obtained in research, the rate of male students reading e-books is higher than female students. Duran (2013) in his study conducted with the student from the Faculty of Education at Uşak University, e-book reading dimensions of benefit, love and habit, determined a higher rate in male students than female students. Whereas, in recent years, in many studies which analyzed the habit of reading printed books and the attitudes in terms of gender variable, the rate was higher in female students (Demir, 2009; Aslantürk and Saracaloğlu, 2010; Bozpolat, 2010). This situation shows males are more interested in technology and internet and they spend more time and have the ability to use them than females. According to TÜİK (2013b) Information Society Statistics year 2012 values, the computer using rate of males between the ages of 16-74 is 59% and 38.5% in females; the rate of using internet in males is 58% and 37% in females. However, the female students' rate is higher than male students when software and hardware requirements are met preferring e-books to printed books which may be connected to female students needing these requirements more than the male students.

Most of the student-teachers from CEIT division prefer reading printed books to e-books even though hardware and software requirements are met. Because CEIT department students have to do many tasks and projects on computers they may feel weary of the screen, and desire to read printed books.

In Turkey today 150 thousand people have the technology to read e-books and approximately 300 thousands e-books are sold yearly. This rate is 4 percent in 1000 of total book market. However, this rate is around 13% in the United States (URL 4). The absence of the right to broadcast digitally the existing books in inventory, hesitation due to piracy and illegal copying of publications in virtual environment and small number of employees with knowledge and experience of e-book typography are undermining e-book publishing in Turkey. Furthermore, high tax rate in e-books has negative impact on e-publishing (Şahin, 2013). Despite these factors, 350 publishers operate e-publishing in Turkey. For example Arkadaş Yayınları has offered for sale more than 310 thousand books in more than 50 languages from the internet (URL 5). The number of e-books in İdefix is 6002 (URL 6). As well as publishing houses some institutions and organizations have made significant efforts on e-book publishing. For example, The Ministry of Education has continued the preparation of e-books and z-

books within the FATİH Project. TÜBİTAK called for the scope of Digital Content Open Course Resources Support Program for university students in March 2013. With this project, an e-book pool will be developed to provide both equality of opportunity and increased quality in undergraduate education for undergraduate students to exploit (URL 7).

As a result, e-books are nowadays an important part of the education system and the publishing industry. When the student-teachers who will be directly involved in the FATİH Project graduate, e-book literacy, at least readership will be an important factor. In Turkey, the legal framework should be made to increase the rate of e-books reading, education programs should be provided for the publishing industry. In addition, regular activities, mainly for teachers or anyone who wants to gain knowledge and skills on how to use e-books should be organized. These activities could be in the universities within the scope of relevant course curriculum or in the form of courses over the internet supported by visual materials. The ongoing lecture notes can be prepared in e-book format in distance education programs in many universities in Turkey, which can contribute to students gaining knowledge and experience in this regard. Standardization efforts on this subject should be accelerated. In addition, in the Department of Computer Education and Instructional Technology, with lessons such as E-Book Design and Development, employees that the market requires, could be trained.

In the context of expanding this research, suggestions listed below should be considered by researchers and practitioners interested in the areas of this study:

1. This study can be expanded by including all sections of the Faculty of Education.
2. This study can be done by including all university students.
3. E-book reading habit of the students can be assessed, by considering the following variables;
    a. Whether they have e-book reader and e-book reading software,
    b. Presence or absence of their own computers,
    c. E-books type they read,
    d. Whether they have the financial capability to buy e-books,
    e. Whether they buy licensed or pirated e-books,
    f. If they have information about e-books copyright law,
    g. If there is e-books reader in their family.
4. The attitudes and opinions of the teaching staff on reading e-books can be explored.
5. In line with requests and needs, co-operation between institutions on e-books designs and typography can be improved.

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A TECHNOLOGY-BASED STATISTICAL REASONING ASSESSMENT TOOL IN DESCRIPTIVE STATISTICS FOR SECONDARY SCHOOL STUDENTS

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ABSTRACT
The focus of assessment in statistics has gradually shifted from traditional assessment towards alternative assessment where more attention has been paid to the core statistical concepts such as center, variability, and distribution. In spite of this, there are comparatively few assessments that combine the significant three types of statistical reasoning (reasoning about center, spread, and distribution) with information technology in the context of secondary school students. Hence, this paper intends to discuss the development and initial validation of a technology-based statistical reasoning assessment tool that has been created based on a previously developed statistical reasoning framework. This framework has been useful in evaluating students' statistical reasoning levels in task-based interviews. The assessment tool formulated through this study will be used to refine and validate the initial statistical reasoning framework. There are five tasks in this instrument and each item is labeled according to four key constructs. The technological tool that has been used in solving tasks is dynamic mathematics software. This technology-based statistical reasoning assessment tool can be applied for further investigation.
Keywords: alternative assessments; statistical reasoning

INTRODUCTION

Assessment is an important part in the teaching and learning process (Dikli, 2003; Usun, 2003; Jamil, 2012) which can provide a clearer picture on what the students have learnt and problems they encountered (Akkya, Karakirik, & Durmus, 2005). Nevertheless, most instructors tend to employ traditional assessments in the classroom; hence they can only gather information about what students know and can do rather than what is really going on in the classroom (Bayram, 2005). Traditional assessments such as true-false tests and multiple choice tests do not give an apparent picture of students' performance and the efficacy of the teaching method adopted. Furthermore, in the traditional statistics classroom, instructors are likely to use textbooks, chalkboard, and paper-and-pencil activities. They only focus on computation skills, routine rules, and memorization of formulas (Qian, 2011). Teachers are thus unable to guide students to reason statistically and they only promote procedural understanding rather than conceptual understanding of statistical concepts (Garfield, delMas & Chance, 2007). Therefore, an alternative assessment is needed for three different reasons. First, to assess the conceptual and meaningful understanding of students. Second, to place more emphasis on the learning procedure rather than the product, and finally, to stimulate more effective learning and teaching practice (Durmus & Karakirik, 2005).

Beginning in the 1990s, the focus of statistics education has slowly moved from traditional assessment to alternative assessment that includes statistical literacy, statistical reasoning, and statistical thinking. The use of information technology provides numerous opportunities to formulate more successful assessment (Jamil, 2012). This is also supported by Csapo, Ainley, Benett, Latour & Law (2010) who claimed that the integration of information technology in assessment has gradually become imperative nowadays. Such innovative assessment tools can promote pedagogical innovation and curriculum reform rather than retaining its traditional function, which is to support the statistical reasoning of students (Chan & Ismail, 2012). To date, a few types of statistical reasoning assessments are being used in statistics education, notably the statistical reasoning assessment (SRA), Comprehensive of Assessment of Outcomes in a First Statistics Course (CAOS), Assessment Resource Tools for Improving Statistical Thinking (ARTIST), and so on. However, these assessments do not involve the use of particular software to assess statistical reasoning. Moreover, some topics are inappropriate for Malaysian secondary school students because they are not in the syllabus, for instance topics concerning correlation and causation in SRA. Therefore, this study filled this gap by formulating a new statistical reasoning assessment tool to suit Malaysian secondary school students, with particular emphasis on descriptive statistics.

Furthermore, unlike previous efforts, elements of GeoGebra spreadsheet have been integrated into the assessment so that the developed assessment can become a technology-based statistical reasoning assessment tool. GeoGebra is dynamic mathematics software which combines the features of a spreadsheet, dynamic geometry software, and computer algebra systems. It is open source software and can be freely downloaded from

the website (http://www.geogebra.org/cms/en/) (Hohenwarter & Lavicza, 2007; Hohenwarter & Preiner, 2007). By using the spreadsheet, the users are able to observe the changes in relationships before and after the figures alteration by moving, stretching and shrinking the figure. The utilization of GeoGebra software provides dynamic visualization which can develop users' understanding of statistical concepts (Boz, 2005). Although emphasis on 'big ideas' or central statistical ideas like center, distribution and variability in teaching and learning statistics has become increasingly obvious nowadays (Garfield & Ben-Zvi, 2007; Garfield & Ben-Zvi, 2008), most students continue to perceive these ideas as exclusive concepts. Therefore, to foster students' understanding about the relationships between these central statistical ideas, three types of statistical reasoning have been incorporated into the technology-based statistical reasoning assessment tool developed through this study, i.e. reasoning about center, spread, and distribution. This paper thus intends to discuss this assessment tool which has been used to characterize and assess students' statistical reasoning across four key constructs and five levels of reasoning.

STATISTICAL REASONING

According to Garfield and Chance (2000), statistical reasoning is described as "the way people reason with statistical ideas and make sense of statistical information. It involves making interpretations based on sets of data, or statistical summaries of data. Students need to be able to combine ideas about data and chance, which leads to making inferences and interpreting statistical results (p. 101)". Meanwhile, Lovett (2001) stated that statistical reasoning involves the use of statistical ideas and tools to summarize and draw assumptions besides making conclusions from the data. Martin (2009), on the other hand, defined statistical reasoning as "forming conclusions and judgments according to the data from observation studies, experiments or sample surveys" (p. 13).

As mentioned before, three types of statistical reasoning were integrated into this assessment tool, namely reasoning about center, spread, and distribution. Reasoning about center concerns data analysis that involves mean, mode, and median. Besides that, reasoning about spread involves range, interquartile range, variance, and standard deviation. Reasoning about distribution entails interpreting a compound structure comprised of reasoning about features such as center, spread, skewness, density, and outliers as well as other concepts such as causality, chance, and sampling (Pfannkuch & Reading, 2006).

In general, statistical reasoning, thinking, and literacy are unique domains, but two instructional perspectives have been formed to describe how these three outcomes are related to each other. Some instructional activities, if viewed from different instructional perspectives, may enhance students' understanding in two or more domains. The first perspective is that statistical literacy provides the foundation to develop the basic knowledge and skills needed to foster statistical thinking and reasoning. Some content of statistical reasoning, thinking, and literacy overlap, but some are independent (delMas, 2002). Another instructional perspective suggests that statistical literacy contains all the learning outcomes. It implies that statistical reasoning and thinking are subsets of statistical literacy and thus do not have their own independent content (delMas, 2002).

delMas (2002) also proposed that test or task items can be used to assess certain domains and perhaps the same item can assess more than one domain. To demonstrate this, he listed out the typical words that are used in tests or tasks that can differentiate statistical reasoning, statistical thinking, and statistical literacy. For instance, to develop statistical literacy, students are often required to identify an example that represents a certain concept, describe a graph, and translate and interpret the results. To enhance statistical reasoning, instructors can ask the students to explain how or why the findings are produced as they are. Meanwhile, to promote statistical thinking, students can be required to apply their knowledge to authentic questions, to review and assess the design and conclusions for studies, or to summarize information from the classroom to new circumstances.

Essentially, statistical reasoning and thinking are exploited interchangeably in some studies. However, there are other studies that distinguish statistical reasoning and statistical thinking. For example, Wild and Pfannkuch (1999) demonstrated this through a model constructed for statistical thinking. delMas (2004) also stated that we can distinguish statistical reasoning from statistical thinking by referring to the methods used by the respondents in solving a task. For instance, someone who possesses statistical reasoning ability can give an explanation for the findings and conclusion. Another person who has statistical thinking skills, on the other hand, is able to apply statistical understanding and processes while solving the task.

Some statisticians assert that statistics is basically an independent subject from general mathematics (e.g. Gal & Garfield, 1997; Cobb & Moore, 1997; Moore & Cobb, 2000; Rossman, Chance, & Medina, 2006; Garfield & Ben-Zvi, 2008). Gal and Garfield (1997) and Rossman, Chance, and Medina (2006) claimed that there are some differences between statistics and mathematics in terms of context, measurement issues, data collection, and

reasoning methods. Context is described as the foundation of meaning and foundation for the analysis of findings, which is vital in statistics when interpreting data and drawing conclusions. However, context might or might not play a role in mathematics (delMas, 2004). Besides that, measurement and data collection are also more crucial in statistics than mathematics as statistics generally depends on valid measurement and data collection. In mathematics, accurate measurement is not necessary and rough measurement is accepted (Gattuso & Ottaviani, 2011). Furthermore, mathematics involves deductive reasoning where a conclusion is made rationally based on definitions and axioms while statistics involves inductive reasoning where the conclusion may be vague but is still acceptable and legitimate. Moreover, Gal and Garfield (1997) stated that while statistics is often undefined, mathematics is more accurate. Nonetheless, mathematics is barely a set of procedures in statistics and there is no single mathematical solution for statistics.

Mathematical reasoning refers to reasoning about patterns as mathematics is considered the study of patterns. It is about certainty and proof within given hypothesis (Gal & Garfield, 1997). According to delMas (2004), mathematical reasoning and statistical reasoning are almost the same, but there are some discrepancies that will lead to different kinds of mistakes, especially when students solve highly abstract tasks. For mathematics, there are fewer tendencies to apply real-world context to the tasks. In contrast, real world context is emphasized in statistics (Cobb & Moore, 1997). Diverse types of statistical instruction are required to enhance students' understanding of statistics ideas and processes as students respond in different ways to statistics compared to mathematics. This also indicates that to teach statistics more effectively and efficiently, instructors should concentrate less on theory and computations and focus more on data and concepts (Rossman, Chance, & Medina, 2006).

INITIAL STATISTICAL REASONING FRAMEWORK

This initial statistical reasoning framework is very important in our study as it forms the basis of this technology-based statistical reasoning assessment tool. It was first formulated to characterize and assess students' statistical reasoning levels in descriptive statistics based on Garfield's (2002) model of statistical reasoning. There are five levels of statistical reasoning embedded in this framework, i.e. idiosyncratic, verbal, transitional, procedural and integrated process reasoning. At the idiosyncratic reasoning level, students know some of the statistical words and symbols, but tend to capitalize on them without totally understanding them, and so the meaning itself is most often inaccurate. Consequently, the students may combine them with unconnected information. At the verbal reasoning level, students have the verbal understanding of some concepts, but they cannot relate them to the actual behavior. To put it in another way, students can give and pick the true definition, but they do not understand the concepts completely. In addition, they may be able to discriminate the dimension of a statistical concept or process accurately, but do not know the procedure to combine them in order to reach the transitional reasoning level. At the procedural reasoning level, students are able to determine the dimensions of statistical concepts or procedures correctly, but are incapable of integrating them completely. Once the students have a complete understanding of statistical procedures and can confidently organize the rules and behavior, it can be said that the students have achieved the integrated process reasoning level (Garfield, 2002).

On the other hand, the four key constructs in this technology-based statistical reasoning assessment tool are describing data; organizing and reducing data; representing data; and analyzing and interpreting data based on the framework of Jones, Thornton, Langrall, Mooney, Perry & Putt (2000). Describing data involves accurate reading of raw data or data demonstrated in charts, tables, or graphs (Jones et al., 2000). It combines the reading of data from the studies of Curcio (1981, 1987) and Curcio and Artz (1997). In the study of Jones et al. (2000), four processes were put forth including reading data representations, demonstrating awareness of essential graphing conventions, identifying when different displays represent the same data, and assessing different displays of the same data. In terms of describing data, Mooney (2002) identified the existence of four sub-processes, namely demonstrating consciousness of exhibited features, distinguishing similar data in various data depictions, assessing the efficacy of data depiction in data presentation, and recognizing components of data values. For the initial framework of this study, only three sub-processes were used in describing data and are as shown in Table 1. These sub-processes consist of extracting and generating information from the data or graph; showing awareness of the displayed attributes of graphical representation; and recognizing the general features of the graphical representation. For the first sub-process, the students have to extract and generate explicit information while reading the data displays. They ought to be aware of the displayed attributes of graphical representation, which is composed of graphical conventions (e.g., title and axis labels) related to the second sub-process. This sub-process is identical to the first sub-process of Mooney (2002). Furthermore, the third sub-process is new to the framework where students need to identify the general features of the graphical representation including shape, center, and spread. By integrating these three features together, students will recognize them as a whole entity rather than isolated concepts (Garfield and Ben-Zvi, 2007).

Table 1: Describing data

Level / Construct	Level 1 Idiosyncratic	Level 2 Verbal	Level 3 Transitional	Level 4 Procedural	Level 5 Integrated Process
Describing Data	Does not extract and generate the idiosyncratic or relevant information from the data or graph	Extracts and generates some information from the data or graph verbally, but are ambiguous or unclear	Extracts and generates one or two dimensions of the information from the data or graph	Extracts and generates the information from the data or graph correctly	Extracts and generates the information from the data or graph completely
	Does not show awareness to the displayed attributes of graphical representation	Shows awareness to the displayed attributes of graphical representation orally, but partly correct	Shows little awareness to the displayed attributes of graphical representation	Shows some awareness to the displayed attributes of graphical representation	Shows complete awareness to the displayed attributes of graphical representation
	Does not recognize the general features of the graphical representation	Recognizes the general features of the graphical representation in words, but partly accurate	Recognizes one or two general features of the graphical representation	Recognizes the general features of the graphical representation accurately	Recognizes the general features of the graphical representation completely

Organizing and reducing data involves arranging, classifying, or merging data into a summary form (Moore, 1997) and requires the measurements of center and spread (Jones et al., 2000). The study of Jones et al. (2000) has four sub-processes related to this key construct: (1) categorizing and arranging data; (2) identifying the information that might be lost in the restructuring of data; (3) explaining data in terms of typicality or representativeness; and (4) portraying data in terms of spread. Mooney (2002), on the other hand, only introduced three sub-processes - categorizing and arranging data; expressing data with measures of center; and delineating the variability of data. Similar to Jones et al. (2000), Groth (2003) also distinguished four sub-processes for organizing and reducing data, i.e., applying measures of dispersion, utilizing measures of center, arranging sets of raw data, and distinguishing the outcomes of data conversion upon center and spread. This study only utilized three sub-processes for the initial framework (Table 2), notably organizing the data into a computer system; reducing the data using the measure of center, either by calculation or aided by technology; and reducing the data using the measure of spread, either by calculation or aided by technology. These three sub-processes are unique in the sense that they involve the utilization of information technology, an aspect that has been neglected in previous studies. The students are required to organize the data into the computer system rather than doing it manually. For the second and third sub-processes, the students have to reduce their data using measures of center and spread in two ways – manual and automated calculation. The latter is done by using the computer. After the students have performed the manual calculation, they have to check the answers against the answers calculated using the computer.

Table 2: Organizing and reducing data

Level / Construct	Level 1 Idiosyncratic	Level 2 Verbal	Level 3 Transitional	Level 4 Procedural	Level 5 Integrated Process
Organizing and Reducing Data	Unable to organize the data into a computer system	Provides oral statements when organizing the data into a computer system, but only partly correct	Organizes the data into a computer system with major mistakes	Organizes the data into a computer system with minor mistakes	Organizes the data into a computer system in the right way
	Unable to reduce the data using the measures of center, either by calculation or aided by technology	Reduces the data using the measures of center in words, either by calculation or aided by technology but only accurate to some extent	Reduces the data using the measures of center with major errors, either by calculation or aided by technology	Reduces the data using the measures of center with minor errors, either by calculation or aided by technology	Reduces the data using the measures of center completely, either by calculation or aided by technology
	Unable to reduce the data using the measures of spread, either by calculation or aided by technology	Reduces the data using the measures of spread orally, either by calculation or aided by technology but only accurate to some extent	Reduces the data using the measures of spread with major faults, either by calculation or aided by technology	Reduces the data using the measures of spread with minor faults, either by calculation or aided by technology	Reduces the data using the measures of spread completely, either by calculation or aided by technology

The third key construct is representing data and encompasses presenting data in a graphical form, which means that the process requires basic conventions related to the presentations (Jones et al., 2000). Moreover, the authors have recognized two sub-processes for representing data: (1) completing a partially created data representation; and (2) producing representations to signify different organizations of a data set. In this regard, Mooney (2002) has also put forth three sub-processes to present data, i.e., creating a data depiction for a given set of data; finishing an incompletely created atypical data depiction; and constructing an interchangeable data depiction. Only three sub-processes are applied in this initial framework as revealed in Table 3. The processes include demonstrating the data sets graphically using the computer, identifying different representations for the same data set, and judging the effectiveness of two different representations for the same data. Undeniably, the execution of this key construct also demands the use of information technology. In the first sub-process, the students are required to graphically present the data set using the GeoGebra software. This sub-process encourages the students to learn and interact actively using the computer as they drag the figures dynamically and learn to present the data set using a variety of graphical presentations (e.g., from a histogram to a box plot and stem and leaf plot). The second sub-process, i.e., identifying the different representations for the same data set, is similar to the second sub-process of describing data in the study of Mooney (2002). The third sub-process is also identical to the third sub-process of describing data in the same study. Unlike earlier studies, this study does not just assess the process of constructing graphs but tries to make sense of the created graph to enhance sophisticated reasoning about representing data (Friel, Curcio & Bright, 2001).

Table 3: Representing data

Level / Construct	Level 1 Idiosyncratic	Level 2 Verbal	Level 3 Transitional	Level 4 Procedural	Level 5 Integrated Process
Representing Data	Demonstrates the data sets graphically using the computer without precise display	Provides verbal statements when demonstrating the data sets graphically using the computer, but only partially correct	Demonstrates the data sets graphically using the computer with major errors	Demonstrates the data sets graphically using the computer with minor errors	Demonstrates the data sets graphically using the computer with a valid display
	Does not identify the different representations for the same data set	Identifies the different representations for the same data set in words, but only partially correct	Identifies one or two aspects of the different representations for the same data set	Identifies the different representations for the same data set in the correct way	Identifies the different representations for the same data set in a complete and comprehensive way
	Does not judge the effectiveness of two different representations for the same data set	Judges the effectiveness of two different representations for the same data set orally, but only partially correct	Judges one or two elements of the effectiveness of two different representations for the same data set	Judges the effectiveness of two different representations for the same data set accurately	Judges the effectiveness of two different representations for the same data set completely

Lastly, analyzing and interpreting data entails recognizing trends, patterns, and formulating deductions or presumptions from the data (Jones et al., 2000). It consists of reading between the data and reading beyond the data (Curcio, 1987). Jones et al. (2000) introduced two sub-processes for analyzing and interpreting data: (1) comparing and combining data; and (2) extrapolating and making predictions from the data. Additionally, three sub-processes were employed in Mooney's (2002) study for analyzing and interpreting data, i.e., comparing between data displays and data sets; comparing within the data displays or data sets; and making inferences from a given data display or data set. Groth (2003) recognized eight sub-processes - exploring sample means; contrasting univariate data sets; determining atypical points in a tabular data set; interpolating within bivariate data; making multiplicative comparisons; explaining bivariate relationships; finding out atypical points in a graphical bivariate data set; and extrapolating from bivariate data. In this study, only three sub-processes were chosen (Table 4), i.e., making comparisons within the same data set; making comparisons between two different data sets; and making predictions, inferences or conclusions from the data or graphs. The first and second sub-processes are equivalent to the first and second sub-processes of Mooney's (2002) study. Making comparisons within the same data set is the first sub-process where students ought to compare the same data set. In addition, students have to compare two different data sets for the second sub-process. Finally, they have to make predictions, inferences, or conclusions from the data or graphs in the third sub-process. This is also similar to the third sub-process from the study of Mooney (2002), which involves making inferences from the data or graph. The process of making predictions is somewhat similar to the second sub-process from the study of Jones et al.

(2000). Another element, making conclusion, is new and does not exist in earlier studies. This has now been included as it is imperative for the students to know how to summarize data or graphs while solving tasks.

Table 4: Analyzing and interpreting data

Level / Construct	Level 1 Idiosyncratic	Level 2 Verbal	Level 3 Transitional	Level 4 Procedural	Level 5 Integrated Process
Analyzing and Interpreting Data	Does not make comparisons within the same data sets	Makes some comparisons within the same data sets verbally, but are incomplete	Makes one or two comparisons within the same data sets	Makes the comparisons within the same data sets correctly	Makes the comparisons within the same data sets completely
	Does not make comparisons between two different data sets	Makes comparisons between two different data sets in words, but are somewhat incorrect	Makes one or two comparisons between two different data sets	Makes comparisons between two different data sets accurately	Makes comparisons between two different data sets completely
	Does not make prediction, inference or conclusion from the data or graphs	Makes prediction, inference or conclusion from the data or graphs in words, but are incomplete	Makes one or two prediction, inference or conclusion from the data or graphs	Makes prediction, inference or conclusion from the data or graphs in the appropriate way	Makes prediction, inference or conclusion from the data or graphs in a complete and comprehensive way

METHODOLOGY

Instrument Development

After developing the initial statistical reasoning framework, this technology-based statistical reasoning assessment tool was constructed to refine and validate the initial statistical reasoning framework. The topics of descriptive statistics covered in this assessment tool are measures of central tendency and measures of variability. There are five tasks in this assessment tool with 56 items altogether. Every item is associated with the sub-processes of four main constructs as indicated in Tables 5 to 8.

Table 5: Examples of Items in the sub-processes for describing data

Constructs	Code	Sub-processes	Items
Describing data	D1	Extracting and generating information from the data or graph	1) What are the highest and lowest amount of protein (in grams) for various fast food sandwiches? 2) Write the name of the feature at each of the labels on the five-number summary of the box plot and record the values from the computer.
	D2	Showing awareness to the displayed attributes of graphical	1) What does this graph tell you?

		representation	
	D3	Recognizing the general features of the graphical representation	1) Describe the distribution of the graph with respect to its shape, center and variability.

Table 6: Examples of Items in the sub-processes for organizing and reducing data

Constructs	Code	Sub-processes	Items
Organizing and reducing data	O1	Organizing the data into a computer system	1) Organize the data into GeoGebra spreadsheet.
	O2	Reducing the data using the measures of center, either by calculation or aided by technology	1) What is the mean of the graph? Explain how. 2) What is the mode of the graph? Explain how. 3) What is the median of the graph? Explain how.
	O3	Reducing the data using the measures of spread, either by calculation or aided by technology	1) What is the range of the graph? Explain how. 2) What is the interquartile range of the graph? Explain how. 3) What is the standard deviation of the graph? Explain how.

Table 7: Examples of Items in the sub-processes for representing data

Constructs	Code	Sub-processes	Items
Representing data	R1	Demonstrating the data sets graphically using the computer	1) Draw the graph using GeoGebra dynamic worksheet by dragging the red circle. Tick the check box of Show histogram, Show mean and Show median. 2) Drag the red circle to draw the new histogram. 3) Construct a frequency polygon using GeoGebra spreadsheet. 4) Represent the data in another way. 5) Construct a box plot for each set of data. 6) Construct a stem and leaf plot for each set of data.
	R2	Identifying the different representations for the same data set	1) Describe how the box plot is related to its matching histogram.
	R3	Judging the effectiveness of two different representations for the same data	2) Which graph do you think represents the data better, the histogram or the box plot? Explain why.

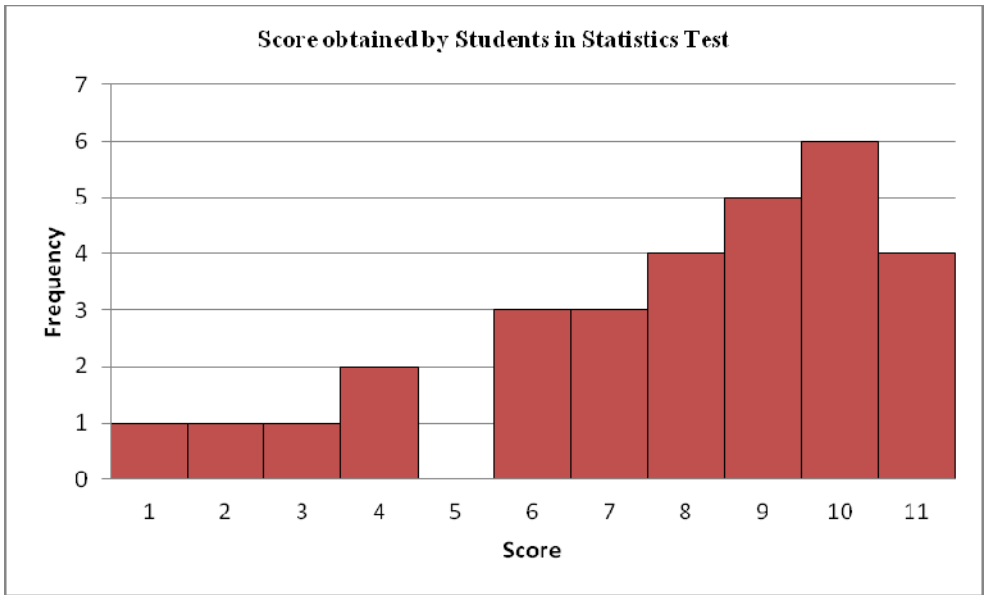
Table 8: Examples of Items in the sub-processes for analyzing and interpreting data

Constructs	Code	Sub-processes	Items
Analyzing and interpreting data	A1	making comparisons within the same data set	1) Compare your answer in Question 2, and 4 with the values shown on the computer. If the answers are different, explain why. 2) Compare the results in question 15 with question 14. What do you observe? Explain why.

			3) Compare the answer you predicted in Question 3 to the value shown on the computer. If the answers are different, explain why.
	A2	making comparisons between two different data sets	1) Compare the distribution of both box plots with respect to shape, center and variability. 2) Compare the distribution of both stem and leaf plots with respect to shape, center and variability.
	A3	making prediction, inference or conclusion from the data or graphs	1) Which measures of center is the most suitable to be used to represent the score obtained by students? Explain why. 2) Which measures of spread is the most suitable to be used to represent the score obtained by students? Explain why. 3) Predict which data set has greater variability, Malaysia or Taiwan. Explain why. 4) Make a conclusion from the data of unemployment rates of males and females. 5) Are there any similarities or differences between the two graphs produced on the computer? Explain.

To evaluate the usefulness of this assessment tool, the participating students are required to solve five tasks in the task-based interview sessions. Students will use the GeoGebra software as the technological tool. During the task-based interview phase, the researcher will interview the students one-by-one and the interview sessions are both video-taped and audio-taped. Both recordings of the interview protocols are transcribed into written form and then tabulated and coded. Subsequently, the data obtained will be used to refine and validate the initial statistical reasoning framework.

Task 1



1) What does this graph tell you?
2) What is the mean of the graph? Explain how.
3) What is the mode of the graph? Explain how.
4) What is the median of the graph? Explain how.
5) Draw the graph using GeoGebra dynamic worksheet by dragging the red circle. Tick the check box of Show histogram, Show mean and Show median.
6) Compare your answer in Question 2, and 4 with the values shown on the computer. If the answers are different, explain why.
7) What is the range of the graph? Explain how.
8) What is the interquartile range of the graph? Explain how.
9) What is the standard deviation of the graph? Explain how.
10) Tick the check box of Show IQR and Show Std Dev.
11) Compare your answer in Question 8 and 9 with the values shown on the computer. If the answers are different, explain why.
12) Describe the distribution of the graph with respect to its shape, center and variability.

Another set of new scores obtained by students from a different class are as follows:

13) Drag the red circle to draw the new histogram.
14) Record the values of mean, median, interquartile range, and standard deviation from the computer.

Two students who each obtained a score of 1 are added to the graph.

15) Record the values of mean, median, interquartile range, and standard deviation from the computer.
16) Compare the results in question 15 with question 14. What do you observe? Explain why.
17) Which measures of center is the most suitable to be used to represent the score obtained by students? Explain why.
18) Which measures of spread is the most suitable to be used to represent the score obtained by students? Explain why

Figure 1: Task 1

Task 1 requires students to explore ungrouped data. In Question 1, students have to obtain the information from the histogram. Furthermore, they need to understand and use the concepts of mean, mode, and median of ungrouped data in Questions 2, 3, 4, 5 and 6. As for Questions 7, 8, 9, 10 and 11, the students should understand and use the concepts of range, interquartile range, and standard deviation for ungrouped data. Moreover, they ought to understand how the concepts of center, spread and distribution are related to each other in Question 12.

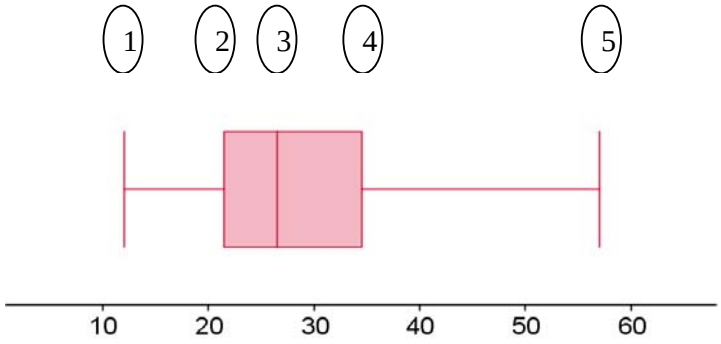
Questions 13, 14, 15 and 16 ask students to determine an outlier in the data set. Meanwhile, Question 17 and 18 require students to identify the most suitable measures of center and spread for the given data.

Task 2

The data below indicate the amount of protein (in grams) for various fast food sandwiches (Source: The Doctor's Pocket Calorie, Fat, and Carbohydrate Counter, 2002).

23	30	20	27	44	26	35	20	29	29
25	15	18	27	19	22	12	26	34	15
27	35	26	43	35	14	24	12	23	31
40	35	38	57	22	42	24	21	27	33

1) What are the highest and lowest amount of protein (in grams) for various fast food sandwiches?
2) Organize the data into GeoGebra spreadsheet.
3) Construct a frequency polygon using GeoGebra spreadsheet.
4) Record the values of the mean, median and standard deviation from the computer.
5) Describe the distribution of the graph in terms of its shape, center and variability.
6) Represent the data in another way.
7) Write the name of the feature at each of the labels on the five-number summary of the box plot and record the values from the computer.



No	Five-number summary	Value
1		
2		
3		
4		
5		

8) Describe how the box plot is related to its matching histogram.
9) Which graph do you think represents the data better, the histogram or the box plot? Explain why.

Figure 2: Task 2

In Task 2, students are asked to investigate the grouped data obtained from the raw data in Question 1. In this part, the students have to organize, present and interpret data in a frequency polygon for the grouped data in Questions 2, 3 and 4. In addition, for Question 5, the students should understand how the concepts of center,

spread and distribution are related to each other. Furthermore, Questions 6 and 7 need students to present and interpret data in box plots where the students have to match the box plot to the histogram in Questions 8 and 9.

Task 3

The following data shows the yearly instant noodle consumption (in millions of packets) for Malaysia and Taiwan from year 2002 to 2007 (Source: Global Oils & Fats Business Magazine, 2009)

Country	2002	2003	2004	2005	2006	2007
Malaysia	7.4	8.2	8.7	8.9	10.6	11.8
Taiwan	9.4	10.0	9.5	8.9	8.7	8.5

1) What are the highest and lowest yearly instant noodle consumption (million packets) for Malaysia?
2) What are the highest and lowest yearly instant noodle consumption (million packets) for Taiwan?
3) Predict the instant noodle consumption for Malaysia and Taiwan in 2008. Explain why.
4) Predict which data set has greater variability, Malaysia or Taiwan. Explain why.
5) Organize the data into GeoGebra spreadsheet.
6) Construct a box plot for each set of data.
7) Record the mean, standard deviation, minimum value, first quartile, median, third quartile, and maximum value for each of the data set.
8) Compare the distribution of both box plots with respect to shape, center and variability.
9) Make a conclusion from the data of instant noodle consumption for Malaysia and Taiwan.

Figure 3: Task 3

Students can then compare the box plots generated from the two data sets in Questions 1 and 2 in Task 3. In addition, they also need to make a prediction from two data sets in Questions 3 and 4. Questions 5, 6 and 7 require students to organize, present and interpret two data sets in the box plots. In Question 8, students are required to relate the concepts of center, spread and distribution to compare the two data sets. Then, they have to make a conclusion from the data in Question 9.

Task 4

A survey was conducted on a sample of people from a country in 1995. The data demonstrated the percentage of males and females who were unemployed (Source: New York Times Almanac).

Males					Females				
1.5	6.6	5.6	0.3	7.7	7.0	6.8	5.6	0.5	9.4
4.1	3.1	4.6	6.0	6.6	3.0	3.4	6.5	8.7	8.0
9.6	4.4	5.2	6.0	8.7	7.7	5.3	4.6	7.2	5.9
9.8	5.9	3.1	5.6	2.2	9.2	8.8	3.2	8.6	3.3
4.6	5.6	1.9	8.8		5.0	8.6	3.7	8.0	

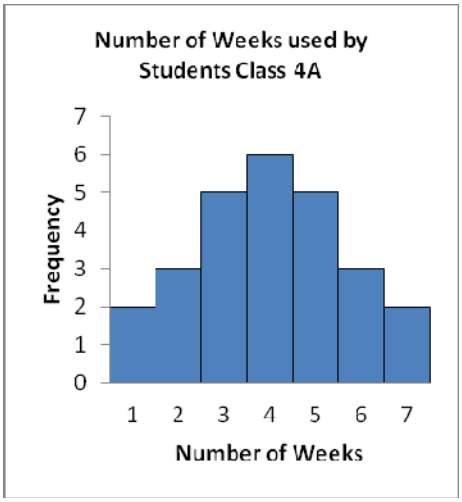
1) What are the highest and lowest percentage of unemployed males?
2) What are the highest and lowest percentage of unemployed females?
3) Organize the data into GeoGebra spreadsheet.
4) Construct a stem and leaf plot for each set of data.
5) Compare the distribution of both stem and leaf plots with respect to shape, center and variability.
6) Make a conclusion from the data of unemployment rates of males and females.

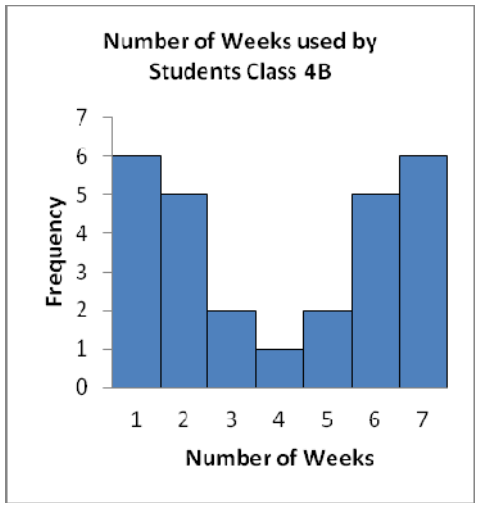
Figure 4: Task 4

For Task 4, the students can compare the stem and leaf plots drawn from the two data sets in Questions 1 and 2. They have to then organize and present the two data sets in stem and leaf plots in Questions 3 and 4. Next, Question 5 asks students to relate the concepts of center, spread and distribution to compare two data sets. Lastly, in Question 6, they need to make a conclusion from the data.

Task 5

The following graphs illustrate the number of weeks used by the students from class 4A and 4B to finish reading a storybook.





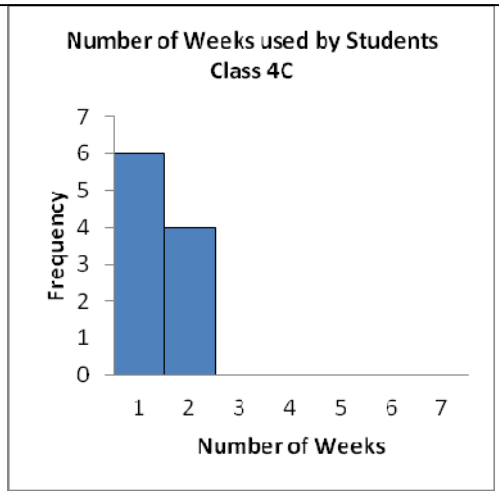
1) What are the highest and lowest number of weeks used by the students from class 4A to finish reading a storybook?
2) What are the highest and lowest number of weeks used by the students from class 4B to finish reading a storybook?
3) Predict which class has the lower standard deviation. Explain why.
4) Drag the red circle on the GeoGebra dynamic worksheet to create the histograms for Class 4A and Class 4B. Tick the check box of Show Std Dev.
5) Compare the answer you predicted in Question 3 to the value shown on the computer. If the answers are different, explain why.
6) Are there any similarities or differences between the two graphs produced on the computer? Explain.

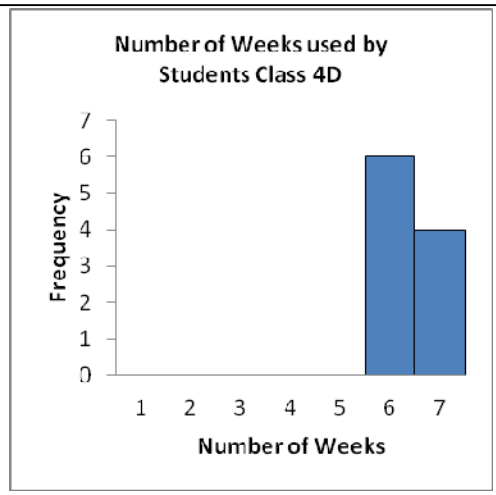
The teacher did a survey of the number of weeks used by the students from class 4A and 4B to finish reading a storybook during the school holidays. The following data indicated the results of the survey.

Week	1	2	3	4	5	6	7
Class 4A	3	3	3	3	3	3	3
Class 4B	0	3	5	6	4	3	0

7) Predict which class has the larger standard deviation. Explain why.
8) Drag the red circle on the GeoGebra dynamic worksheet to create the histograms. Tick the check box of Show Std Dev.
9) Compare the answer you predicted in Question 7 to the value shown on the computer. If the answers are different, explain why.
10) Are there any similarities or differences between the two graphs produced on the computer? Explain.

The graphs below show the number of weeks used by the students from class 4C and 4D to finish reading a storybook.





11) Predict which class has the larger standard deviation. Explain why.
12) Drag the red circle on the GeoGebra dynamic worksheet to create the histograms for Class 4C and Class 4D. Tick the check box of Show Std Dev.
13) Compare the answer you predicted in Question 11 to the value shown on the computer. If the answers are different, explain why.
14) Are there any similarities or differences between the two graphs produced on the computer? Explain.

Figure 5: Task 5

Task 5 requires students to explore histograms. In Questions 1 and 2, they ought to obtain the information from two histograms. This is followed by making a prediction from two histograms in Questions 3, 5, 7, 9, 11 and 13. Finally, they need to present and interpret the data in histograms for two data sets in Questions 4, 6, 8, 10, 12, and 14.

Tasks Validation

Content validity was carried out to determine the matching degree between the content and domain being measured (Gay, Mills & Airasian, 2009). The tasks of this technology-based statistical reasoning assessment tool had been validated by three experts, a crucial step which ensures that the items can evaluate the students' statistical reasoning level. The cooperation was carried out via electronic mail. The instrument was not validated concurrently by all experts, but was reviewed by one expert and amended accordingly before it was sent to the next expert. These three experts are lecturers from foreign universities that have published significantly influential works in the field of statistical reasoning. Expert A is an associate professor from the University of Minnesota, USA, with extensive experience in the field. He has taught statistics to university students for more than 20 years and has published countless papers about statistical reasoning in refereed journals, book chapters, and conference proceedings. Expert B is an associate professor from Illinois State University, USA, with years of teaching experience in statistics as well. He was actively involved in the development of models for statistical reasoning. Expert C is a senior lecturer from the University of New England, Australia who has numerous publications on statistical reasoning such as reasoning about sampling, reasoning about variation, informal inferential reasoning, and so forth. All experts contributed valuable views and suggestions to the constructed tasks other than helping to verify the accuracy of the English words used. Appropriate corrections were then made. Since this instrument is in dual language (English and Malay), two lecturers who are excellent in Malay helped to verify the language accuracy.

Tasks Reliability

Inter-rater agreement was sought to confirm the reliability of this instrument (Slavin, 2007). Two raters were involved in statistics; both of them are lecturers from local universities and are proficient in statistics and mathematics education. Rater A is an associate professor from Universiti Teknologi Malaysia and has 15 years of teaching experience in statistics and mathematics. The rater's field of specialization is in advanced mathematical thinking and problem solving. Meanwhile, rater B is a senior lecturer from the same university who has extensive teaching experience in statistics and mathematics subjects as well. He was a lecturer in the

Islamic Azad University, Iran, before joining the current university. The researcher tabulated the four constructs, sub-processes, and items before both raters were asked whether they agree or disagree. This was done by either giving a (√) or (X). Both raters were requested to judge the appropriateness of the items under the four constructs within a two week period before an in-depth discussion was held. Then, the percentage of agreement was calculated based on their judgment.

DISCUSSION

The validity and reliability of the technology-based statistical reasoning assessment tool had been measured. The three experts who validated the instrument had commented on the strengths and weaknesses of the instrument. Concerning instrument strength, expert A mentioned that there were some good items in this assessment tool. In addition, expert A also pointed out that it is acceptable to have both statistical literacy and statistical reasoning items in the instrument as some content is interconnected and sometimes statistical reasoning is the subset of statistical literacy (delMas, 2002). Expert B stated that there were two good questions to assess statistical reasoning, i.e., 'Describe the distribution of the graph with respect to its shape, center, and variability' and 'Which graph do you think represents the data better, the histogram or the box plot? Explain why.' Expert C found this instrument interesting and is looking forward to reading the published results.

For the weaknesses of the instrument, expert A recommended to change Question 1 ('What does this graph tell you?') in Task 1 to 'What can you tell me about the statistics test scores from this graph?' as he did not understand what the question wanted. However, no changes were made to this question; we expect the students to give answers on the display features of the graph such as the title and axis label and not merely on the statistics test scores. Besides that, expert A was confused about one of the questions in Task 2 – 'Justify your conclusion for the data', so this question was then eliminated from the instrument to avoid confusion on behalf of the students. Expert B said that there were too many questions focused around the GeoGebra computer program rather than statistical reasoning. Therefore, two sub-processes of representing data which concerned procedural steps in GeoGebra software were changed to make room for better judgment on the students' reasoning level. One of the sub-processes for representing data was unchanged because procedural steps like drawing or constructing a graph are needed in order to carry out the subsequent reasoning step.

The three experts also gave some recommendations to improve the instrument. For instance, expert A suggested that the question in Task 4 be changed so that the data can be more robust. Nonetheless, the researcher kept the question as the data was obtained from a practical source. Not only that, expert A also suggested that the questions in Task 5 which are related to asking the students to create a graph using the GeoGebra software be modified before identifying the minimum and maximum value and estimating the standard deviation. This suggestion was partly accepted as it is essential that the students compare the similarities and differences between the two graphs in terms of the value of mean, median, standard deviation, and interquartile range. This step can only be done after they have estimated the value of standard deviation. Moreover, expert B requested to have a question that entails comparing quiz scores of the first class with those of the second class. Such a question was not inserted as this would confuse the students in terms of the order of the classes. Expert B also suggested the addition of two more questions into Task 3 and Task 4, which are 'Predict the noodle consumption for 2008 and explain why' and 'What conclusion can you draw from the data about the unemployment rates of men and women'. This suggestion was accepted and thus the two questions were included in the instrument. Expert C proposed adding the phrase, 'you decided on this value' behind the 'Explain how'. However, the researcher felt that 'Explain how' can be understood easily and it is a typical phrase for assessing statistical reasoning. To sum up, the views, comments, responses, and recommendations given by these three experts were encouraging and helpful.

The degree of reliability of this instrument was manually calculated at the first stage in terms of percentage of agreement between the two raters. This was done by dividing the number of times both raters mutually agreed on a certain item by the number of possible observations. The computed percentage of agreement was 96.4 %. The same results were then analyzed using SPSS software and the output was as indicated in Table 9. The result was consistent with the manual calculation, i.e., 96.4 %. According to Boyatzis (1998), stability of a measure of consistency between the judgments of two rates can only be established if the percentage of agreement is at least 70 %. Therefore, it can be concluded that the inter-rater reliability for this assessment tool is reasonably consistent. Since the instrument has strong validity and reliability, it is highly recommended that this instrument be used not only at the secondary school level, but also at the university level.

Table 9: Percentage of agreement

Reviewer_difference

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-1	2	3.6	3.6	3.6
	0	54	96.4	96.4	100.0
	Total	56	100.0	100.0	

CONCLUSIONS

A technology-based statistical reasoning assessment tool has been developed in order to assess and characterize students' statistical reasoning across four key constructs and five levels of reasoning as well as to refine and validate the initial statistical reasoning framework. This assessment tool will be tested empirically in a task-based interview session. It is probable that this newly developed assessment tool will promote students' conceptual understanding of statistical concepts, thus leading them to reason statistically. In future studies, instructors and researchers can make use of this assessment tool to assess students' statistical reasoning level in terms of different races, gender, country, educational background, and so forth. Further investigations require not just improvement to the framework but also to disseminate tools and methods more extensively beyond students studying statistics.

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AN EVALUATION INTO THE VIEWS OF CANDIDATE MATHEMATICS TEACHERS OVER "TABLET COMPUTERS" TO BE APPLIED IN SECONDARY SCHOOLS

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ABSTRACT
This study aims to investigate, in terms of different variables, the views of prospective Mathematics teachers on tablet computers to be used in schools as an outcome of the Fatih Project, which was initiated by the Ministry of National Education. In the study, scanning model, one of the quantitative research methods, was used. In the population of the study is involved 130 prospective Mathematics teachers who study Mathematics Education at the Department of Primary Education, Faculty of Education, Giresun University in 2013 and 2014 Academic Year. The data of the study were obtained with the usage of 'Tablet Pc Questionnaire Form' developed by the researcher himself and 'Computer Attitude Scale' devised by Bindak and Çelik (2006). The data obtained from the study were analyzed with the tests known as percentage, frequency, single-factor Anova and Chi-square. The results indicated that there is a significant difference between prospective teachers' Computer Attitude Scores and their tendency to supporting 'Tablet Computers'. Similarly, prospective teachers' conditions of supporting the usage of 'Tablet Pc Computer' show significant differences in terms of computer-use frequency, while no significant differences were found in terms of the case of the need to take in-service courses, the case of having a classroom and computers, the time, frequency and objective of computer-use. However, in terms of gender, significant differences were found between prospective teachers' views. In addition, prospective teachers stated that the usage of tablet-computers in Mathematics Course could provide you with two advantages. First, Mathematics classes could become more enjoyable than it used to be through visuals and animations. Second, the abstract concepts in Mathematics could become more understandable. However, the disadvantages stated by prospective teachers are as follows: 1) The communication between Mathematics teachers and students could be reduced and, 2) social interaction between students might be reduced.
Keywords: Prospective Mathematics Teachers, Fatih Project, Tablet Computer.

INTRODUCTION

This is a rapidly developing and changing world where knowledge has doubled and technology has been constantly developing. In line with these developments, new technological devices have gradually emerged. Technological devices have been benefitted throughout the history. A few years are regarded as a long period for technological world. The powers and features of these technological devices have increased logarithmically with the developments. In parallel with this, the variety and usage of technological devices have been increasing in education as well. It is true that people have a need for an improved technology in order to achieve and spread knowledge in current age. Known as processing, producing, saving, using, sharing and spreading knowledge, technology has a significant role in this age. Communities and individuals being able to have an access to knowledge, make it available for their own usage and make an addition to it and spread it are regarded as powerful. Such a great importance attached to knowledge and technology and using them in an intensive way in social fields are considered one of the most important factors that require structural changes in the field of education as in other fields (Erişen & Çeliköz, 2007).

Children born after 2000 are grown up with technology and studying through traditional methods make them bored and lead them to memorize things. They have shares on social media instead of electronic posts. They can adapt to digital world so rapidly. In this context, the attitudes and habits of these people and their expectations and learning methods could change. It is a fact that some activities should be arranged for visual and audial devices in the process of learning and teaching in order to realize an effective learning (Çepni & Akyıldız, 2010). The way to address more sensual organs could be possible with making educational systems compatible with informatics technologies (Alkan, Tekdere & Genç, 2003). In order that both teachers and students are able to perceive and absorb what is taught as topics and issues in teaching programs, technological devices have been used in an intensive way for in-class learning and teaching activities (Yiğit et al., 2007). Using the most advanced technology in education would enable to carry out the requirements of education in line with needs for the age and also achieve the highest productivity in education (Arslan, 2003).

With the introduction of technology in mathematics education, it is still vague whether mathematics teaching changed or not. While technology is moving with giant steps, teachers have adapted this technology to traditional teaching methods and techniques. As using the methods and techniques, audio, vision and action are all used. Old books were replaced with colorful books and the books used in electronic media. Even though there

is no problem in this sense, it hasn't brought about a dramatic change in our learning and teaching experience (Baki, 2008). The function and status of teacher is very crucial in education. The changes to be made in education is primarily based on making teacher active, educational approach and mathematical manner. In the basis of the ongoing problem in mathematics teaching lies lack of qualified teachers. In the first place it comes lack of knowledge or stability and shallowness in the accumulation of knowledge. Teacher hasn't been able to achieve what was expected from the precautions taken to eliminate professional incompatibility with programmed course books, in-class technological devices such as television, video, computer and so on (Yıldırım, 2000). A professional teacher will never ask students to do poor quality tasks. Meaningless memorization, so-called homework and projects given to students that were all encountered at schools so frequently are not the tasks that a professional teacher asks students to do. What is expected from a professional teacher, instead, is that he should bear mind to educate students to use their powers in an effective way and know their ideal capacities and use them in this way (Altan, 2010). In addition, teacher should help students to understand the processes related to mathematics and make a connection between the concepts and processes (Baykul, 2011).

One of the significant technological devices started to be used in education is tablet computer. Tablet computers have all the properties other computers have. One of the features that tablet computers have is capable of using special pen to write on screen (Cox, 2006, Fister & McCarthy, 2008). In addition, the advantages of these computers for teachers are that they can be written and erased very easily, they can be used to show the slides and that they can be used to give a copy of the course notes to students (Gill, 2007, Galligan, Loch, McDonald & Taylor, 2010). On the other hand, tablet could be used as an electronic board with the projection system. A tablet computer will enable teachers and students to use limitless pages, various kinds of inks without erasing (Weitz, Wachsmuth & Mirliss, 2006). Contrary to traditional computer, tablet computers enable teachers and students to contact directly through computer documents in the classroom and to clean and talk about them (Anderson, 2004). When it comes to the publishing of the books handed out freely, the paper cost, distribution and usage of them, it is likely to say that tablet computers are practical and economic. It would unburden students from carrying a pack full of books and notebooks. The notes students take and the assignments they do could be checked by teachers as a distant system. In the current time when central exam system has been discussed, the collective exams of the students could be arranged by means of tablet computers at schools concomitantly. The results could be learned in the interactive media at the same time. As it was introduced from 2002 onward, tablet computer has turned into a useful device gradually for educators (Mock, 2004). The Fatih Project in Education has been carried out by the ministry and it was planned to spread it all over the nation in the period of 2011-2014. The project envisaged to provide primary, secondary and high school with supporting the infrastructure through interactive LCD panel boards, tablet computers and the Internet access in order to use informatics technological devices in the process of learning-teaching to provide equality of opportunity in education and improve technology at schools (MEB, 2012).

Developed countries have carried out intensive researches in order to determine the efficacy of tablet computers in the environment of teaching-learning in line with certain objectives and targets. There is similar need in Turkey as well and it is necessary to make researches over the efficiency of tablet computers in learning-teaching in order to meet that need. It is hoped that the current study would fill a significant gap and that the findings to be obtained would be useful for teacher to review their knowledge over tablet computer usage and beneficial for academicians conducting studies in this field. In addition, the data to be obtained in this study would provide benefits during the implementation of the project. The purpose of the current study was to determine the views of secondary education candidate mathematics teachers over the usability of tablet computers that has started in some schools by the Ministry of Education within the content of FATIH project, to make analysis with the findings obtained and to give some recommendations related to the issue.

METHODOLOGY

Research Model

A quantitative research method was adopted and a survey method was used in this study. Survey model is a research approach aiming at describing a present or past situation as it is (Karasar, 2002). In these kinds of studies, the aim is not to make a generalization but to make a section, reflect a certain case in a detailed way and shed light for the future.

Population and Sampling

The sampling of the research was made up of 130 candidate Mathematics teachers, 40 boys and 90 girls, having an education in Giresun University, Faculty of Education, Primary Education Mathematics Teaching Department in the academic year of 2013-2014.

Data Collection Instrument

As the data collection instrument, the questionnaire form developed by the researcher was used. While preparing this questionnaire form, the author benefitted from the computer attitude scale developed by Bindak and Çelik (2006) with a reliability coefficient of α =.91. In the comment of the scores obtained in the computer attitude scale which had a total sum of 22 items, the formula of range width (a=row width /the number of groups). The content validity of the questionnaire was obtained with the expert opinion. The first part of the questionnaire form, which was made up of two parts, was comprised of 6 questions aiming at determining the demographic information, while the second part was composed of 4 questions in total, 2 ranking scaled about the views related to tablet computers and 2 classifying scaled questions.

The Analysis of the Data

In the analysis of the data, SPSS 17 package program was used. Arithmetical means, standard deviations and numbers (N) depending on the personal features of the students answering the questionnaire for both dimensions were determined in the analysis. Whether there was a statistically significant difference between answers students gave to the questionnaire was determined through t test, F test and Chi-square tests. The data regarding numerical developments were tabulated and evaluated and whether there was a difference between the independent variables was tested at α = .05 significance level.

FINDINGS

The relation between the status of supporting tablet computers at mathematics courses by candidate mathematics teachers and computer attitude total scores were examined. The main tendency of the views of candidate mathematics teachers in this issue and main changing measurement values were given in Table 1 and Table 2.

Table 1: ***Main Tendency and Changing Measurements with regard to Computer Attitude Scores of Candidate Mathematics Teachers.***

The status of supporting tablet computers	**N**	$\overline{X}$	**S**
Yes	61	2.87	.30
No	54	3.09	.25
No idea	15	2.90	.21
Total	130	2.97	.29

As given in Table 1, total scores arithmetical means of the computer attitude scale for the candidate mathematics teachers participating in the research and supporting the usage of table computers in mathematics courses was found as ($\overline{x}$) 2.87 and that of the candidate teachers not supporting was ($\overline{x}$) 3.09 and the mean for the candidate teachers having no idea was ($\overline{x}$) 2.90.

One way variance analysis was made for the unrelated measurements over whether mean scores of computer attitude scales of candidate teachers participating in the research differed and the results were given in Table 2.

Tablo 2: ***The Results of One Way ANOVA for Unrelated Measurements regarding the Computer Attitude Scores of Candidate Mathematics Teachers***

Source of Variance	**Total Square (TS)**	**SD**	**Square Means (SM)**	**F**	**P**	**Significant Difference**
Inter-groups	1.41	2	0.71	9.76	.001	1-2 2-3
Intra-groups	9.17	127	0.07			
Total	10.58	129				

1-Yes, 2-No, 3-No idea

As given in Table 3, a significant difference was found between the computer attitude total scores of the candidate teachers supporting that tablet computers should be used in mathematics courses and those of the ones not supporting it in favor of the candidate mathematics teachers supporting tablet computers [$F_{(2\text{-}127)}$= 9.76, p<.05].

The status of the supporting using tablet computers in mathematics courses by mathematics candidate teachers was examined in terms of different variables and given in Table 3.

Table 3. ***The Distribution of the Status of the Supporting Using Tablet Computers in Mathematics Courses by Mathematics Candidate Teachers was Examined in Terms of Different Variables***

Variables	Status of the supporting using tablet computers						Sign. Diff.
	Yes		No		No Idea		
	F	%	F	%	F	%	
Gender							λ^2 (2)= 2.632; p = .268 p > 0.05
Man	23	57.5	13	32.5	4	10	
Woman	38	42.2	41	945.6	11	12.2	
Year							λ^2 (2)=1.785; p= .410 p > 0.05
1st Year	27	45.0	28	46.7	5	8.3	
2nd Year	34	48.6	26	37.1	10	14.3	
Status of having a computer							λ^2(2)=10.32 ; p = .06 p > 0.05
Yes	51	54.3	31	33.0	12	12.8	
No	10	27.8	23	63.9	3	8.3	
Period Using Computers							
1-4 yrs (university)	3	18.8	10	62.5	3	18.8	λ^2 (6)=8.79; p= .19 p > 0.05
5-7 yrs (High School)	22	47.8	20	43.5	4	8.7	
8-10 yrs (Pri. Ed. Part 2)	24	48.0	19	38.0	7	14.0	
11 yrs + (Pri. Ed. Part I)	12	66.7	5	27.8	1	5.6	
Frequency of Comp. Use							λ^2(4)=1202; p = .002 p < 0.05*
Every day	44	51.8	34	40.0	7	8.2	
Every week	16	43.2	13	35.1	16	21.6	
Every year	1	12.5	7	87.5	0	0,0	
Purpose of Using Computer							
Education (assignments, researches etc.)	16	37.2	21	48.8	6	14.0	λ^2(4)= 12.16; p = .14 p > 0.05
Social Media (Facebook, MSN, twitter etc.)	39	52.0	29	38.7	7	9.3	
Other (shopping, payment, game, film, music, news)	6	66.7	1	11.1	2	22.2	
Total	61	46.9	54	41.5	15	11.5	

As shown in Table 3, the status of supporting using tablet computers in mathematics courses by candidate mathematics teachers did not differ significantly in terms of gender, years, the status of having a computer, the period of using a computer and the purpose of using a computer. However, a significant difference was found between the views of candidate teachers in terms of frequency of using a computer [λ^2(4)=12.02; p<.05].

The relation between the status of feeling a need for an in-service training course over using tablet computers in mathematics courses by candidate mathematics teachers and their computer attitude scores was examined. The main tendency and main changing measurement values of the views of candidate teachers in this issue were given in Table 4 and Table 5.

Table 4. ***The Main Tendency and Changing Measurements of Candidate Mathematics Teachers Regarding Computer Attitude Scores***

The status of feeling a need for an in-service training course on using tablet computer	N	$\overline{X}$	S
Yes	86	2.9868	.28312
No	37	2.9361	.30519
No idea	7	2.8571	.20735
Total	130	2.9654	.28635

As shown in Table 4, the arithmetical mean of the computer attitude scale total scores of the candidate mathematics teaches participating in the research and feeling a need for an in-service training course on using tablet computers was ($\overline{X}$) 2.99 and the scores of those not feeling a need for an in-service training course was ($\overline{X}$) 2.94 and the scores of the ones having no idea was found as ($\overline{X}$) 2.94.

A one way variance analysis (ANOVA) was carried out for unrelated measurements over whether computer attitude scale total scores of the candidate teachers participating in the research differed, and given in Table 5.

Table 5. ***One Way ANOVA Results for the Unrelated Measurements with regard to Computer Attitude Scores of Candidate Mathematics Teachers***

Source of Variance	Total Square (TS)	Sd	Mean Squares (MS)	F	P	Significant Difference
Intergroup	.153	2	.077			
Intragroup	10.425	127	.082	.933	.396	No
Total	10.578	129				

1-Yes, 2- No, 3-No Idea

As given in Table 5, no difference was found between the computer attitude scale total scores of the candidate mathematics teachers feeling a need for an in-service training course on using tablet computers in mathematics course and the scores of those not feeling a need for an in-service training [F(2-127)= .933, p>.05].

The status of feeling a need by mathematics teachers for an in-service training course over using tablet computers in mathematics courses was examined in terms of some variables and given in Table 6.

Table 6. ***The Distribution of the Status of Feeling a Need by Mathematics Teachers for an In-Service Training Course over Using Tablet Computers in Mathematics Courses in Terms of Different Variables***

Variables	Status of the supporting using tablet computers						Sig. Diff.
	Yes		No		No Idea		
	f	%	f	%	f	%	
Gender							$\lambda^2(2)=9.326$; p = .009 p< 0.05
Man	19	47.5	17	42.5	4	10.0	
Woman	67	74.4	20	22.2	3	3.3	
Year							$\lambda^2(2)=3.856$; p= .145 p > 0.05
	42	70.0	13	21.7	5	8.3	
	44	62.9	24	34.3	2	2.9	
1st Year							$\lambda^2(2)=2.966$; p = .227 p > 0.05
2nd Year	60	63.8	27	28.7	7	7.4	
Status of having a computer	26	72.2	10	27.8	0	.0	
Period Using Computers							$\lambda^2(6)=1.050$; p= .984 p > 0.05
1-4 yrs (university)	10	62.5	5	31.3	1	6.4	
5-7 yrs (High School)	29	63.0	15	32.6	2	4.3	
8-10 yrs (Pri. Ed. Part 2	34	68.0	13	26.0	3	6.0	

11 yrs + (Pri. Ed. Part I)	13	72.2	4	22.2	1	5.6	
Frequency of Comp. Use							$\lambda^2(4)=6.309$; p = .177 p > 0.05
Every day	51	60.0	29	34.1	5	5.9	
Every week	30	81.1	5	13.5	2	5.4	
Every year	5	62.5	3	37.5	0	.0	
Purpose of Using Computer							
Education (assignments, researches etc.)	28	65.1	12	27.9	3	7.0	
Social Media (Facebook, MSN, twitter etc.)	52	69.3	19	25.3	4	5.3	$\lambda^2(4)= 9.046$; p = .338 p > 0.05
Other (shopping, payment, game, film, music, news)	6	66.7	3	33.3	0	.0	
Total	86	66.2	37	28.5	7	5.4	

As given in Table 6, the status of feeling a need by candidate teachers for an in-service training course over using tablet computers in mathematics courses did not differ in terms of year, the status of having a computer, the period of using a computer, frequency of computer use and purpose of computer use. However, the views of candidate teachers were found significantly different in terms of gender [$\lambda^2(2)=9.326$; $p<.05$].

The views of the candidate mathematics teachers over the advantages and disadvantages of using tablet computers in mathematics courses were examined and the frequency levels were given in Table 7 and Table 8.

Table 7. ***The Frequency Distribution of the Views of the Candidate Mathematics Teachers over the Advantages and Disadvantages of Using Tablet Computers in Mathematics Courses***

Advantages	**Candidate Teacher**	
	f	**%**
1.It could make mathematics course more enjoyable with visuals and animations	108	83.1
2. It could facilitate the perception of abstract concepts in mathematics course.	69	53.1
3. It could increase the interest of students in mathematic courses	55	42.3
4. It could enable students to make mathematical assessments and evaluations easier.	54	41.5
5. It could enable students to achieve mathematical issues they wonder about in a short time.	54	41.5
6. It could give more time to teachers for mathematical activities.	53	40.8
7. It could increase the skills of students to use technological tools.	49	37.7
8. It could increase the active involvement of students in mathematics courses	46	35.4
9. It could enable students to make researches and investigations on mathematics courses.	46	35.4
10. It could help with demonstrating the activities that cannot be employed through animations.	44	33.8
11. It could increase the permanence of learning by making mathematics courses more efficient.	41	31.5
12. It is easy to carry and could relieve students of course books.	41	31.5
13. It could increase the interests of students in scientific and technological developments.	30	23.1
14. It could enable students to review the topics in mathematic courses.	28	21.5
15. Tablet computers could increase the usage of such various	27	20.8

programs and software as "ME vitamin" in teaching.		
16. It could increase the communication of students with teaches in mathematics courses	17	13.1

As shown in Table 7, over using tablet computers in mathematics courses, 108 (83.1%) candidate mathematics teachers stated that it would make the courses more enjoyable with visual materials and animations. This shows that a great majority of the participants has this opinion. Sixty-nine candidate teachers (53.1%) pointed out that it could facilitate the perception of abstract concepts in mathematics course. In addition, candidate teachers expressed in the least frequency and percentage (f =17; 13.1%) that it would be an advantage to use it in mathematics course in terms of increasing communication with teachers.

Table 8. ***The Frequency Distribution of the Views of the Candidate Mathematics Teachers over the Disadvantages and Disadvantages of Using Tablet Computers in Mathematics Courses***

Disadvantages	**Candidate Teacher**	
	f	**%**
1. It could lessen the communication between students and mathematics teachers.	62	47.7
2. It could decrease social interaction between students.	56	43.1
3. It could encourage students for a ready-made knowledge in mathematics courses.	45	34.6
4. The radiation sent off by tablet computers could harm (eye etc.) health.	38	29.2
5. It could worsen the writing skills of students in mathematics courses.	34	26.1
6. Students could break down tablet computers in a short time.	32	24.6
7. Tablet computers could be used out of their purpose.	26	20.0
8. It could create a habit of laziness at mathematics teachers.	24	20.0
9. Individual differences between students could cause problems in the process of using tablet computers.	20	18.5
10. It could prevent student skills to be realized by candidate teachers.	17	13.1
11. It could lessen the interest in science and technology and published books.	15	11.5
12. Broken tablets could hinder teaching of mathematics course.	11	8.5
13. It could affect the skills of students in commenting scientific events negatively.	10	7.7
14. Classroom management of the teacher could be difficult.	9	6.9
15. Carrying and protecting tablet computers could be difficult.	4	3.1

As given in Table 8, candidate teachers participating in the research stated that in the case of using tablet computers in mathematics courses some disadvantages could come out. The leading one of these disadvantages was the view of "It could lessen the communication between students and mathematics teachers" (f =62; 47.7%). Fifty-six of the candidate teachers (43.1%) pointed out that "It could decrease social interaction between students". Forty-five of the candidate teachers (34.6%) stated that it could encourage students for a ready-made knowledge. Thirty-eight of candidate teachers expressed that the radiation sent off by tablet computers could harm (eye etc.) health, while 34 of them pointed out that it could worsen the writing skills of students in mathematics courses. In addition, candidate teachers pointed out that carrying and protecting tablet computers could be difficult, with the least frequency and percentage (f =4; 3.1%).

DISCUSSION, CONCLUSIONS AND SUGGESTIONS

The findings obtained in this research differed significantly in terms of the status of candidate mathematics teachers' supporting using tablet computers in mathematics courses, the period of using a computer and the purpose of using a computer. These results were parallel with the result in the study carried out by Uzoğlu & Bozdoğan (2012) for the variables of gender, working status and the status of having a computer. In addition, in another study by Daşdemir et al., carried out with teachers a similarity was found with the current study in terms of gender, professional experience and the status of having a computer. However, a significant difference was found in terms of the status of candidate teachers' supporting using tablet computers in mathematics courses and

the frequency of using a computer. Depending on this result, as the frequency of teachers' using a computer increased, their status of supporting using a tablet computer increased. In addition, a significant relation was found between the candidate mathematics teachers with a high attitude of computer and those with a low attitude of computer over supporting tablet computer usage in secondary school mathematics courses. And this result is in line with the result obtained by Uzoğlu and Bozdoğan (2012).

In the findings obtained in another dimension of the research, no significant difference was found in terms of the status of feeling a need for using tablet computers in mathematics courses, year, period of using a computer, frequency of using a computer and the purpose of using a computer. This result is parallel with the results of period of using a computer and the purpose of using a computer in the study by Uzoğlu and Bozdoğan (2012). In addition, no difference was found between the scores of the candidate mathematics teachers feeling a need for an in-service course, those of the ones feeling no need and the ones having no idea.

Candidate mathematics teachers indicated the first three advantages of using a tablet computer in mathematics courses would be "It could make mathematics course more enjoyable with visuals and animations", "It could facilitate the perception of abstract concepts in mathematics course" and "It could increase the interest of students in mathematic courses" while the item "It could increase the communication of students with teaches in mathematics courses" was the one thought to be the least advantageous. In their study, İnan et al. (2010) pointed out that students participated in classroom activities when they used computers while studying. In another study, Kyun end Lee (2009) found that students are more willing and effective in computed based learning.

On the other hand, candidate teachers pointed out that there might be some disadvantages in the case of using tablet computers in mathematics courses. The first three were "It could lessen the communication between students and mathematics teachers", "It could decrease social interaction between students" and "It could encourage students for a ready-made knowledge in mathematics courses", while the item "Carrying and protecting tablet computers could be difficult" were the least advantageous one. The advantages and disadvantages of using tablet computers in mathematics courses are in line with the results of the research by Uzoğlu and Bozdoğan (2012) and those of the current study. In the light of the study, the followings were recommended.

1. In this study, only the variables of computer attitude, gender, age, the status of having a computer, the period of using a computer, the purpose of using a computer were investigated. The arrangement of the studies to be carried out in the future in a way to include more variables would make more contribution to academic studies. In addition, some sampling should be chosen from private universities as well as state universities.
2. Collecting data from the candidate teachers studying in other Faculties of Education over using computers in educational settings would be beneficial in this process.
3. The sampling of the current study was comprised of 130 candidate mathematics teachers. Therefore, some other researches could be carried out with the working groups to be made up of different candidate teachers and the relations between them could be investigated.
4. Tablet computers have not been used in all of the schools. The academic success of tablet computers could be investigated after the completion of Fatih Project.

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AN INTEGRATED SKILLS APPROACH USING FEATURE MOVIES IN EFL AT TERTIARY LEVEL

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ABSTRACT
This paper presents the results of a case study based on an integrated skills approach using feature movies (DVDs) in EFL syllabi at the tertiary level. 100 students took part in the study and the data was collected through a three - section survey questionnaire: demographic items, 18 likert scale questions and an open-ended question. The data and results of the survey revealed that the integration of feature movies in the syllabus helped students in several ways: (1) improve language competence by watching, listening and speaking, (2) understand authentic language and culture, (3) increase fluency and integrated writing skill, (4) practice English for various functions and purposes, (5) learn vocabulary and authentic expressions, (6) distinguish between artificial and natural use of language, and (7) use the language in social exchanges and different interactional settings. Finally, as for the pedagogical implications and drawbacks in the integration process of feature movies, some relevant suggestions and recommendations are given.

INTRODUCTION
Feature movies (FMs) are a much more dynamic medium than a textbook or an audio recording in the EFL context. Movies are such valuable and rich resources for teaching because they present colloquial English in real life contexts rather than artificial situations; an opportunity of being exposed to different native speaker voices, slang, reduced speech, stress, accents, and dialects (King, 2002). Although some teachers may view movies as a medium of entertainment, which seems to have no place in the pedagogical setting, many teachers may assign a film presentation project for their intermediate English students in which films are viewed holistically and critically (Casanave and Freedman, 1995). However, teachers may decide which functions of the FMs they will introduce in the EFL curriculum, and to what extent they have to exploit integrated skills in pursuing EFL learning.

The review of literature on the use of FMs in ELT reveals that varieties of English, slices of culture and historical change can be demonstrated. Furthermore, using audio-visual elements aids learning and movies are great fun to watch (Lynch, 2008). King (ibid) suggested that "it is a refreshing learning experience for students who need to take a break from rote learning of endless English vocabulary and drill practices, and replace it with something realistic, a dimension that is missing in textbook-oriented teaching."

Listening is the predominant skill among other integrated skills in presenting FMs in EFL classes whether the movies chosen are presented with subtitles or not. Hence movies can provide an opportunity for extensive listening, "listening for general pleasure or interest, usually to longer stretches of discourse" (Flowerdew & Miller, 2005: 19). However, to make the practice of listening tasks more useful, the movies may be presented without subtitles depending on the learners' language proficiency level.

If chosen with appropriate length and interesting topics, FMs, which are purposeful and tailored to students' learning needs and proficiency level (King, ibid), can provide enjoyable language learning opportunities for EFL students in a non-native teaching environment. Some researchers (Qiang et al, 2007) argue that FMs make the learner's articulatory organs work even when the learner is merely watching the movies silently. This is evidenced by their silent (covert) imitation of the speakers' pronunciation and utterances without making a sound. Unless a before watching discussion activity is designed, learners' silent imitation may not help them improve their speech. In fact, movies provide exposure to real language uttered in authentic settings and the culture in which the foreign language is spoken (Telatnik and Kruse, 1982; Stempleski, 1992). In addition, they assist the learners' comprehension by enabling them to listen to exchanges and see such visual supports as facial expressions and gestures simultaneously (Allan, 1985; Sheerin, 1982), which may boost their insights into the topic of the conversations.

As Kusumarasdyati (2006) claimed "the sheer development of multimedia for pedagogical purposes has encouraged more and more educators to make use of them in their language classrooms. Among many different

types of media, movie videos remain one of the popular teaching tools due to several reasons." Based on this idea, the present paper attempts to explore some learning activities designed to improve EFL learners' active listening skill as well as other integrated skills. It also aims at promoting better understanding of cultural diversities through FMs as a teaching tool. It is claimed that the language spoken in the movies, but also presented in the appropriate cultural context (Chapple and Curtis, 2000; Herron et al, 2002) can be an invaluable means of enhancing more appropriate use of language and preventing cross-cultural understanding.

METHOD

The present study is aimed at learners' reflections on integrating FMs with the syllabus as part of multimedia studies in EFL classes of intermediate and pre-intermediate learners in the English Preparatory Program (EPP) at the tertiary level with regard to some specific issues. A total of 100 students taking EFL courses at the EPP participated in this study. 14 of them were at intermediate level of English and the rest were at pre-intermediate level. The students are trained in EFL to complete their education in various English-medium four-year departments or two-year programs.

RESEARCH QUESTIONS

The study covered the following questions which guided the research process in regard to exploitation of using FMs in a non-native EFL context as well as the pedagogical and linguistic implications.

1. To what extent do the students think integrating FMs into the EFL courses aided them in exploiting various language competencies, TL skills, critical thinking, cultural awareness, appreciation of filming arts, authentic use of language and language differences between a non-native environment and in the TL settings?
2. Do the students find FMs helpful in the English prep courses they took?
3. In what ways do the students consider integration of the FMs with a large amount of linguistic and lexical data into the syllabus helpful to gain competence in the TL?
4. In terms of developing fluency, practicing structure and writing as an integrated task do the students think the FMs are worth consolidating different teaching tasks to attain TL skills?
5. What was the most advantageous/disadvantageous part of FMs?
6. What was the most irrelevant aspect of using FMs in EFL courses?
7. How would the students think FMs help them improve their translation skill?
8. What do the students think about integrating FMs into the syllabus in aiding peer interaction?
9. What were the students' suggestions for using FMs more effectively in practicing authentic language?

INSTRUMENT

In this study a three-section questionnaire was used to collect data. The first section included demographic items such as age, level group, gender and department to be referred to as some items in the main section of the questionnaire need a point of correlation. The second section consisted of 18 items, in which respondents were requested to choose a number from 1 to 5 using the criteria, based on a five-point Likert-type scale (Vagias, 2006) (strongly agree, agree, neutral, disagree, and strongly disagree). The items were, more likely, based on research for the implementation of an integrated skills approach rather than a discrete skills approach. The last part of the survey included a comment section (optional) aiming to search for the students' opinion about implementing the FMs in EFL courses in the EPP.

PROCEDURE

The implementation of FMs into the syllabus was threefold with a preliminary part and also involved some subheadings:

Plot, summary and characters in the movie

- Before-Watching Activities (BWA)
  - Discussion
  - Picture-telling activity
- While-Watching Activities (WWA)
  - Who said this? Guessing quotations
  - Self-directed comprehension tasks (finding missing information and sentence completion)
- After Watching Activities (AWA)
  - Teacher-directed comprehension tasks
  - Movie-related writing tasks

Plot, summary and characters: Before watching the whole movie, a brief plot summary and the main characters in the cast with their role names in the movie were given to make the students familiar with its theme, and to have an overall picture of it.

Before-Watching Activities: This segment is an initial step followed prior to watching the whole movie. The students engaged in some previewing activities, including various discussion questions related to the topic/events presented in the movie.

While-Watching Activities: Immediately after the BWA stage the students were engaged in the core activity. In contrast with short sequence viewing, the whole movie approach was adopted. The students watched the movie in two class sessions in a multimedia class equipped with cable channels with English medium broadcast, a DVD player, a computer and a data projector with loud speakers. This segment of the study contained two types of "W*ho do you think these quotations belong to?"* questions: one was with the names of the characters students could choose from, and the other was without the names.

After Watching Activities: AWA covered comprehension, open-ended, completion as well as multiple choice questions as a consolidation of tasks done in previous sections. In this part students were asked to answer general comprehension questions focusing on the details in the movie.

DATA ANALYSIS

The data was sorted and the variables were summarized into qualitative data which made them easy to analyze. The collected data was written into excel sheets prior to being subjected to statistical analysis. The data from the first (demographic section) and the last (comment section) parts received through the questionnaire based on the general framework established, and the teachers' noticing the students' reactions to using the FMs, were subjected to content analysis which is a useful model to explain the basic process of qualitative data analysis. The model, interlinked and cyclical, consists of three parts: Noticing, Collecting, and Thinking about things. The second section of the questionnaire consisting of students' responses to 18 items was entered into SPSS 11 (Statistical Package for the Social Sciences) for computation of descriptive statistics. Before its entry into the statistical package, the data was coded as "strongly agree" 1, "agree" 2, "neutral" 3, "disagree" 4 and "strongly disagree" 5. After the data collection, means, frequencies and percentages were calculated for each item in this section. The data written into charts produced by the SPSS program are given in the results section below.

RESULTS

The results are presented within the framework established by the consolidation of survey research questions. First, findings from the second section of the questionnaire are presented, and then based on the question "*What do you think about using feature movies in the preparatory program ELT class?*" students' responses in the comment section will be discussed. Unfortunately not all the students submitted their comments. This study sets out to answer the following research question:

How and to what extent did the students think watching FMs (captioned/non-captioned) in English Preparatory classes as part of the CALL syllabus helped them improve their various competencies, critical thinking, cultural awareness, receptive/performative and translation skills, authenticity of language in the movies, use of TL in various contexts, fluency, grammar and structure?

In Table 1, the descriptive statistics display means, frequencies and percentages with regard to how and to what extent students agreed or disagreed that watching FMs increased their EFL skills, cultural awareness, and improved linguistic competencies. All in all, the survey results shed light upon asserting student's beliefs as to whether watching feature movies (captioned/non-captioned) increased their linguistic awareness and helped them improve various language competencies and integrated skills.

Table 1: Survey about using feature movies in EFL teaching

Watching feature movies in English Prep Courses helped me improve my:		SA		A		N		D		SD	
	Mean	N	%	N	%	N	%	N	%	N	%
1. Understanding of the authentic language used in the movie.	2,1	*17*	17	*63*	63	*11*	11	*7*	7	*2*	2
2. Critical thinking about the Target Language (TL) culture.	2,4	*16*	16	*40*	40	*33*	33	*11*	11	-	-
3. Knowledge of how the authentic language is used in various contexts and settings.	2,5	*7*	7	*47*	47	*37*	37	*8*	8	*1*	1
4. Performative skill (speaking).	2,4	*18*	18	*46*	46	*20*	20	*12*	12	*4*	4
5. Receptive skill (listening).	2,2	*23*	23	*49*	49	*14*	14	*11*	11	*3*	3

6. Translation skill from TL into mother tongue while watching non-captioned movies.	2,6	*10*	10	*35*	35	*41*	41	*13*	13	*1*	1
7. Fluency.	2,5	*13*	13	*43*	43	*23*	23	*20*	20	*1*	1
8. Grammar and structure.	3,0	*7*	7	*29*	29	*24*	24	*35*	35	*5*	5
9. Writing as an integrated skill presented as a final task after watching the movie.	3,2	*4*	4	*30*	30	*23*	23	*29*	29	*14*	14
10. Knowledge of how TL is used for different functions and purposes within a context.	2,5	*8*	8	*48*	48	*27*	27	*16*	16	*1*	1
11. Vocabulary and authentic expressions.	2,2	*23*	23	*50*	50	*15*	15	*5*	5	*7*	7
12. Understanding and appreciation of life in the TL country	2,3	*22*	22	*42*	42	*21*	21	*13*	13	*2*	2
13. Understanding and appreciation of the filming arts.	2,9	*11*	11	*31*	31	*29*	29	*18*	18	*11*	11
14. Understanding of the difference between the artificial use of TL in a non-native environment (classroom) and natural use in a native environment.	2,1	*32*	32	*35*	35	*28*	28	*4*	4	*1*	1
15. Interaction with peers in the English Language Teaching class	3,1	*9*	9	*28*	28	*27*	27	*21*	21	*15*	15
16. Understanding that such movies are very beneficial in acquiring the authentic aspect of the TL.	2,4	*16*	16	*46*	46	*20*	20	*15*	15	*3*	3
17. Understanding of how well the varieties of the English language can be demonstrated in the movies.	2,4	*11*	11	*51*	51	*28*	28	*6*	6	*4*	4
18. Language skills with the fun and joy I experienced while watching the feature movies.	2,4	*29*	29	*34*	34	*18*	18	*9*	9	*10*	10

Key: SA: strongly agree; A: agree; N: neutral; D: disagree; SD: strongly disagree.

The results as displayed in Table 1 are based on the students' answers. 86 students at B level (pre-intermediate) watched the FMs entitled *You've Got Mail* (1998), 119 minutes long, and *My Best Friend's Wedding* (1997); 105 minutes long, and 14 students at the C level (intermediate) viewed the FMs entitled *Message in a Bottle* (1999), 131 minutes long and *Tin Cup* (1996), 135 minutes long. The students did all the *before*, *while* and *after watching activities* respectively. The movies were chosen randomly and the activities were all identical in each feature movie. As for the statistical distribution of the answers shown in Table 1 above, a majority of students "strongly agreed" or "agreed" that watching FMs helped them improve:

- critical thinking about the TL culture
- understanding authentic language in various contexts
- performative and receptive skills (speaking, listening)
- fluency
- writing as an integrated skill
- use of TL for different functions and purposes
- vocabulary and authentic expressions
- appreciation of life in the TL country and the filming arts
- the difference between the artificial use of TL in a non-native environment
- interaction with peers in ELT class
- the benefits of movies in acquiring the authentic aspect of the TL
- the varieties of English demonstrated in the movies
- language skills with fun and joy.

Nevertheless, it seems some students did not believe or were "neutral" that watching FMs was helpful as a teaching tool in improving their:

- translation skill from TL into mother tongue
- grammar and structure.

Although some students (35 per cent) agreed that FMs were useful to improve their *translation skill from TL into mother tongue*, almost half of them (41 per cent) were "neutral". It is assumed that the reason why the students remained neutral about the translation as part of WWA is that, as the teachers observed, there was no time at all to allocate for the students to translate what they hear or see if the movies were shown with captions.

In the detailed analysis of some items (3, 9, 13 and 15) in the questionnaire, regarding whether watching FMs helped them improve their *knowledge of how the authentic language is used in various contexts and settings* (item # 3) 37 per cent claimed to be "neutral" contrary to 47 per cent "agreed". The result shows that almost one

third of the respondents had no idea of the effect of authentic use of language in learning EFL. This emphasizes that the authentic aspect of a foreign language should be embedded into the syllabus to actualize the authenticity more in the ELT context. Almost 29 per cent of the respondents "disagree" that *writing as an integrated skill* (item # 9) was helpful in improving their English. This acknowledges that writing in the process of watching FMs was considered as a final assignment in consolidation of language study skills. So the integration of the writing skill into the syllabus should be reconsidered in regard to a more sustainable, suitable and enjoyable learning/teaching component. Responses to item # 13, *understanding and appreciation of filming arts* and item # 15, *interaction with peers in the ELT class* were quite satisfactory. However, 29 per cent of the respondents were "neutral" to *filming arts* and they seemed to have no idea of the artful effect of watching FMs in an EFL context. How this might be improved seems quite intriguing for implementing such an aspect for the sake of ELT. Item # 15, also creates contradiction to popular opinion in the questionnaire, 27 per cent of the respondents were "neutral" to the idea of *interaction with peer in ELT class*, whereas 28 per cent of the students' response was "agree". Their response to this item may reveal such a fact that, in feature movie watching, teachers should allocate time for peer interaction to increase their self-esteem and fluency.

DISCUSSION OF THE STUDENTS' RESPONSES TO THE OPEN-ENDED QUESTION

The students' responses will be discussed in this part of the study as an important aid to this research. Their views, comments and opinions of how to implement the FMs into the appropriate segment of the syllabus are of primary importance to create a better opportunity for them in terms of the visual aspects of language teaching. Students' views and comments on the question: "*What do you think about viewing feature movies in ELT in the English Preparatory Program?*" were given randomly but they were consolidated and evaluated as *problems* and *advantages* of using FMs from their perspectives. A total of 27 students (6 females, 21 males) expressed their feelings, reactions, favorable/unfavorable comments, as well as their critiques. The comments consolidated are twofold and illustrated in figure 1 below.

Figure 1: Students' Comments on Using FMs in ELT

Problems	Advantages
• the selection of movies; • boring, old and all about romance; • not about real life stories; • movies relevant to students' common interests; • movies with subtitles.	• good and useful for ELT class, fluency, accent, use of English and intonation; • helpful to learn English better; • entertaining and educational; • improves speaking and listening skills; • appropriately chosen movies are better and useful; • helps improve everyday authentic conversations.

DISCUSSION OF PROBLEMS

The movie selection criteria seems to be the most complicated and time-consuming step. As King (2002) claims "the merits of uninterrupted film viewing are numerous as long as teachers follow accepted standards of choosing films: choosing the right film for a particular level of students." All the movies chosen were pre-viewed for not only appropriateness to the syllabus but also for preparing *before*, *while* and *after watching activities*. So in the movie selection process, the following points were taken into account:

- clear and easily understandable language used in the movies
- appropriateness to the level of students
- violence, sex and profanity
- cross-cultural aspects
- paralinguistic aspects (accent, slang, intonation, pronunciation etc.)
- number of short and longer dialogs
- the amount of conversations rather than visual scenes
- appropriate for both sexes
- not contrary to or offending the host culture
- suitability to EFL context and teachable aspects
- thought-provoking content
- plots interesting to all age groups and not peculiar to a biased/certain context
- appealing topic but not about politics, religion or special field-related
- comprehensible and usable for language learning purposes.

The students also commented that the movies should be shown with subtitles. To a certain extent, few parts of the movies were shown with subtitles; but some teachers reported that the subtitles distracted students' attention, and proved unhelpful during WWA due to insufficient time and synchronizing the tasks with the scenes watched,

particularly with "*Who do you think these quotations belong to?*" Supporting our argument, King (2002) emphasized that in captioned FMs students focus is on reading captions not listening to dialogs and the activity becomes reading skills development rather than listening comprehension training. Massi and Blázquez (2008) have suggested some perspectives in choosing appropriate or suitable audiovisual texts such as the learners' linguistic level of proficiency, age, needs and interests, their learning strategies and cognitive styles.

DISCUSSION OF ADVANTAGES

Despite a few objections, most students were in favor of using FMs. However, if there is use of FMs without preparation of tasks and activities, the outcome expected from the learners will not be satisfactory in an ELT non-native context. Students' appreciation of FMs with the tasks and activities seem to be more contributive to their learning of contextualized vocabulary, authentic use of language and various contexts and paralinguistic skills they may improve in an artificial environment.

The students claimed FMs are good references for cross-cultural understanding and authentic, educational, entertaining, accessible aid to learning and practicing English through visual elements and dialogs in various contexts. Even though most students were rule-oriented in learning EFL, from their explicit comments, we can infer that they did not have any ambiguities and frustrations about their expectations from FM activities. As for the role of FMs in listening comprehension, King (ibid) claims that "exposing learners to authentic materials, however, is a necessary stage in the learning process to help them master listening strategies."

PEDAGOGICAL IMPLICATIONS AND DRAWBACKS

The pedagogical aim of this study is to help learners increase their intrinsic and extrinsic motivation to practice English in various contexts. FMs and specific activities may provide more pedagogical options, and are a rich resource of intrinsically motivating materials for learners (King ibid). The students' responses to the open-ended question, their perspectives about the movie choice are various. FMs should be easy to understand, and the comprehensibility of the dialogues and the language used should not contain heavy accent. Arcario (1992) suggests that comprehensibility is a major criterion in selecting a video for language-learning purposes. The drawbacks about using FMs in EFL classes can randomly be listed as follows:

1. Students do not learn language skills if the films are shown without any activities
2. Careful selection and adoption of activities and tasks, the syllabus should be designed within the linguistic output expected
3. Captioned and non-captioned aspects of movie viewing should be determined
4. Careful integration with the core syllabus should be done
5. Enabling students to learn cultural issues, linguistic and lexical elements and providing various language practice materials will make films more advantageous
6. Non-captioned movies may hinder the learning opportunities of movies
7. Captioned movies may cause students' distraction and become a 'screen reading' activity
8. Offending scenes and non-standard articulation of language may decrease students' motivation and enthusiasm
9. Teachers' unnecessary interruptions may distract students' attention and the audio-visual interactive session may become a classical in-class teaching.

CONCLUSION AND RECOMMENDATIONS

In this fast growing and rapidly changing digital world, FMs have become an effective language teaching tool to develop the EFL learners' receptive and performative skills. It also enhances possibilities of exposure to audiovisual discourse and stimulates the learners' imagination, cross-cultural understanding and critical thinking respectively. The authentic language input for improving the EFL skills, presented through FMs that arouse the learners' potential and motivation can engage them in a variety of communicative activities related to aural perception in the TL. The study focused on the development of students' paralinguistic skills and absorbing the living, authentic language. Therefore, all the activities and the tasks were based on the whole-movie watching session and the analysis of linguistic items was considered in regard to the integrated skills approach. When new media and relative components are incorporated into lessons, the learners may develop FLL skills and will also become autonomous learners and increase their critical thinking skills as well.

The significance of teaching language through FMs is multifold: Firstly, cultural aspects are well expressed and all perfectly shown and manifested in the English movies. Secondly, the learners can avoid the boredom of language instruction for a certain time. Thirdly, the teachers will be able to utilize the multimedia tools as FMs to make the language lessons more informative, imaginative, motivational and entertaining. For the implementation of a feature movie-based syllabus into the curriculum five things seem to be important in terms of EFL objectives:

1. Careful selection of FMs with clear topic and language is the first condition for using movies to Teach English as a Foreign Language (TEFL);
2. A tailor-made, objective-oriented activity and integrated task worksheets to be exploited for BWA, WWA and AWA during the feature movie teaching sessions;
3. To induce/elicit timely and optimal output from the learners in the teaching sessions, several self-directed activities, tasks and integrated skills activities are most significant to create a learnable, visual environment for communicative competence;
4. Teacher's explicitly set roles are not limited to showing the movies and implementing the activities in the lesson but they are to be more determining about the objectives to make the most of learning opportunities of FMs in TEFL;
5. Learners' enthusiasm and motivation about learning English becomes more evident when they are provided with well-designed activities and tasks on FMs; besides, the use of FMs may be more stimulating, enjoyable, involving even the low motivated learners from this highly digitalized e-generation.

The research suggested that the movies and accompanying activities/tasks provided not only a fertile source of language input and cross-cultural understanding but aspects of non-verbal communication and paralinguistic skills as well. However, we found several important points such as the teachers' attitude towards feature movie viewing; learners' perception of movies to develop their EFL skills in a non-native setting, and finally the time allocation for viewing, activities and integrated tasks to be implemented. Teachers have an indisputable role in implementing the FMs and for making the movie-based multimedia lesson a rewarding EFL learning experience. The careful implementation of set goals and objectives lies with the teachers as well. Learners' consideration of FMs holds a very important place, because the objectives and integrated activities/tasks should be clearly defined prior to teaching. Besides, the purpose is not to view the movies as passive listeners but it requires the learners' actual participation. The last point is the time limitation and how much time should be allocated for the use of an integrated approach to this visual aid to FLL and whether or not it gets sufficient attention of the learners and help them attain the EFL skills.

Finally, syllabus objectives, set goals, linguistic contribution to EFL learners' output, content of the movies, selection criteria, paralinguistic features received from the movie sessions, students' attainment goals, learner strategies, authentic language and the reflections of certain experiences previously gained are a few of the most important components to improvise this study. The research confirmed that FMs with appropriately designed activities and tasks were not only a valuable resource for the EFL classroom, but they enhanced students' self-motivation, and provided an enjoyable, educational experience for students and teachers alike.

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BRIDGING THE STUDENTS' AND INSTRUCTOR'S EXPERIENCES: EXPLORING INSTRUCTIONAL POTENTIAL OF VIDEOCONFERENCE IN MULTI-CAMPUS UNIVERSITIES

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ABSTRACT
Videoconferencing was often used to distribute live or pre-recorded lectures to students at remote sites. This paper reports a recent study of videoconferencing as a form of technology-enabled learning and teaching in higher education. Videoconferencing was integrated in a blended synchronous approach to teaching remote and face-to-face students in a multi-campus Chinese university. The study focused on first-year engineering students' learning and instructor's teaching experiences, reflecting the instructional potential of videoconferencing. A qualitative approach to examining these experiences was adopted. The findings inform: (1) the instructional potential of videoconference on transforming instructional performance in a blended synchronous virtual environment; and (2) the learning experiences were characterized in a synchronous perceptual differences between the face-to-face and online modalities. The implications of the findings to utlilise the videoconferencing potential in the context of multi-campus university learning and teaching are also discussed.

INTRODUCTION

Videoconference is often used as a tool for multi-campus teaching. The primary objective has been to diminish remote students' isolation and remove geographical distance with greater attention to tool utilisation and economies of scale than to pedagogical development for enrichment of the educational experience (Andrews and Klease 1998; Freeman 1998; Jacobs and Rodgers 1997; Pearson and Jesshope 1998). However, this application was primarily to distribute live or pre-recorded lectures to students at remote sites rather than enrichment of the educational experience.

With the advance of information and communication technology (ICT), blended synchronous learning and teaching (Hastie, Hung, Chen & Kinshuk, 2010) visually and verbally mediated by videoconferencing, is widely promoted in changing higher education landscape. This blended approach was to connect students at multi learning sites different from those blending the technology for subject learning in classroom (e.g., Kirkgöz, 2011). How to connect enrolled students at different remote sites with those in university main campuses for enhancement of educational experiences seems no longer a challenge. It is highly possible to enhance instruction, student communication and learning (Szeto, 2011; Woo, et al., 2008) in multi-campus universities. Various blended synchronous videoconferencing approaches to connecting remote groups of students with those in main campus emerge, forming larger communities of inquiry. In this respect, videoconferencing seems to be used for enriching university learning and teaching (Szeto, in press, 2014; Ebden 2010; Hammond 2009). In fact, its instructional potential in practice is yet to be fully explored (Lawson, Comber, Cage and Cullum-Hanshaw, 2010).

This paper aims to report a study exploring a videoconferencing approach to multi-campus teaching and learning that differs from the previous studies mentioned. Instead of transmitting traditional live or pre-recorded lectures, the study focuses on exploring instructional potential of videoconferencing in a blended synchronous teaching approach to learning engineering drawing for the students located at different sites. There were two research questions to be addressed:

(1) What is the instructional potential of videoconferencing in the blended synchronous learning in a multi-campus Chinese university context?
(2) How can the potential characterize the online/face-to-face students' learning and instructors' teaching in the blended synchronous virtual environment?

TEACHING REMOTE AND FACE-TO-FACE STUDENTS IN HIGHER EDUCATION

Remote and face-to-face students are taught separately and are selfdom engaged in learning synchronously in universities. After reviewing the literature on using videoconferencing in schools, Lawson et al. (2010, p.307) concluded that:

> The utilization of videoconferencing by schools is at a very early stage and yet, the recognition of its potential for educational interaction between remote participants in well established. With the advance of videoconferencing technology, new modes of learning and teaching are developed not only to bridge the two for learning but also build larger learning communities.

According to the review, videoconferencing has been implemented slightly better in universities than in schools. In Whipp and Lorentz's (2009) study, they reported that videoconference was used as a communication tool for exploration of help giving in online teaching and learning. Although Li, Moorman and Dyjur (2010) integrated videoconference in their e-mentoring system to support inquiry-based learning, they seemed to focus on limited features of videoconference as a tool. However, Knipe and Lee's (2002) findings indicated that learning via videoconferencing is not the same as in traditional classrooms due to inappropriate instructional planning. However, different university teachers accounted for various teaching and learning effects.

In contrast, Stephenson, Brown, and Griffin (2008) concluded that although a preference for classroom teaching was evidenced, the participants in their study appreciated the electronic delivery of lecturing via different conferencing devices. Smyth (2005) conceptualised videoconference in instructional planning. She proposed a framework for pedagogic decision making for the integration of videoconferencing media in the curriculum for constructivist-oriented teaching. She further suggested a rubric of engaging students in various types of interaction with sound instructional decisions utilises the full advantages of videoconferencing. Thus, videoconference can be utilised as a tool and also an instructional element to enable instructional planning.

The above review has revealed that instructional potential of videoconferencing is yet to be finalized. The recent development of ICT evidences that videoconference can offer new affordances for learning and teaching on the Internet. Its capability can enhance a sense of simultaneity for remote learners as if learning were taking place in a 'close to face-to-face' virtual environment (Smyth, 2011). By comparing four types of synchronous computer-mediated communication in language teaching, videoconferencing could create 'a sense of natural communication' in collaboratively negotiating meanings in language learning for individual students or remote learning groups (Yamada, 2009). However, its sense of simultaneity for the learners as if learning were taking place in a 'close to face-to-face' virtual environment (Smyth 2011) was pending further exploration. The primary concerns are the instructional potential of videoconferencing and the educational experience derived from the instructional use of videoconferencing.

In summary, instructional potential of videoconferencing needs further exploration in learning and teaching practices. This paper set out to address the two research questions: What potential emerged in the blended synchronous learning and how the potential was characterized in the virtual environment? Thus, a study was initiated to explore the potential of videoconferencing in the blended synchronous approach to teaching two groups of remote and face-to-face engineering students in a multi-campus Chinese university. To explore the potential, this study adopted Garrison, Anderson and Archer's (2000) Community of Inquiry (CoI) as a theoretical lens through which the students as well as of an instructor's experiences were examined.

THE COI FRAMEWORK

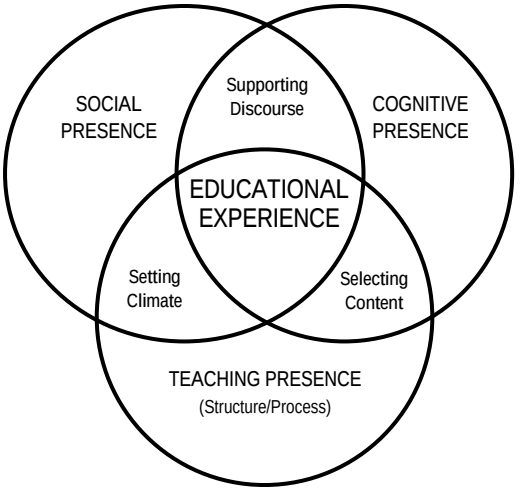

Figure 1: The Community of Inquiry framework.
Source: Garrison *et al.*, (2000) Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2*(2-3)*, p.87-105.

The CoI framework was conceptualized in a range of studies from asynchronous text-based computer-mediated communication (CMC) to synchronous computer conferencing (Rourke, Anderson & Garrison, 1999). The centre of the framework, lying at the intersection of the teaching, social and cognitive presences, is a quality educational experience. This is seeking attainment of educational experiences via deeper levels of meaningful learning in relation to constructivist-oriented instruction (Akyol, Arbaugh, Cleveland-Innes, Garrison, Ice & Richardson, 2009; Akyol & Garrison, 2011). It is posited that teaching, social and cognitive presences are the three important conceptual elements in a community of inquiry, representing three dimensions of characterizing the educational experience. Focusing on the experiences in a community of inquiry, the framework has been widely adopted in various studies of online learning. Figure 1 shows the CoI framework and its three presences. Figure 1 shows the CoI framework.

Teaching presence is interpreted as the instructional design that facilitates education experiences in relation to the other two presences - social presence, that is "the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people through the medium of communication being used" (Garrison et al., 2000, p. 94); and cognitive presence, that is 'participants in any particular configuration of a community of inquiry [being] able to construct meaning through sustained communication' (Garrison et al., 2000, p. 89). Thus, an appropriate blend of teaching, social and cognitive presences in online teaching and learning plays a key role in articulating meaningful educational experience that can contribute to deeper levels of learning (Ke, 2010). Thus, the CoI framework is timely as the theoretical lens adopted in this study.

Indeed, the three presences characterised the blended synchronous learning and teaching experiences. To explore the experiences, the CoI coding template (Garrison, et al., 2000) of the three presences was used as a coding structure for data collection and analysis (See Table 1).

RESEARCH DESIGN

This paper draws from a larger study aiming to investigate synchronous online teaching and learning involving 150 undergraduate students over a 2-year period (Szeto, 2013). This paper reports the first phase of the cross-institutional project in which 28 students participated. A grounded theory approach (Strass & Corbin, 1990) was adopted to explore instructional potential of videoconferencing as the educational experience reflected. By implementing the approach, an instructor synchronously taught a group of face-to-face students on a university campus and a group of online students located at a remote learning site. Due to limited resources, only one remote learning group was set up instead of multiple groups.

A project team was formed with two faculty members from an engineering department (the department) of the multi-campus university and the author from another educational institution in Hong Kong. This team was an interdisciplinary cooperation (Karal, 2010) for the advancement of ICT integration in multi-campus teaching and learning. As a pedagogic synergy in higher education, the team members started the study with a computer-aided engineering drawing course. One of the two faculty members (the instructor) was responsible for the synchronous teaching. To obtain informant consensus, the project team explained to the students the aims, research design and processes of the study. All students (N = 28) accepted to participate in the study. Half of the students were randomly assigned to the online group and the other half were in the face-to-face group.

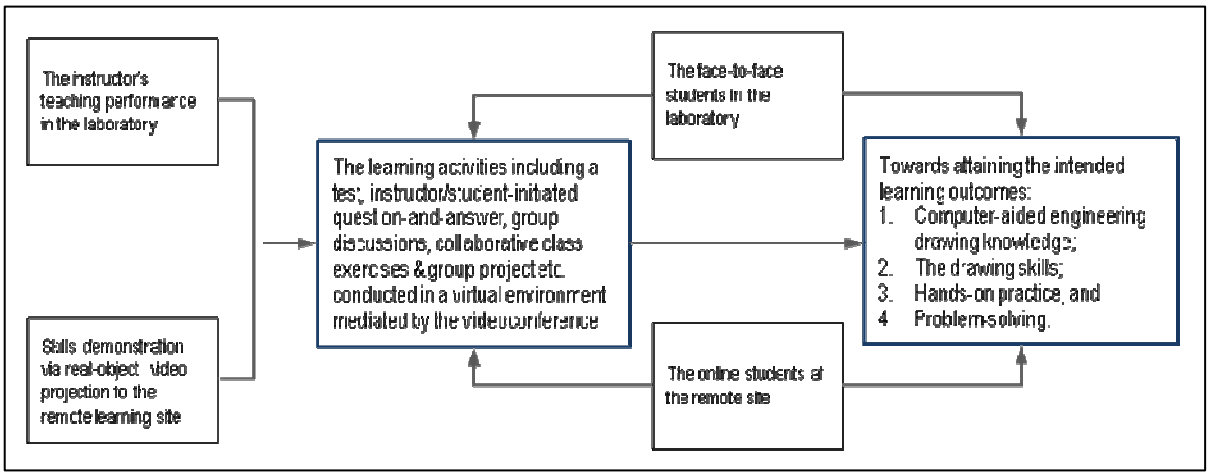

Figure 2: The blended synchronous learning and teaching process.

Twenty-eight first-year engineering students participated in the first phase of a five-phase study. They were divided into two groups, each comprising 14 students. GP1 (n = 14) was taught face-to-face in an engineering laboratory while GP2 (n = 14) synchronously attended the same sessions mediated by the devices at a remote site (a different campus site of the university). The students were required to attend 6 hours per day for 9 days/sessions with a total of 54 hours in an intensive summer engineering drawing course. They also submitted 7 engineering drawings and 1 group project and took a quiz in the fifth session for formative assessment.

Internet-based, multi-point videoconferencing, real-object projection and real-time communication synchronously accessible to the GP2 students were integrated in the campus networked learning environment. Figure 2 shows the blended synchronous instruction mediated by videoconference.

The instructor synchronously taught the two groups and facilitated the blended learning activities in the Internet-based videoconference learning environment where the two groups of students could see and talk to each other as if in a virtual "face-to-face" environment.

DATA COLLECTION AND ANALYSIS

This study collected and analysed data in the notions of grounded theory (Strass & Corbin, 1990). By implementing this approach, the aim was "to gain deeper understandings of the lived experience of learners [and instructors]" (Bianco & Carr-Chellman, 2007, p.303). It was appropriate to capture the data as it emerged during the blended synchronous learning. Data were collected over the entire course including class observation, video recording, teaching reflection, semi-structured interviews and an end-of-course group sharing.

The blended synchronous processes were captured on video tapes in a 4-in-1 recording format, while two researchers observed the sessions, one in the laboratory and one at the remote site, respectively (Szeto, 2013). Figure 3 shows a snapshot of the adapted blended synchronous learning and teaching:

Figure 3: A snapshot of the blended synchronous learning and teaching.

Two to three students were randomly invited from the two groups for a semi-structured interview about their experiences immediately after each session. The instructor also wrote reflective journals on his teaching. At the end of the last session, 5 online and 4 face-to-face students and the instructor accepted the invitation to take part in a focus group sharing of their experiences. The interviews and sharing were recorded in a digital audio device for verbatim transcription.

To conform with Strauss and Corbin's (1990) notions of grounded theory, a coding template was recommended. This study adapted the CoI coding template (Garrison, et al., 2000) as a preconceived coding structure for data analysis. All coded data were compared for emergent meanings of the students and instructor's experiences. This analysis was completed with the use of a computer-aided qualitative data analysis software package, NVivo. Table 1 shows the coding structure with sample quotes.

Table 1: The coding structure with sample quotes in a hierarchy.

Codes	Categories	Sample quotes
Teaching presence	■ Instructional management ■ Building understanding ■ Direct instruction	I found the demonstration was enjoyable (The instructor). I explained the topic exceptionally clearly to the students (GP1).
Social presence	■ Emotional expression ■ Open communication ■ Group cohesion	The instructor spent longer facilitating us in the question and answer session than the other group (GP2). The students required additional stimulation of group communication (The instructor).
Cognitive presence	■ Triggering events ■ Exploration ■ Integration ■ Resolution	We experienced short transactional interactions with GP1 for the in-class activities (GP2).

Adapted from Garrison *et al.*, (2000) Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2*(2-3)*, p.87-105.

Then, the reliability of the analysis was enhanced through a cross-checking, comparing and auditing process by another qualitative researcher in the study. This cross-checking process established the internal validity of the data analysis (Bush, 2002).

FINDINGS

The findings of qualitative data analysis revealed the videoconferencing potential through the GP1 and GP2 students' learning and the instructor's teaching experiences. Tables 2 to 4 compare the students and instructor's experiences by the individual CoI presence attributes.

Table 2 shows a quick comparison of the experiences by the teaching presences with the bold text as key themes emerged in the data.

Table 2: Comparison of the student and instructor's experiences in the teaching presence

GP1's learning experience	GP2's learning experience	The instructor's teaching experience
- The presentation was very **detailed** and at a **steady pace**. - Deliberately **slowed down** teaching pace. - This was **extraordinary** compared with what they had experienced in normal class teaching. - The topic was **exceptionally clear.** - **Overdone repetition** might make the teaching a bit unnatural.	- A **positive perception** of the blended synchronous teaching. - Teaching was very **comprehensive**. - Demonstration was **really good** because the **skill processes** were **enlarged** on a big screen. - Deliberately-repeated steps for skills demonstration **enhanced clarity.** - The synchronous teaching approach seemed **better than face-to-face.**	- **Different attention** was paid to the GP2 students - GP1 seemed to be a **'control group'** in an experiment. - **Encouraged** questions and **detected** the **students' understandings** of the content. - GP2 could fully grasp the content while GP1 did **not** feel **bored**. - Teaching **pace** was adjusted for **clarity**. - **Repetition** was more important to GP2. - Experienced the **pedagogical difference and challenges.** - Teaching was **enjoyable** in this mode.

GP1: The face-to-face group; GP2: The online group

The table reflected the instructor's teaching performance in this study. His strategy was in a mix of teacher-facilitated individual learning in the beginning that was gradually transformed into collaborative constructive learning at the end. With the lecturing, demonstration and group activity methods, clarity of conveying the content to the students in terms of "detailed", "steady/slow teaching pace" and "extraordinary" was enhanced. Although the different amount of attention given to GP1 and GP2 was noticeable, the two groups of students complimented the teaching as being 'comprehensive'. The instructor synchronously experienced both pedagogic challenges and enjoyment in the process. Table 3 shows the comparison in the social presence

attributes.

Table 3: Comparison of the student and instructor's experiences in the social presence

GP1's learning experience	GP2's learning experience	The instructor's teaching experience
- The instructor spent **longer** facilitating GP2 in the Q & A sessions. - Seemed to be **neglected** by the instructor. - **Interested** in **meeting** other students located at the remote site - Interaction with GP2 **was difficult** because the students were not **physically present**. - **Screen projection** of GP2 students enhanced a sense of **connected learning communities** at large. - Audio transmission was rough and unstable.	- Received too much attention as if they were under **the spotlight**. - **Multi-screen projections** of the instructor's teaching and Gp1 students created **a "real" sense** of attending **'face-to-face'** teaching. - Experienced **short transactional interactions** with GP1 for cross-group activities. - **Cooperative tasks** with GP1 were **indirect** in the environment. - Transmission was occasionally interrupted and the system was restarted.	- Ensured that his '**teaching performance**' were as **real** as possible on the screen. - Pushed **so hard** to facilitate **inter-group communication** - Adjusted his **language use**. - Facial expressions and other **social cues** were used **directly** and **explicitly**. - Used **hand gestures** for the GP2 students to facilitate their responses.

GP1 = The face-to-face group; GP2 = The online group

The comparison shows that the instructor's teaching performance via videoconferencing characterised social presence as 'real' and 'face-to-face' with direct and explicit language used in the facilitation of inter-group activities. Hand gestures and social cues also enhanced student communication. Although GP1 found it interesting to virtually meet the GP2 students, they felt neglected because the instructor spent too long with GP2 in some question-and-answer sessions. On the contrary, the GP2 students felt that they were placed under a spotlight in the social presence. The two groups of students appreciated the multi-screen projection of the instructor and themselves that enhanced a 'real' sense of 'face-to-face' communication. Paradoxically, they realised that interacting with the other students was indirect and found it difficult to do cooperative tasks in the virtual environment although it seemed 'real'. GP1 also agreed with GP2 that a sense of being connected with other learning communities synchronously enriched their experience during the face-to-face learning. It is likely that the participants performing as 'real' as possible in the environment can enhance social presence. Table 4 shows the comparison in the cognitive presence attributes.

Table 4: Comparison of the student and instructor's experiences in the cognitive presence

GP1's learning experience	GP2's learning experience	The instructor's teaching experience
- Engineering **knowledge** and computer-aided drawing **skills** were **gained** in these activities. - The technology should be **reliable** and there should be **zero** technical **problems to achieve the** expected learning **outcomes**. - **Responses** to the instructor's or GP2 students' **questions** could encourage **knowledge sharing.**	- **Satisfactory learning** together with GP1 in **groups** was facilitated in a **virtual 'face-to-face' learning environment**. - Engineering **knowledge** and drawing **skills** were familiarized more **quickly.** - Assignments could be completed more **easily**. - Lacked **live practice** of the knowledge learned **together** with the instructor.	- The students were **spontaneous** when engaging in **group learning activities**. - They might be **disengaged** sometimes. - The assignment and quiz results did **not** show **remarkable difference** between the GP2 and GP1 students. - Additional **stimulation** of **group communicative interactions** was required.

GP1 = The face-to-face group; GP2 = The online group

The comparison shows that the GP1 and GP2 students could gain the engineering knowledge and skills quickly and achieve similar results for the group assignments. GP1 agreed that discussing with the instructor and the GP2 students could encourage knowledge sharing, provided that there were no technical problems. The instructor observed that the two groups of students spontaneously participated in group learning activities although some seemed to be disengaged. Additional efforts, however, were required to foster group communicative interactions in the instructional process.

DISCUSSION

In the context of multi-campus universities, transmission of traditional or pre-recorded lectures in synchronous/asynchronous modes (Andrews and Klease 1998; Freeman 1998; Woo et al. 2008) has been taken for granted as the main videoconferencing feature. However, the findings reported in this paper have evidenced the instructional potential of videoconferencing which is different from direct transmission of recorded lectures. Synchronously connecting face-to-face on-campus students with remote students in different campuses enriches the overall learning experience. Learning seems to be much richer than in either face-to-face teaching or the online learning mode (see Tables 2 to 4), when educational experience is the centre of the instructional process (see Figures 1). The implication is that synchronously and visually/verbally connecting students located at different campuses can possibly build a scalable and flexible virtual 'face-to-face' learning community of inquiry mediated by videoconference. The instructional potential of videoconference is reflected in the learning and teaching experiences captured in the blended synchronous virtual community of inquiry.

TRANSFORMATION OF TEACHING PERFORMANCE IN THE BLENDED SYNCHRONOUS LEARNING

The instructor's teaching performance has reinforced teaching presence in the blended synchronous instructional process. He reflected a fruitful synchronous teaching journey because his pedagogy was transformed. 'I taught in a traditional face-to-face classroom before. It was about passing information to the students with different teaching aids. Now, the teaching format has changed, and so has my strategy' (extract from the instructor's reflection). This transformation possibly occurred in the shift from teacher-centred to student-centred teaching through sound instructional planning (e.g. Smyth 2005). By synchronously blending face-to-face and remote scenarios, the instructor was situated in a better position instead of a challenging situation to transform towards sensible performance in the CoI framework. In fact, multiple roles of teaching, facilitating, moderating and supporting in between face-to-face and visually/verbally connected virtual situations mediated by videoconferencing are required.

BLENDED SYNCHRONOUS EXPERIENCES IN THE PERCEPTUAL DIFFERENCE BETWEEN FACE-TO-FACE AND ONLINE SITUATIONS

Due to the synchronous approach, online learning tasks such as discussions and collaborative projects between the face-to-face and remote students occurred in a visually/verbally connected virtual learning community, while face-to-face communication could synchronously take place within each group at different campuses. Consequently, the students were unintentionally situated in a synchronous dual communicative situation (i.e. communication synchronously takes place in face-to-face & online situations) and their performance in the tasks was possibly differently affected. The two groups of students rated their experience below the mid-point of the Likert scale. In contrast, Li, Moorman and Dyjur (2010) concluded that their e-mentoring model via videoconference could engage students in guided inquiry with carful system design.

The scholars' studies were different from the students and instructor of this study who were engaged in the synchronous communicative situation. The learning experiences were diverse. One student commented that 'We were not used to discussing with others through a screen and a microphone with a voice level louder than normal talking' (group sharing extract/GP2/S3). They experienced a sense of indirectness in working on the tasks in the situations. In fact, the cross-group interactions between GP1 and GP2 for cooperative activities were transactional and short. The students could not get away from a perceptual preference for a face-to-face situation although they had already adapted to the virtual learning in the engineering drawing course.

IMPLICATIONS OF BLENDED SYNCHRONOUS VIDEOCONFERENCE-BASED LEARNING FOR MULTI-CAMPUS UNIVERSITIES

The interdisciplinary cooperation between the engineering and education experts (e.g., Karal, 2010) has created a solid pedagogic synergy for the advancement of using videoconferencing for blended synchronous learning on the Internet. The videoconferencing potential was exploited in the study. As Smyth (2005) suggested, videoconference is important to instructors because it could be an instructional planning tool. By examining the students' learning and instructor's teaching experience, videoconference is an instructional tool for both students and instructors by enhancing the teaching, social and cognitive presences. The learning and teaching experiences of this study characterise the instructional potential of videoconference multi-campus universities can take into consideration in developing new instructional approaches:

(1) Instructors need time for adaptation to the instructional transformation;
(2) The synchronous perceptual difference between online and face-to-face situations may hinder students' participation in the virtual environment;
(3) The synchronous difference may affect students' cross-group communication;

(4) Training requires for both students and instructors; and
(5) Connection of online/face-to-face students and instructor in a blended synchronous community of inquiry is feasible, if universities provide extra support in terms of the three CoI presences.

CONCLUSIONS

This paper is valuable in that it explores the instructional potential of videoconference through the students' learning and instructor's teaching experiences in blended synchronous learning. It is admitted that the technical barriers, pedagogical constraints and ICT competencies at the time the previous studies were conducted were much different from what is now available.

One GP1 student highlighted that 'This [teaching] is extraordinary [compared with] what we have experienced in normal classroom teaching' while the GP2 students complimented the teaching with the comment that 'This blended synchronous videoconferencing approach to learning and teaching seemed better than the face-to-face teaching in the classroom'. These compliments are different from the finding of Knipe and Lee's (2002) study that the local students obtained more review, information and explanation from the lectures and skill practices than the external students.

The instructional potential of videoconferencing has evidenced in enriched and extended learning and teaching experiences, whereby not only face-to-face and online students but also the instructor are transformed. This paper only reflects the findings of the potential derived from the study in a multi-campus Chinese university. There is no intention to generalize the results due to institutional differences in learning and teaching.

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DIGITAL CITIZENSHIP

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ABSTRACT
Era in which we live is known and referred as digital age.In this age technology is rapidly changed and developed. In light of these technological advances in 21th century, schools have the responsibility of training "digital citizen" as well as a good citizen. Digital citizens must have extensive skills, knowledge, Internet and technology access and schools must guide the students to be a digital citizens. Ribble and Bailey (2007) described the digital citizens features in schools that need to have in nine touchpoints. Based on these points, this research is aimed to develop a scale about digital citizenship.
Keywords: digital age, digital citizen, digital citizenship

INTRODUCTION

Strongly expanded information and communication technology (ICT) has changed life, people and era. Anymore, ICT has become the sine qua non of our lives. Upon this change, using digital tools is increased, primary requirement for individuals is being to use ICT effectively not only for entertainment but also searching for and sharing information, communication, access, law and consumption.

The changing era with ICT has led to the exchange the characteristics of individuals and upon this the characteristics of the community. Digital era that digital tools are widely used is endeavoring to create digital citizens from the digital society. Schuler(2002) defined digital citizens as "the characteristic of a genuine digital city". Digital citizen is generally identified as "those who use the Internet regularly and effectively" (Mossberger, Tolbert & McNeal, 2011).

Digital citizen must have some characteristics such as understand human, cultural, and societal issues related to technology and practice legal and ethical behavior; advocate and practice safe, legal, and responsible use of information and technology; exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity; demonstrate personal responsibility for lifelong learning; and exhibit leadership for digital citizenship (Ribble, 2008). A Common Sense Media White Paper(2011) explained that digital citizenship means the ability to use technology competently; interpret and understand digital content and assess its credibility; create, research, and communicate with appropriate tools; think critically about the ethical opportunities and challenges of the digital world; make safe, responsible, respectful choices online To understand the characteristics of digital citizens and digital citizenship clearly, based on previous works (Ribble, Bailey & Ross, 2004, Ribble & Bailey, 2004a, Ribble & Bailey, 2004b, Ribble & Bailey, 2004c, Ribble & Bailey, 2005), Ribble & Bailey(2007) described nine areas of behavior that digital citizenship must have: access, commerce, communication, literacy, etiquette, law, rights and responsibilities, health and wellness, security(self-protection).

Digital citizenship goals for the 21st century are educate, empower and protect (Common Sense Media White Paper, 2011). Ribble & Bailey(2007) explained these three as respect(etiquette, access, law), educate(communication, literacy, commerce) and protect(rights and responsibility, safety/security, health and welfare).

Being digital citizen is more important thing in nowadays. Therefore in education there are some key features to make the students digital citizens for looking at the 21st century digital citizenship goals. These key factors are student learning and academic performance, student environment and student behavior, student life outside the school environment. Ribble & Bailey(2007) sorted the nine areas of behavior for making up digital citizenship under these three keys.

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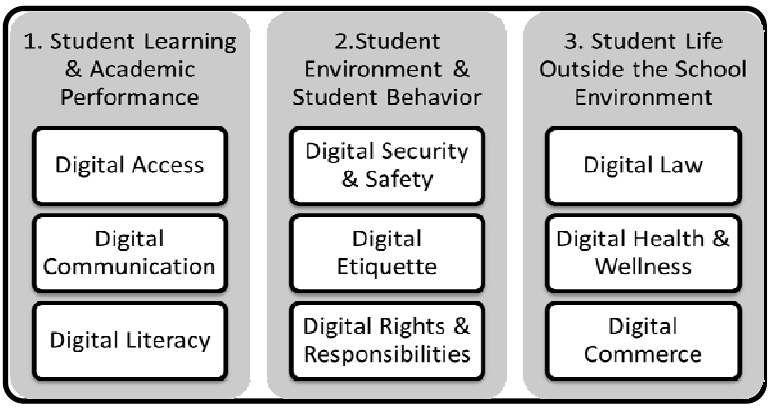

Fig. 1. Digital Citizenship Touchpoints (Ribble & Bailey, 2007)

Student Learning & Academic Performance
1- Digital Access: full electronic participation in society.
2- Digital Communication: electronic exchange of information.
3- Digital Literacy: process of teaching and learning about technology and the use of technology.

Student Environment & Student Behavior
4- Digital Security (self-protection): electronic precautions to guarantee safety.
5-Digital Etiquette: electronic standards of conduct or procedure.
6- Digital Rights & Responsibilities: those freedoms extended to everyone in a digital world.

Student Life Outside the School Environment
7- Digital Law: electronic responsibility for actions and deeds
8- Digital Health & Wellness: physical and psychological well-being in a digital technology world.
9- Digital Commerce: electronic buying and selling of goods.

This era which people must have digital citizenship features, education and students are important for doing this. Hence the aim of the research is to develop a scale about digital citizenship based on Ribble & Bailey(2007)' s digital citizenship nine touchpoints for analyzing students.

METHOD

Population

The population of this study constitute of students of the Faculty of Education of Sakarya University in the 2012-2013 academic year. The population consists of a total of 4395 students. Participation in the study was on a voluntary basis. Convenience sampling method was used in the study. Totally 229 students from the undergraduate program in Elementary Teaching, Pre-school Teaching, Turkish Teaching, Religion and Ethics Education filled out the questionnaires.

Data Gathering Tool

Developing a scale is the aim of this study. For developing the Digital Citizenship Scale (DCS), first literature was reviewed and item pool was created based on Ribble & Bailey(2007)' s digital citizenship nine touchpoints. Four experts evaluated these items and accordance with the experts' recommendations, the scale was created as 34 items. This scale was applied to the participants and reliability and validity analyses were performed.

The 34-item scale was developed as five-point Likert-type scale. The students answered the items by selecting one of the "Strongly Agree", "Agree", "Neutral", "Disagree", "Strongly Disagree" options.

Data Analysis

SPSS 21 statistical software was used for performing construct validity and reliability analyses. For analyzing construct validity, exploratory factor analysis was used. Nine factors were found in the exploratory factor analysis. Moreover internal consistency coefficients were used for examining the reliability of the scale. After validity and reliability analysis the scale has 33 items.

FINDINGS

Validity

For analyzing construct validity of DCS, exploratory factor analysis was used. Stevens(1996) explained "the purpose of exploratory factor analysis is to identify the factor structure or model for a set of variables.". According to this purpose, first, Kaiser-Mayer-Olkin (KMO) coefficient and Bartlett sphericity test were used for analyzing suitability of the data for factor analysis by exploratory factor analysis (EFA). KMO coefficient gives the information about the suitability of the the data matrix for the factor analysis, the suitability of the data structure for factor extraction and this coefficient is expected to be higher than .60 (Büyüköztürk, 2007). In the analysis the KMO value for the DCS was found .75. Also the Bartlett test determines the relationship between the variables on the basis of partial correlations, and the calculated chi-square statistic is expected to be significant (Büyüköztürk, 2007). The calculated chi square statistic was $\chi 2 = 3336, 213$, p. =.000 in the Bartlett sphericity test. KMO coefficient and Bartlett sphericity test indicate that the collected data are suitable for the factor analysis.

Firstly, items are categorized under nine factors with eigenvalues over 1 and the communalities of the items varied between .541 and .907 in the results of exploratory factor analysis (EFA).

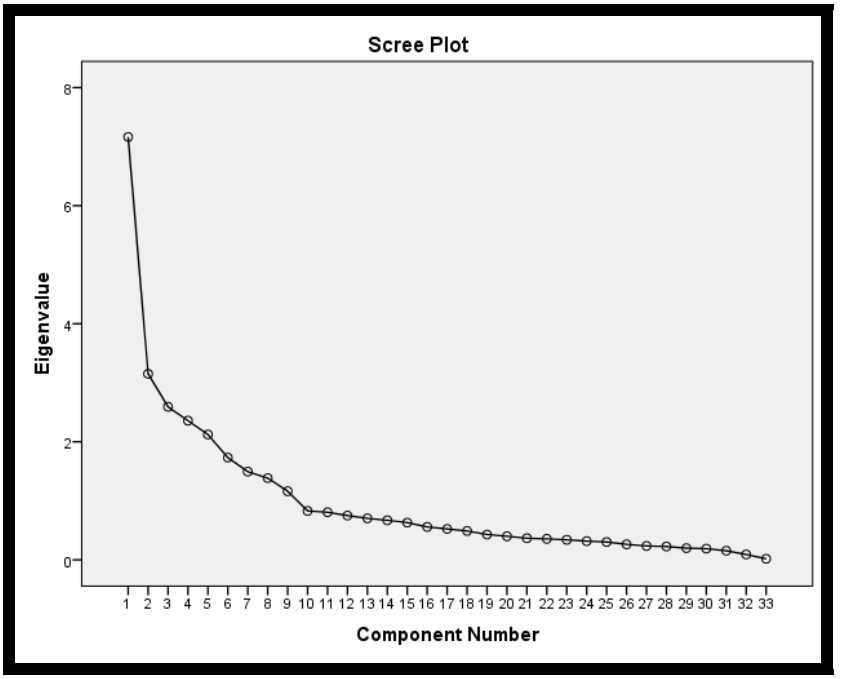

Fig. 2. Scree Plot

As a result of the EFA, scree plot showed that the scale has nine factors. Eigenvalue of the factors and the total variance explained supported this structure.

Table 1. Eigenvalue of the factors and the explained variance

Factors		Items	Eigenvalue	% of Variance
Factor 1	Digital Literacy	8,9,10,11,12,13	7.163	21.707
Factor 2	Digital Law	25,26,27,28	3.151	9.548
Factor 3	Digital Rights & Responsibilities	21,22,23,24	2.593	7.856
Factor 4	Digital Communication	1,2,3,4	2.357	7.142
Factor 5	Digital Security	14,15,16	2.123	6.432
Factor 6	Digital Commerce	32,33,34	1.732	5.247
Factor 7	Digital Access	5,6,7	1.494	4.527
Factor 8	Digital Etiquette	17,18,20	1.384	4.195
Factor 9	Digital Health & Wellness	29,30,31	1.163	3.523

Eigenvalue of the first factor is 7.163, eigenvalue of the second factor is 3.151, eigenvalue of the third factor is 2.593, eigenvalue of the fourth factor is 2.357, eigenvalue of the fifth factor is 2.123, eigenvalue of the sixth

factor is 1.732, eigenvalue of the seventh factor is 1.494, eigenvalue of the eighth factor is 1.384, eigenvalue of the ninth factor is 1.163. Moreover the first factor explains 21.707% of the total variance, the second factor explains 9.548% of the total variance, the third factor explains 7.856% of the total variance, the fourth factor explains 7.142% of the total variance, the fifth factor explains 6.432% of the total variance, the sixth factor explains 5.247% of the total variance, the seventh factor explains 4.527% of the total variance, the eighth factor explains 4.195% of the total variance and the ninth factor explains 3.523% of the total variance. The total explained variance of the scsle is 70.178%.

Second, varimax rotation technique was used in order to facilitate the disclosure of important factors. Item 19 was removed from the scale because item's factor loading showed that it was also under the two factors. The factor loadings are between the lowest .558 and the highest .889. The total explained variance values of the scale and factor loadings show that the scale is successful in explaining digital citizenship.

Table 2. Results of the exploratory factor analysis

Item	Communalities	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
i13	,703	,731								,306
i9	,577	,667								
i8	,556	,603								
i12	,534	,587								
i11	,545	,559								
i10	,527	,558								
i27	,786		,868							
i26	,750		,823							
i28	,630		,773							
i25	,656		,701	,335						
i22	,810			,795						
i21	,659			,761						
i24	,647			,740						
i23	,688		,366	,653						
i2	,751				,849					
i1	,600				,749					
i4	,567				,674					
i3	,667	,346			,636					
i16	,885					,897				
i14	,839					,885				
i15	,634					,770				
i32	,812						,880			
i34	,715						,828			
i33	,728						,820			
i5	,908							,852		
i6	,896							,843		
i7	,694							,665		
i18	,771								,853	
i17	,695								,760	
i20	,659								,736	
i31	,794									,856
i30	,738									,739
i29	,693									,738

*Loadings are values above .30.

RELIABILITY

For the reliability of the DCS, Cronbach's Alpha internal consistency coefficient was calculated. As a result of the analysis, the Cronbach's Alpha value of the scale is .85. According to the factors, the Cronbach's Alpha value of the Factor 1 is .78, the Cronbach's Alpha value of the Factor 2 is .84, the Cronbach's Alpha value of the Factor 3 is .80, the Cronbach's Alpha value of the Factor 4 is .79, the Cronbach's Alpha value of the Factor 5 is .85, the Cronbach's Alpha value of the Factor 6 is .84, the Cronbach's Alpha value of the Factor 7 is .90, the Cronbach's Alpha value of the Factor 8 is .70 and the Cronbach's Alpha value of the Factor 9 is .70. The .70 or

higher calculated reliability coefficient for psychological scales is considered sufficient in terms of the reliability of the scale (Büyüköztürk, 2007). Thus, the Digital Citizenship Scale and its factors developed have a high reliability level. This finding indicates that the scale is able to distinguish between students' digital citizenship or not.

CONCLUSION

In this study, a scale was developed to measure the digital citizenship levels of students of a faculty of education. First, item pool was created after reviewing the literature and receiving expert opinion. Then the 34-item scale was applied to students of the Faculty of Education of Sakarya University in the 2012-2013 academic year. Reliability and validity analyses were conducted on the data collected from 229 students from the undergraduate program in Elementary Teaching, Pre-school Teaching, Turkish Teaching, Religion and Ethics Education.

For examining validity of DCS, exploratory factor analysis was used. The EFA showed that all the items had high factor loadings and items are categorized under nine factors. The nine factors in the DCS explained 70.178% of the total variance. The total variance explained and the factor loadings show that the scale is successful in capturing digital citizenship level. Thus, it can be safely argued that the scale provides a valid measure of digital citizenship.

To examine the reliability of the scale, the Cronbach's Alpha value was calculated. The value calculated was high (.85), which showed that the scale has high reliability.

In conclusion, the reliability and validity analyses conducted show that the DCS developed is an effective measurement tool that can be used to study about digital citizenship. The scale can be used in future studies.

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EFFECT OF BLENDED LEARNING ENVIRONMENT MODEL ON HIGH SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT

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ABSTRACT
This study analyzes the students' academic performance by comparing the blended learning environment and traditional learning environment. It has been observed whether there is a significant difference between the academic achievement grade dispersions and the male-female students' grades. The study has been carried out in Diyarbakir Anatolian High School in 2010-2011 academic year first semester biology courses. For the study, two quantitive courses sections have been selected among the classes formed by secondary school senior students. Cluster analysis has been conducted to provide the objectivity when forming the experiment and control groups. The study has been conducted with 54 participants, 19 males and 8 females for the experiment group and 18 males and 9 females for the control group. The experiment group continued its education in blended learning environment and the control group continued its education in traditional learning environment. The created learning environments have focused the genetics topic of the biology course and lasted for 6 weeks. During the study, pre-test and final-test have been used for the academic achievement analysis. According to the results acquired at the end of the study, a significant difference hasn't been found between the two groups at the end of the pre-test applied to experiment and control groups. Besides, in accordance with the averages of the final test grades, the experiment group has been found more successful than the control group. In both of the learning environments, female students have turned out to be more successful than the male students.
Keywords: Blended learning, Online learning, Face to face learning, Academic achievement

INTRODUCTİON

In our age in which technology has been advancing, and information has been rapidly increasing and refreshing, the importance of the education has been growing accordingly. While the developments observed in science and technology in the 21st century have expanded the duties and responsibilitis of the education system, they have also brought new opportunities. The fact that our world has been turning into an information-based world ,the value of information increases; the acquisition of information in the right place and at the right time is of vital importance for individuals and society. Rapid and easy access to the wide dissemination of information has resulted in information access technology developments that will provide the circulation of this information (Kartal, 2000; Şahan, 2005). Educational technology holds a very important place for the implementation of the theories produced by educational sciences and the improvement of these implementations (Lim & Morris, 2009; Şimşek & et al., 2009; Peşman & Özdemir, 2012).

One of the innovations of technology is the Internet. The 'Internet' is formed by conjoining two words that imply an international network: Inter (**Inter**national) and Net (**Net**work) (İşman, 2003). The educational system has also benefited from the advantages brought by the Internet. The Internet, which offers learners access to information and the opportunity of written, audio and video communication, has entered into a very rapid development process all over the world. This has caused Internet-based education to expand rapidly (Symonds, 2003; Odabaşı & et al., 2005).

New Internet-based education techniques have removed traditional place and time obstacles and have provided students access to information whenever and wherever they want (Yiğit & Özden, 1999). That the learner can access the information without being dependent on time and place has made the Internet an indispensable part of the education.

Courses offered using the Internet can be considered a form of enriched education, and this includes Web-based online courses, blended courses, and other kinds of Internet-supplemented courses (Kaya, 2002).

Şahan (2005) states that Web-based education is a new education model which can be used to support the acquisition of new information skills and for the enrichment of students' learning habits and experiences. Many education techniques such as presentations, discussions, demonstration, answer-question, brainstorming, case studies, information hunt, cooperative learning, problem centered learning can be conducted in a Web-based environment. This way, it is possible for the learners to gain experiences such as reading, writing, observing, listening, and performing tasks (Şimşek, 2002). However, online learning is deprived of many advantages that

traditional learning embodies (Korkmaz & Karakuş, 2009). The biggest deficiency of these new approaches is that they cannot provide the students with social and face-to-face interaction opportunities with other learners and with the instructor.

On the other hand, Laurillard (2002) has stated that technological tools should be used to a certain extent in order for learning and teaching to be more effective. However, he also emphasizes that information and technology tools along with multimedia tools cannot guarantee complete success of teaching and learning.

WHAT IS BLENDED LEARNING?

A stronger learning environment has emerged with combining the strongest aspects of the two available approaches to remove the deficiencies of traditional learning and Web-based learning. This new learning approach is blended learning. In international literature it is also referred as hybrid learning and mixed learning and it is used in very different ways by many researchers. Graham (2006) defines the blended learning as "the combining of the two different education models, traditional face to face learning and distance learning". Blended learning can also be defined as integrating face to face learning and electronic learning or distance learning, using difference learning theories, methodologies and techniques in the same place and supporting the learning with various online technologies during the learning process in the classroom (Rossett, 2002; Discroll, 2002; Singh, 2003). Throne (2003), on the other hand, defines the blended learning as "an education model which can integrate e-learning which has improved in parallel with new and technologic developments with traditional learning which provides the interaction in classroom". Wilson & Smilanich (2005) see the blended learning as "the implementation of the most effective learning solutions in a coordinated way to achieve the desired learning targets". While Horton (2000) defines it as "combining some strong and advantageous aspects of online learning and the learning in classroom" and Morgan (2002) explains that blended learning is conducted to blend the best aspects of online learning and face to face learning.

Blended learning is a new type of education prepared for a certain group by combining the positive aspects of different learning approaches. Blended learning will provide a big convenience for the course to achieve its target by combining the face to face interaction in traditional learning and time, place and material richness provided by Web-based learning. Yılmaz & Orhan (2010) state that the best way to solve the lack of interaction problem faced in technology-based learning is to blend traditional learning and online learning. Throne (2003) emphasizes that the blending of these two learning approaches occurs by combining CD ROM, e-mail, conference, online animation, audio message, multimedia technology and real classroom environment and he states that it should be presented to the student with traditional classroom management and face to face learning. From this point of view, Blended learning can be a good solution by offering different learning environments to the students who have individual differences as well as approaches to learning.

Besides, blended learning is a learning approach formed with the combination of the different learning environments and activity types for a certain group with the addition of electronic sources to the face to face learning (Bersin, 2004). This approach has the facilities to meet the necessities of our time. The fact that it is applicable and renewable, and it has the technological innovations that are brought by our modern age stands as a proof approach which is worthy of research.

In line with the arguments provided so far, the purpose of this study is to assess the level of success that the students of secondary school will acquire in blended learning environment in biology course. The study aims to compare two learning environments on the basis of the academic achievement grades of the students in blended learning environment and traditional face to face learning environment, and it aims to assess the effectiveness of blended learning environment in biology course and to observe the effectiveness of two learning environments on genders.

That the traditional learning is ineffective in terms of learners' participation and interaction, it is filled into a limited time period and that the distance learning limits the interaction between the learners have caused the emergence of this new learning environment. It is thought that blended learning, which has been tried in many universities and has given positive results, may remove similar problems experienced in primary and secondary schools, too. This study has been planned with the expectation that the opportunities presented by blended learning may be used in secondary schools. To observe the effect of blended learning environment on gender which is also prepared for this research is another reason to make this research.

The research questions of this study were formulated as follows:

- To reveal whether there is a significant difference in learning between blended and face to face instruction.
- Whether there is a significant difference between the academic achievement averages of male-female students.

The criteria for the selection of experiment and control groups are sufficiently objective. The multi choice test used in the study is reliable.

RESEARCH METHODOLOGY

During the research, brainstorming known as student centered learning methods with Web based learning environment, research-study learning method, question answer technique and preparation of a blog page to provide for distance learning have been used. The research tries to determine the effect of blended learning environment on the performance of the students of secondary education 12th grade quantitive courses in their biology courses.

In the research conducted in the blended learning environment, the independent variable is the academic performance level of the students of secondary education quantitive courses 12/B section is the dependent variable. Therefore, the research has been conducted on an experimental model. With the experimental method, it has been tried to find out how and to what extent the independent variable influences the dependent variable. An experiment group and a control group have been formed to implement the experimental method. The groups are as follows;

Experiment Group: The students of the class 12/B studying in a class where blended learning environment has been provided.
Control Group: The students of the class 12/C studying in a class where traditional learning environment is offered.

Furthermore, tests used as pre-tests and final tests have been applied to those groups at the beginning and at the end of the experimental study to assess their academic performance. The dispersion of the students' academic performance, which is the dependent variable, on gender has also been studied in this research.

The pattern of the research model with pre-test and final test control group is as follows:

Table 1. Experimental design

	Pre-Test	**Application**	**Final Test**
Traditional Learning Environment	The pre-test conducted for the traditional learning environment		The final test conducted for the traditional learning environment
Blended Learning Environment	The pre-test conducted for the blended learning environment		The final test conducted for the blended learning environment

Participants

The study has been carried on two classes of 2010 - 2011 academic year fall term quantitive courses 12th grader students of Diyarbakir Anatolian High School, Diyarbakir. The two classes to whom the experiment has been applied to consist of 54 students in total. Both of the classes have the same number of students and this is 27. For the determination of the experimental group and control group from these two classes, the students' overall achievement grades of 10th grade, overall achievement of 11th grade, biology course achievement of 11th grade and the pre-test result that the students acquired have been used. 12/B, which has 19 male and 8 female students, has been chosen as the experiment group and 12/C, which has 18 male and 9 female students, has been chosen as the control group.

Of the two groups students who joined in the study, general grade point is average of 10th class-students and general grade point is average of 11th class-students in biology course and grade points they gained in pre-test questions are compared. Values gained after comparison are considered acceptable for objectivity in forming experiment and control groups. The data have been formed via Cluster Analysis technique, and they have been evaluated with the statistics program SPSS 16.0 for Windows.

10th grade overall achievement grades of the control and the experiment group students have been compared by means of independents samples test. The data acquired are as follows:

Table 2. T- test results on 10th grade overall achievement grades of control and experiment groups

Groups	N	Mean	SD	Levene test		t	p
				F	p		
Experiment	28	78.90	8.89	0.04	0.843	0.476	0.63
Control	30	77.83	8.19				
Total	58						

10th grade overall achievement grades of the control and the experiment group students have been compared by means of independent samples test, and the data acquired are demonstrated in the table above. According to the findings acquired with the help of the table above, it has been found out that there isn't a statistically significant difference between the 10th grade overall achievement grades of the control group students and the experiment group students. According to this finding, it can be said that the groups have been assigned objectively according to their 10th grade overall achievement grades.11th grade overall achievement grade average of experiment and control group students have been compared by means of independent samples test. The data acquired are as shown in Table 3 below:

Table 3. T-test results on 11th grade overall achievement grade average of experiment and control groups

Groups	N	Mean	SD	Levene test		t	p
				F	p		
Experiment	28	79.94	8.97	0.210	0.648	1.272	0.209
Control	30	77.01	8.58				
Total	58						

Based on the result of the independent samples test of 11th grade overall achievement grade average of the groups it has been found out that there isn't a significant difference between the groups. According to the data acquired, it can be said that the groups have been assigned objectively according to their 11th grade overall achievement grades.

11th grade biology course achievement grades of experiment and control group students have been compared by means of independent samples test. The data acquired are as shown in Table 4 below:

Table 4. T-test results on 11th grade biology course achievement grade averages of experiment and control groups

Groups	N	Mean	SD	Levene test		t	p
				F	p		
Experiment	28	72.71	11.85	1.102	0.298	0.754	0.454
Control	30	70.14	13.92				
Total	58						

Likewise, the 11th grade biology course achievement grade averages of the groups have been compared by means of independent samples test. At the end of this comparison it has been found out that there isn't a significant difference between the groups. Under the light of this data it can be seen that the experiment and control groups have been chosen objectively according to their biology course achievement grade averages.

The grades that the experiment and control group students have taken in the pre-test have been compared by means of independent samples test. The data acquired are as shown in the table below:

Table 5. T-test results on pre-test grades of experiment and control groups

Groups	N	Mean	SD	Levene test		t	p
				F	p		
Experiment	27	29.25	12.91	0.11	0.73	0.1	0.91
Control	27	28.88	12.27				
Total	54						

After the comparison of pre-test achievement grade averages of the experiment and the average groups, it has been found out that there isn't a significant difference between the two groups. All the data acquired shows that the groups are formed objectively.

The data collection and analysis
Theoretical dimension has been created through evaluating the data acquired with literature review and experts' point of view. Experimental data has been collected by means of achievement test. Achievement test has been given to the students before and after the application. After the forming of the experiment and control groups, traditional method has been applied to the control group and the newly prepared program has been applied to the experiment group. In the improvement of the testing tools in the research and in the evaluation of the data acquired as a result of the research the analysis functions below have been used.

During the data analysis, arithmetical mean, standard deviation, cluster analysis, item difficulty index, item discrimination index, KR_{20} reliability coefficient, percentage and frequency have been used. Besides, paired samples test and independent have been used in order to compare the data acquired from the samples chosen for the research. Reliability interval for the statistical analysis operations has been determined as $0<0.05$ and in analysis operations one of the relevant pack programs SPSS 16.0 for Windows has been used.

The data collection tools
The information pertaining to data collection tools are used in order to determine the academic performances according to the learning environments where the experiment and control group students have been applied the study are given below.
Achievement tests (Pre-Test and Final Test)
Inasmuch as the subject of the research is the students' participation to the biology course. Academic achievement test has been prepared according to the goals and attitudes prepared in this subject. The subjects that are covered by the biology course and the attitude dimension of these subjects have been prepared in compliance with Bloom's taxonomy. The achievement test has been prepared as a repetitive test and has been conducted to the students both before and after the experiment.

Pre-Test: It has been implemented to identify the students' knowledge before the experimental study. 25 multi-choice questions have been prepared about biology course participation subject with the help of experts' point of view. The pre-application of the achievement test have been conducted to 82 students and it has been found out that KR-20 = 0.69. 4 items whose item discrimination levels are zero or negative have been removed from the test and the test has been decreased to 21 items and 5 achievement test questions (2, 4, 11, 16 and 18th questions) whose item discrimination levels are below 0.20 have been corrected. The achievement test has been applied to 54 students who are experiment and control group students. Pre-test item difficulties and item discrimination have been calculated. Pre-test item difficulty total has been found as 5.6 and pre-test item discrimination total has been found as 5.35. Achievement test item difficulty and item discrimination levels have been found low. This situation can be explained with the fact that nearly all of the students' pre-knowledge about the subject is inefficient.

Final test: A knowledge test consisting of 21 items and equivalent form to the pre-test has been conducted to the students to test the students' knowledge level they acquired after the experimental operation. 54 students who are in experiment and control groups have participated in the application. The item difficulty total of the final test has turned out to be 14.72 and the item discrimination total of the final test has turned out to be 7.85. Looking at the data acquired, it can be said that the final test is of medium difficulty.

Application
The study has been conducted on 27 students of 12/B class Anatolian High School Quantitive Courses section in biology course. The same course given in traditional learning environment has been conducted on 27 students of 12/C class. Education process in both learning environment has been executed by the same instructor.
Flipped classroom is a form of blended learning which encompasses any use of technology to leverage the learning in a classroom, so a teacher can spend more time interacting with students instead of lecturing. This is most commonly being done using teacher-created videos that students view outside of class time (Barseghian,2011). It has been applied in the classroom where the experiment is executed.

The application period which has lasted for six weeks has lasted for 18 hours being 3 hours a week. The students studying in blended learning environment have studied in classroom environment for 12 hours and have studied in Web environment for 6 hours. A blog page has been prepared for the students to be able to be in interaction for 24 hours a day in blended learning Web environment. The Computer lab in the school has been opened for

the use of the students who don't have Internet connection in their houses. Each student has been given a password so that they could access the Web page and the students' access to the blog page with their own password has been provided.

Throughout the research, the subjects are given in hierarchical order in titles and subtitles so that the students can use the blog page comfortably. The students have been provided to watch relevant videos whenever they want and to reach detailed sources about the subject while they are learning the subject of genetics in multi-environment. Each student who connects to the blog page has been provided to ask questions, take notes and write comments in any chapter of genetics subject they want to. Tests relevant to genetics, including the questions of the exams prepared by OSYM, have been put on the Web page so that the students can practice whenever they want. Apart from the Web page, the students have been given tests on the covered topic each week, *PowerPoint* slides have been shown and materials on the topic have been presented to the class.

RESULTS

Comments to constitute basis for the research results by using data analysis methods have been made to the control group and experiment group during the process of beginning the study for the evaluation of the data after application of the programs and the data collection. The results acquired via data analysis and their evaluation have been given under titles by categorizing them according to their acquisition phases.

Results about the pre-test

Comprehension of how the experiment group and control group students are ready for the program prepared before the research and the relation of the pre-learning of the experiment group and control group students are analyzed in this chapter. The data acquired from the pre-test that has been carried out to both of the groups have been analyzed and it has been explained in this chapter if there is a significant difference between the two groups.

Table 6. The pre-test result points applied to the experiment and control groups

Groups	N	Mean	SD	t	p
Experiment Group	27	29.25	12.91	0.10	0.91
Control Group	27	28.88	12.27		

p<0.05

Table 6 above shows the pre-test academic achievement grade averages of experiment group, who has studied in blended learning environment, and control group, who has studied in traditional learning environment. The pre-test academic achievement grade average of the experiment group students who has studied in blended learning environment is 29,25, on the other hand, the pre-test academic achievement grade average of the control group students who has studied in traditional learning environment is 28,88. In order to assess if there is a significant difference between the pre-test academic achievement grade averages of the experiment group and the control group independent sample tests have been conducted. At the end of the application, it has turned out that there isn't a significant difference between the pre-test academic grade average of 12/B, studying in blended learning environment and 12/C studying in the traditional learning environment. It turned out to be clear that there isn't a significant difference between academic achievement levels of the two groups under the light of the data acquired from the comparison of the academic achievement points of the pre-tests.

Results on the comparison of pre-test final test academic achievement grades

In this chapter, the pre-test and final test grades acquired by experiment and control groups have been compared. Whether there is a significant difference between the pre-test and final test grades of the experiment group is explained via the data acquired from Table 7 and whether there is a significant difference between the pre-test and final test grades of the control group is explained via the data acquired from Table 7.

Table 7. The Pre-Test and Final Test Results of the Experiment Group

Groups	N	Mean	SD	t	p
Pre-test	27	29.25	12.91	-15.52	0.00
Final Test	27	78.70	13.05		

p<0.05

As it can be seen from the table, the pre-test grade average of experiment group who have studied in blended learning environment has turned out to be 29.25 and their final test grade average has turned out to be 78.70. Paired Samples Test has been conducted in order to see if there is a significant difference between the pre-test and final test grades of the experiment group who has studied in the blended learning environment. At the end of

the study, it has been understood that there is a significant difference between the pre-test and final test grade average of the experiment group students who have studied in blended learning environment. The significant difference shows that the blended learning environment has turned out to be successful.

Table 8. The Pre-Test and Final Test Results of the Control Group

Groups	N	Mean	SD	t	p
Pre-test	27	28.88	12.27	-14.64	0.00
Final test	27	72.22	9.12		

p<0.05

Based on the information Table 8 provides, it is understood that the pre-test and final test academic achievement grade averages of control group who have studied in traditional learning environment. The pre-test academic achievement average of the control group has turned out to be 28.88; their final test achievement average has turned out to be 72.22. Paired Samples Test has been conducted in order to see if there is a significant difference between the pre-test and final test grades of the control group who has studied in the traditional learning environment. At the end of the application, it has turned out that there is a significant difference between the pre-test and final test academic achievement grade averages of the control group students who have studied in traditional learning environment. The difference shows that the traditional learning process has turned out to result in success.

Results on the final test

At the end of the study, the students have been presented the same test with the one they had at the beginning of the topic. Experiment and control group students have answered the test. The data acquired and the results acquired under the light of this data are included in this chapter.

Table 9. The Final Test Results of the Experiment and Control Group

Groups	**N**	**Mean**	**SD**	**t**	**p**
Experiment Group	27	78,70	13,05	2,11	0,03
Control Group	27	72,22	9,12		

p<0.05

Table 9 shows the final test academic achievement grade averages of the students of experiment group who have studied in blended learning environment and the students of control group who have studied in traditional learning environment. The pre-test academic achievement grade average of the experiment group students who have studied in blended learning environment is 78.70; the academic achievement average of the control group students who have studied in traditional learning environment has turned out to be 72.22. Independent Samples Test has been conducted in order to find out if there is a significant difference between final test academic achievement grade averages of experiment group students and control group students. At the end of the application it has turned out that there is a significant difference between the final test academic achievement grade averages of experiment group who have studied in blended learning environment and control group who have studied in traditional learning environment.

In general terms, when we look at the final test results which have been conducted to the control and experiment group students after the study, it has been observed that the students who have studied in blended learning environment turns out to be more successful after the study. Looking at this situation, it can be said that blended learning have been more effective than traditional learning all along the study.

Table 10. Pre-Test and Final Test Group Statistics Depending on Gender

	Groups	**Gender**	**N**	**Mean**	**SD**	**Std. Average Error**	**p**
Experiment Group	Pre-test	Male	19	27.10	8.38	1.92	0.18
		Female	8	34.37	19.89	7.03	
	Final Test	Male	19	75.78	13.56	3.11	0.07
		Female	8	85.62	9.03	3.19	
Control Group	Pre-test	Male	18	25.00	11.11	2.61	0. 01
		Female	9	36.66	11.18	3.72	
	Final Test	Male	18	71.11	10.64	2.50	0.38
		Female	9	74.44	4.63	1.54	

p <0.05

As it is seen in the table above, the academic achievement grade averages of experiment group and control group students depending on gender are given. According to the table experiment group male student' academic achievement average is 27.10; final test academic achievement average is 75.78. The same experiment group's female student academic achievement grade average is 34.37; final test academic achievement average is 85.62. Control group students' academic achievement average depending on gender is as follows: male student pre-test academic achievement grade average is 25.00; final test academic achievement grade average is 71.11. Female student academic achievement grade average is 36.66; final test academic achievement grade average is 74.44.

Based on the data derived from this table, Independent Sample Test has been conducted in order to assess if there is a significant difference between control group and experiment group students' academic achievement grade averages depending on gender. And the end of this application, the dispersion of the results acquired at the end of the pre-test and the final test carried out with experiment group and control group students on gender has been examined. First of all, in order to examine if there is a significant difference between the academic achievement grade averages it has been analyzed if the groups have homogenous variances by means of Levene's Test. At the end of the study it has been observed that the academic achievement grade average of the experiment group does not have significant difference depending on gender.

CONCLUSION

At the end of this study, it has been observed that the students who have studied in blended learning environment are academically more successful than the students who have studied in traditional learning environment. The results of the study are examined below as articles.

- At the end of the achievement test conducted before the study, a significant difference hasn't been found between the academic achievements of the students who have studied in blended learning environment and the students who have studied in traditional learning environment. It has been observed that the academic achievement average of the two groups is close to each other when the averages of their achievement tests are taken.

- It has been observed that there has been a positive increase in the academic achievement averages of the students who have studied in both of the environments.

- A significant difference has been found between the final test achievement grades of the two student groups having studied according to two learning approaches which demonstrate the academic achievement averages acquired at the end of the study. According to this result, one of the learning environments that have been applied during the study, blended learning environment and its effect on the academic achievement grades of the students who have studied in this environment have been found more than the effect of traditional learning environment's effect on the students' academic achievement. The academic achievement average of the students who have studied in blended leaning environment has been found higher than the academic achievement average of the students who have studied in traditional learning environment.

- It has been analyzed if the study has a significant difference on gender. At the end of the study the academic achievement averages of the female students have turned out to be higher than the academic achievement averages of the male students in both the pre-test and final test which have been conducted in both of the learning environments. A significant difference hasn't been observed between the academic achievement averages of male-female students when the experiment group students' academic achievement grades are analyzed depending on gender. When the academic achievement averages of the control group students are analyzed depending on the gender and when the academic achievement grade averages of pre-tests are observed there has been observed a significant difference between male and female academic achievement grade averages. Also, when looked at the academic achievement grade averages of the final test that has been applied to the experiment group, the difference that previously considered as significant between the academic achievement grade averages of male and female students has been removed.

DISCUSSION

All in all, this study focuses on what blended learning means and on the differences between traditional learning and blended learning prepared for 12th grade biology course. The effect of blended learning environment on the students' academic performance has been analyzed. Under the light of the results of the study, it has been observed that the academic success of the students who have studied in blended learning environment in which online learning environment and face to face learning environment are used together, increases.

Any time period, place or distance is not important for the learners in online learning environment (Tatlı, 2009). The fact that the students can get access to information in any place without being limited by boundaries or spaces with blended learning environment and the fact that blended learning environment provides exchange of information and ideas in cyber world are the factors causing the increase of their achievement grades. The result of this study asserting that blended learning environment increases the academic achievement averages is also supported by Demirer (2009); Ünsal (2007); Usta & Mahiroğlu (2008); Bañados (2006); Robinson (2004); Dziuban, Hartman & Moskal, (2004); Boyle & et al. (2003); Singh (2003); Doo, Morris & Virginia, (2006); Morgan (2002) in the studies conducted on blended learning. In addition, according to Hopper (2003), the best courses are those which have ample and timely feedback, use the technology in compliance with intelligence and provide learning by action. They are the courses in which the online courses are used in the best way. Not only blended learning provides an environment in which there are simultaneous feedback and effective usage of technology but also it provides the learners in online learning environment to be in interaction. This benefit of blended learning is a proof that it will gain an effective and significant place in modern education system.

SUGGESTIONS

This study has been carried out in a secondary school institution, one of the Anatolian High Schools. Similar studies can be conducted in other schools, non-math courses and balanced courses sections study. The online learning material that has been used during the study has been developed by the researcher himself. Taking into account that the preparation of the online learning material used in this study requires expertise, the prospective online learning materials to be used in next studies should be prepared with experts' support and they should be provided to be of more quality and to be more useful.

Apart from Web based learning in blended learning environment, some techniques such as brainstorming and question answer techniques have been used in this study. The future studies can be carried out with available techniques and methods apart from learning methods and techniques that have been used. This study has offered a blended learning environment by using traditional learning environment and online learning environment together. By using the same learning environment, online learning and traditional learning can be carried out separately from each other without keeping them simultaneously.

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EFFECTIVE ASSESSMENTS OF INTEGRATED ANIMATIONS -- EXPLORING DYNAMIC PHYSICS INSTRUCTION FOR COLLEGE STUDENTS' LEARNING AND ATTITUDES

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ABSTRACT
The purpose of this study was to give effective assessments of three major physics animations to upgrade college students' learning achievements and attitudes. All college participants were taken from mechanical and civil engineering departments who joined this physics course during the 2011 academic year. Three prime objectives of physics instruction were: (1) to improve physics animated texts, (2) to promote positive learning achievement, and (3) to evaluate the validity of the revised physics instruction with regard to learning attitudes. Assessments of applied animations in this study contributed much to learning results of students' performance which enhanced students' physics concepts learning and attitudes indicated by different variances of gender, major, dispositions.
Keywords: animations, physics instruction, learning performance

INTRODUCTION

Effective assessments to improve students' physics instruction and learning performances, rather than merely teaching basic-level physics concepts, become the primary concern and fundamental goal for physics educators (Kiboss, 2002). Many researchers have pointed out that students rarely build a complete physics knowledge because they underestimate the complexity and relationships between prior knowledge and new knowledge without interactive animations or signaling functions (Feltovich, Coulson & Spiro, 2001). Some physics instruction of promising strategies have already been successfully explored, such as visual animations for communicated environment (Tao, 2004; Author, 2008a, 2008b, 2011, 2013), in their advanced concepts of science history (Galili & Hazan, 2001; Wang & Marsh, 2002) to help students achieve more effective physics learning. To be a constructive physics instruction of learning environment, this approach integrates visual animations into students' understanding of conceptions towards physics learning and attitudes. Several constructivists' strategies of integrated animations were included in the overall physics learning process, such as multimedia texts and hands-on inquiry experiences for students to learn fundamental physics conceptual developments. Specifically, this study would focus on three following critical learning questions:

(1) To what extent do three integrated animation units improve college students' learning conceptions for physics assessments?
(2) What effective assessments of integrated animations does this study make for upgrading students' physics learning performances?
(3) What are college students' learning attitudes to physics instruction in contrast with their prior learning and performances?

This study of three integrated animation units aims at facilitating students' effective assessments of physics conceptions and improving their physics learning attitudes. It is considered acceptable by Kiboss (2002) and Tao (2004) that physics instruction of integrated animations would be available for students of universities, colleges, and high schools as a collaborating tool in assessing learners' learning environment and performances to replace traditional physics learning (Barton, 2005).

THEORETICAL BACKGROUND

A recent research discovery reveals that college students' learning towards physics is declining not in their lack of interest, but in lack of integrated animations for instruction environment nowadays (Becerra-Labra, Gras-Martı & Torregrosa, 2012). Thus, efforts towards integrated animations are needed for positive physics learning concepts to increase students' interest and motivation. Many scholars' up-to-date strategies of physics learning are based on constructive integrated animations related to the authentic nature of physics instruction. There are several potential advantages for this study to get effective assessments of rich integrated animations which closely parallel with new technologies of physics instruction. This study also offers physics teaching activities including three integrated animation units in the learning environment suitable for a constructive assessment of

students' learning performances.

CONSTRUCTIVIST APPROACHES IN PHYSICS INSTRUCTION

It is a new tendency that physics learning requires to build a persuasive learning environment for college students' integrated animations with constructivist instruction. Constructivism would be an interactive epistemology which defined students' constant competence and demonstrates their understanding of real knowledge. Hodson (1996) classified four important constructivist aspects based on the literature survey: to identify students' ideas and views; to create opportunities for students to explore their conceptions, to provide stimuli for students to develop new ideas; and to support their attempts to rethink and reconstruct their own ideas and views. Tenenbaum, Naidu, Jegede, and Austin (2001) presented seven key constructivist factors for students' physics learning environment: (1) dealing with arguments, discussions, debates; (2) meeting conceptual conflicts and dilemmas; (3) sharing ideas with others; (4) measuring targeted materials toward solutions; (5) organizing reflections and conceptual investigations; (6) fitting students' needs; and (7) making meaningful, real-life examples. All seven factors emphasized students' dynamic fulfillment that real knowledge was actively constructed in learners' mind step-by-step. For last few decades, the importance of the constructivist perspective has been stressed by educators for improving students' learning performances. Ausubel (1968) indicated that the fundamental principle of constructivist instruction was to assess what students knew and then to design activities and assessments of their performances accordingly. Constructivist principles had been interpreted in a variety of scientific ways ranging from information processing, interactive and social constructivist to physics instruction (Yore, 2001). Both constructivist principles and students' conceptual changes were influential in physics instruction, and they were inseparable from any physics instruction. This study explored the constructivist-based physics instruction which had been in accordance with the conceptual change models (Posner, Strike, Hewson, and Gertzog, 1982) to help students modify their misconceptions and develop better learning performances.

TECHNOLOGY ENRICHMENT FOR THE ANIMATED LEARNING ENVIRONMENT

College students who face rapid changes in the modern world will be in great need of technological instruction with effective animated learning environment. More than one decade, Gilbert (1999) proposed a new strategy of integrated animations to enhance students' science learning environment. He said that much scientific learning was too abstract to interpret, and those complicated ideas would prevent students from constructing mental models and their subsequent learning performances. Several means of physics instruction had been dealt with, such as models, analogies, equations, graphs, diagrams, pictures, mathematical operations, and visual and action images (Lemke, 1998). All these could be functional with integrated animations for different effects of a single representation compared to multiple representations (Yore & Treagust, 2006). Several multiple representations (Spiro & Jehng, 1990; Paivio, 1971 &1991) could be in collation with Ainsworths' learning frameworks of the ubiquitous DeFT (design, functions, and tasks 1999, 2006) for students' animated learning environment. A common justification for using multiple representations responded to the fact that they captured students' interest and, in doing so, played an important role in promoting animated environment for students' learning performances.

LEARNING THEORY AND MULTIMEDIA ENVIRONMENT

Verbal and visual inputs would construct multi-functions of dual-coding theory (Paivio, 1971 & 1991) in students' integrated animations of physics learning environment (Butler & Mautz, 1996). Both verbal and visual systems could be linked and inter-communicated for the cueing combination of one system to the other, which in turn facilitated students' integrated animations of physics instruction. Theoretical principles from this multimedia-orientated environment would offer fundamental presentations as texts and animated sequences which all interacted together to enhance students' learning performances (Mayer, 1997; Moreno & Mayer, 1999). The contiguity principles for computer-based instruction gave students effective impact when words and pictures were presented contiguously in time or space (Mayer & Anderson, 1991; Mayer & Sims, 1994). Learners might construct three basic principles for integrated animations of both words and pictures in their learning environment:

- Principle 1: To improve understanding and performance, learners should get more involved in building multimedia connections between verbal information and learners' visual representations.
- Principle 2: To evaluate physics instruction effectively, learners should construct integrated animations between pictorial information and learners' visual representations of that information.
- Principle 3: To upgrade learning attitudes, learners should address referential environment between corresponding elements in verbal and visual representations.

To sum up, the multimedia environment of integrated animations included digital combinations of words, graphs, animations, and sound in physics instruction. All functions and demonstrations designed to attract students' visions, could stimulate their motivations to learn, and create effective integrated animations in their physics learning environment (Rieber, 1996; Mayer, 1999; Sperling, Seyedmonir, Aleksic and Meadows, 2003).

INSTRUCTIVE APPLICATIONS OF INTEGRATED ANIMATIONS

Instructive applications for three unit integrated animations should focus on students' effective physics learning in terms of constructing knowledge and promoting related physics competence. The purpose of this study was to construct students' instructive applications of physics knowledge cognition from three integrated animation units. The instructive applications of integrated animations made students' physics learning and research methods towards multi-faceted, flexible, and more effective. Some advantages of physic applications in integrated animations were: (a) to increase students' interest and ability to retain the subject materials; (b) to illustrate physics conceptions in a number of ways not available to lecturers' writing on the chalkboard; and (c) to present multimedia demonstrations for students outside the classroom via computer or video (Whitnell et al., 1994). Critical questions as to why integrated animations of physics instruction could increase students' conceptual understanding had been addressed by many researchers (Ardac & Akaygun, 2004; Kiboss, 2002; Schoenfeld-Tacher, Jones & Persichitte, 2001). Ainsworth (1999) proposed a functional taxonomy of multiple representations, for the promoted understanding of deeper learning conceptions that might include abstract generalization and related teaching between representations. Kiboss (2002) implied that module applications of integrated animations for physics instruction would upgrade students' understanding of concepts and skills. Tao (2004) employed computer-based designs of peer collaborative learning instructions to help students develop image formations via a lens, and to further improve these image formations. Barton (2005) explored that innovative changes to support teachers' useful integrated animations of physics instruction made successful developments in scientific education. However, not all applications of integrated animations were necessarily appropriate or an effective strategy for improving students' learning performances (Lin & Dwyer, 2004). Sperling et al. (2003) argued that regardless of inconsistent findings about multimedia, authentic science materials were needed to facilitate appropriate and functional physics instruction. Mayer, Hegarty, Mayer and Campbell (2005) concluded different phenomena in several physics experiments. They used the same descriptions and graphics for both paper-based and computer-based versions of lightning formations in the following experimental process -- how a toilet tank worked, how ocean waves formed, and how the car braking system operated. They found that the static illustrations reduced extraneous and promoted germane processing, when compared with narrated animations. Recent advancements in physics instruction of integrated animations had allowed educators to incorporate texts as well as visual and sound resources into students' learning environment. Some researchers indicated that the incorporation of integrated animations into physics courses could upgrade students' understanding and different levels of achievements (Barton, 2005; Tao, 2004; Kiboss, 2002).

This study responded to two critical questions. First of all, what kinds of animations and animated environment would be pertinent for integrated instruction in college physics learning? Secondly, how could we modify students' feedback in physics learning achievements and attitudes for applications of three integrated animation units?

METHODOLOGY

The overall research methodology was comprised of three effective assessments, including pretests, posttests and questionnaire for non-major college students in the required physics courses. Since few contemporary physics education programs had been effectively implemented in Taiwanese colleges, the present study focused on undergraduates' learning performances to upgrade their competence via integrated animations of physics instruction. All pretests, posttests and follow-up questionnaire had assessed students' performances in the multimedia physics instruction. It was assumed that integrated animations of physics instruction was crucial to students' understanding since many college students were often too shy to ask questions either during or after classes. It was believed that physics instruction of three integrated animation units would stimulate more interactions between students-students and instructors-students suitable for students' learning competence and individual characteristics**.**

PARTICIPANTS

Assessments of statistical samples for group surveys were taken from college students in the present researcher's physics classes. All participants (N = 193) were recruited as tentative samples from both civil engineering and mechanical engineering departments by a stratified procedure to eliminate voids in the sampling frames. All students' characteristics -- such as gender (male, 92.2%; female, 7.8%), majors (civil engineering, 35.8%; mechanical engineering, 64.2%), dispositions towards computer learning (positive, 28.5%; neutral, 57.5%;

negative, 14.0%), and attendance at computer orientation classes (yes, 74.1%; no, 25.9%), were used to define the sampling frames and potential blocking variables for the data analyses.

TOOLS

There were four major assessment tools in the data collection and analyses stages: namely, (a) pretests, (b) physics instruction of three integrated animation units, (c) posttests, and (d) a follow-up questionnaire. Several pretests and posttests appropriate to three integrated physics units were developed to assess students' learning achievements and learning attitudes. All tests with computer-based analyses were focused on three categories: knowledge, comprehension, and applications (Bloom et al., 1956). A ratio sampling frame from the "kinetic energy and work" unit was exemplified by -- knowledge (30%), comprehension (40%) and applications (30%) as the following 3 items from 10 item models:

(1) Knowledge Orientation (only 1 item from 3 item models)-- If one can lift up a ball with a mass of 0.4 kg straight up at a constant speed through a displacement of 5 m, the total work needed to move the ball would be _____.

Answer: (A) 0 J (B) 19.6 J (C) 5 J (D) -19.6J (E) 72 J.

(2) Comprehension Orientation (only 1 item from 4 item models) -- A brick with a mass of 6.00 kg initially at rest is pulled to the right by a constant horizontal force with the magnitude F = 12.0 N. What will the speed of the brick be after it has been moved 3.0 m? _____

Answer: (A) 0 m /s (B) 2.4 m /s (C) 3.5 m /s (D) 4.2 m /s (E) 5.5 m /s.

(3) Application Orientation (only 1 item from 3 item models) -- What is the speed of the brick after it has been

moved 3.0 m if the surface has a 0.15 coefficient of kinetic friction with which it is in contact?

Answer: (A) 0 m /s (B) 1.8 m /s (C) 3.5 m /s (D) 4.2 m /s (E) 5.5 m /s.

Both pretests and posttests for three physics units were administered by local physics professors of the Entrance Examination Center in Taiwan to assess different test validities. The reliability of students' achievement tests was analyzed in Cronbach's alpha coefficients for the pretests and posttests, which were 0.78 and 0.79 respectively. Kline (2005) posited that the α value up 0.70 was considered acceptable. The same test validities were combined together with pretests and posttests to detect students' differential physics learning performances.

Effective assessments of students' learning attitudes in the questionnaire were devised by the author (2008a, 2008b, 2011). The Likert 5-point scale was used to evaluate students' physics learning attitudes. Each test item had five responsive categories, ranged from item 1 (strongly disagree) to item 5 (strongly agree). The questionnaire included six aspects as the following descriptions:

(S_1) Learning Attitude towards Integrated Physics Units

Students' attitudes towards their competence in integrated physics courses depended on what new information they learned from multimedia aids, and what conceptions they could construct from integrated animations of their learning programs.

(S_2) Learning Attitude towards Physics Instructors

Most students believed that instructors were always satisfied with and encouraged by better grades and learning achievements. If they got higher grades, they could be more actively involved in integrated animations of physics learning programs. Thus, physics instructors' opinion influenced students' learning motivation.

(S_3) Learning Attitude towards Integrated Physics Learning Environment

Students' assessments of integrated physics learning units depended on a well-equipped multimedia environment.

(S_4) Learning Attitude towards Students' Interactions

A positive learning attitude towards collaboration and integrated animations of physics units was required in the learning process. Interactions between students helped them to solve their problems, develop good learning habits, and provide meaningful discussions of integrated physics learning.

(S_5) Learning Attitude towards Self-evaluations

Most students believed they could perform well with the help of the integrated learning environment; after previews and reviews, students could make self-assessments, finish required assignments, and improve their integrated physics learning grades.

(S_6) Learning Attitude towards Integrated Physics Learning Results

The better learning attitudes students had the more positive the integrated learning results they could demonstrate. Most students felt more satisfied with their integrated learning as their competence and achievement increased. Integrated physics learning helped improve students' problem-solving abilities,

increase their knowledge of basic physics conceptions, and broaden their interest in pursuing more new knowledge.

Effective attitude assessments of the questionnaire were evaluated according to the content, constructive validity and internal consistency reliability. Three specialists were asked to set up the validities of the questionnaire content. Pilot versions of the questionnaire were examined using principle component factor analyses to verify the structure and alignment given the designed constraints. Factor analyses revealed six factors with Eigenvalues over 1.0 and a cumulative total variance of 74%. Orthogonal rotation was conducted by the Varimax option support and six subscales described were identified. The results of both expert analyses and factor analyses confirmed all validities. Reliability was explored in terms of Cronbach's α coefficient to determine the internal consistency of total subscales. The analyses of six subscales separately yielded different coefficients ranging from 0.92 to 0.96 (S_1=0.96, S_2=0.92, S_3=0.93, S_4=0.94, S_5=0.94, and S_6=0.96). Compared to the previous report of average reliabilities, this questionnaire had a higher reliability than statistical data by most other researchers (Katerina & Tzougraki, 2004).

TREATMENTS

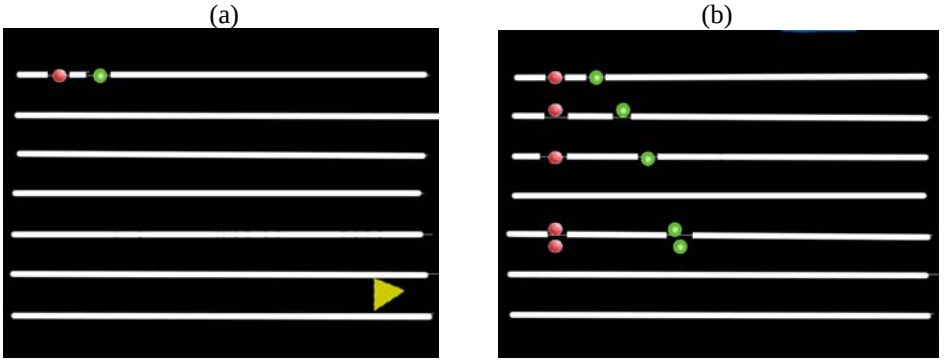
Three integrated physics units were conducted for effective learning assessments. These integrated physics units normally involved 3 hours of lecture demonstrations and 3 hours of laboratory hand-work each week. The lecture demonstrations programs were redesigned to be enriched with supplemental programs. The supplementary materials (such as animations and slides), lectures, and demonstrations all combined within an integrated learning environment in well-equipped facilities. These component programs were developed by the author drawn from the literature (Ainsworth, 1999; Yore and Treagust, 2006) and constructivist perspectives. Six integrated features of physics courses were covered in the instructional designs and computer animations as the following way:

1. Three integrated animation units were employed for specific visualizations of physics instruction.
2. The recognition of integrated environment determined the important priority of meaningful physics instruction.
3. Concrete creative images and mental assemblages facilitated students' memory and understanding.
4. Integrated interactions of physics learning between teachers and students were reinforced and encouraged in this study.
5. Guided learning with the integrated environment as a catalyst would achieve greater physics instruction goals and overcome students' learning obstacles.
6. Integrated physics presentations and demonstrations proposed opportunities and activities for students' real-life learning.

Three integrated animation units were produced in Flash MX (Macromedia Inc.), static visuals were made with Mathematica 4.2 (Wolfram Research, Inc.), and classroom demonstrations were presented by PowerPoint or e-plus software. The conceptions, ideas and dynamic processes were operated in Adobe Photoshop 7.01. Three integrated animation units were separately indicated from [Figure 1] to [Figure 3].

[Figure 1] showed visual animations of kinematics involved in the whole physics process. When one ball was released from rest; another ball fell horizontally to the right at the same instant. Their vertical motions were identical. Students were required to understand the physics motion process so multimedia animations recorded this whole dynamic process. From these animations, students needed a full physics understanding of vertical and horizontal motions, which were identical to each other in their importance. The whole animated presentations could help students to understand effectively and to solve conceptual related problems of kinematics.

(a) (b)



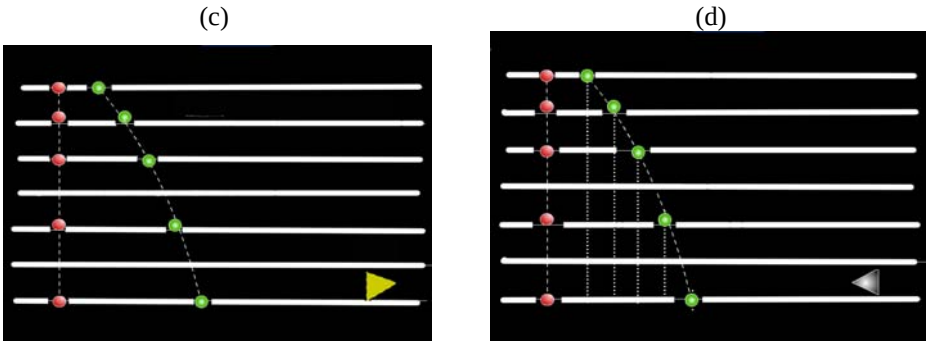


Figure 1: Selected illustrations and corresponding conceptions from the integrated physics courses with kinematics animations conducted by Photoshop 7.01, as shown in the sequence from slides (a) to (d)

[Figure 2] indicated the passing movements of a ray from one medium V_1 into another medium V_2. The angle of refraction was different from that of incidence. This case would always be the same during reflections when the ray entered a medium at a speed less than the speed of light. Snell's law was the basic requirement of refraction derived from light theory. The sequence presentations of integrated animations, as seen from pictures (a) to (d) in [Figure 2] step by step, provided an effective domination for the conception of the incident wave and the refracted wave. Most students who came from a vocational school background did not have much advanced concepts of abstract physics and dynamic processes; therefore, these animated documents helped students build a sound, basic recognition of refractions and avoid the difficulty and confusion of physics geometric optics as encountered in their daily lives.

The principal animations for the conservation of mechanical energy could be seen in [Figure 3] -- as a

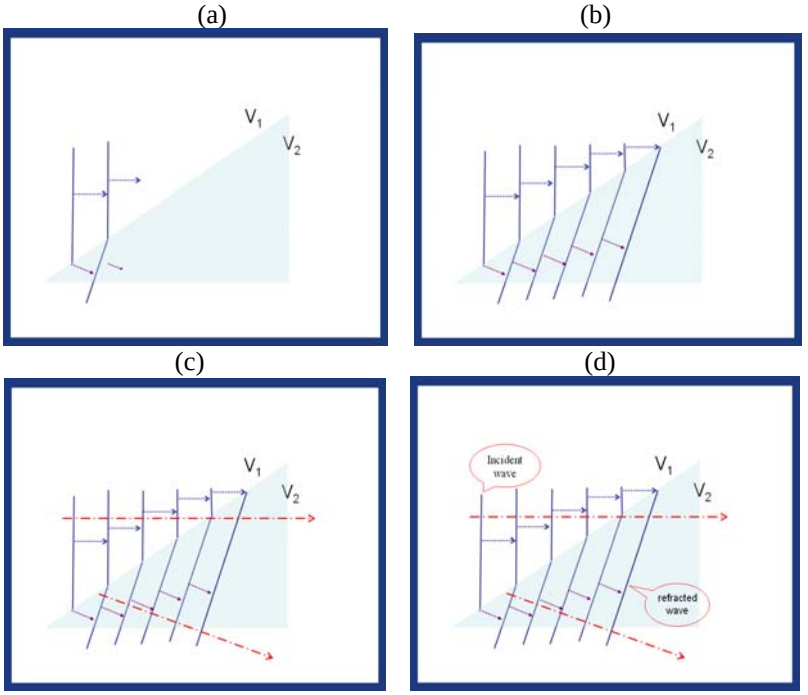


Figure 2: Selected illustrations and conceptions from the integrated physics courses with corresponding animation arrangements and movements for the ray passing from medium V_1 into medium V_2, conducted by Photoshop 7.01, as shown in different sequences from slides (a) to (d).

pendulum swung in a motion system, and the energy was transferred back and forth between kinetic energy K and gravitational potential energy U, as shown from pictures (a) to (f) in [Figure 3], with the sum K+U being constant, as shown in [Figure 3]. The slides indicated a vivid physics illustration of the conservation energy. Any energy that did not serve the intended purpose must be subtracted from the total sum in order to obtain the amount of useful energy. This physics application was very straightforward. This experiment of integrated physic mechanical energy saved students from the misunderstanding of interpreting the abstract conceptions of

mechanical energy. These animations were available for solving conceptual problems related to the principle of the conservation energy.

DATA MANAGEMENT AND ANALYSES

Pretests, posttests and responsive questionnaire were collected and assigned in identified groups and codes. Six blocking variables were used to form four comparative groups: gender (male, female), major departments (civil

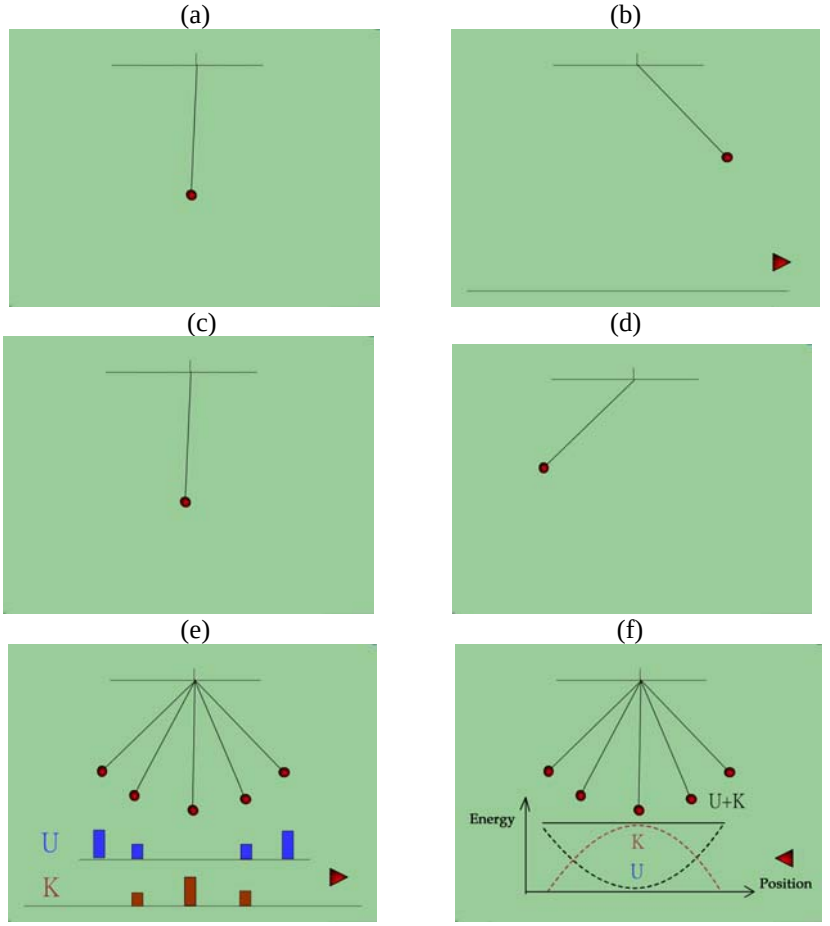


Figure 3: Selected illustrations and concepts from the integrated physics courses with corresponding animations for the conservation principle of mechanical energy, conducted by Photoshop 7.01, as shown in sequences from slides (a) to (f)

engineering, mechanical engineering), dispositions toward integrated physics courses (negative, neutral, positive), and attendance at physics learning (yes, no). All quantitative data were employed for statistical analyses functioned by the SPSS of Windows 10.0 software. Descriptive statistics (sample sizes, means, and standard deviations) were calculated for two comparative groups, and the significant levels for one-way analyses of covariance (ANCOVA) were set at 0.05 to examine main effects. In cases where *p*-values were less than or equal to 0.05, Scheffe's post hoc comparisons were conducted on different significant effects. Regarding students' changes in achievements and attitudes, the differential effects were explored and identified by the categories of blocking variables for the integrated physics learning.

RESULTS

The major perspective of this study focused on three physics units with integrated animations available for Taiwan technical college students. Blocking variables for the data analyses corresponded to differentiated requirements of students' learning performances in implemented conditions and learning attitudes. The design principles and study developments had already been described in the above sections. Next this study examined students' learning performances before and after attending instruction tests in these integrated physics programs. Students' learning performances were documented and analyzed by means of pretests and posttests; the means and standard deviations were calculated by descriptive statistics, and improvements brought about by three physics units (see Table 1). Average performances throughout pretests and posttests for three physics units indicated students' different scores from 10 to 20 points. These scores corresponded to percentage improvements of 35.8% in the kinetic energy and work unit, 30.3% in the optics unit, and 16.5% in the kinematics unit. The

total improvement for three physics units was 26.5%, and effect size found by one-way ANCOVA testing was f = 0.279, the above medium effect. The effect size was used as the factor or index to differentiate variations in students' learning behaviors. Cohen (1994) pointed out that the effect size had more research efficiencies than the p-value. The testing results of statistical significance revealed occurrence rates. The effect size put important emphasis on the measurements of the relative magnitude for the experimental results. Although both testing results of statistical significance and effect size showed the size of the experimental effect, effect size became especially influential when comparing the magnitude of experimental treatments to other experimental effects. Cohen noticed that, "the effect size of one-way ANCOVA was represented by $f = [\eta^2 / (1-\eta^2)]^{½}$, in which η^2 indicated Eta square to show different efficient, f = 0.1 as the smaller effect size, f = 0.25 as the medium effect size, and f = 0.4 as the higher effect size" (Cohen, 1988). Inspective results of students' attitude survey (with four subscales) indicated reasonable attitudes towards physics learning.

Table 1: Mean scores (M) , standard deviations (SD) and percentage improvement of students' integrated physics learning.

Test	Course Content	Number	Pretest		Posttest		Percent Improvement*
			M	SD	M	SD	
1	Kinetic energy and Work	65	45.77	10.91	62.15	13.75	35.8%
2	Optics	59	46.44	12.25	60.53	12.93	30.3%
3	Kinematics	69	55.43	16.17	64.57	13.14	16.5%
Average		--	49.43	14.07	62.52	13.32	

Note: *Totally effect sizes, f = 0.279

Detailed statistics of variances and covariances were analyzed to examine the differential effects of integrated instructions on civil and mechanical engineering students' physics learning achievements and attitudes. The main effects of the integrated physics courses for students' achievements (for the given variables) were tested by a series of ANCOVAs in which the pretest results were utilized as the covariances. All ANCOVA results revealed that when students' performances of posttests were adjusted by performances of pretests, different significant main effects appeared. The statistical parameters, F-ratios, p-values and effect sizes (f) for each of 12 ANCOVAs for gender, major, dispositions towards computers and orientation attendance (for each of three physics courses and four blocking variables) were summarized in [Table 2]. All ANCOVA results revealed significant main effects between mechanical and civil engineering students in kinematics (F = 4.209, p = 0.044, f = 0.259) and kinetic energy and work content achievements (F = 22.100, p = 0.001, f = 0.593), with above medium or higher effects, but not in the optical units (F = 1.328, p = 0.254, f = 0.153). Non-significant (p > 0.05) main effects were found for gender, disposition towards multimedia, and attendance at computer orientation classes for all three integrated physics units. All effect sizes were below the medium effect (f < 0.25).

Table 2: Summary of F-ratios, p-values and effect sizes (f) for each of the ANCOVAs

Blocking Variables	Analyses of Variance	Physics Content Achievement		
		Kinetic Energy and Work	Optics	Kinematics
Gender (male, female)	F-ratio	.027	.010	.084
	p-value	.870	.920	.772
	f	.123	.132	.123
Major (civil, mechanical engineering)	F-ratio	22.10	13.28	4.209
	p-value	.001*	.254	.044*
	f	.593	.153	.259
Disposition toward multimedia (positive, neutral, negative)	F-ratio	.515	1.575	.649
	p-value	.600	.216	.526
	f	.128	.237	.146
Attendance (yes, no)	F-ratio	.044	.075	1.663
	p-value	.835	.786	.202
	f	.123	.128	.163

Note: * p < 0.05

The questionnaire results showed students' differential physics learning attitudes. The four survey subscales indicated positive attitudes toward integrated physics units, with the statistical mean responding > 4.00 for all learning attitudes. The descriptive statistical mean and standard deviations for students' learning attitudes (for six

subscales and the total survey) were indicated in [Table 3]. Differential effects of the integrated physics units were explored for taking a variety of students' characteristics into consideration. The main effects of the integrated physics units (with six attitude subscales for the six blocking variables) were tested by a series of ANCOVAs. The final testing was done on the combined samples since each student had to complete the same attitude survey. [Table 4] provided a brief summary of the *F*-ratios, *p*-values and effect sizes (*f*) in 24 ANCOVAs for gender, major, disposition towards integrated physics courses, and students' attendance.

Table 3: Descriptive statistics for the mean scores (M) and standard deviations (SD) for students' integrated physics learning attitudes for six subscales and the total survey.

Scores	Attitude Measurement						
	S_1	S_2	S_3	S_4	S_5	S_6	Total
M	4.22	4.15	4.03	4.08	4.03	4.14	4.11
SD	0.17	0.20	0.07	0.17	0.16	0.24	0.33

The statistic ANCOVAs revealed significant main effects of gender on students' learning attitudes, favoring males over females (S_4) (F = 3.885, p = 0.050, f = 0.143), and self-evaluation (S_5) (F = 4.621, p = 0.033, f = 0.157). The effect sizes ranged between 0.1 and 0.2, indicating small and medium effects. Students demonstrated a non-significant gender effect of attitudes towards integrated physics units (S_1), attitude towards the physics instructors (S_2), attitude towards integrated physics learning environment (S_3), and attitude towards integrated physics learning results (S_6). These effect sizes were all below 0.14, only a small effect. Non-significant (p > 0.05) main effects were found for student's major (either mechanical or civil engineering) on all six attitude subscales.

The main effects of ANOVAs significance testing showed that students who attended the learning activities had a favorable attitude towards integrated physics units (S_1) (F = 8.694, p = 0.004, f = 0.215), attitude towards the physics instructors (S_2) (F = 7.509, p = 0.007, f = 0.199), attitude towards students' interactions (S_4) (F = 4.590, p = 0.033, f = 0.153), and attitude towards integrated physics learning results (S_6) (F = 4.059, p = 0.045, f = 0.146); all effect sizes ranged from small up to medium. Non-significant (p>0.05) main effects were found for two other subscales: learning attitude towards integrated physics learning environment (S_3) and self-evaluation (S_5).

Significant positive main effects were found for dispositions towards integrated physics units for all attitude subscales: attitude towards integrated physics units (S_1) (F = 18.943, p = 0.001, f = 0.446), learning attitude towards the physics instructors (S_2) (F = 21.131, p = 0.001, f = 0.472), attitude towards the integrated physics learning environment (S_3) (F = 10.439, p = 0.001, f = 0.331), attitude towards students' interactions (S_4) (F = 12.067, p = 0.001, f = 0.357), attitude towards self-evaluation (S_5) (F = 14.741, p = 0.001, f = 0.393), and attitude towards integrated physics learning results (S_6) (F = 20.378, p = 0.001, f = 0.464). The effect sizes ranged between 0.331 and 0.472, indicating medium and higher effects. Scheffe's post hoc comparison results revealed that S_1, S_2, and S_5 students' attitudes reporting 'positive' were superior to those reporting 'neutral' and 'negative', and attitudes reporting 'neutral' were superior to those reporting 'negative.' The results of Scheffe's post hoc comparisons revealed the same integrated physics learning results that S_3, S_4, and S_6 students' attitudes reporting 'positive' were superior to those reporting 'negative', and attitudes reporting 'neutral' were superior to those reporting 'negative.'

Table 4: Summary of *F*-ratios, *p*-values and effect sizes (*f*) for each of the ANCOVAs

Blocking Variable	Analyses of Variance	Attitude Measurement					
		S_1	S_2	S_3	S_4	S_5	S_6
Gender (male, female)	*F*-ratio	2.718	1.642	3.771	3.885	4.621	3.133
	p-value	0.101	0.202	0.054	0.050*	0.033*	0.078
	f	0.119	0.095	0.139	0.143	0.157	0.128
Major (civil, mechanical engineering)	*F*-ratio	1.004	0.001	0.524	0.727	1.898	2.859
	p-value	0.318	0.977	0.470	0.395	0.170	0.092
	f	0.071	0.071	0.055	0.063	0.101	0.123
Disposition toward multimedia (positive, neutral, negative)	*F*-ratio	18.943	21.131	10.439	12.067	14.741	20.378
	p-value	0.001*	0.001*	0.001*	0.001*	0.001*	0.001*
	f	0.446	0.472	0.331	0.357	0.393	0.464
Attendance (yes, no)	*F*-ratio	8.694	7.509	1.652	4.590	3.286	4.059
	p-value	0.004*	0.007*	0.200	0.033*	0.071	0.045*
	f	0.215	0.199	0.095	0.153	0.132	0.146

Note: * $p < 0.05$

CONCLUSIONS

It would be a promising strategic teaching for this research to integrate both animations and physics instruction into upgrading students' learning performances. The validity of this study exemplified many characteristics of integrated animations and animated environment in previous research results (Author, 2008a, 2008b, 2011, 2013; Kiboss, 2002; Tao, 2004), which contributed much to students' scientific learning competence and proficiency. As an effective integrated study, all the statistical physics learning results discussed above were consistent with most recent advanced researches (Tenenbaum, et al., 2001; Kiboss, 2002; Tao, 2004). In order to present students' better targeted programs of physics understanding and promote a more positive attitude towards physics learning, all ANCOVAs findings of students' characteristics such as gender, dispositions toward integrated physic courses, and attendance at the integrated physics learning programs had a major significant ($p < 0.05$) influence on their attitudes, with higher effect sizes than other variants considered.

Three major animation principles concerning the properties of physics learning environment such as kinematics, the movement of a ray and the conservation of mechanical energy (indicated in Figure 1, Figure 2 and Figure 3) gave students to organize reflections on the effective learning of physics conceptions. Based on the analyses of statistical responses, students were able to identify fundamental concepts between animations environment and physics learning. The integrated texts and physics learning environment helped to develop more unifying principles and meaningful higher-level skills which would enhance students' physics understanding and facilitate their learning performances. The integrated animations environment of physics learning provided a powerful means for fostering physic principles because it could illustrate multi-level physics conceptions (Galili, 1996; Kiboss, 2002). All results of three major animations supported and facilitated students' physics conceptions learning and attitudes.

The integrated statistic results of three animation units in this study were well-organized and helpful for most college students' effective physics learning. It would significantly make a positive contribution to students' physics learning attitudes. The results gave more reliable implications to previous researches (Barton, 2005; Tao, 2004; Kiboss, 2002) in relation to integrated physics materials and demonstrated applications which could encourage students to construct a better physics conceptual understanding. As stated by Ainsworth (2006, p. 183), the DeFT (Design, Functions, Tasks) learning framework needed to integrate the cognitive representations and constructivist theories of education into multiple research programs. He proposed that the effectiveness of multiple representations could best be understood by considering three fundamental learning aspects: the design parameters that were unique to learning environment; the functions that supported integrated physics learning; and the cognitive tasks that must be undertaken by learners' interactions with multiple representations. All three major animations increased students' learning perspective and cultivated physics conceptions. Through the availability of three principal animation texts, students were capable of more effective performances for developing physics conceptions and learning environment.

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INSPECTING THE THEORETICAL MODEL OF JUNIOR HIGH SCHOOL STUDENTS' LEARNING IN ENGLISH VILLAGE WITH STRUCTURAL EQUATION MODELING

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ABSTRACT

English teaching in elementary and junior high schools in Taiwan has been criticized for years as being restricted in classroom learning and not being expanded out of the classrooms and combined with real situations so that students are not really prepared to successfully use English outside of school Therefore, the computer supported collaborative learning (CSCL) platform for subsequent learning was established in English Village to help the students continue with applicable English learning after studying in English Village. CSCL is therefore worth using for remedial or broader learning. Based on the past literature, this study constructed a theoretical model for junior high school students learning in English Village and discussed the interaction among latent variables in the model. The research tools contained the sub-scales of Learning Motivation, Learning Behavior, and CSCL, as well as four English Village situational tests. A total of 243 grade 7 students in five classes in a junior high school in Pingtung County were selected as the research subjects to test the theoretical model and to observe the fit of the data with Structural Equation Model. The research outcomes show that the theoretical model in English Village presents the goodness of fit on the observed data that students' learning motivation positively and directly affected the expression of learning behaviors, the performance of learning achievements, and the collaborative quality in the CSCL. Students' learning behaviors positively and directly affected the collaborative quality in the CSCL.

INTRODUCTION

To coordinate with Challenge 2008 National Development Project - Talents Cultivation in E-generation - Create International Living Environment and Enhance National English Capability proposed by Executive Yuan, several counties in Taiwan have actively established or operate English Villages, with Taoyuan County as the pioneer. The very first International English Villages were established in Happy and Chung-Li Elementary Schools and Wun Chang Junior High School in 2008. English Village in Private Nan Jung Junior High School, Pingtung County, was also started in the first half of 2008. This study combined English learning situations in English Village to develop the learning platform suitable for students' mobile learning and cooperation communities so that students could precede with follow-up e-learning after the temporary learning experience. Present English instruction in elementary and junior high schools is restricted in classes, without being extended to real situations. It is therefore necessary to provide elaborate English vocabulary teaching and follow-up learning to remedy or deepen the learning.

RESEARCH BACKGROUND AND MOTIVATION

Read (2000) indicated that systematical vocabulary learning could provide the basis for developing single vocabularies. Particularly, in outdoor learning situations with full English, abundant vocabularies were required for different instructional activities rather than focusing on grammar or reading texts. Independent units for vocabulary learning were emphasized, especially the pronunciation and forms, which were considered as the optimal way of vocabulary learning. According to the study of Nuttall (1996), it was likely to appear misconception when focusing language learning on pronunciation, vocabulary, and structures, as reading articles was minor in the basic learning contents, rather than ignoring the importance of learning abundant vocabulary. Through empirical study, training with vocabulary pronunciation could effectively enhance vocabulary learning and writing ability. In addition to learning English from texts and articles in classes, various ways of language learning could be beneficial (Conway & Gathercole, 1990). For instance, flashcards can be applied to training students' pronunciation, enhancing the vocabulary structure, and having them loudly read out the vocabulary to reinforce memorization of the vocabulary. When establishing the contents in the Web-Based Collaborative Learning system, the integration of English learning and media, as mentioned by the previous researchers (Conway & Gathercole, 1990; Nuttall, 1996; Read, 2000), where English vocabulary learning was trained through listening and reading the vocabulary, was referred to reinforce students' vocabulary recitation.

In recent years, the rapid development and popularity of computers and technology has expanded the applications of collaborative learning from traditional classrooms to the world so that students around the world could join in collaborative learning through the web. Such collaborative learning requires computer technology that is generally named Computer Supported Collaborative Learning (CSCL) or Web-Based Collaborative Learning, where the supported application program is called CSCL system. In order to allow students to proceed effectively with collaborative learning on the web, the development and improvement of CSCL have gradually been emphasized.

LITERATURE REVIEW AND DEFINITIONS OF RESEARCH VARIABLES

From the research of Garcia, McCann, Turner, and Roska (1998), it was clearly found that ideas could control motivations related to concept, value, anticipation, and emotion, and ideas play the important mediating role between various motivations and learning behaviors or strategies so that idea-controlled Learning Motivation presented direct effects on students' learning behaviors or strategies. Wigfield and Eccles (2000) pointed out the effects of operation value and ability belief on students' choice and learning behaviors. Pintrich (1989, 2003) also indicated the effects of value, anticipation, and emotion on students' learning behaviors of activity choice, efforts, insistence, and learning strategies.

Collaborative learning refers to group learning in which students in the same group work together to achieve the common objective. All the members jointly receive the benefit of their work. In this case, an active and dependent relationship appears among the classmates (Johnson & Johnson, 1994). Various researchers proposed distinct interpretations for the definition of collaborative learning, including effective mastery of learning topics (Johnson & Johnson, 1994; Krol, Veenman, & Voeten, 2001), stepwised planning of activities (Gutwin & Greenberg, 1999; Morgan, Salas, & Glickman, 1993; Putnam, 1995), and focus on tasks (Marks, Mathieu, & Zaccaro, 2001). The researchers considered the definition of collaborative learning in tasks as group members integrating their abilities, skills, and knowledge and adopting common actions or decision-making to complete the group task or achieve the academic objective. In the research on Web-Based Collaborative Learning Activities, promoting learners' learning effectiveness and enhancing peer interaction and cooperation were mainly expected (Johnson, Druckman, & Dansereau, 1994; Johnson & Johnson, 2000; Johnson & Johnson, 1994, 1996; Johnson & Johnson, 1999; Johnson, Johnson, & Holubec, 1994a, 1994b). Slavin (1995) regarded collaborative learning as a structural and systematical teaching strategy that students with different genders, abilities, and racial backgrounds could cooperatively learn the mastery learning materials with a team or a small group. Three major reasons were discussed for collaborative learning being the mainstream of practical instructions. First, collaborative learning could enhance students' learning effectiveness and improve individual interpersonal relationship and dignity in a group. Second, collaborative learning could effectively promote students' problem-solving and thinking capabilities and the capability of knowledge integration and application. Third, collaborative learning could help students with distinct educational values and racial background learn from interpersonal interaction and cultivate appropriate social skills. Web-Based Collaborative Learning allows students to notice the value of the technology and could enhance their learning contents and technological skills (Winer, Berthiaume, & Arcuri, 2004). Borges and Baranauskas (2003) indicated that instructors were responsible for developing instructional professions, considering different learning behaviors of learners, and designing effective opeartional strategies to promote learners' Web-Based Collaborative Learning with the development of technology.

All behaviors related to learning are regarded as Learning Behaviors, such as learning methods, learning attitudes, learning habits, and learning difficulties (Cookson, 1986). Group Dynamics was proposed by Lewin (1951) in the 1930's when studying a series of group behaviors. The main idea referred to all interactions and behaviors of the group members in a group. Zimmerman (2000) mentioned that learners would observe their own behaviors through various methods and control and adjust the learning behaviors through such self-observation. In this case, Cognition was regarded as a critical factor in learning behaviors. Especially, a person who could accept new experiences could reduce learning difficulties when learning new knowledge and skills. Computer anxiety refers to individuals doubt about using computers, such as loss of important data or errors (Thatcher & Perrewe, 2002). Other reserchers pointed out the effects of preference and environment on Computer anxiety (Marakas, Johnson, & Palmer, 2000). Consequently, Computer anxiety could affect the use of information technology.

Students' Learning Motivation and Learning Emotion are closely related to Academic Learning Behaviors; especially, students' Learning Motivation and Emotion have been greatly emphasized in recent educational research and practice (Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Lanehart, 2002 ; Wenden & Rubin, 1987). From the research, students receiving positive outcomes in the learning process were likely to have positive

emotions like pride and hope. On the contrary, negative emotions like anxiety, anger, and guilt would appear when receiving negative learning outcomes (Pekrun *et al.*, 2002). A lot of researchers (Dweck, 2000; Dweck & Leggett, 1988; El-Alayli & Baumgardner, 2003) believed that students with positive learning behaviors were likely to present positive reactions after achieving success, including the emotions of pride or the emotion of pride and the feeling of relaxation not an emotion relaxation, or being willing to seek for challenges and show insistence and efforts. On the contrary, students with negative learning behaviors could have negative reactions, such as helplessness, negative emotions, and lower motivation and anticipation after failure, or lack of insistence and efforts (Dweck, 2000; El-Alayli & Baumgardner, 2003; Hong, Chiu, Dweck, Lin, & Wan, 1999; Pintrich, 2000). Weiler (2005) pointed out the effect of Learning Motivation on students' Learning Achievement and that Learning Achievement revealed positive relationship with Learning Motivation. Gagne', Yekovich, and Yekovich (1993) regarded motivation as the guidance of behaviors and the strength of power. Most researchers considered emotions in Learning Motivation as an important part of educational activities as well as the factor in students' Learning Behaviors (Meyer & Turner, 2002; Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Lanehart, 2002). As a matter of fact, research on Learning Motivation in educational situations shows that a lot of research tends to discuss the relations among Learning Motivation, Learning Behaviors, or Learning Achievement, and Learning Motivation in academic learning could affect students' Learning Behaviors (Atkinson, 1964; Covington, 1984; Mizelle, Hart, & Carr, 1993). According to social cognition theory, human Motivation-Behavior can be adjusted by individual forethought (Bandura, 1977). Winter (1991) also pointed out the significantly positive relations between students' Learning Motivation and Learning Behaviors.

RESEARCH PURPOSE

This study discusses the effect of Learning Motivation on grade 7 students' Learning Behaviors, Learning Achievement, and Participation in Discussions on Web-Based Collaborative Learning Platform when learning in English Village, as well as the effect of Learning Behaviors on Web-Based Collaborative Learning. The research purposes are listed as follows.

(1) To test the fitness of the theoretical model and observed data when students learn in English Village.
(2) To discuss the path relationship and effects of the structural model when students learn in English Village.

RESEARCH DESIGN

The learning in English Village for grade 7 students is multiple. This study establishes a theoretical model with latent variables of Learning Motivation, Web-Based Collaborative Learning, Learning Behaviors, and Learning Achievement with Structural Equation Modeling (SEM) for students learning in English Village. In addition,to test the fitness of the theoretical model and observed data, the factors in students' learning are further analyzed. The variables in the model are further described as follows.

1. Research hypothesis model

Based on the previous literature review, the factors in students' learning in English Village were inspected, and the structural model of hypotheses is proposed as Fig. 1, including the latent variables of Learning Motivation, Learning Behaviors, Web-Based Collaborative Learning, and Learning Achievement, which are marked with ovals, and the observable variables, which are marked with rectangles. Within the five latent variables, Learning Motivation is the latent independent variable, while Learning Behaviors, Web-Based Collaborative Learning, and Learning Achievement are latent dependent variables. According to the research purposes, the research hypotheses are listed as follows.

(1) To test the fitness of the theoretical model and observed data when students learn in English Village.

Hypothesis 1-1 The reliability, validity, and fitness for the dimensions of the theoretical model correspond to the standard.

(2) To discuss the optimal path relationship and the effects when students learning in English Village.

Hypothesis 2-1 grade7 students' Learning Motivation in English Village positively affects their Learning Behaviors.

Hypothesis 2-2 grade 7 students' Learning Motivation in English Village positively affects their Learning Achievement.

Hypothesis 2-3 grade 7 students' Learning Motivation in English Village positively affects their performance in Web-Based Collaborative Learning.

Hypothesis 2-4 grade 7 students' Learning Behaviors in English Village positively affects their performance in Web-Based Collaborative Learning.

Based on the above research hypotheses 2-1~2-4, the structural model for H2-1~H2-4 is shown in Fig. 1.

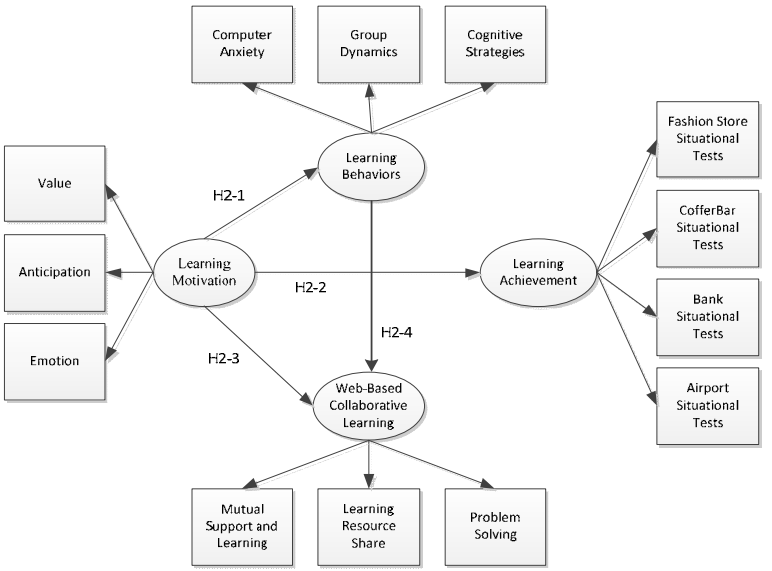

Fig. 1 Structural model for hypotheses

2. Research field

English Village in a junior high school in Pingtung County was selected as the research site, where four learning situations of fashion store, coffee bar, bank, and airport were established. Eight foreign teachers took turns for the instructions of each learning situation. The students were divided into four groups, and each topic lasted for a courses. After the situational learning in English Village, each student could continue English learning and applications through Web-Based Collaborative Learning Platform.

3. Research sample

A total of 245 grade 7 students from five classes who joined the activity were selected for questionnaire survey and tests. The questionnaire was filled in and situational tests were given in classes. A total of 243 copies of questionnaire and test scores were retrieved, with the effective retrieval rate 99.18%. According to the empirical research of Loehlin (2004) on 72 Structural Equation Modeling (SEM) studies in personality and social psychology, with the sample median being 198, almost all Structural Equation Modeling analyses were unstable when the samples were less than 100. Therefore, samples less than 200 are not recommended for stable Structural Equation Modeling analyses. There were 243 samples in this study, which was considered reasonable.

4. Research tool

Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village and four English situational learning tests were self-organized as below.

(1). Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village

Nine education experts were invited to fill in the first draft of the expert questionnaire so as to establish the validity of the questionnaire. Having the experts inspect the text of the questions and revise or delete the unclear ones, the formal questionnaire was completed, with the overall Cronbach's Alpha reliability 0.934. With Likert's five scales, the higher the score received, the higher the intensity the participant showed on the item. Three dimensions were classified, namely Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning, which were the latent variables in the theoretical model.

Nine questions were included in the sub-scale of Learning Motivation, which were referred to the relevant researchers (Pintrich, 1989, 2003) and semi-structural interviews. Learning Motivation was further divided into three sub-dimensions of Value, Anticipation, and Emotion. Seven questions were contained in the sub-scale of Learning Behaviors, which were referred to the relevant researchers (Lewin, 1951; Pintrich, 1989) and semi-structural interviews. Learning Behaviors was further divided into three sub-dimensions of Cognitive strategies, Group dynamics, and Computer anxiety. By referring to the relevant researchers (Swigger & Brazile, 1997) and semi-structural interviews, seven questions were included in the sub-scale of Web-Based Collaborative Learning, which was further divided into the sub-dimensions of Mutual support and learning, Learning resource share, and Problem-solving

(2). English situational learning tests
The researcher and two English teachers observed and recorded the instructions in English Village for the situational tests based on the four topics of fashion store, coffee bar, bank, and airport. Each quiz, as the evaluation of Learning Achievement, was based on the learning situations in English Village. Two major sections were designed for each test, and each correct question in the section was scored 1. All tests was confirmed the reliability up to 0.976. The four tests were regarded as the sub-dimensions, i.e., the latent variables of Learning Achievement in the theoretical model.

RESEARCH PROGRAM
There are five classed attended this instructional program, and each class contains eight courses. The first four contains consisted of situational instructions in English Village; four groups were divided for one courses of the four situations. The foreign teachers and the researcher proceeded with team teaching, and the groups were moved to the next situational class for the next courses. The students were asked to fill in the situational tests ten minutes before the end of each courses so that four tests were completed in the four courses. The following four courses were preceded follow-up learning in computer labs. Based on Web-Based Collaborative Learning, the computer teacher and the researcher preceded with team teaching of online learning and cooperative discussions. Finally, students were required to fill in Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village twenty minutes before the last courses.

DATA ANALYSIS
According to the research purposes, two statistical methods were adopted.
(1) SPSS12.0 was utilized for descriptive statistics (times distribution, mean, standard deviation, skewness, and kurtosis), and One-Way ANOVA was applied to understanding the characteristics and distributions of the retrieved samples.

(2) AMOS16 was utilized for establishing Structural Equation Modeling and confirmatory analyses. Confirmatory Factor Analysis (CFA), with goodness-of-fit index, was first utilized for testing the composite reliability, convergent validity, and discriminant validity. Various structural models and relevant hypotheses were further tested and compared, including the evaluation of overall fitness, the tests of research hypotheses, and the analysis and comparison of path effect.

RESEARCH OUTCOMES
With Confirmatory Factor Analysis (CFA) to measure the theoretical model for grade 7 students' learning in English Village, the structural model was further examined by Path Analysis of latent variables. Measurement tests were classified into Normality Test, Offending Estimate Test, Fitness Test, Convergent Validity Test, and Discriminant Validity Test; and the structural model test was divided into Offending Estimate Test, Overall Goodness of Fit Index Test, Model Parameter Estimate Test, Hypothesis Test of Path Coefficient, and Effect Analysis.

1. Confirmatory Factor Analysis of measurement tests
(1). Normality Test
The dimensions, sub-dimensions, and question estimates were organized in Table 1 for further tests and explanation. Normality Test was divided into Univariate Normality Test and Multivariate Normality Test. When the absolute skewness and kurtosis of observed variables are less than 2, the observed variables present normality (Bollen & Long, 1993). The absolute SK and KU in Table 1 were less than 2,whics corresponded to the univariate normality. Based on Bollen (1989), when Mardia coefficient is less than p(P+2) (p is the number of observable variables), the sample showesd multivariate normality. In Table 1, the Mardia coefficient of Learning Motivation 24.84,was less than 99, the mardia coefficient of Web-Based Collaborative Learning 14.82 was less than 63, the mardia coefficient of Learning Behaviors 13.34 was less than 63, and the mardia coefficient of Learning Achievement 2.84 was less than 24, so then all corresponded to multivariate normality. Method of Maximum Likelihood therefore could be applied to Structural Equation Modeling analyses.

(2). Offending Estimate Test
Offending estimate refers to the estimated parameter exceeding acceptable range, i.e., inappropriate solution in the measurement model or structural model. When offending estimates appear, the estimate of the entire model is incorrect and it should be organized. In Table 2, the error variance EV was positive, the standardized regression weighted coefficient SFL (t) was between 0.49 and 0.82, not exceeding 0.95, t was significant, and standard error SE was between 0.27 and 0.82, so this measurement model did not reveal offending estimates.

Table 1: Confirmatory Analysis of the measurement model

Dimension	Measured variable	M	SD	SK	KU	SFL	SE	SMC	EV	CR	AVE
Learning Motivation	**Value**	**3.90**								**0.68**	**0.52**
	LM01	3.88	1.02	-0.72	0.09	0.70	0.29*	0.49	0.51		
	LM02	3.91	0.97	-0.73	0.20	0.74	0.28*	0.54	0.46		
	Anticipation	**3.69**								**0.60**	**0.34**
	LM03	3.66	1.07	-0.49	-0.35	0.52	0.32*	0.27	0.73		
	LM04	3.72	1.01	-0.35	-0.49	0.67	0.30*	0.45	0.55		
	LM05	3.69	1.13	-0.52	-0.41	0.55	0.33*	0.30	0.70		
	Emotion	**3.59**								**0.77**	**0.46**
	LM06	3.53	1.12	-0.29	-0.64	0.79	0.30*	0.62	0.38		
	LM07	3.91	1.11	-0.76	-0.20	0.66	0.31*	0.43	0.57		
	LM08	3.37	1.21	-0.38	-0.62	0.63	0.34*	0.40	0.60		
	LM09	3.54	1.14	-0.41	-0.54	0.63	0.32*	0.39	0.61		
	Mardia coefficient	**24.84**					***p*(*p*+2) = 99**				
Dimension	**Measured variable**	**M**	**SD**	**SK**	**KU**	**SFL**	**SE**	**SMC**	**EV**	**CR**	**AVE**
Web-Based Collaborative Learning	**Mutual support and learning**	**3.51**								**0.82**	**0.61**
	WCL01	3.58	1.07	-0.33	-0.38	0.80	0.27*	0.64	0.36		
	WCL02	3.32	1.09	-0.11	-0.46	0.81	0.28*	0.65	0.35		
	WCL03	3.63	1.17	-0.48	-0.57	0.73	0.31*	0.53	0.47		
	Learning resource share	**3.61**								**0.73**	**0.58**
	WCL04	3.54	1.03	-0.37	-0.24	0.75	0.28*	0.56	0.44		
	WCL05	3.69	1.12	-0.65	-0.18	0.78	0.31*	0.60	0.40		
	Problem-solving	**4.13**								**0.66**	**0.50**
	WCL06	3.91	1.18	-0.93	0.00	0.70	0.46*	0.49	0.51		
	WCL07	4.34	0.93	-1.41	1.49	0.71	0.31*	0.50	0.50		
	Mardia coefficient	**14.82**					***p*(*p*+2) =63**				
Learning Behaviors	**Cognitive strategies**	**3.57**								**0.67**	**0.42**
	LB01	3.51	1.11	-0.42	-0.28	0.60	0.33*	0.35	0.65		
	LB02	3.42	1.13	-0.32	-0.47	0.82	0.35*	0.66	0.34		
	LB03	3.78	1.10	-0.58	-0.34	0.49	0.34*	0.24	0.76		
	Group dynamics	**3.87**								**0.58**	**0.42**
	LB04	3.94	1.09	-0.78	-0.19	0.75	0.42*	0.56	0.44		
	LB05	3.80	1.06	-0.78	0.11	0.52	0.55*	0.27	0.73		
	Computer anxiety	**3.22**								**0.55**	**0.38**
	LB06	3.34	1.10	-0.29	-0.29	0.63	0.37*	0.61	0.39		
	LB07	3.09	1.24	-0.15	-0.79	0.60	0.42*	0.64	0.36		

	Mardia coefficient	**13.34**				**$p(p+2)$ =63**					
Learning Achievemet	**Situational tests**	**7.87**									
	Fashion store	11.05	3.74	0.19	-0.86	0.80	0.82*	0.64	0.36	**0.79**	**0.49**
	Coffee bar	10.57	2.23	0.81	0.08	0.75	0.29*	0.56	0.44		
	Bank	3.31	2.07	-1.19	1.22	0.52	0.31*	0.27	0.73		
	Airport	6.54	3.55	-0.72	-0.13	0.71	0.77*	0.50	0.50		
	Mardia coefficient	**2.84**				**$p(p+2)$ =24**					

Data source: organized by the author
Note 1: * stands for the statistics reaching the standard, when α=0.05.
Note 2: M is mean; SD is standard deviation; SK is skewness; KU is kurtosis; SFL is standardized factor loading; SE is the standard error of factor loading; SMC is squared multiple correlation; EV is error variance; CR is composite reliability; and AVE is average variance extracted
Note 3: p is the number of observed variables, and p(p+2) should be larger than Mardia coefficient.

(3). Fitness test
From Table 2, χ^2 in Learning Motivation (35.61, p=0.06>α) did not reach significance, corresponding to the fit index, whileχ^2 in Web-Based Collaborative Learning (26.098, p=0.006<α), Learning Behaviors (21.251, p=0.031<α), and Learning Achievement (6.268, p=0.044<α) achieved significance, not corresponding to the fit index. From such an evaluation index, it might be mistaken that the theoretical model and observed data did not fit because χ^2/df being within 1~5 was required. howeren, χ^2/df of each dimension was 1.484, 2.373, 1.932, and 3.134, so they conformed to the standard fitness.

Regarding the standard fitness of the measurement model, GFI, AGFI, NFI, NNFI, RFI, and IFI of the dimensions in the theoretical model appeared above the optimal value 0.9, except RFI of Learning Behaviors being 0.862, close to 0.9. The above indices indicated that a model could explain the covariance percentage of observed data where the closer the value to 1, the better fitness was shown. Generally speaking, when the value is larger than 0.90, the fitness is regarded as optimal. Standardized root mean square residual (SRMR), as the mean square root of the square elements in the residual covariance matrix, reflects the residual value. When the value is small, the model fitness is better. Moreover, root mean square error of approximation (RMSEA) is regarded as the measure of discrepancy per degree of freedom. When root mean square error of approximation is less than 0.05, it is considered Good fit, Fair fit when between 0.05 and 0.08, Mediocre fit when between 0.08 and 0.10, and Bad fit when larger than 0.10. According to Table 2, SRMR and RMSEA were less than the standard 0.08, except the RMSEA of Learning Achievement being 0.094, reaching the standard fit. Regarding PNFI and PGFI in parsimony goodness-of-fit index, in spite that they did not achieve standard fitness in Web-Based Collaborative Learning, Learning Behaviors, and Learning Achievement, and CN of Web-Based Collaborative Learning did not reach the standard, CN of the rest dimensions corresponded to the standard that the entire measurement model presented favorable fitness.

(4). Convergent Validity Test
Convergent validity tests whether the questions developed from a variable will converge on a factor (dimension). The test standard is referred to (1) the standardized factor loading of observed variables being over 0.5 and t achieving significance (Hair, Anderson, Tatham, & Black, 1998), (2) composite reliability over 0.6 (Bagozzi & Yi, 1988; Fornell & Larcker, 1981), and (3) the average variance extracted of each latent variable larger than 0.5 (Fornell & Larcker, 1981). Composite reliability, also named construct reliability, is the reliability index of latent variables (dimensions) to measure the internal consistency of observed variables (questions in the questionnaire) of latent variables. From Table 1, standardized factor loading of SFL (t) was between 0.49 and 0.82, mostly larger than 0.5, and t achieved significance, The composite reliability CR of the dimensions appeared between 0.55 and 0.82, except Group dynamics and Computer anxiety being 0.58 and 0.55, not reaching 0.6, so the overall reliability presented the reference value. Average variance extracted (AVE) should appear between 0.34 and 0.61. In addition to Web-Based Collaborative Learning, average variance extracted of other dimensions reached 0.5, and some sub-dimensions of Learning Motivation, Learning Behaviors, and Learning Achievement did not achieved 0.5. Overall, the convergent validity of the measurement model in this study was acceptable, while average variance extracted (AVE) required improvement.

Table 2: Test of goodness-of-fit index of the measurement model

Statistic test		Standard	Learning Motivation	Web-Based Collaborative Learning	Learning Behaviors	Learning Achievement
Measures of absolute fit	χ^2	The less the better (P≧α)	35.61* (p=0.06>α)	26.098 (p=0.006<α)	21.251 (p=0.031<α)	6.268 (p=0.044<α)
	χ^2/df	Between 1~5	1.484*	2.373*	1.932*	3.134*
	GFI	>0.9	0.969*	0.972*	0.975*	0.988*
	AGFI	>0.9	0.942*	0.928*	0.938*	0.940*
	RMR	<0.08	0.043*	0.036*	0.054*	0.183
	SRMR	<0.08	0.035*	0.032*	0.045*	0.027*
	RMSEA	<0.08	0.045*	0.075*	0.062*	0.094
Incremental fit measures	**NFI**	>0.9	0.947*	0.958*	0.928*	0.978*
	NNFI	>0.9	0.973*	0.952*	0.928*	0.954*
	CFI	>0.9	0.982*	0.975*	0.962*	0.985*
	RFI	>0.9	0.920*	0.920*	0.862	0.934*
	IFI	>0.9	0.982*	0.975*	0.964*	0.985*
Parsimonious fit measures	**PNFI**	>0.5	0.631*	0.502*	0.486	0.326
	PGFI	>0.5	0.517*	0.382	0.383	0.198
	CN	>200	248*	183	225*	232*

Data source: Self-organized
Note 1: * stands for corresponding to the standard.

(5). Discriminant Validity Test
Discriminant validity refers to the questions in various dimensions where the correlations should be low. By measuring two dimensions and Correlation Analysis, when the correlation between the two dimensions is low, they present discriminant validity (Anderson & Gerbing, 1988; Churchill, 1979). Hair et al (1998) also suggested that the AVE square root of each dimension should be larger than the number of the correlative coefficient in various dimensions and at least represented 75% of overall comparative number. From Table 3, after Correlation Analysis of the ten dimensions, 45 correlations were between 0.01 and 0.66, the AVE square roots were between 0.61 and 0.78, and merely three dimensions have the AVE square roots larger than 0.61. In this case, the AVE square root of each dimension was larger than the number of correlative coefficient in various dimensions and represented 91.67% of the overall comparative number. The discriminant validity of the measurement model was favorable.

Table 3: Test of discriminant validity

Dimension	No. of question	Correlative coefficient / *AVE* square root									
		A	B	C	D	E	F	G	H	I	J
A. Value [1]	2	**0.72**[2]									
B. Anticipation	3	0.58*[3]	**0.69**								
C. Emotion	4	0.57*	0.58*	**0.68**							
D. Supportive learning	3	0.54*	0.51*	0.62*	**0.78**						
E. Learning resource share	2	0.46*	0.51*	0.62*	0.66*	**0.76**					
F. Problem-solving	2	0.35*	0.31*	0.48*	0.46*	0.46*	**0.70**				
G. Cognitive strategies	3	0.42*	0.45*	0.56*	0.61*	0.61*	0.48*	**0.65**			
H. Group dynamics	2	0.28*	0.31*	0.40*	0.41*	0.46*	0.42*	0.40*	**0.65**		
I. Computer anxiety	2	0.23*	0.31*	0.27*	0.45*	0.46*	0.24*	0.49*	0.34*	**0.61**	
J. Learning Achievement	4	0.10	0.15*	0.23*	0.13*	0.16*	0.27*	0.18*	0.16*	0.01	**0.70**

Data source: Self-organized

Note (1): The mean of variables is regarded as the mean of total of various dimensions in the scale.

Note (2): The diagonal value is the AVE square root of the latent variable, whose value should be larger than non-diagonal value.

Note (3): * When the significance α=0.05, the correlative coefficient among variables achieves the significant standard.

2. Path Analysis of latent variables in the structural model

(1). Offending Estimate Test

The offending estimate in the structural model can be observed in Table 4. The error variance in the overall model was positive, the standardized regression weighted coefficient was between 0.264 and 0.838, which was less than 0.95, and the standard error was between 0.034 and 0.441. The three tests corresponded to the standard that no offending estimate appeared in the structural model.

(2). Overall Goodness of Fit Index Test

According to Table 5, $\chi 2$ of the overall model (104.61, $p=0.00<\alpha$) achieved the significant standard, but not the fit; $\chi 2/df=1.715$ reached the fit. Regarding the overall model, GFI=0.939, AGFI=0.909, NFI=0.921, NNFI=0.955, CFI=0.965, RFI=0.899, and IFI=0.965; in addition to RFI=0.899 close to 0.9, the rest achieved the optimal fitness 0.9. Both SRMR and RMSEA were 0.054, less than the fit standard 0.08. In parsimony goodness-of-fit index, PNFI=0.720 and PGFI=0.629 reached the fit standard 0.5; however, CN=186 did not achieve the fit standard 200. As a result, the covariance structure of the model corresponded to that of the real sample data. According to the above goodness-of-fit indices, the structural model in this study presented favorable fitness.

Table 4: Parameter estimate of the overall model

Parameter			Regression weighted coefficient	standard error	t	Error variance	t	Squared multiple correlations
Learning Behaviors	←	Learning Motivation	0.771*	0.038	7.722	—	—	—
Web-Based Collaborative Learning	←	Learning Motivation	0.376*	0.040	3.209	—	—	—
Web-Based Collaborative Learning	←	Learning Behaviors	0.678*	0.141	4.383	—	—	—

Learning Achievement	←	Learning Motivation	0.264*	0.150	3.469	—	—	—
Value	←	Learning Motivation	0.706*	0.037	11.126	0.375*	9.080	0.498
Anticipation	←	Learning Motivation	0.721*	0.034	11.390	0.305*	8.902	0.519
Emotion	←	Learning Motivation	0.838*	0.441	14.993	0.924*	6.687	0.702
Cognitive strategies	←	Learning Behaviors	0.790*	0.139	8.644	0.315*	8.298	0.625
Group dynamics	←	Learning Behaviors	0.557*	0.120	6.807	0.322*	8.415	0.310
Computer anxiety	←	Learning Behaviors	0.576*	0.239	6.645	0.484*	10.352	0.332
mutual support and learning	←	Web-Based Collaborative Learning	0.807*	0.161	9.352	0.272*	6.793	0.651
learning resource share	←	Web-Based Collaborative Learning	0.802*	0.161	9.333	0.462*	10.116	0.643
problem-solving	←	Web-Based Collaborative Learning	0.590*	0.178	3.721	0.628*	9.793	0.348
fashion_store	←	Learning Achievement	0.781*	0.090	9.643	5.433*	6.756	0.610
coffee_bar	←	Learning Achievement	0.760*	0.050	7.369	2.090*	7.319	0.578
bank	←	Learning Achievement	0.518*	0.056	10.402	3.127*	10.003	0.268
airport	←	Learning Achievement	0.714*	0.064	12.402	6.153*	8.134	0.510
Learning Motivation			—	—	—	0.372*	5.889	—
Learning Behaviors			—	—	—	0.004	0.123	0.594
Web-Based Collaborative Learning			—	—	—	0.126*	3.323	0.370
Learning Achievement			—	—	—	7.910*	6.204	0.070

Data source: Self-organized
Note: * stands for significant standard 0.05
— represents no estimate

(3). Model Parameter Estimate Test

From Table 4 and Fig. 2, the factor loading estimate of latent variables and observed variables, the squared multiple correlation (R^2) of observed variables, and the squared multiple correlation (R^2) of latent dependent variables are shown. The factor loading estimate (regression weighted coefficient) between 0.264~0.838 achieved the significant standard ($t>1.96$). The variance explained is demonstrated as below.

Table 5: Test of goodness-of-fit index of the overall model

Statistic test		Standard	Test result	Fitness
Measures of absolute fit	χ^2	The less the better(P≧α)	104.61(P=0.00<α)	No
	χ^2/df	Between 1~5	1.715	Yes
	GFI	>0.9	0.939 0.909	Yes
	AGFI	>0.9	0.909	Yes
	RMR	<0.08	0.151	No
	SRMR	<0.08	0.054	Yes
	RMSEA	<0.08	0.054	Yes
Incremental fit measures	**NFI**	>0.9	0.921	Yes
	NNFI	>0.9	0.955	Yes
	CFI	>0.9	0.965 0.899	Yes
	RFI	>0.9	0.899	No
	IFI	>0.9	0.965	Yes
Parsimonious fit measures	**PNFI**	>0.5	0.720 0.629	Yes
	PGFI	>0.5	0.629	Yes
	CN	>200	186	No

Data source: Self-organized
Note: * stands for corresponding to the standard

(i) In terms of Learning Motivation
Learning Motivation contained the dimensions of Value, Anticipation, and Emotion. The factor loading estimates (regression weighted coefficient) of Value and Anticipation showed close values of 0.706 and 0.721, and R^2 were 0.498 and 0.519, close to 0.5, showing the explanation capability. The factor loading estimate of Emotion was 0.838, which was the highest one in all sub-dimensions, and R^2 was 0.702 revealing the favorable explanation. Moreover, when comparing the factor loadings among various sub-dimensions, Emotion (0.838) was the most important factor in students' cognition of Learning Motivation, followed by Anticipation (0.721), and Value (0.706) was relatively low. Such results showed that the critical factor of Emotion should be emphasized in order to enhance students' Learning Motivation. The result was consistent with several researchers' opinions that students' Learning Motivation and Emotion have been highly emphasized in educational research and practice in recent years (Pekrun, *et al.*, 2002; Schutz & Lanehart, 2002; Wenden & Rubin, 1987). Most researchers considered Emotion in Learning Motivation as an inevitable part in educational activities (Meyer & Turner, 2002; Pekrun, *et al.*, 2002; Schutz & Lanehart, 2002).

(ii) Regarding Learning Behaviors
Learning Behaviors included the sub-dimensions of Cognitive strategies, Group dynamics, and Computer

anxiety. The factor loading estimate of Cognitive strategies was 0.79, and R^2 was 0.625, showing the favorable explanation. The factor loading estimates of Group dynamics and Computer anxiety showed close with values of 0.557 and 0.576, and R^2 was 0.310 and 0.332, revealing that the two factors did not reach the standard 0.4, and so lacked explanation power. Moreover, after comparing the factor loadings among various sub-dimensions, Cognitive strategies (0.79) was the most important factor in students' Learning Behaviors, followed by Computer anxiety (0.576), and Group dynamics (0.557), which was relatively low. Such results showed that the key factors of Cognitive strategies should be stressed when concerning students' Learning Behaviors.

(iii) In regard to Web-Based Collaborative Learning
Web-Based Collaborative Learning contained the sub-dimensions of Mutual support and learning, Learning resource sharing, and Problem-solving. The factor loading estimates of Mutual support and learning and Learning resource sharing showed 0.807 and 0.802, which were rather high in all sub-dimensions, and R^2 was 0.651 and 0.643, showing favorable explanations. The factor loading estimate of Problem-solving was 0.59, and R^2 was 0.348, not achieving the standard 0.4, revealing lower explanation capability. Consequently, both Mutual support and learning (0.807) and Learning resource sharing (0.802) were the key factors in students' Web-Based Collaborative Learning process, followed by Problem-solving (0.59). As a result, Mutual support and learning and Learning resource sharing were the key factors in promoting students' Web-Based Collaborative Learning and Learning effectiveness, in which Mutual support and learning presented the highest correlation with Web-Based Collaborative Learning.

Furthermore, the multiple correlation coefficient R^2 of latent dependent variables showed the variance explained 0.370 for Web-Based Collaborative Learning, 0.594 for Learning Behaviors, and 0.07 for Learning Achievement (Table 4 & Fig. 2).

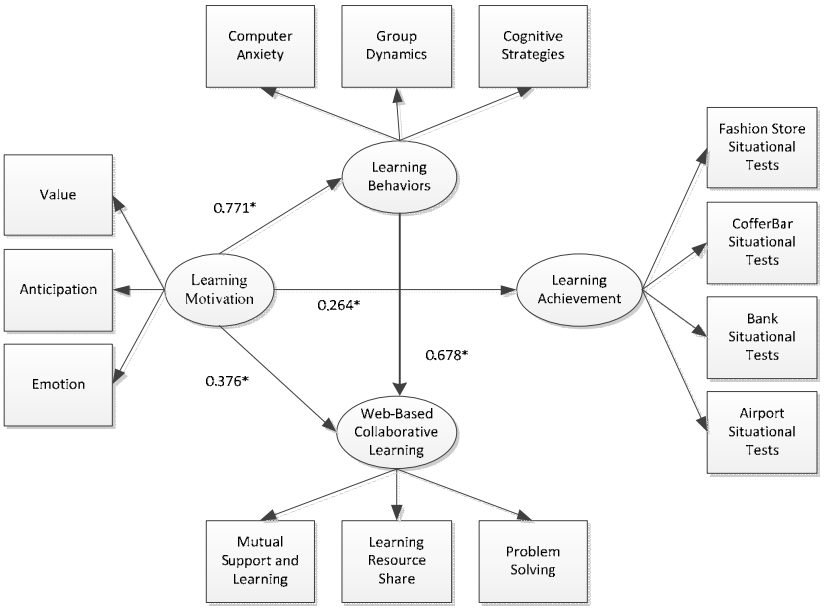

Fig. 2 Path relationship among latent variables in the structural model

(4). Hypothesis Test of Path Coefficient
With the verification of the theoretical model, Table 6, the research hypotheses 2-1~2-4 showed significantly positive effects. The outcomes are concluded as below. (1) In English Village, grade 7 students' Learning Motivation positively affected their Learning Behaviors, with the path=0.771 and t=7.722, achieving significance. (2) grade 7 students' Learning Motivation positively affected their Learning Achievement, with the path=0.264 and t=3.469, reaching significance. (3) grade 7 students' Learning Motivation positively affected their Web-Based Collaborative Learning, with the path=0.376 and t=3.209, achieving significance. (4) grade 7 students' Learning Behaviors positively affected their Web-Based Collaborative Learning, with the path=0.678 and t=4.383, reaching significance.

(5). Effect Analysis
From Table 7, the latent independent variables of Learning Motivation in the theoretical model presented significant correlations with Learning Behaviors, Learning Achievement, and Web-Based Collaborative Learning, in which Web-Based Collaborative Learning revealed the largest effect. The effect values showed Direct effect 0.376, Indirect effect of Learning Behaviors 0.523 (0.771*0.678), and the overall effect 0.899.

Learning Motivation showed positive effects on Learning Behavior with the value 0.771; Learning Behaviors appeared positive effects on Web-Based Collaborative Learning with the value 0.678; and, Learning Motivation revealed positive effects on Learning Achievement with the value 0.264.

In conclusion, the reliability, validity, and fitness between the theoretical model and observed variables corresponded to the standards of Hypothesis 1-1 was confirmed. The path in hypotheses 2-1~2-4 reached significance so that the four hypotheses were confirmed.

Table 6: Test of path relationship

Hypothesis	Path	Hypothesis relation	Path value	t	Hypothesis
2-1	Learning Motivation→Learning Behaviors	positive	0.771*	7.722	Agreed
2-2	Learning Motivation→Learning Achievement	positive	0.264*	3.469	Agreed
2-3	Learning Motivation→Web-Based Collaborative Learning	positive	0.376*	3.209	Agreed
2-4	Learning Behaviors→Web-Based Collaborative Learning	positive	0.678*	4.383	Agreed

Data source: Self-organized
Note: * stands for significance 0.05

Table 7: Effects of overall model

Latent dependent variables	Latent independent variable	Direct effect	Indirect effect	Total effect	Hypothesis
Learning Behaviors	Learning Motivation	0.771*	—	0.771	2-1 agreed
Learning Achievement	Learning Motivation	0.264*	—	0.264	2-2 agreed
Web-Based Collaborative Learning	Learning Motivation	0.376*	0.523(0.771*0.678)	0.899	2-3 agreed
	Learning Behaviors	0.678*	—	0.678	2-4 agreed

Data source: Self-organized
Note: * stands for the significance 0.05
— represents no estimate

The above explanations and Tables 6 & 7 are consistent with what a lot of researchers have presented. In other words, research on Learning Motivation has been greatly emphasized in educational situations, and students' Learning Motivation affects their Learning Behaviors, showing direct and positive effects of Learning Motivation on Learning Behaviors (Atkinson, 1964; Covington, 1984; Gagné, et al., 1993; Garcia, et al., 1998; Meyer & Turner, 2002; Mizelle, et al., 1993; Pekrun, et al., 2002; Pintrich, 1989, 2003; Schutz & Lanehart, 2002; Winter, 1991).

CONCLUSIONS

This study aims to establish a theoretical model which could affect the learning of junior high school students in English Village and to discuss the mutual effects among the latent variables. The research tools contain self-organized Questionnaire of Learning Motivation, Learning Behaviors, and Web-Based Collaborative Learning in English Village and four situational tests. Data from a Total of 243 grade 7 students in five classes in Pingtung County were arranged Structural Equation Modeling to test the fitness of the theoretical model and observed data. The conclusions are demonstrated as follows. The theoretical model and observed data of grade 7 students in English Village are fitted. Students' Learning Motivation positively and directly affects their Learning Behaviors, Learning Achievement, and Web-Based Collaborative Learning, and Learning Behaviors positively and directly affects Web-Based Collaborative Learning. The research outcomes show that Emotion is the key

factor in promoting students' Learning Motivation. When concerning students' Learning Behaviors, Cognitive strategies should be emphasized. Mutual support and learning and Learning resource share are the primary factors in promoting students' Web-Based Collaborative Learning and Learning effectiveness, in which Mutual support and learning presents the highest correlations with Web-Based Collaborative Learning.

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INSTRUCTORS' PERCEPTIONS TOWARDS THE USE OF AN ONLINE INSTRUCTIONAL TOOL IN AN ACADEMIC ENGLISH SETTING IN KUWAIT

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ABSTRACT
This study sets out to explore the faculty members' perceptions of a specific web-based instruction tool (Achieve3000) in a private higher education institute in Kuwait. The online tool provides highly differentiated instruction, which is initiated with a level set at the beginning of the term. The program is used in two consecutive courses as part of the coursework, with the main focus on Academic English skills. For that purpose, 8 faculty members, 6 of which have used it for the first time, have been interviewed. The questions have been designed to seek responses about faculty members' perceptions of using the branded program in EAP practice, perceptions related to the strengths and weaknesses of the program, opinions about the contribution to student learning, and student attitudes towards web-based instruction. The analysis of the data reveal that participants have positive views towards differentiated instruction and seem to think this is one of the major strengths of the ICT tool. In addition to this instructors think ICT motivates students, adds variety to class, but it makes them question their role in the classroom, and also aggravates the already existing plagiarism endemic among students.
Key words: differentiated instruction, ICT in (ELT) English Language Teaching, EAP (English for Academic Purposes), academics' perceptions

INTRODUCTION

Passively listening to the audio tapes, repeating after the teacher have become things of the past now in an EFL class. Computers and the Internet have changed foreign language learning for good. Information communication technologies, an umbrella term for using computers, software, or Internet for instructional purposes (Hew & Brush, 2007, p. 225), refers to the use of technology by teachers for instructional preparation, instructional delivery, and technology as a learning tool for students (Inan & Lowther, 2010). ICT have been integrated into many aspects of education, and particularly into English language curricula providing learners and teachers with a broad spectrum of resources for higher language achievement. The use of ICT in language teaching and learning, which is also referred as computer-assisted language learning (CALL) developed from the earliest stages in audio tapes, word processing, and CD-ROM to Internet, whiteboard, social networking sites, email and other forms of technology including PowerPoint presentations.

Keeping students interested and engaged in an activity may be a challenge for ESL/EFL teachers, and CALL provides new possibilities for assisting teachers to successfully meet this challenge. CALL can energize the students (Lee, 2000), and offer some advantages such as the reduction of long-term costs, and increased opportunities for access to various sources of information, increased opportunities for communication and personalization of the teaching process (Jorge, Jorge, Gutiérrez, García & Díaz, 2003). By using authentic materials with visuals and animations, posting and replying messages, writing and replying emails, learning is no longer restrained in time and space; rather, through the internet, learners are offered opportunities to communicate and learn collaboratively whenever and wherever they want. The students display an enhanced sense of achievement and increase in self-directed learning, with the ability to communicate, conduct research and present ideas effectively beyond the confines of the class (Shetzer & Warschauer, 2000).

The field of ICT and Computer Assisted Language Learning is highly eclectic and these diverse activities of CALL represent a variety of ways that support learning (Levy, 1997, p. 41). As there is no one single method, technique, approach, or course book that work well perfectly in every context, a single type of CALL may not correspond to all needs and fit all learners' preferences. Evaluation consists of getting a clear understanding of what the tool actually offers in terms of input and interaction, and then judging how closely it fits learner's needs as determined by their preferences and learning objectives.

In order to maximize the effectiveness of using ICT we need to think carefully about how it will be integrated into the language learning curriculum. Albirini (2004) expresses that as a recent educational innovation, the computerization of education is a complex process where many agents play a role. Many factors should be considered for a successful implementation of CALL, such as students and teachers' attitudes, expectations and needs, as well as technological and organizational infrastructure, and the curriculum. However, the human force of the educational system, teachers and students, seem to be the most influential agents in facilitating or impeding changes that are outside the control of the ministries of education, and any successful transformation in

educational practice requires the development of positive user attitude toward the new technology (Pelgrum, 2001).

Recent studies have shown that the successful implementation of educational technologies depends largely on the attitudes of educators, who eventually determine how they are used in the classroom. Bullock (2004) found that teachers' attitudes are a major enabling and disabling factor in the adoption of technology. Similarly, Kersaint, Horton, Stohl, and Garofalo (2003) found that teachers who have positive attitudes toward technology feel more comfortable using it and usually incorporate it into their teaching. The development of teachers' positive attitudes toward CALL is a key factor for enhancing computer integration (Watson Todd, 2003). Internet based instruction can be effective only with the teacher's role as a "facilitator" who plans, designs and guides the lesson (Brandl, 2002).

Background and Objectives of the Study

This study sets out to explore the faculty members' perceptions of a specific web-based instruction tool. The online tool is used in two consecutive courses, with the main focus on Academic English skills. According to the course descriptions, the courses aim to develop students' writing and reading skills, and both courses involve critical reading and thinking skills and emphasize writing as a process.

EAP - English for Academic Purposes – refers to the language and associated practices that people need in order to undertake study or work in English medium higher education. The objective of an EAP course is to help these people learn some of the linguistic and mainly institutional and disciplinary practices involved in studying or working through the medium of English (Gillett, 2011). EAP teaching is task based, and it uses the types of academic task commonly found in higher education. Writing classes are usually based on some kind of authentic extended writing task that the students do in their own time, with the help of in-class teaching and individual tutorial support. Reading is similar with students doing large amounts of in-class and out of class reading - usually of authentic texts, as well as the lecturer helping the students to be more aware of typical language used in academic texts, text structure and strategies for reading critically and dealing with difficulties (Gillet & Wray, 2006).

According to Watson Todd (2003), there are six approaches on which teaching EAP generally places a greater emphasis than other types of English teaching, and integrating technology is one them. Modern nature of technological resources in many EAP situations enables EAP to be at the forefront of using technology for language teaching. EAP situations are generally better resourced than other situations of English language teaching and because EAP course objectives may include technology-oriented goals, technology has played an important role in teaching EAP in the last few years. The nature of EAP situations, then, often allows approaches to be used which other situations may wish to use but which are constrained by practical factors.

According to the website of the program, it provides web-based, differentiated instruction solutions designed to reach a school's entire student population. Among a variety of literacy solutions they provide, the one that constitutes the subject of this research is ELL, which targets English language learners at a college readiness level. Students who have subscription to the web page receive daily content and they proceed with the guidance of their instructors. ELL solution integrates language skills, activates background knowledge, focuses on vocabulary and explicitly teaches reading strategies (Achieve3000, 2012).

A concept that should be emphasized about the ICT tool is "differentiated instruction". Differentiated Instruction (DI) is a teaching and learning philosophy that emphasizes students at the core. Because each student is different, DI stresses that one style of teaching will not match every student's learning style. DI allows teachers to vary learning activities, content, assessment, and the classroom environment to meet the needs and support the growth of each child. In other words, teachers vary content, process, and product for each learner – from prekindergarten to college (Stanford & Reeves, 2009, p. 3). Teacher is the one to decide on the type and area of differentiation, taking into serious consideration the particular needs of each student.

Researchers and educators in favor of differentiated teaching believe that it is the answer to equity and effectiveness for all in mixed ability classrooms and academic improvement of students by differentiated teaching is supported by various research studies (Valiende & Tarman, 2011, pp. 172-173). However time constraints, class size and workload often prevent teachers from moving away from the "one size fits all" approach. This is why the need for integration of ICT in the learning process is now greater than ever and the potential of ICT, to promote new teaching objectives, change traditional teaching practices and develop new teaching methods has been noticed and emphasized by many researchers (Jonassen, 2000).

By analyzing the reading and writing strategies that are emphasized within the five step routine, the ICT tool looks like an ideal solution for teaching Academic English to second language learners. Task-based instruction, integrated with authentic texts with both in and out of class options, authentic extended writing task which yields itself to process writing and differentiated instruction are the strengths of the online instruction tool.

The online instructional tool has been used by the English Department since February 2011. At the beginning of every semester faculty members receive in-service training through video conferencing, and are encouraged to send their questions and concerns by e-mail to the professional development staff in the company. The program targets reading 40 articles and answering the comprehension and essay writing questions related to the article that has been read. This ICT tool comprises 40% of the course assessment, so students are highly recommended to complete their reading and writing activities so that they can get higher grades at the end of the course.

Despite some similar previous experiences in other countries all over the world, this has been an innovative approach in EAP instruction in Kuwait. This year, with new faculty sharing the web-based instruction experience, it has been deemed necessary to ask faculty their opinions about the implementation of the program and the feedback they get from their students.

Purpose of the Study

Current trends in education have spurred competitiveness among universities as they seek new ways to attract students not only in traditional environments but also in the online environment. In both, it is important to ensure high levels of student learning and achieve a better understanding of students' needs in relation to their learning (Armstrong, 2011). Online education can be improved and its value as an educational tool may be increased by getting feedback from teachers and students on a regular basis. By investigating ways that faculty members perceive and interact with the learning environment, the design of the online learning environment can be better developed to support learning.

For that purpose, 8 faculty members, 6 of which have used it for the first time, have been interviewed and asked about their perspectives of the online program. The questions in the interview have been designed to seek responses about faculty members' perceptions of using the branded program in EAP practice, perceptions related to the strengths and weaknesses of the program, opinions about the contribution to student learning, and student attitudes towards the web-based instruction.

Significance of the Study

Despite the abundance of research on teacher and student attitudes and perspectives towards computer, use of ICT and CALL in class, studies regarding the use of Information and Communication Technologies in teaching Academic English in higher education are scarce. In addition, studies within the context of Gulf counties, in particular, Kuwait are very rare and this research is the first that is carried out in a Kuwaiti higher education institute.

Gulf countries are the primary providers of education for their youth, and over the past 40 years, they have put their oil wealth by investing heavily in education. Nevertheless, major problems remain in GCC education systems and some indicators, such as the mean number of years of schooling (6.1 years in Kuwait) and high dropout rates are a serious issue in the GCC region. According to a survey conducted in 2010 (AlMunajjed & Sabbagh), when participants were asked the reasons of their discontent with their education system, 63% listed traditional methods of teaching as the main reason. Traditional teaching methods in the GCC countries emphasize repetition and memorization rather than skills highly valued in the modern workplace, such as creative thinking, brainstorming, problem solving, and personal initiative. Outmoded curricula and textbooks were mentioned as another source of dissatisfaction because they are not preparing students to succeed in rapidly changing societies that aspire to become knowledge-based economies in competitive global markets. These deficiencies require a commitment by Gulf societies to address curricula, teaching methods, and the use of information and communications technology (ICT) in schools (AlMunajjed & Sabbagh, 2010). This finding seems to serve the purpose of this research, which is aiming to get student feedback through teacher perspectives of using a new teaching method and applying ICT in the classroom of a Gulf country higher education classroom.

Another significance of this study is that it analyzes, among other facilities the ICT tool provides, whether differentiated instruction is perceived as a strength by the participants. Differentiated instruction is a hot topic in the educational sciences and the integration of ICT into differentiated instruction has recently begun to emerge as a research topic in the literature. The participants' opinions on how the online tool differentiates content, process and product will also be analyzed in participants' interviews.

METHOD

This study has used qualitative research methods. Within the scope of the research, in-depth interviews with semi-structured questions were conducted in order to obtain faculty views and perspectives about Achieve3000.

The population of the study consists of all of the 8, 4 male and 4 female academics who used this program in 2012-2013 Fall in the English department of a private Kuwaiti university. Kuwait is a culturally diversified country, and the nationalities of the participants reflect this reality, with 2 Americans, 2 Indians, 1 British, 1 Jordanian, 1 New Zealander and 1 Russian. All participants have extensive experience in teaching English at a college level and have similar backgrounds such as English literature, English language teaching or educational sciences. 4 academics that were interviewed have MA's and 4 of them hold PhD degrees. When asked, 6 of them mentioned having used ICT before, and they all expressed a positive attitude towards ICT. 2 participants mentioned this was their first time with ICT and they did not express a negative or a positive attitude towards the use of internet and communication technologies in teaching foreign languages.

Data Collection Tool

8 participants were interviewed on their perspectives of the online instruction tool and asked various questions. Literature and expert opinion were consulted with in the preparation of these questions. For the purpose of the research problem, the open-ended questions posed to the participants are as follows:

1. What are your perceptions of the strengths of the program?
2. What are your perceptions of the weaknesses of the program?
3. What do you think of students' attitudes towards the web-based instruction?
4. Would you recommend this program to your colleagues?

Academics' names are kept confidential, and the participants are only given codes. While giving direct quotes from the participant, the "code number" is given.

Data Analysis

Audio recordings were transcribed and converted into typed text. To ensure reliability and validity, academics were presented the interview texts for their approval before using the text for analysis. Direct quotations by the interviewed individuals were used and consistency within the opinion was analyzed to ensure inner reliability.

The content analysis procedure that was applied for the analysis of the interviews is "categorical analysis". The raw data was converted into codes and categories. In this context, a paragraph that expresses a complete opinion was specified as the unit of analysis. Quantitative demographic data were also assessed and presented under the concerned heading. Qualitative research findings and their interpretation were created by analyzing the views of participants under certain categories.

Findings

Findings Related To Participants' Perceptions of the Program's Strengths and Contributions to Student Learning

a. Strengths

During the interview, the first question that was asked to the participants was, "What are your perceptions of the strengths of the program?" Table 1 shows the perceptions related to the strengths of the program.

Table 1: Perceptions regarding the Program's Strengths

Strength	Frequency
More motivating than conventional methods /students do more work	6
Differentiated instruction	5
Students are exposed to different types of exercises	3
Easy and flexible access to information / valuable database	3
Ease of making lesson plans/filing and sharing info	2

Academics mentioned a variety of positive aspects of the online program, ranging from motivation to adding variety and even ease of filing student papers. The most frequently cited perception with 6 participants is that the program is thought to be more motivating than any other conventional method and as a result students get to do more work than they would in a regular class setting. Some opinions of participants are quoted as follows:

> *Before we started using this program, I used to give them handouts, and only 20 % used to read. With the computer program, most of them read the texts. It is really good and motivating. It makes learning and teaching interesting (P 3).*

> *It is a way for students to produce a lot more work than they would be able to otherwise. It motivates students highly, it is highly motivational and I am amazed at the amount of writing I get out of students. 40 essays is way more than I could get from a normal class (P 7).*

What is common in these perceptions is that according to the instructors, this program motivates students to get more involved in reading and writing activities than any traditional textbook or writing assignment could achieve. According to Participant 2, the reason is "new generation" of students:

> *One thing is because of this generation of kids …to hold their interest you have to use this… a few of them would rather use just white board, but most of them, in fact all of my students are interested in computers and electronics (P 2).*

The second strength was perceived to be the differentiated instruction the program provides. With the help of a built-in exam taken at the beginning of each academic term, the program sets a level for every student and sends reading and writing tasks at differentiated levels. As a student demonstrates progress in reading comprehension, the rigor of the text increases. This feature was highly favored by 5 participants. Some participants made the following comments:

> *I like that it is differentiated, that the students can get their own reading levels. I can tell these student they can do these articles, no excuses…The fact that these articles are at their levels gives them a reading practice that they can get nowhere else. It is important for fluency, the speed of reading (P 4).*

> *The strongest aspect of the program is they work at different levels; this has always been such a problem in any composition class. I like the fact there is test at the beginning and they work at their levels. I don't have to apologize to students for the difficulty of the text. It was always a big issue for me, I always felt guilty for weak students, adapting the level for the general level, so I think differentiated instruction is really helpful (P 8).*

Differentiated learning seems to be lifting all the excuses that the students can make related to the difficulty of the task and win even the weakest students in the class. This component of the program is considered to be strength even by the most skeptical user of the program with the following remark:

> *Frankly the only strength that I find about the program is it gives students a level set exam at the beginning because if you have a general level set for everyone, students with low reading abilities become depressed because they cannot read and understand, so they give up (P 2)*

The next strength as perceived by 3 participants is the variety of questions, exercises and tasks the program provides. Participants seem to think this exposes students to different materials that should be stimulating enough for a keen language learner.

> *It allows the student to respond in so many ways, whether it is summarizing, making questions or responding to individual questions, multiple choice, writing essays of different lengths, if they want to take advantage of it, it allows them to do as much as or as little as they like (P 6).*

The online program is a rich database of reading articles. This fact has been mentioned by 3 participants and they have also commented on the value of having such an easy access to thousands of articles for users:

> *I remember myself teaching composition, trying to find an interesting text, coming up with comprehension questions, I couldn't find enough in the books, and photocopying them … I did a lot of work myself. This digital database saves teachers from the trouble of preparing materials (P 8).*

> *The program is a mass of information, readily available for students and teachers to use. It allows students to access so much that in my opinion in Kuwait they would never be able to access (P 6).*

Some participants also commented on the practicalities of the program for instructors, such as filing, storing information, not worrying about losing student papers. The remark made by Participant 7 reflects the relief of a busy language instructor:

> *Also it files everything effectively, I don't have to worry about filing students and papers, and it is easy to manage (P 7).*

As a result, the program tends to have strengths that are appreciated by the instructors, and differentiated instruction is noticed as a strong point of the program.

b. Contributions to Student Learning

Following this question, the participants were asked whether these strengths have contributed to student learning, and which skills have improved due to the exposure to the online program. This question was asked to find out the effect of the program in an academic English class with a primary focus on writing and reading skills. Participants generally think that the program has contributed to student learning in a variety of skills. A total of 11 positive responses, as opposed to 3 negative responses tend to highlight the positive effects of the program. The answers are displayed in Table 2.

Table 2: Contribution to Student Learning

Skills	Frequency
Reading	5
Vocabulary	3
Writing	3
Not sure	3

Participants mostly seem to express the positive effect on reading skills, which is followed by vocabulary and writing skills. In an academic English class, with a major focus on writing, this program appears to lack a strong writing component, as seen in participant comments.

Similar to findings about the strengths, participants appreciate the fact that the program offers many opportunities to students so that they read and analyze various reading texts.

> *I can't imagine their not improving reading an article, guessing what the questions will be; reading in terms of what they think will be asked. That must have improved naturally if they have done it (P 4).*

> *It depends on their input, which is basically reading. If they read, they will learn more vocabulary and better sentence structures. All in all, most of them have got slightly and relatively better command of English (P 5).*

> *Reading is even more effective than writing. Reading and vocabulary … (P 7)*

Those who are not sure whether the strengths have contributed to student learning mention the system's susceptibility to manipulation:

> *I hope so. I don't know if I can know that. I can't tell because some things are out of the class, out of my control, and you can't always control cheating (P 4).*

> *Students take exams at the beginning and at the end of the term. Test scores generally show that their reading levels have gone up 2-3 levels for many students. However, if you ask me, I have no answer for that. The system shows there is, but I cannot always see an improvement. Students have access to their previous answers and those who used for the 2nd time, use their old responses (P 3).*

Maybe the final comment covers it all by saying, for students who take it seriously, i.e., who don't cheat and manipulate the system; the program has a lot to offer:

> *They are exposed to lots of reading material. If they take it seriously, they will benefit from writing as well. Given that it is difficult to get students to write on their own, this program makes them do this. They are exposed to lots of vocabulary, and also because the program itself has a vocabulary list per article, this is maybe the only way they can have constant exposure to grammar formations, syntax,*

vocabulary, expression, argument, description, because there are many types of articles and they can have the exposure to all of them. If they take it seriously they could benefit a lot in aspects of the learning outcome (P 6).

It could be concluded that the majority of participants, with some reservations, think contributing to student learning is one of the strengths of the program.

Findings Related To Participants' Perceptions of the Program's Weaknesses

During the interview, the second question that was asked to the participants was, "What are your perceptions of the weaknesses of the program?" Table 3 shows the responses to this question.

Table 3: Perceptions regarding the Program's Weaknesses

Weakness	Frequency
Grading/technical difficulties	5
Plagiarism/Open to manipulation	5
Topics/types of articles	5
Teacher's role/ Management of the course	4
Failing to contribute in some skills	4

The challenges which the instructors met and perceived as 'weaknesses' while they were using the program could be categorized under 5 headings. Interestingly, the top 3 weaknesses have the same frequency and were mentioned by 5 out of 8 participants. The second highly mentioned weakness follows this group closely with 4 participants.

The load of grading, the difficulty of grading, technical shortcomings related to grading and giving feedback to students and any other technical problems that were encountered related to the program was the first and foremost problem that was expressed by the participants.

Some participant comments will clarify the technical challenges of the online database.

We can't grade them accurately, feedback options are very limited, and that's a problem. Also, grading they get is not detailed enough, we can't correct their writing, we give general comments, you cannot give detailed feedback. You just have to copy and paste for their answers, and it takes time (P 8).

Another user of the program comments on a technical shortcoming related to calculating scores for students and comes up with a suggestion:

This program should have a built in calculating table to help the instructor to monitor and tabulate the scores the students have obtained in each reading. Doing calculations on an excel sheet outside the system is time-consuming (P 1).

The next participant comments on the issue of grading from the workload perspective and emphasizes that the motivational power of the program can bring some burden for instructors who will eventually grade them.

If students get seriously involved in this, the teachers will definitely be overwhelmed with the amount they have to mark. Students generally leave it to the last minute, last semester I found myself marking over 500 thought questions in a single weekend. The weekend before I had maybe 400 hundred, a weekend before it was 300 hundred! (P 6).

These comments show that the technical structure and the implementation of the program clearly have some flaws that need fixing. With more careful planning and technical guidance by the administrators of the program, they may be modified to relieve the instructors.

The other commonly mentioned weakness is related to the topics that the students are exposed in their daily news articles. Regional and cultural sensitivities, inappropriate format, and a lack of variety are expressed in participants' comments.

Who would teach an academic program using newspapers? It doesn't go in depth enough for what they need and also there is no overall plan for the vocabulary that they are learning. These are newspaper

articles, I tell my students there are different types of writing, and that there is a different organization and a format of a newspaper article versus and academic essay, versus a regular essay (P 2).

Participant 2 complains about the inappropriateness of the format of the material for academic English. The next two participants mention the content as a weakness rather than the format.

Another shortcoming of Achieve is the subjects. The topics of articles should be more relevant to our area, Arab and Muslim area and culture. Social, political and religious sensitivities should be considered because in this region religion is important (P 5).

When you put out a program like this, it has to go out to the masses, you cannot offend anyone…they have to be non-offensive, a little bit pleasant, positive and uplifting kind of thing…this person does this… this person gets this award... safe topics (P 4).

The program is written by an American company for American students, so this may be restricting the variety of topics. In the Middle East, students cannot associate with all the topics, and this seems to affect the effectiveness of the program according to some academics.

However, these flaws are related to the practical aspects of the program, not to the inherent nature of ICT. The other two weaknesses as perceived by participants seem to be more deeply rooted than the technical and content-topic problem. Particularly the plagiarism and manipulation problem concerning the program is so widespread that instructors suspect most of their students resort to some type of cheating while they are using the program.

I was pretty sure that some of my students were getting somebody else to do the articles for them outside class. Two students, when I asked them, they declined. But based on their scores when they took the level set and the progress they showed later on was not convincing (P 2)

You can't control cheating, or someone else doing the work for them, which I think has happened, there are definite signs of that. It is always one of the drawbacks with computer, internet based teaching… cheating and manipulating (P 4).

Participants are well aware of the cheating problem and express a concern for independent and flexible learning opportunities are being abused by some students, as expressed by 5 participants. Some students get other people to do the self-study work for them, and according to the Participant 4, this is partially due to the nature of ICT. Some participants tend to think ICT is quite susceptible to manipulation and cheating, therefore should be closely monitored by instructors.

Another problem related to the nature of ICT, rather than this specific program only, is related to the management of the course. Instructors seem to be confused about their roles in the classroom when they are implementing the program. Whether they should take attendance or run this course online, whether they should interfere while students are reading their articles, and basically what they should do in the classroom has been a topic of concern for some participants.

I sometimes feel "Am I teaching these kids? Or just spending time with them?" They are doing their own thing, I am doing my thing on the computer, and there is no interaction. … They see it an easier way to spend time in class …. But I feel guilty, and useless, like an extra element when my students are doing Achieve. When they ask "Are we going to do class or is it going to be Achieve?", it feels bad (P 8).

I don't define teaching as sitting back and keeping track of things online… I am having trouble, combining independent learning with teacher-led instruction (P 4).

These two participants had problems about their roles in the classroom during the use of the program. What they were required to do was not what they are used to doing in the traditional lecturing method, so they mentioned this confusion as a challenge. Another participant probably had the same confusion and in an effort to solve this, s/he adopted a more flexible approach with attendance and assigned these online reading articles as homework.

I wasn't really sure on what method I should adopt with students, whether I should let them as frequently as they should, or be strict with attendance. But the nature of this course defies the need for perfect attendance, so I was a bit flexible with attendance (P 5).

ICT requires a learner-centric approach and maybe the problems experienced by some instructors result from the lack of practical experience that is required for a smooth shift from the traditional teacher-centric approach to the new approach where the focus is on the learner. Despite these positive comments about the contribution to reading skills, the program gets criticism from some participants as to not contributing enough to particularly students' writing skills.

> *The program didn't contribute to make them better writers, but in the course curriculum it says we are teaching writing. Combining reading with this program took away from our time to teach how to write (P 2).*

> *In terms of writing I didn't feel they could really do much because the whole concept of writing in the program is a little mixed up. Sometimes they have to write summaries, sometimes narrative, sometimes creative writing, because this variation in questions was too quick, we couldn't deal with every aspect of writing skill in class there was nobody to guide them as to how to go about it (P 1).*

Another criticism comes about the type of questions.

> *I don't know what they are learning with the activity questions. The program is mainly based on multiple choice activities; it is a very American skill. I was never asked multiple-choice as a student, we were asked short essays, long term papers, so this type seems funny to me (P 8).*

It is apparent that the program has some weaknesses, as perceived by participants. However, a quote from a participant may reflect the general feeling of the faculty members towards the program: "*It is extremely effective with the reservation of the shortcomings. The writing part has some problems, but if the program allowed us to give better feedback for student written responses, it would be a whole system and improve writing skills better" (P 5).*

Findings Related to Participants' Perceptions regarding Students' Feedback

The third question that was posed to the participants was regarding the student feedback. Students' attitudes towards the program were questioned through faculty members' perspectives. Faculty members expressed that their perceptions towards student feedback depend on random student comments, their own observations and conversations in and outside the class and their deliberate questions about the usefulness of the program. Table 3 shows the answers given to this question.

Table 4: Perceptions regarding Students' Feedback

Student Feedback	Frequency
Positive – useful and motivating	6
Negative – too much work	4
Negative - boring	3

According to the participants, students' approach to the program is positive. They generally find the program motivating and useful in practicing their reading and writing skills. Some comments on this question elaborate on student feedback in detail.

> *Many of them told me personally and I know these are the students who actually worked on the program, not those laid back types, they said they benefitted from the program (P 1).*
> *I like the program and most of my students do, too. My students tell me it has helped them a lot in improving their vocabulary and reading skills (P 3).*
> *But they admit that it motivates them and makes them do more than what they would normally do (P 7).*

These participants base their perceptions on direct student comments and mention that a majority of the students and particularly the ones who take it seriously benefit from the program. However, even the students who think the program contributes to their learning complain about the course load, as expressed by participants. As the program requires a certain number of reading and writing activities to be completed and the students who fail to reach that number lose points, it has also been a topic of complaint for students. Negative attitude towards the program mostly comes from that aspect, as exemplified in participants' comments:

> *Truthfully speaking, my students generally find it a chore. They say things like 'too much work', 'too much writing', if the teacher insists on essays, the students grumble. They think volume is too much; the*

articles are too difficult, even if it set at their level, and they would rather something easier so they can answer the questions more easily and quickly (P 6).

One participant states his students complain about the program, but he has a different opinion on this complaint:

They all say it is too much work; they would rather do less work, but that's just typical laziness. They think it is too much work, but I don't think it is negative feedback (P 7).

If students think the program requires too much time and effort, this is not a very negative thing for teachers as long as students do the work. However, if the workload starts affecting the motivation levels and participation in the program, it may certainly hinder learning. Comments and responses to the question display that the positive feedback teachers receive outweighs the negative attitude about the workload. However, there are also some participants who received negative feedback about the articles and topics in these articles. According to these instructors, students think some of these reading texts are not interesting enough. Topics of articles have been an issue of weakness in some instructors' perspectives as well.

The ones that did it at the beginning that really tried hard said 'This is boring, the readings are boring' (P 4).

Some complain about the boring articles, some of them don't like technology, they hate having to do anything on the computer. But I think they are rare cases (P 8).

Still, participants do not seem to be negatively influenced by the negative feedback they get from their students. They think the program motivates most of them and it is very typical of students to complain about the tasks. As one participant puts it "*I don't get praises about the program but it is in the nature of the students*" (P 2).

Findings Related To Participants' Perceptions regarding the program's recommendability

When the participants were asked whether they would recommend the program to other users considering all the strengths and weaknesses, with the exception of two people, six of them said "yes". One participant was not sure about the recommendability of the program, and one participant responded this question negatively. Participants were also asked to give reasons for their positive or negative responses. Table 5 below shows the frequencies of the participant comments, followed by some directly quoted comments from the participants.

Table 5: Perceptions regarding the program's recommendability

Would they recommend it	Frequency
Yes	6
No	1
Hesitant	1

I would definitely say yes, it adds variety to the curriculum. Most students enjoy reading things online. Not much formal maybe, but it helps their informal writing skills. However it puts a lot of work on the instructors, and sometimes it is difficult to keep track of students. But, if they want to use it, they should go ahead with that, it is highly useful, improves the quality of teaching and learning (P 3)

Despite his perceptions about the shortcomings of the program Participant 3 strongly believes the program is good for the variety in the classroom.

Another participant thinks this program balances the teacher's role in the classroom and independent learning, unlike some other participants who expressed some discomfort about their roles in the classroom while the students were working on their own:

It is the best thing out there; there is nothing as good as this. There are other programs that are good for reading but this program is the one that allows teacher to have control that we mark the writing. Otherwise it would purely be an automated reading thing that you wouldn't need a teacher. This one needs a teacher for the thought questions, the writing component, for giving feedback and grading. It is a good mix of self-use and teachers' input (P 7).

It is interesting how perceptions can differ even for the same program that is in question. This participant who seems to be experienced in ICT thinks there is room for teacher feedback in this program, unlike other programs which sometimes do not even require a teacher. However, for Participant 7, "grading and giving feedback" as the

only teacher input may not be disturbing, whereas for the other instructors who mentioned this very feature of the program as a weakness did not want to limit their roles and input to grading only, they expressed a desire to be more active in the classroom.

The participant who gave a negative response to this question made the following comment:

> *I wouldn't recommend because this program has nothing to do with their academic skills…also the program itself is not motivating the students enough (P 2).*

The hesitant participant believes everything depends on the teacher's attitude towards the program and how seriously students are doing the work. Whether it is ICT or something else, these are the determinant factors, not which ICT tool is used.

> *The potential of the program totally depends on the teacher behind it. It has potential as far as the teachers know how to manipulate and use it. We can't really know how much they have improved, we can't know if they have done the work themselves, it all depends on students' desire to use it as a tool or just to get the grade in class. That scenario is the same whether it is ICT or not (P 4).*

In fact, Participant 5 is touching upon the hottest issues in ICT, which has been a topic for many research papers. User, or more specifically teacher attitudes towards ICT indeed determines the success of ICT substantially, and whether it is traditional or innovative teaching methods applied in class, the teacher has the power to influence student attitudes towards ICT and the whole learning experience.

DISCUSSION

According to user perceptions, the major strengths of the program lie within its motivating factor, its differentiated instruction, and contributing to student learning by exposing them to a variety of activities that would be difficult to combine and find materials for in a traditional class. This finding about the increase in motivation has been mentioned and confirmed in many other studies that have been carried out in various settings. There seems to be general consensus that both teachers and students feel use of ICT greatly contributes to student motivation for learning. Students indeed find it more motivating to study with computers than with traditional means (Bullock, 2001). Marjaana Veermans and Anna Tapola reviewed four articles that focused on the general use of computers as integrated in the curriculum. They found that the pleasure and variety can keep students engaged and motivated. If ICT is carefully planned and pedagogically implemented, it can support relationships and motivation that in turn support long-lasting engagement and learning. ICT can be compelling, but only quality of curriculum programs in which the technology is implemented makes the real difference to students' attitudes, motivation, and performance. To conclude, there is evidence, from research, that technology can increase students' motivation for learning, but only if it is implemented in a pedagogically meaningful way (Veermans & Tapola, 2004).

Some participants also mentioned that the variety of materials, exercises, the amount of information they are exposed also contributes to some skills in English. However, despite thousands of impact studies, the impact of ICT use on student achievement is still difficult to measure and open to debate (Trucano, 2005). The positive impact of ICT use in education and its contribution to student learning has not been proven and just like this study, in studies that rely largely on self-reporting, users believe that ICTs make a positive difference and most users feel that using ICTs make them more effective learners. It is believed that specific uses of ICT can have positive effects on student achievement when ICTs are used appropriately to complement a teacher's existing pedagogical philosophies (Trucano, 2005).

Differentiated instruction has been expressed as one of the major strengths of the program. Differentiated instruction (DI) has become a hot topic in education and it can be defined as a modification of the curriculum that enables all students to learn (Theroux, 2004). Researchers identified three ways to modify the lesson plan in order to provide differentiate instruction; they are (a) differentiating the content (the "input" of teaching and learning), (b) differentiating the activities (the process of teaching and learning), and (c) differentiating the product (the output of teaching and learning). Thus, to meet each student's individual needs in the classroom, the teacher can provide differentiated learning by providing choice in either or all of the areas (Williams-Black, Bailey & Lawson, 2010). The ICT tool that has been the topic of this paper offers DI to its users in three ways, input, process and output of teaching and learning. With a level set exam taken at the beginning of the term, students are placed at a level and receive the material accordingly. Student progress is monitored regularly and if there is growth in the level, the adjustments are made monthly. This feature of the program is appreciated by the participants because they do not have to go through the effort of simplifying the content or the exercises. Thanks

to DI, students with different proficiency levels do not feel lost or neglected in the classroom and they remain occupied in the material. Research that has been carried out on DI suggests that through differentiated instruction and activities, students take a greater responsibility and ownership for their own learning via activities that are primarily focused on students' multiple intelligences, higher-order thinking, and learning styles. With this in mind, differentiated instruction is an effective tool to implement in the classroom in order to meet students' learning styles and multiple intelligences (Bailey & Williams-Black, 2008).

Differentiated instruction is especially beneficial to English language learners. English Language Learners (ELL) generally participate in general education curriculum and assessment and when students of with different heritages and linguistic backgrounds are included in traditional classrooms, teachers face a dilemma. DI may be the answer we have been looking for (Stanford and Reeves, 2009, p. 3). Lavadenz and Armas conducted research on differentiated instruction for English Language Learners, and found that allowing the students to engage in cooperative learning with flexible grouping allowed the students to partake in relevant, meaningful conversations about content in various ways and develop independence (Thompson & Valladares, 2011, p. 8). Tomlinson, Callahan, and Lelli carried out research on low socio-economic primary students over a four-year period and identified their learning preferences. In the end they observed growth expressed and achievement gains as compared to other schools in the same district when DI was used (Tomlinson, 2003). In parallel to these findings, the participants in this research tend to recognize the positive impact of differentiated instruction on student motivation and learning.

Participant perceptions regarding the program's weaknesses list some grading difficulties and technical problems they experience while using the program as ICT tool's number one weakness. Indeed, integration of ICT in the classroom is not a flawless one. Jones's study points out seven major barriers in this process and 'facing technical problems' was mentioned by 13% of participants and listed as the fifth barrier in the study. Another similar study carried out on the barriers revealed "lack of adequate technical support" as one of the issues teachers face during integration of ICT with %39.2 of the participants (Samuel & Zaitun, 2007, p. 2). The grading load, as mentioned by the participants in this study could be associated with time pressures both outside and during class, and the technical shortcomings could be linked to lack of support or recognition for integrating computers; and inadequate training and technical support, as described in many other studies carried out by various researchers (Bordbar, 2010, p. 33). The World Bank Group report on the use of ICT in education also state that introducing and using ICTs to support teaching and learning is time consuming for teachers, teaching with ICTs takes more time, approximately 10% extra time is required to cover the same material. Another point the report touches upon is that the functioning technical infrastructure is crucial and teachers must have adequate access to functioning computers, and be provided with sufficient technical support, if they are to use ICTs effectively (Trucano, 2005).

The second weakness of the ICT tool was considered to be plagiarism. Participants raised their concerns about students manipulating the placement test at the beginning of the term, copying and pasting internet sources or other students' responses for writing questions and even hiring others to do the homework for them. With the development of information and communication technology, plagiarism has become a serious problem in the academic community. According to the studies on academic plagiarism conducted at universities in four different European countries, plagiarism rates among students are quite high and students mostly ignore or allow plagiarism because of a lack of knowledge, lack of consequences, or simply because ICT makes plagiarism easy to commit. Over 70% of students reported that they used the internet as the main source of plagiarism and that the main reasons for committing plagiarism were easy and anonymous access to the internet, severe time constraints, procrastination, ineffective work management and work overload (Pupovac, Bilic-Zulle & Petrovecki, 2008). It is suggested that easily accessible information on the internet, the development of IT and the simple copy/paste command facilitate plagiarism. However, some researchers do not see the Internet or ICT as primarily responsible for plagiarism, but its use and abuse by people. The failure of the academic community to engage properly with issues emerging from the new information world of which ICT is a significant part contributes substantially to plagiarism (Townley and Parsell, 2004). Rather than blaming ICT for Internet-enabled plagiarism, academics should build and sustain ethical relationships and academic virtues to nurture an intellectual community. Attempts at eradicating academic misconduct and rewarding creativity and real acquisition of knowledge in universities and schools will undoubtedly contribute to achieving this goal.

Participant perceptions reveal that the management of the course is a problem area and also some users have trouble adjusting to the new role in an ICT class. In fact, topic choice, grading problems, attendance issues could be all categorized under the management of the integration of ICT in the curriculum. These areas indicate that participants feel there are some problems regarding the management of the course. Planning is crucial when using ICTs and where little planning has occurred; research shows that student work is often unfocused and can

result in lower attainment (Trucano, 2005). The planning stage is recognized as particularly important for effective introduction of ICTs into the curriculum. According the UNESCO report, for a successful implementation, the teachers and the students' ability and ICT skills and the learning goals should be considered. For example, when purchasing or developing ICT materials, the following questions should be asked: Does the product meet institutional objectives? Does the product contribute to the aims and objectives of the course? Is the content current, unbiased, and politically and socially sensitive? Is the use of text and media appropriate for the needs and objectives of the course? Instructors need greater training than simple computer skills to be able to connect the potential of ICTs to the subject they are teaching. For real integration of ICTs into the teaching and learning process, teachers must be helped to understand how educational technology can inform and enhance pedagogy. In this regard, many experts emphasize continuous training as essential to teacher development, and a slow approach, expecting teachers to take anywhere between three and five years to fully adapt to the new technologies and related pedagogies. Similarly, collaboration between the institute and private software developers is seen as very effective in ensuring educational software remains locally relevant and tied to specific curricular objectives, both of which are important for encouraging teachers to make use of available ICT (Haddad & Rennie, 2005).

There is currently great debate about how teachers should adapt current teaching skills and practice to accommodate the introduction of ICT, whether teachers are becoming redundant as a consequence of the use of ICT in education or whether a teacher-less classroom is possible. In fact, new educational technologies do not curb the need for teachers but they call for a redefinition of their profession. This redefinition is involved with teaching methodology, assessment of learning, student tracking, communication, and evaluation. Most critically, the question of the extent to which teachers relinquish control and let learners drive their own learning may create the greatest barrier to the adoption of ICT in the classroom (Wheeler, 2000). The roles of teachers have changed and continue to change from that of instructors to that of constructors, facilitators, coaches, and creators of learning environments.

As to student feedback regarding the program, participants have generally expressed a positive attitude of students. Of course students complain about the workload, however, according to participants, the majority of them appreciate what ICT has to offer and enjoy the variety and flexibility the program provides. This finding has been supported by other research done to identify student attitude toward the integration of CALL into the curriculum. Student evaluation of a CALL based course in Sofia University in Bulgaria showed that the respondents had a highly positive attitude towards CALL implementations with respect to the skill development they perceived. Eliciting ideas on course improvements concerned mainly course materials and delivery methods: students would rather work without course books; they would like to have more up-to-date reading materials which confirms the value of authentic materials that e-learning environment provides (Kremenska, 2007). The study revealed that students' attitude towards the program indicated an enthusiastic student response. Furthermore, Almekhlafi's study carried out on elementary prep students in the UAE in 2006 shows that users had a positive attitude toward using CALL and had a high intention and satisfaction to use it in the future due to their perception of its utility and educational benefits. Results also showed a high self-perception of knowledge gain as a result of using CALL (Almekhlafi, 2006). Another study on Saudi university students demonstrate that students in general have a positive attitude toward the integration of CALL into the curriculum for teaching basic language skills in the institute where they were exposed to CALL for Listening, Speaking, Reading and Writing skills (Bulut & AbuSeileek, 2009).

Participants as users of this program mostly said they would recommend this program mainly because it adds variety to the course by not making the teacher redundant in the class and allowing for a facilitator role. Despite few hesitations, participants generally display a positive attitude towards the use of this ICT tool in Academic English classes and the results show similarity to other research findings. A study in Ghana indicate that teaching staff in universities have relatively high and positive attitudes toward computer technology and ICT. The computer attitude is directly associated with affective, perceived usefulness, perceived behavioral control, and behavioral attitudes (Larbi-Apau & Moseley, 2012). Another study on Greek teachers of ELL conclude similar findings, teachers' attitude to technology is positive yet they believe that the ICT tools are time consuming and not teacher-friendly and they would like to use a foreign language platform that would improve ICT integration. Teachers are more likely to incorporate ICT use in their classroom if it is related to the nature of their instruction and are convinced that it is compatible with educational goals (Dogoriti & Pange, 2012).

CONCLUSION

This study was carried out under several limitations. Interviewing eight participants in a private university setting in Kuwait about a specific type of an ICT tool is certainly one of them. Findings of this study therefore

can only be generalized for a similar group of participants. Also, since the program is relatively new in the university, these could be interpreted as preliminary findings regarding the perceptions of instructors.

For being able to fully assess the online program, more comprehensive investigation with larger numbers of individuals is needed. Further studies can utilize students so as to provide a broader picture of the status of integration of ICT into the curriculum and computer attitudes and skills among the students and teachers in Kuwait. Using different demographic groups, researchers can also examine the possibility of differences that may occur between the male and female students and also among students with different majors. A quantitative research design will surely provide valuable insights as to student perceptions.

This is a recent implementation in the institute and instructors have just started to form their attitudes and perceptions of the program. They are in constant contact with the program administrators and as they voice their concerns about the content, management and some technical shortcomings of the program and more importantly as they continue with their professional development conferences in ICT and gain experience in ICT, their perceptions will continue to change and another research may be necessary to evaluate how the integration of the program has evolved within a certain period of time.

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INTEGRATING FEEDBACK INTO PROSPECTIVE ENGLISH LANGUAGE TEACHERS' WRITING PROCESS VIA BLOGS AND PORTFOLIOS

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ABSTRACT
The purpose of this study is to investigate the effect of blogging and portfolio keeping on a group of pre-service teachers' writing skill in a compulsory writing course at a tertiary level English language teaching (ELT) programme in Turkey. The study specifically looked into to what extent receiving feedback from course instructor and peers created ownership in writing and also to what extent giving feedback to peers' writing through blogging and portfolios contributed to a group of prospective English language teachers' writing skill. The study lasted two academic terms (28 weeks) with two groups; namely, portfolio group (30 student teachers) and blog group (29 student teachers). The blog group posted all their written work on personal blogs while the portfolio group kept personal portfolios for their written work. As part of blogging and portfolio keeping both groups also received feedback from course instructor and peers as well as providing feedback to other peers' writing. Results of the study may suggest that blogs and portfolios emerge as effective tools to integrate feedback practice into writing process, offering course instructors and students ample time and practice outside ordinary English classes as a foreign language (EFL). The study also shows that the practice of blogging and portfolio keeping and specifically receiving and giving feedback both on paper and online contributes to student teachers' writing skills significantly on basic elements of writing skill such as process, organization, content, language use, vocabulary, mechanics, and accuracy. In addition, receiving teacher's feedback was reported as the most favourite type compared to receiving and giving peer feedback. Thus blogs and portfolios need to be integrated into writing classes in order to secure better benefits from writing practice in EFL contexts.
Keywords: blogging; portfolio-keeping; feedback; writing; pre-service teachers of English

INTRODUCTION

Writing practice when viewed as a process entails continual and constructive feedback to written work (Hyland, 1988; Bitchener, 2008). However, in writing classes such a practice might be arduous to realize, given the limited time students and teachers have to devote to feedback sessions in ordinary language classes. Thus it would be necessary to take writing instruction out of classrooms. Blogs and portfolios being two major sophisticated sources offer variety to such an end, enhancing students' writing outside ordinary class walls and thus integrating feedback into the whole writing practice.

With the widespread use of computer technology and various applications of the Internet such as blogs, podcasts, newsfeeds, and wikis, language instruction including writing has gone beyond ordinary language classrooms and by means of which the learners have had chances to continue their learning in and out of classrooms continually (Hendron, 2008; Richardson, 2009). One such tool, blogs are an interactive platform or "interactive homepages" can facilitate writing instruction as students through "online exchanges" exceed their learning "beyond the physical classroom" (Blackstone, Spiri, & Naganuma, 2007, p.1), breaking the classroom walls (Arslan & Kızıl, 2007). Through blogs students are engaged in more creative writing tasks along the process of their writing (Eastment, 2005), leading to language development on the part of students (Pinkman, 2005; Fellner & Apple, 2006). When compared with only in-class writing instruction in EFL settings, blog-based writing instruction may bring out an element of collaboration and interaction while learning to write in EFL contexts (Hyland & Hyland, 2006; Miceli, Murray & Kennedy, 2010). With the interactive nature of blogs, learners receive and give feedback to each other's writing without the pressure of the other revising one's work face to face since such an application offers students ample time to read peer's writing, give them feedback and also revise their work (Hansen, 2005) and also without time restrictions, through blogs, both teachers and students share ideas and opinions, having ample opportunities to offer ideas collaboratively at every stage of writing (Arslan & Şahin-Kızıl, 2010).

Furthermore, portfolio keeping can serve similar purposes. Song and August (2002, pp. 49-50) claim portfolio assessment "can accommodate and even support extensive revision, can be used to examine progress over time, and can encourage students to take responsibility for their own writing." Baturay and Daloğlu (2010, pp. 413-414) also support that portfolio entailing students' active participation in the writing process "creates an atmosphere for student centred learning, which requires active student involvement" and also "capitalize[s] on students' natural tendency to save work and to take a second look and think about how they could improve future work."

Portfolios and blogs can therefore offer such possible means to integrate feedback into the writing process. However, the role and place of feedback in a process approach to writing has been a matter of discussion (Goldstein, 2004). Some authors have cautioned its effect as corrective feedback is ineffective as a means of improving student writing (Truscott, 1996*;* Truscott, 2007; Truscott & Hsu, 2008), correction can be "ineffective or harmful" for the students as it might negatively affect "fluency ... and their overall writing quality" (Truscott, 2004, p.338), there may be no guarantee for the students to improve their future writing without teachers' support (Truscott, 1996), and any possible benefits are really trivial (Truscott, 2007; Truscott & Hsu, 2008). On the other hand, the bulk of research studies have shown positive effects of corrective feedback on learners' written work (Ashwell, 2000; Fatham & Whalley, 1990; Ferris & Roberts, 2001; Miaoa, Badger & Zhen, 2006**).** In process approaches to writing, feedback is also of high importance in order to empower learner autonomy and also to actively involve them in the feedback process (Mendoca & Johnson, 1994). Ferris (2004, pp.59-60) suggests that error treatment is necessary, teachers need to offer "indirect feedback", and students have to revise their written work having been provided with feedback "ideally in class where they can consult with their peers and instructor." While lack of feedback on written work leads to frustration (Lee, 2004), offering feedback leads to more fruitful results for second language learners (Leki, 1991). Studies as to students' use of feedback have shown that feedback is useful to improve students' second language writing as well as L2 grammar (Ferris, 1995; Hyland, 1998). Providing feedback on students' writing may help students recognise and avoid local errors in further revisions (Chandler, 2003; Fatham & Whalley, 1990; Ashwell, 2000). Corrective feedback may, therefore, contribute to students' learning of some local issues such as sentence structure, wording, and correctness (Bitchener, Young, & Cameron, 2005) as well as global ones such as content, purpose, and organization (Straub, 1997).

In addition whether teacher feedback or peer feedback brings out more fruitful results has also been a matter of discussion. In a number of research studies teacher-written feedback is considered an important part of the writing process by both teachers and students (Cohen & Cavalcanti, 1990; Fatham & Whalley, 1990; Connor & Asenavage, 1994; Ferris, 1995; Zhang, 1995; Paulus, 1999; Ferris, 2002). On the other hand, "peer feedback is still well-liked and teachers keep incorporating it in their courses and report students' positive experiences" (Hyland & Hyland, 2006). Peer feedback has been found effective in improving students' writing skill (Tsui & Ng, 2000; Hu, 2005; Matsuno, 2009) as it may help students to develop critical thinking skills to analyse and revise their own writing (Leki, 1990; Zhang, 1995), activate learner participation and also create an authentic communicative context (Hyland, 2003). Moreover, peer feedback is likely to lead to greater learner independence or autonomy (Berg, 1999; Miaoa, Badger & Zhen, 2006).

Prospective teachers of English attending an English Language Teaching (ELT) department need to acquire strong language skills in writing in English and also learn how to give and receive feedback prior to their professional careers. This study, therefore, aims to investigate how writing instruction and particularly feedback practice can last beyond the classrooms with a specific purpose to determine the extent to which blog and portfolio integrated writing instruction and whether blog and portfolio integrated teacher and peer feedback would contribute to their writing skill in English.

THE STUDY

Research Setting and Participants

The study was conducted in the English Language Teaching Department of a Faculty of Education with 59 prospective teachers of English. All the participants were of similar features in terms of background in English as they came to the department through a central university exam and also they were given a departmental screening exam that focused on testing all language skills including writing in English. Those students who failed in the English proficiency exam administered at the beginning of the academic year had to attend a two-semester (28 weeks) compulsory English language programme, including teaching grammar and also four language skills; namely reading, speaking, listening and writing. After the screening exam, student teachers were put into two different classes. The course instructor, author of this particular study, assigned the class with 29 students as blog writing class and the other with 30 students as portfolio writing class for research purposes. In the study there were 18 males and 41 females. Portfolio group had 30 students (21 females and 9 males) and the blog group had 29 participants (20 females and 9 males). In the programme writing courses lasted four hours a week and aimed at teaching expository writing. In this 28 weeks' study, both groups received the same kind of instruction on basic elements of writing skill such as organisation, process, unity, coherence, word choice, language use, grammar, and mechanics (Harmer, 2004) and also on types of paragraphs and essays such as narrative, descriptive, expository, cause and effect, comparison and contrast, classification, and argumentative (Smalley, Ruetten, & Kozyrev, 2001). While the blog group did all writing including giving and receiving feedback through personal blogs, the portfolio group did it through pen-paper assignments to be collected in their personal portfolios. After each assignment they were asked to hand in their work in portfolios or to post

them on their blogs. The course instructor gave feedback to each assignment and also each participant was paired to give and get feedback from another peer.

Nature of the Study

The study is of quasi-experimental design. With a purpose to determine whether blog-based or portfolio writing instruction and feedback had proven more useful contributions to participant student teachers' writing skill, data were collected through a pre and post questionnaire, through assessment of participants' essays at the beginning and end of the year, and also through continual feedback given to written work. Before and also at the end of the study, having been briefed about the assessment criteria two experienced writing instructors from the Foreign Languages Department evaluated participants' first and final essays through an analytic assessment scale developed from the studies of Jacobs, Zinkgraf, Wormuth, Hartfiel, and Hughey (1981), Tribble (1996), and Northwest Regional Educational Laboratory (2011) (see Table 1).

Table 1. Analytic Assessment Scale for Written Work: Adapted from Jacobs et al. (1981), Tribble (1996), and Northwest Regional Educational Laboratory (2011)

Area	Criteria	Score
Content/Ideas	EXCELLENT TO VERY GOOD: Excellent to very good treatment of the subject or topic; topic narrow enough; considerable variety of ideas; independent and thorough interpretation of the topic; content relevant to the topic; accurate details; original ideas; clear purpose for writing.	30-24
	GOOD TO AVERAGE: Adequate treatment of topic; some variety of ideas or argument; some independence of interpretation of the topic; most content relevant to the topic; reasonably accurate detail.	23-18
	FAIR TO POOR: Treatment of the topic is hardly adequate; little variety of ideas; some irrelevant content; lacking detail.	17-10
	VERY POOR: Inadequate treatment of the topic; very broad topic; no purpose for writing; no variety of ideas or argument; content irrelevant; almost no useful detail.	9-6
	INADEQUATE: Fails to address the task with any effectiveness. NOT ENOUGH FOR ASSESSMENT	5-0
Organization	EXCELLENT TO VERY GOOD: Fluent expression, ideas clearly stated and supported; appropriately organized paragraph(s) or sections; effective introduction, strong support and effective conclusion; logically sequenced (coherence); connectives appropriately used (cohesion).	20-17
	GOOD TO AVERAGE: Uneven expression, but main ideas stand out; paragraphing or section organization evident; logically sequenced (coherence); some connectives used (cohesion).	16-12
	FAIR TO POOR: Very uneven expression, ideas difficult to follow; organization does not help reader; logical sequence difficult to follow (coherence); connectives largely absent (cohesion).	11-8
	VERY POOR: Lacks fluent expression; ideas very difficult to follow; little sense of organization; ineffective introduction, weak support and poor conclusion; no sense of logical sequence (coherence); connectives not used (cohesion).	7-5
	INADEQUATE: Fails to address this aspect of the task with any effectiveness. NOT ENOUGH FOR ASSESSMENT	4-0
Vocabulary/ Word Choice	EXCELLENT TO VERY GOOD: Wide range of vocabulary; accurate word/idiom choice and usage; appropriate selection to match register.	20-17
	GOOD TO AVERAGE: Adequate range of vocabulary; occasional mistakes in word/idiom choice and usage; register not always appropriate.	16-12
	FAIR TO POOR: Limited range of vocabulary; a noticeable number of mistakes in word/idiom choice and usage; register not always appropriate.	11-8
	VERY POOR: No range of vocabulary; uncomfortably frequent word/idiom choice and usage; no apparent sense of register.	7-5
	INADEQUATE: Fails to address this aspect of the task with any effectiveness. NOT ENOUGH FOR ASSESSMENT	4-0
Language Use	EXCELLENT TO VERY GOOD: Confident handling of appropriate structures, sentences well-built and structures strong and varied; hardly any errors of agreement, tense, number, word order, articles, pronouns, prepositions; meaning never obscured.	20-17
	GOOD TO AVERAGE: Acceptable grammar- but problems with more complex structures; mostly appropriate structures; some errors on agreement, tense, number,	16-12

	word order, articles.	
	FAIR TO POOR: Insufficient range of structures with control only shown in simple constructions; frequent errors on agreement, tense, number, word order, articles, pronouns, prepositions; meaning sometimes obscured.	11-8
	VERY POOR: Major problems with structures- even simple ones; sentences and structures poor, incomplete or awkward; frequent errors of negation, agreement, tense, number, word order/function, articles, pronouns, prepositions; meaning often obscured.	7-5
	INADEQUATE: Fails to address this aspect of the task with any effectiveness. NOT ENOUGH FOR ASSESSMENT	4-0
Mechanics/ Conventions	EXCELLENT TO VERY GOOD: Demonstrates full command of writing conventions such as spelling, punctuation, capitalization, and layout.	10-8
	GOOD TO AVERAGE: Occasional errors in spelling, punctuation, capitalization, and layout.	7-5
	FAIR TO POOR: Frequent errors in spelling, punctuation, capitalization, and layout.	4-2
	VERY POOR: Very poor mastery of conventions; full of errors of spelling, punctuation, and capitalization; layout is distracting. Fails to address this aspect of the task with any effectiveness. NOT ENOUGH FOR ASSESSMENT	1-0

In addition a holistic assessment rubric was developed based upon general categories of the analytic assessment criteria and used in order to provide explicit feedback to participants' written assignments throughout the writing programme by the course instructor and also by peers (see Table 2).

Table 2. Holistic Assessment Guide for Essay Evaluation

1. Underline the Thesis Statement (TS)! *Is TS clear with a focus?* *Or does thesis statement need improvement?*
2. Is the essay organized clearly? *Does the essay have an introductory paragraph, support paragraphs with a topic sentence and a concluding paragraph?* *Or does the essay need improvement in terms of organisation?*
3. Is the content consistent and rich enough? *Does content in each paragraph support the thesis statement?* *Indicate if there are any unrelated sentences in the paragraphs?*
4. Are transitions and reminders used effectively throughout the essay? *Are there strong ties between sentences and paragraphs?* *Or does the author need to make stronger ties in the essay?*
5. How is the language used? *Is the essay free from grammatical errors?* *In the essay if there are some grammatical errors, indicate them.*
6. Is there sentence variety? *Are there simple, compound, and complex sentences in the essay?* *Or do sentences need rewriting?*
7. Is vocabulary choice accurate, appropriate, powerful, rich, and meaningful? *Or does the author need to use more effective words?*
8. Is mechanics such as spelling and punctuation used correctly? *If not, indicate them.*
Write your overall comment on the essay. 1. What are the strengths of the essay? 2. What are the weaknesses of the essay? 3. Make suggestions for revision of the essay.

While assessing their peer work, participants were asked to consider these basic elements included in the holistic assessment guide. The participants were also reminded that their written work was also assessed in terms of the same criteria by the course instructor as the course instructor throughout the term gave feedback to each participant's assignments posted in their personal blogs or submitted to the instructor in their personal portfolios according to this holistic assessment guide. Peers also gave and received feedback weekly in line with the same guide. Each participant was paired with another peer by the instructor or they were asked to pair with another peer to get and give feedback on a voluntary basis. Prior to peer feedback and teacher feedback sessions, both groups received training on how to give feedback. Peer reviewers needed to be well trained in order to better

understand what teacher and peer feedback given to their work meant and also to provide fruitful feedback to each other because such training was essential to enhance collaboration and interaction between the instructor and peers and between peers (Stanley, 1992; Min, 2006; Zhu, 2001; Hyland & Hyland, 2006) in order to help reach positive outcomes (Jacobs, Curtis, Braine, & Huang, 1998; Paulus, 1999). It was also of high importance to maintain student motivation and commitment while giving feedback "at the right time and in the proper context" (Gue´nette, 2007, p.52). The portfolio group met in the classroom four times a week. They put all their assignments in their personal portfolios. For the study "collection portfolios" were used in order for the students to keep all their written work draft and final throughout the course (Apple & Shimo, 2004, p.54) whereas the blog group received all the courses in a computer lab. The course instructor guided each student as to how to set up their own blogs using www.blogger.com as a free site for the bloggers (see Table 3 for study procedure).

Table 3. Study Procedure

Pre-study	Both blog and portfolio groups wrote a five paragraph essay as part of screening examination Each participant completed a pre-study self-assessment questionnaire.
The study	In the fall term (14 weeks), all participants studied basic components of writing such as unity, coherence, parallelism, dangling expressions, cohesive devices, mechanics, word choice, grammar, language use, etc. All participants examined and produced paragraphs of different types; namely, description, classification, process, comparison and contrast, cause and effect, and narration. Both blog and portfolio groups received training on holistic assessment guide. Blog group participants set up their own blogs and learned how to use Google Docs. Portfolio group participants learned how to keep personal portfolios.
	In the spring term (14 weeks) all participants examined and produced five paragraph essays of different types such as description, classification, process, comparison and contrast, cause and effect, narration, and argumentation. Blog group participants posted their assignments on personal blogs. Portfolio group participants put their assignments in their personal portfolios. Course instructor gave feedback to participants' writing through blogs or portfolios. Blog group participants gave and received feedback through blogs. Portfolio group participants gave and received feedback through portfolios.
Post-study	Each participant wrote a final five paragraph essays and completed a post-study self-assessment questionnaire.

The course instructor and also each participant in the blog group set up their personal blog accounts. The course instructor posted a number of study pages as to instructions for assignments and writing paragraphs and essays on the tutor blog (see Figure1 for a sample tutor blog).

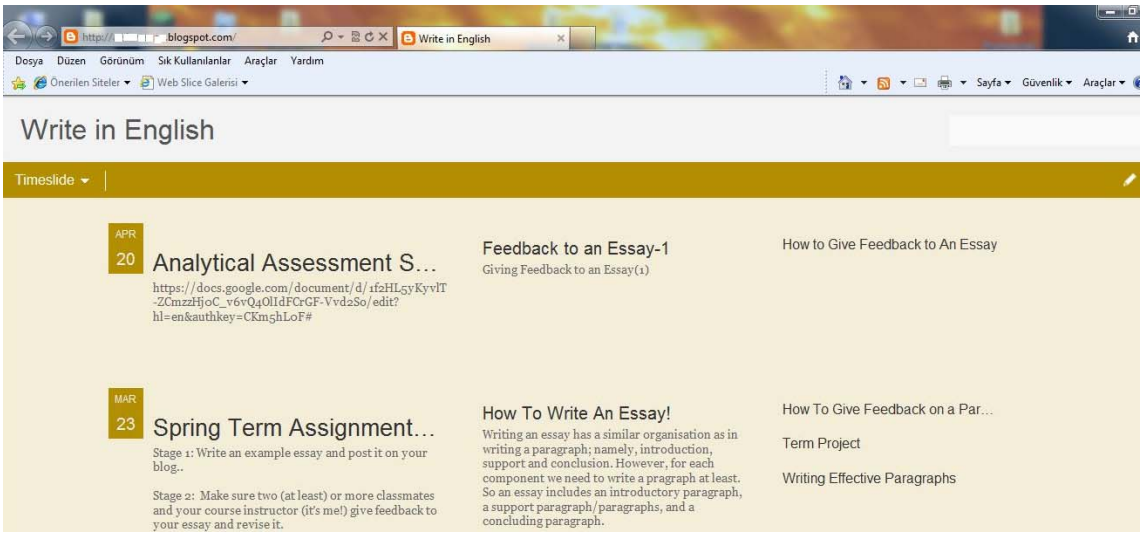


Figure 1. Sample Tutor Blog

Moreover, the participants posted all their written work on their individual blogs which were accessible to the course instructor, to other class members, and also to any follower (see Figure 2 for a sample peer blog).

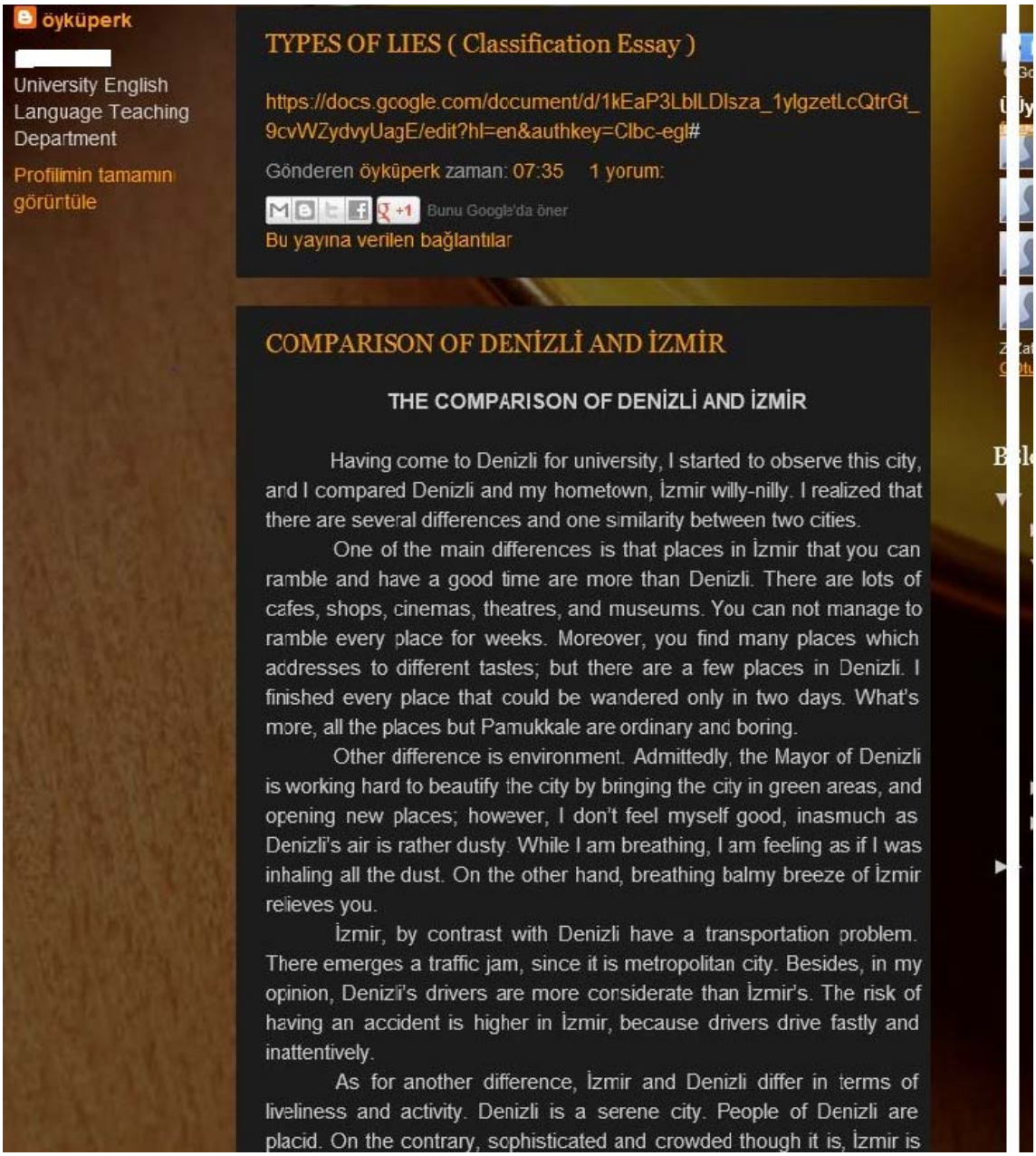


Figure 2. Real Peer Blog Reproduced with the Permission of Blog Writer

As participants had access to all other peer blogs, each participant had to give weekly feedback to peers' written work on peer blogs (www.blogger.com) using www.docs.google.com which enabled reviewers to offer feedback and writers to trace feedback given and also to make necessary changes with ease (see Figure 3 for a sample peer blog with feedback given using google doc.).

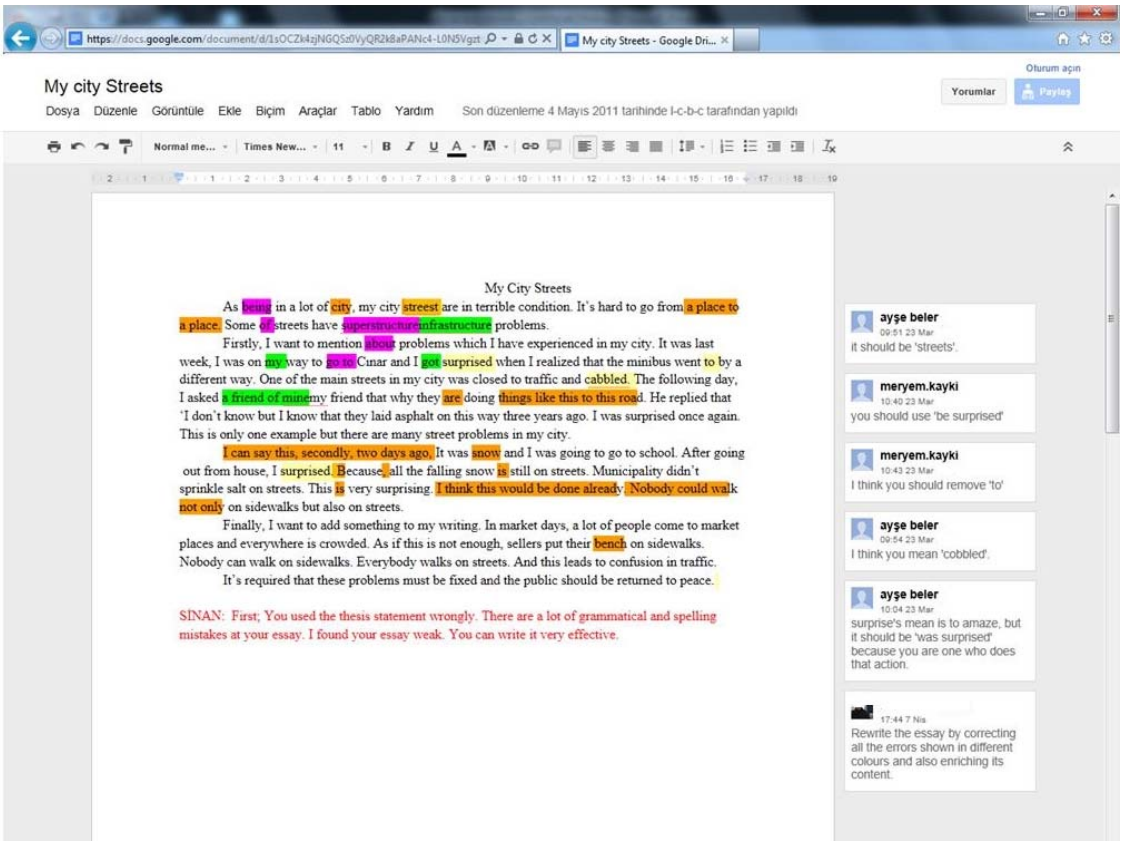
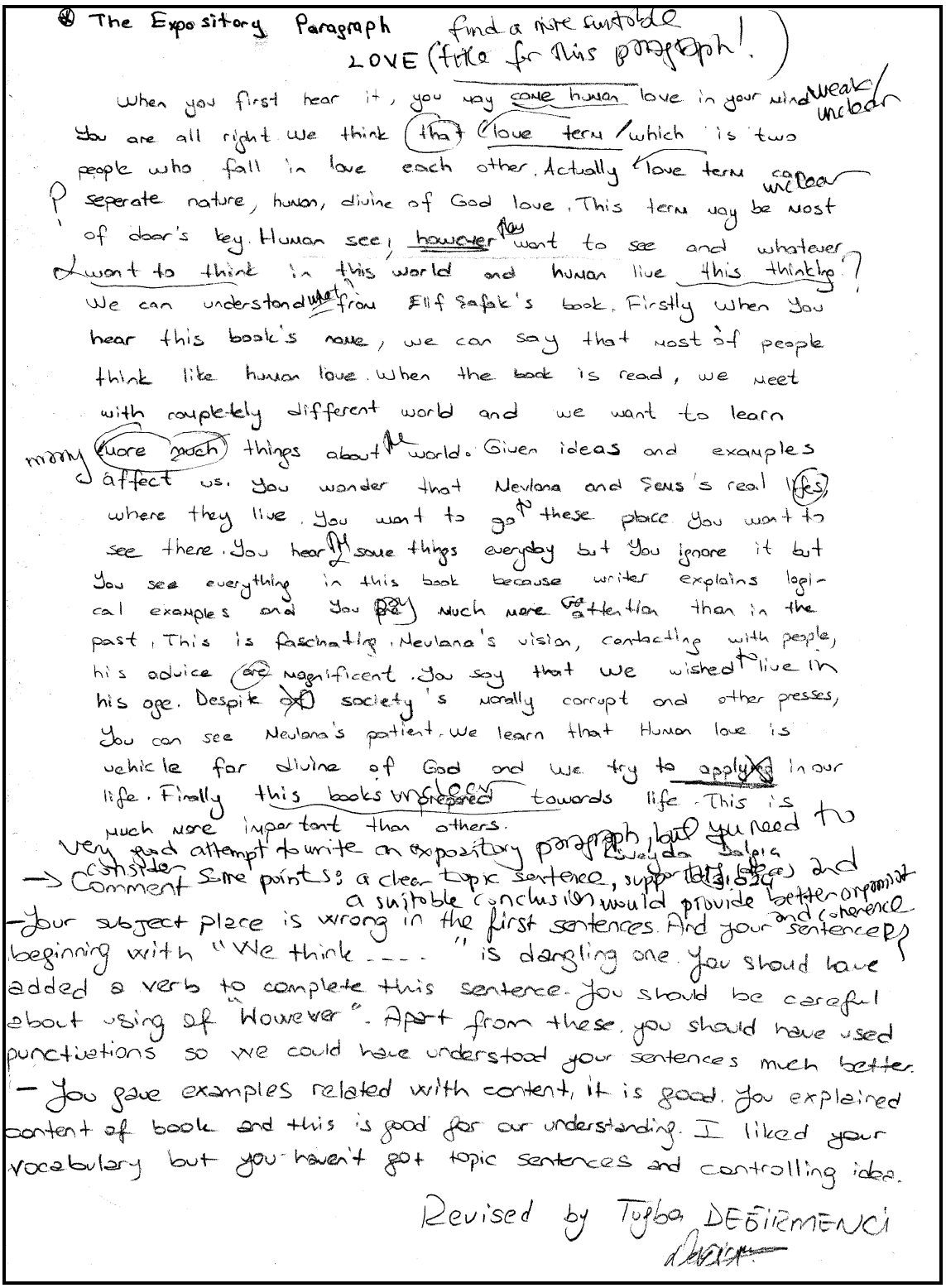


Figure 3. Real Peer Blog with Feedback Given: Reproduced with the Permission of Blog Writer

On the other hand, the portfolio group participants were also paired each week to offer and receive feedback to their paragraphs and essays (See Figure 4 for sample peer portfolio with feedback given).



The Expository Paragraph (find a more suitable title for this paragraph!)

LOVE

When you first hear it, you may come human love in your mind. You are all right we think that love term which is two people who fall in love each other. Actually love term has seperate nature, human, divine of God love. This term may be most of door's key. Human see, however they want to see and whatever they want to think in this world and human live this thinking. We can understand what from Elif Safak's book. Firstly when you hear this book's name, we can say that most of people think like human love. When the book is read, we meet with completely different world and we want to learn many more such things about the world. Given ideas and examples affect us. You wonder that Mevlana and Sems's real (yes) where they live. You want to go these place you want to see there. You hear some things everyday but you ignore it but you see everything in this book because writer explains logical examples and you pay much more attention than in the past. This is fascinating. Mevlana's vision, contacting with people, his advice are magnificent. You say that we wished to live in his age. Despite society's morally corrupt and other presses, you can see Mevlana's patient. We learn that Human love is vehicle for divine of God and we try to apply in our life. Finally this books inspired towards life. This is much more important than others.

Very good attempt to write an expository paragraph, but you need to consider Comment Some points: a clear topic sentence, supporting ideas and a suitable conclusion would provide better organization and coherence. Your subject place is wrong in the first sentences. And your sentence beginning with "We think ---- " is dangling one. You should have added a verb to complete this sentence. You should be careful about using of "However". Apart from these, you should have used punctuations so we could have understood your sentences much better. - You gave examples related with content, it is good. You explained content of book and this is good for our understanding. I liked your vocabulary but you haven't got topic sentences and controlling idea.

Revised by Tuğba DEĞİRMENCİ

Figure 4. Sample Portfolio with Feedback Given: Reproduced with the Permission of Portfolio Writer

Instrument and Data Analysis

Each student completed a pre-questionnaire prior to the courses and also a post-questionnaire at the end of the courses, which were designed to elicit information about participants' background knowledge in writing in English, to identify their development in writing and also to assess the effect of teacher and peer feedback on their writing. The main categories of the questionnaire included: a) Demographic information; b) Evaluation of Writing Competence; and c) Views about Feedback (included in the post questionnaire). Since all pre-questionnaire items exist in the post-questionnaire, only the post-questionnaire is put in the appendices (see Appendix 1). Participants' consent to be included in the study for research purposes was also received through the post-questionnaire. All the blog and portfolio samples in this article were taken from the participants who gave their written consents. The pre-questionnaire included 49 items of elements of writing under the basic constituents of writing as process, organisation, content, vocabulary use, language use, grammar and vocabulary. Items included in the questionnaire were designed in line with the holistic assessment guide and analytic assessment scale which consisted of all the basic elements of writing such as 'Organisation, Content/Ideas, Vocabulary/Word choice, Language Use (Style-Syntax), Grammar, and Conventions (Mechanics) which were included in the questionnaire as well. To validate the items in the questionnaire expert help was taken from five instructors in the ELT department. The questionnaire was piloted with 19 freshman students who were exempt from the compulsory writing programme. The Cronbach's Alpha co-efficiency of the pilot questionnaire was .968 (N of Items 46). The number of items increased from 46 to 49 in the main study. The post-questionnaire was also distributed to the same 59 students, 30 of whom were in Paper Based Writing Group and 29 were in the Blog Writing Group. Alpha reliability test showed that the questionnaire distributed pre and post study was highly reliable as the pre-questionnaire had Cronbach's Alpha value of .945 (N of Items 49) and the post-questionnaire had Cronbach's Alpha co-efficiency of .946 (N of Items 49). Moreover, the post questionnaire included feedback items and it had Cronbach's Alpha value of .946 (N of Items 73).

Questionnaire data were evaluated descriptively in order to evaluate participants' views of the effect of blog-based writing and portfolio writing and feedback on their writing skills. Student teachers were also asked to write a five paragraph essay at the beginning and also one at the end of the courses which were assessed using the analytic rubric. All quantitative data were compared and contrasted using statistical analyses. As there was no normal distribution for any of the items (<0.005), paper-based group and blog group were compared descriptively using 2 independent Mann-Whitney-U test and also Wilcoxon sign test (two related samples) as non-parametric tests.

FINDINGS

The participants evaluated their writing performance before and after the study. Before the study the majority of blog and portfolio group participants reported poor, very poor, or average writing competence while nobody reported very good writing competence (see Table 4).

Table 4. Pre-Study Self- Evaluation of Writing Competence

	Blog		Portfolio	
	f	%	*f*	%
Very poor	4	13,8	6	20,0
Poor	9	31,0	12	40,0
Average	12	41,4	10	33,3
Good	4	13,8	2	6,7
Very Good	0	0	0	0
Total	29	100,0	30	100,0

In addition, Mann-Whitney U Test results of blog group and portfolio group self-reports might show that the blog group and portfolio group participants did not have any significant differences in terms of their writing skill before (U=358,00; p=,218; p>0,05) and after the programme (U=345,000; p=,115; p>0,05) (see Table 5).

Table 5. Mann-Whitney U Test Results for Writing Competence Based on Blog & Portfolio Groups' Self-Assessment

			Pre-study			
	N	Mean Rank	Sum of Ranks	U	Z	P
Portfolio	30	27,43	823,00	358,000	-1,232	,218
Blog	29	32,66	947,00			
			Post-study			
	N	Mean Rank	Sum of Ranks	U	Z	P
Portfolio	30	33,00	990,00	345,000	-1,578	,115

Blog	29	26,90	780,00

Similarly, an assessment of essays did not show any significant differences between the groups in terms of their writing skill before the programme (U=374,500; p=,359; p>0,05) and also at the end of the programme (U=369,000; p=,316; p>0,05) (see Table 6).

Table 6. Mann-Whitney U Test Results for Writing Competence Based on Essay Evaluation: Comparison of Blog & Portfolio Groups

	N	Mean Rank	Sum of Ranks	U	Z	P
			Pre-study			
Portfolio	30	27,98	839,50	374,500	-,918	,359
Blog	29	32,09	930,50			
			Post-study			
Portfolio	30	27,80	834,00	369,000	-1,002	,316
Blog	29	32,28	936,00			

Statistics as to both self-assessment and essay evaluations indicated that both groups had poor writing competence in English prior to the writing courses. However they improved their writing skill by the end of the programme. As seen in Table 4, before the study the majority had reported poor writing competence; however, at the end of the study, it can be seen that both groups significantly improved their writing skill as 55.2 % of blog group participants and 66.7% of portfolio group participants reported “good” and 6.9% and 13.3 % “very good” competence, respectively after the study while no participant reported ‘poor’ or ‘very poor’ writing skill (see Table 7).

Table 7. Post Study Self- Evaluation of Writing Competence

	Blog		Portfolio	
	f post	*% post*	*f post*	*% post*
Very poor	0	0	0	0
Poor	0	0	0	0
Average	11	37,9	6	20,0
Good	16	55,2	20	66,7
Very Good	2	6,9	4	13,3
Total	29	100,0	30	100,0

The results of self-reports might suggest that both groups improved their writing skill significantly at the end of the programme. Moreover, when each group was analysed specifically as to pre and post study results, it can also be seen that each group had a significant development in their writing after the study as shown in Table 8. A Wilcoxon Signed Ranks Test therefore shows that a 28 week writing program elicited a statistically significant change in their writing skill.

Table 8: Wilcoxon Signed Ranks Test Results for Pre and Post Study Writing Competence: Self-Assessment

	Z Asymp.Sig. (2-tailed) (P)
Portfolio	-4,700[a] ,000
Blog	-3,736[a] ,000

Pre and post-study essay evaluation also verifies such results as when their pre essays were analysed, the participants had low level grades at the beginning of the programme and this significantly increased from an average of 47.6 to 76.5 for the blog group and from 46.0 to 75.1 out of 100 for the portfolio group while the blog group achieved higher grades than the portfolio group (see Table 9).

Table 9. Essay Evaluation: Pre and Post Grades

	Portfolio		Blog	
	Pre	*Post*	*Pre*	*Post*
Mean	46,0	75,1	49,2	78,1

In addition a Wilcoxon Signed Ranks Test supports this fact as both portfolio group and blog group participants improved their writing competence significantly (see Table 10).

Table 10. Wilcoxon Signed Ranks Test Results for Pre and Post Study Essay Evaluation

Portfolio		Blog	
Z	Asymp.Sig. (2-tailed) (P)	Z	Asymp.Sig. (2-tailed) (P)
-4,784[a]	,000	-4,628[a]	,000

An analysis of participants' essays using an analytical assessment scale also shows that they all improved their writing skill in terms of content, organisation, vocabulary, grammar and mechanics (Table 11).

Table 11. Wilcoxon Signed Ranks Test Results for Pre-Post Essay Evaluation: Writing Components

	Portfolio		Blog	
	Z	Asymp.Sig. (2-tailed) (P)	Z	Asymp.Sig. (2-tailed) (P)
Content	-3,808[a]	,000	-4,296[a]	,000
Organization	-4,140[a]	,000	-3,497[a]	,000
Vocabulary	-4,632[a]	,000	-4,589[a]	,000
Grammar	-4,573[a]	,000	-4,344[a]	,000
Mechanics	-4,632 [a]	,000	-4,315 [a]	,000
Total Grade	-4,784 [a]	,000	-4,628 [a]	,000

Thus a Wilcoxon Signed Ranks Test used to analyse participants' essays in relation to basic constituents of writing before and after the study also shows significant improvement for both groups, which may also show that a 28 week writing program elicited a statistically significant change in their writing skill in all components of writing.

Qualitative research findings might also indicate positive contribution of blogging and also portfolio keeping to most components of writing skill. When the participants were asked about their views of these applications, both groups had positive opinions with very few participants cautious about such practices. As some sample self-reports may indicate that the portfolio group participants were able to improve their writing skill considerably. One of these reports may indicate the positive contribution of portfolio keeping: ***"When I look at my first paragraph, I see the difference with my last essays. My writing skills have developed since the first day of my writing courses (P22)."*** Most of them reported that they learnt how to write according to the basic conventions of writing. One participant highlighted improvement in vocabulary choice and sentence structures: ***"The strong points of the writing courses are improving our vocabulary choice, giving and receiving feedback and improving our ideas more willingly. Moreover, we have been much better than at the beginning about sentence structure (fragment, run on, dangling (P6)."*** Another participant stressed development in writing organised essays: ***"It provided us to develop our writing skill according to writing rules (organisation, coherence, word choice …). For example, before that I couldn't write an organised essay but now I'm writing an essay by following the rules, at least partly (P1)."***

Blog group participants also reported positive views about the effect of blogging. Some of them expressed their appreciation of using blogs as one report may show: ***"Using blogs is very useful for us. We put our writing there, and we received and gave feedbacks, and we noticed that we should work hard. One of the most developing things us is blog (B1)."*** Some others reported its effects in terms of sharing their work with others and getting feedback from them. Views of one blog participant may reflect this: ***"Using blogger is really good thing at the aim of showing our writing to our classmates easily. Anyone also around the world can see what I write. Furthermore he/she can give feedback to me. Thanks to blogger we don't have to occupy with papers any more (B2)."*** Blogging also gave them chances to see their peers' written work as one sample report may show: ***"Writing blog is beneficial for me. I can read my friends' essays or other people's essays. I can improve myself by analysing other essays. When I read them, I compare them with my essays and I can see lack of my essays (B14)."*** However, very few blog group participants highlighted the possible problems related to blogging, one of which being related to having access to the Internet ***"I didn't like the blog because it has many problems. Sometimes we couldn't have put our homework on blogger. Moreover some of us don't have internet so it is a problem (B16)"*** and the other some participants' lack of interest in using computers ***"I think using blog for us is not very important. Instead of it we should do this by writing in hand because I am not interested in computer a lot (B21)."*** Despite these negative remarks, the whole process of writing involving getting and giving feedback through blogs changed participants' negative views at the end of the study: ***"I hadn't a blog before writing courses and I thought that it wasn't necessary for us first. But now I understand that we have learned a lot of new techniques of writing by receiving and giving feedback in using blog for writing purposes (B6)."***

Receiving and giving feedback the participants improved their writing skill considerably. At the outset of the study, the participants were trained to give and receive feedback, and for a period of 28 weeks they all gave and received feedback. As it can be seen in Table 12, the participants considered all types of feedback important while teacher feedback was the most favourite one at the end of the study. The participants reported that receiving teacher feedback was 'very important' (98.3%) when compared with receiving peer feedback (33.9%) and giving feedback (39%).

Table 12. Participants' Views of Different Types of Feedback

	Receiving Teacher Feedback		*Receiving Peer Feedback*		*Giving Peer Feedback*	
	f	*%*	*f*	*%*	*f*	*%*
Very Important	58	98,3	20	33,9	23	39,0
Important	1	1,7	33	55,9	30	50,8
Unsure	0	0	3	5,1	4	6,8
Not Important	0	0	3	5,1	2	3,4
Not Important at All	0	0	0	0	0	0
Total	59	100	59	100	59	100

Moreover, an analysis of receiving teacher feedback in relation to basic components of writing shows that teacher feedback was again very important or important in terms of all elements of writing such as process, content, organisation, vocabulary, language use, grammar and mechanics while feedback on content and organisation were deemed the most important (see Table 13).

Table 13. Views of Receiving Teacher Feedback

	Very Important		*Important*		*Unsure*		*Not Important*		*Not Important at All*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Process	49	83,1	9	15,3	1	1,7	0	0	0	0	59	100
Content	54	91,5	4	6,8	1	1,7	0	0	0	0	59	100
Organisation	54	91,5	5	8,5	0	0	0	0	0	0	59	100
Vocabulary	47	79,7	9	15,3	2	3,4	0	0	1	1,7	59	100
Language Use	47	79,7	10	16,9	1	1,7	0	0	1	1,7	59	100
Grammar	53	89,8	5	8,5	0	0	0	0	1	1,7	59	100
Mechanics	44	74,6	14	23,7	0	0	0	0	1	1,7	59	100

An analysis of receiving peer feedback also shows that the participants were of different views of such a practice. While the majority of the participants considered it very important or important for the items such as process, content, organisation, vocabulary, language use, grammar, and mechanics, few were unsure about its application or regarded it as not important (see Table 14).

Table 14. Views of Receiving Peer Feedback

	Very Important		*Important*		*Unsure*		*Not Important*		*Not Important at All*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Process	17	28,8	29	49,2	9	15,3	4	6,8	0	0	59	100
Content	22	37,3	30	50,8	3	5,1	4	6,8	2	3,4	59	100
Organisation	18	30,5	35	59,3	3	5,1	3	5,1	0	0	59	100
Vocabulary	16	27,1	30	50,8	4	6,8	7	11,9	0	0	59	100
Language Use	15	25,4	32	54,2	8	13,6	3	5,1	1	1,7	59	100
Grammar	20	33,9	31	52,5	3	5,1	4	6,8	1	1,7	59	100
Mechanics	16	27,1	29	49,2	7	11,9	6	10,2	1	1,7	59	100

As to receiving peer feedback the majority of the participants reported similar views to receiving feedback. To the majority giving peer feedback was either a very important or important practice while very few participants were either unsure about its application or found it unimportant or not important concerning such items as process, content, organisation, vocabulary, language use, grammar, and mechanics (see Table 15).

Table 15. Views of Giving Peer Feedback

	Very Important		*Important*		*Unsure*		*Not Important*		*Not Important at All*		*Total*	
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Process	19	32,2	30	50,8	8	13,6	2	3,4	0	0	59	100
Content	27	45,8	27	45,8	2	3,4	3	5,1	0	0	59	100
Organisation	28	47,5	25	42,4	4	6,8	2	3,4	0	0	59	100
Vocabulary	17	28,8	33	55,9	5	8,5	3	5,1	1	1,7	59	100
Language Use	18	30,5	31	52,5	7	11,9	2	3,4	1	1,7	59	100
Grammar	25	42,4	28	47,5	2	3,4	3	5,1	1	1,7	59	100
Mechanics	16	27,1	33	55,9	7	11,9	2	3,4	1	1,7	59	100

The study findings may indicate that all feedback sessions were very useful to some extent. Moreover, an analysis of participants' views of feedback may show peers found all sorts of feedback useful: ***"Receiving-giving feedback is very important for me because it helps me revise my mistake and improve myself. I saw where I made mistakes B1."*** A similar view was shared by another participant:

"I hadn't thought that giving and getting feedback was really important for me, but later I recognised that it was important, too in many respects. For example, I can revise my writings and correct my faults more than before thanks to feedback. Ideas of my instructor and my peers are very important for me. That's why I can evaluate myself and my works (B19)."

However, among all types of feedback, receiving teacher feedback through blogs or portfolios was of high importance for the participants to improve their writing skill when compared with getting or giving peer feedback. Most participants in the portfolio group indicated strong views about the contribution of receiving teacher feedback to their writing skill as can be seen in some sample reports: ***"Receiving feedback from teacher is very crucial since all the students know that the critics given by the teacher are for their own good, and he has great knowledge to give detailed feedback (P7)."*** Similarly almost all the participants in the blog group reported highly positive views about receiving teacher feedback through blogs: ***"Receiving teacher feedback is important for me because he knows everything about writing. So, he gives information to me accurately. B11."*** One reason for preferring teacher feedback was confidence the participants had in their writing instructor: ***"When we write something we don't know what kind of mistakes we make but when a teacher looks at our paper he can see these mistakes easily, therefore we don't make these mistakes anymore P23."*** Teacher feedback was therefore useful in making the participants realise their mistakes: ***"I saw my mistakes such as punctuation, spelling, etc. when the teacher gave to my paper the feedback (P5)."*** Teacher feedback therefore meant improvement: ***"Receiving feedback from my instructor, of course, is very important. That means improving P13."***

On the other hand, most of these participants were a bit cautious about the possible effects of feedback given by their peers. They were of high opinions of feedback provided by their instructor; however, mostly they held negative views as regards peer feedback: ***"I think receiving feedback from my instructor is very beneficial but peer feedback is not good. Because our friend may not be good in giving feedback or she/he may ignore some things. So it is not believable and beneficial B4."***

One possible reason was lack of confidence in peers' writing knowledge or peers' taking feedback practice unserious. One participant indicated that peers lacked knowledge needed to offer feedback: ***"The teacher's feedback is very important to me but I don't think so for peers. Because any students are advanced and need to learn more so I don't trust peers except teachers (P2)."***

Some participants did not trust their friends in giving feedback: ***"I don't care my friends' feedback much because they are the same status with me. Their feedback is important of course, but the feedback which is given by teacher is the most important feedback I think (P20)."*** Another peer highlighted this: ***"Feedback is the most important thing about writing. When an instructor gives us feedback we understand where we do our mistakes. But peer feedback is less important for me because someone gives less importance than they have to. Another reason is our levels which are not same (P12)."*** A similar view supports such an idea: ***"I think friend feedback isn't important for me because my friends don't write their real comments and they don't correct my grammatical mistakes P10."***

Similarly, ***"When I take feedback from my instructor, I like it so much because I can see my mistakes and faults. I trust him and his knowledge. But in peer feedback it changes. Some of the students may do mistakes***

in feedback and they may check the writings to their own opinions I don't think that they are fair while making feedback (P29)."

Some participants had the common belief that giving peer feedback offered more benefits than receiving peer feedback: ***"I think giving feedback is very useful. Because when we give feedback we are learning that if we can see our friend's mistakes (P24)."*** Similarly***, "While analysing my friends' paper, I learned a lot of things which I did the same wrong in my paper. It is very useful and good for use. I compared my own paper with my friends and it shows my degree in class (P25)."*** Whereas giving feedback was seen problematic by some participants as they lacked necessary competence in giving feedback to peers' writing: ***"I can't give very good feedback for my friends' essays because I can't find various words and ideas while I am writing. They also write the same things. So these feedbacks aren't very beneficial for me (P9)."***

Such a process of receiving and giving feedback contributed to participants' improvement of writing skills as well as building in self-confidence: ***"When I was recommended that we receive and give feedback, I was surprised. It was hard for me but it is very easy now. I can give feedback to anyone else (B6)."***

Almost all participants had very positive views of the writing instruction as they were able to produce more effective paragraphs and essays according to basic conventions of writing at the end of the programme. The participants were also of high opinions of portfolio keeping and blogging through which they shared their written work with their course instructor and also class peers by getting and giving feedback. Feedback given to written work by their course instructor was more appreciated than that of peers since almost all participants had confidence in their course instructor's constructive feedback while peer feedback being found doubtful. Suffice to say that such intensive writing practice through blogs and portfolios and also offering feedback to written work immensely contributed to student teachers' writing competence prior to their professional lives.

DISCUSSION AND CONCLUSION

Blog and portfolio integrated writing instruction may offer positive contributions to the development of writing skill in English language contexts. Having been actively engaged in blogs and portfolios in and out of writing classes without time restrictions and classroom boundaries almost all participants in the study were able to develop their writing competency. Prospective teachers of English held positive views of portfolio keeping and blogging as effective tools in this particular writing course. The practice of portfolio keeping helped student teachers overcome their writing anxiety (Öztürk & Çeçen, 2007) as Ok (2012) reports that in a reading-writing course, keeping portfolio resulted in more student motivation towards writing in English. In addition, keeping portfolio meant development in basic components of writing. Aydin (2010) came up with similar results to this study as giving and receiving feedback to paragraphs and essays through portfolio keeping in EFL resulted in writing more organised paragraphs and compositions with better punctuation and capitalization. On the other hand, blog-based writing instruction had big impact on the development of English language students' writing performance (Arslan & Şahin-Kızıl, 2010); namely, blogging led to autonomous learning and increased students' motivation in writing courses (Blackstone, Spiri, & Naganuma, 2007). Study results of Drexler, Dawson, and Ferdig (2007) also indicate that blogs help develop expository writing skills as well as increasing students' motivation in writing. Lan, Hung, and Hsu (2011, p.148) also studied the effect of rich media guided writing strategy and also pen-and-paper guided writing strategy and concluded that "a web-based learning environment with high richness media could guide students to write and achieve more positive writing attitudes in terms of motivation, enjoyment and anxiety." In her study, Çiftçi (2009) reported that both the control (in-class process approach integrated writing classes) and experimental (blog) group students showed a major improvement on such elements of writing as content, organization, vocabulary, language use, and mechanics, having been involved in peer feedback sessions.

As for the effect of feedback on students' writing, teacher feedback offered more positive contributions to learners' English (Connor & Asenavage, 1994) while research on the effect of peer feedback has been controversial. To some authors peer feedback fails to serve linguistic development of the learners (Wu, 2006). Wu (2006, p. 125) also acknowledges the contribution of teacher feedback while most peer review only "... serve[s] a pragmatic function to give complimentary praise or blessings." These results are of similar nature to this particular study as most students were sceptical about the effect of peer feedback when their qualitative views were taken. Teacher feedback emerged as the most favoured one in both qualitative and quantitative analyses. Similar to Zhang's (1995) study most participants in our study preferred teacher feedback to peer feedback since they did not trust in their peers' writing competence and they thought their peers were not as qualified as their writing instructor. Almost all participants in this study highlighted that they had confidence in their course instructor and such confidence led to positive gains from the courses as teacher feedback was more likely to lead to greater improvements in students' writing (Fathman & Whalley, 1990; Miaoa, Badger, & Zhen,

2006). Similarly, Nelson, and Carson (1998) state that Chinese and Spanish-speaking students liked to see teacher comments and also correction of words and negative comments on their sentential problems rather than peers' comments because teacher feedback led to greater improvement for the students once they received feedback. On the other hand, some studies indicate positive contribution of peer feedback to help students identify their weaknesses and strengths (Tsui & Ng, 2000). In Matsuno's (2009) and Hu's (2005) studies, EFL students welcomed peer feedback (Miaoa, Badger, & Zhen, 2006). While teacher feedback was really essential in improving students' writing, our study also shows that peer feedback contributed to prospective teachers' writing skills to some extent as they were actively involved in giving and receiving feedback continually. Berg (1999) also confirmed that peer feedback encouraged "critical reasoning." In Storch's study (2005, p.153), through collaborative writing and providing feedback to each other's work, students produced better texts in relation to "task fulfilment, grammatical accuracy, and complexity." In Blackstone, Spiri, and Naganuma's (2007, p.1) study an application of a "blogging buddy" system also facilitated "greater learner interaction and reflection on skills development." In their study Tsui and Ng (2000) confirmed the role of peer comments and they identified four roles of peer comments; namely, "[p]eer comments enhance a sense of audience, raise learners' awareness of their own strengths and weaknesses, encourage collaborative learning, and foster the ownership of text." In this study participants similarly reported that they became aware of their writing competency and collaborated with each other by giving and receiving feedback; they did not trust peer feedback, though. The findings of this particular study may also indicate the importance of giving feedback rather than receiving feedback (Lundstrom & Baker, 2008). Participants of the study were able to improve their writing skill while giving peer feedback rather than receiving peer feedback.

Feedback is likely to lead to better writing in English (Storch & Tapper, 1997; Reid, 1994); however, effective feedback is closely linked to a number of factors such as students' attitudes towards feedback (Leki, 1990), the nature of the feedback (Fathman &Whalley, 1990; Sheppard, 1992), and the timing of feedback (Ferris, 1995). In this study most participants developed positive attitudes towards feedback (Ferris, 1995) as they were not limited to fixed class hours for writing and for receiving or giving feedback. For an effective feedback establishing a trusting relationship between the course instructor and students and between students is really important in order to benefit positive gains from feedback sessions (Lee & Schallert, 2008) regardless of blogging or portfolio keeping. This study proves that course instructor and peers achieved such an interactive and collaborative writing atmosphere.

Receiving feedback of any sort is therefore of high importance in order to improve writing skills in English. In Fathman and Whalley (1990) feedback given on form and content contributed to the writing skill of experimental group more than that of control group which received no feedback. Concerning the type of feedback whether L2 writing teachers need to focus on local or global issues (Ferris, 2004; Goldstein, 2004; Truscott, 2004) the focus, in this particular study, was mostly on global issues using holistic assessment scale while the course instructor and peers also highlighted local issues while giving feedback unlike Montgomery and Baker (2007) as they state in their study teachers offered more feedback on local issues such as spelling, grammar, and punctuation than those of global ones such as ideas, content, and organization. In this particular study, participants received feedback on all global and local components of writing either through blogs or portfolios and all were of positive opinions of such a practice. However, some other researchers may indicate that feedback to local issues does not lead to avoidance of local errors (Sheppard, 1992; Truscott, 1996), and local errors may emerge in later drafts (Truscott, 1996) and feedback given to form may lead to ignorance of writing as a process (Hamp-Lyons, 2006). Nevertheless, provided that it is constructive and done properly feedback is of paramount importance to improving non-native learners' writing skill in English. Corrective feedback may contribute to students' learning of some local issues (Bitchener, Young, & Cameron, 2005). Feedback on both local and global issues along the writing process may offer more benefits (Ashwell, 2000) as Straub (1997, p. 91) states that students favour "getting responses on global matters of content, purpose, and organization as on local matters of sentence structure, wording, and correctness." In the study Bitchener (2008) conducted, students who received written corrective feedback outperformed the other students in the post-test administered immediately.

Once prospective teachers of English acquire basic writing skills and learn how to give and receive feedback to writing in English, they can transfer such skills to their potential learners when they commence teaching in actual classes. Therefore, receiving teacher or peer feedback and also giving feedback prepare them for their professional lives. Application of blogs and portfolios, therefore, enhances students' active participation in the writing practice, avoiding monotony in traditional writing classes.

Limitations of the Study

This particular study may indicate very positive implications for writing instruction in EFL contexts; however, it is not devoid of limitations. Some blog group participants might have had difficulty accessing computers and the Internet out of class hours, so the added difficulty of trying to get a computer with Internet connection might have affected their attitudes towards blogging and feedback negatively.

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Appendix 1. Post-Study Self-Assessment Questionnaire

POST STUDY SELF-ASSESSMENT QUESTIONNAIRE ON WRITING IN ENGLISH

Dear Student,

The purpose of this questionnaire is to evaluate the effect of writing instruction you received and also your views of giving and receiving feedback on writing after the writing courses this academic year. Would you please complete the questionnaire by either providing information or by checking the suitable option for each item?

Would you please tick (√) the best option that fits you for each item below?

1. Gender:

O Male **O** Female

2. After the preparatory programme how would you evaluate your writing skill in English?

	Very Good	Good	Average	Poor	Very Poor
Writing skill	**O**	**O**	**O**	**O**	**O**

1. How would you evaluate your personal competence in writing in English in the following components of writing skill after you attended the writing courses at the ELT department?

	Very Good	Good	Unsure	Poor	Very Poor
Brainstorming	O	O	O	O	O
Narrowing a topic	O	O	O	O	O
Making an outline/plan of writing	O	O	O	O	O
Drafting	O	O	O	O	O
Getting feedback	O	O	O	O	O
Revising	O	O	O	O	O
Preparing the final draft	O	O	O	O	O
Editing	O	O	O	O	O
Organizing writing	O	O	O	O	O
Writing effective titles	O	O	O	O	O
Writing an effective paragraph topic sentence	O	O	O	O	O
Writing effective paragraph supporting sentences	O	O	O	O	O
Writing effective paragraph concluding sentences	O	O	O	O	O
Writing an effective essay thesis statement	O	O	O	O	O
Writing an effective essay introduction	O	O	O	O	O
Writing an effective essay conclusion	O	O	O	O	O
Having a clear purpose for writing	O	O	O	O	O
Writing with an awareness of the reader	O	O	O	O	O
Focusing on the main idea throughout writing	O	O	O	O	O
Presenting unified ideas	O	O	O	O	O
Presenting ideas creatively	O	O	O	O	O
Presenting ideas logically connected	O	O	O	O	O
Enhancing the topic with relevant details	O	O	O	O	O
Presenting ideas coherently	O	O	O	O	O
Using transitions effectively	O	O	O	O	O
Using reminders effectively	O	O	O	O	O
Using relevant language style (e.g. formal, informal)	O	O	O	O	O
Using correct word forms	O	O	O	O	O
Making accurate word choice	O	O	O	O	O
Making powerful word choice	O	O	O	O	O
Using a variety of sentence types	O	O	O	O	O
Writing simple sentences	O	O	O	O	O
Writing compound sentences	O	O	O	O	O
Writing complex sentences	O	O	O	O	O
Using parallel structures	O	O	O	O	O
Avoiding sentence fragments	O	O	O	O	O
Avoiding run on sentences	O	O	O	O	O
Avoiding dangling expressions	O	O	O	O	O
Avoiding comma splices	O	O	O	O	O

Using verbs correctly	O	O	O	O	O
Using articles correctly	O	O	O	O	O
Using prepositions correctly	O	O	O	O	O
Using pronouns correctly	O	O	O	O	O
Using tenses correctly	O	O	O	O	O
Using simple grammatical structures correctly	O	O	O	O	O
Using complex grammatical structures correctly	O	O	O	O	O
Using spelling correctly	O	O	O	O	O
Using punctuation correctly	O	O	O	O	O
Using capitalisation correctly	O	O	O	O	O

4. In writing courses how important do you think feedback was?

	Very Important	Important	Unsure	Not Important	Not Very Important at All
Receiving teacher feedback	**O**	**O**	**O**	**O**	**O**
Receiving peer feedback	**O**	**O**	**O**	**O**	**O**
Giving peer feedback	**O**	**O**	**O**	**O**	**O**

5. In receiving teacher feedback what points do you think was important?

	Very Important	Important	Unsure	Not Important	Not Very Important at All
PROCESS	**O**	**O**	**O**	**O**	**O**
ORGANISATION	**O**	**O**	**O**	**O**	**O**
CONTENT-IDEAS	**O**	**O**	**O**	**O**	**O**
VOCABULARY	**O**	**O**	**O**	**O**	**O**
STYLE-SYNTAX	**O**	**O**	**O**	**O**	**O**
GRAMMAR	**O**	**O**	**O**	**O**	**O**
MECHANICS	**O**	**O**	**O**	**O**	**O**

6. In receiving peer feedback what points do you think was important?

	Very Important	Important	Unsure	Not Important	Not Very Important at All
PROCESS	**O**	**O**	**O**	**O**	**O**
ORGANISATION	**O**	**O**	**O**	**O**	**O**
CONTENT-IDEAS	**O**	**O**	**O**	**O**	**O**
VOCABULARY	**O**	**O**	**O**	**O**	**O**
STYLE-SYNTAX	**O**	**O**	**O**	**O**	**O**
GRAMMAR	**O**	**O**	**O**	**O**	**O**
MECHANICS	**O**	**O**	**O**	**O**	**O**

1. In giving peer feedback what points do you think was important?

	Very Important	Important	Unsure	Not Important	Not Very Important at All
PROCESS	**O**	**O**	**O**	**O**	**O**
ORGANISATION	**O**	**O**	**O**	**O**	**O**
CONTENT-IDEAS	**O**	**O**	**O**	**O**	**O**
VOCABULARY	**O**	**O**	**O**	**O**	**O**
STYLE-SYNTAX	**O**	**O**	**O**	**O**	**O**
GRAMMAR	**O**	**O**	**O**	**O**	**O**
MECHANICS	**O**	**O**	**O**	**O**	**O**

1. Can you write down the strong and weak points of the writing courses you received at the preparatory programme?

2. Can you comment on your experience in receiving feedback from your writing instructor and peers on your writing and also giving feedback to peers' writing?

INTERPRETIVE STRUCTURAL MODELING OF MLEARNING CURRICULUM IMPLEMENTATION MODEL OF ENGLISH LANGUAGE COMMUNICATION SKILLS FOR UNDERGRADUATES

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ABSTRACT
In the field of distance education, learning mediated through mobile technology or mobile learning (mLearning) has rapidly building a repertoire of influence in distance education research. This paper aims to propose an mLearning curriculum implementation model for English Language and Communication skills course among undergraduates using Interpretive Structural Modeling (ISM) technique. The model was constructed to complement the formal in-class learning in view of mLearning as a solution to cater the diverse undergraduate language learning needs. The ISM technique was used to integrate selected expert views to develop the model which was generated through ISM software. The model consists of a network of mobile language activities and in-class activities determined prior to the development of the model through focus group activity. Findings of the study resulted in an interpretive structural model of a network of mobile language activities weaved into in-class activities which could dynamically illustrate how undergraduate language learners with different learning needs could be solved collaboratively via mLearning. The model was further evaluated to be refined by the experts. Interestingly through the evaluation, the experts found out that the activities in the model could be classified into three main domains: Knowledge Input activities, enabling skills activities, and Evaluation and Reflection activities without disrupting the relationships among the activities. This categorization of the activities aims to guide the curriculum implementers through how an activity or a group of activities influence or depend on other activities which is vital, for example in determining sets of appropriate mobile learning and in-class activities for a particular lesson to fulfill the course outcome in optimally aiding more students to achieve their individual learning targets.
Key words: mLearning, Interpretive Structural Modeling, curriculum implementation model, communication skills

INTRODUCTION

Language learning differs from other subject in the curriculum as learning a language requires integration and fluent application between the explicit learning of vocabulary and language rules with unconscious skills development (Milton, 2006). This implies that language learners need to master both grammatical knowledge and fluency. As it may be feasible to acquire knowledge in grammar in the formal classroom, it is not always true for fluency. It is often difficult to provide enough time and space in the classroom for every students to develop fluency especially a few hours of lessons per week may fail to provide meaningful exposure required for all students to learn. The general large numbers of students in a language class in the higher education would further limit individual students' contact hours with their lecturer. To add to this difficulty, most language instruction is still based on drill and exercise principles, discarding fluency and language competence out of classroom practices. In the universities, English courses offered consist of two major types: a) English for competency (EFC), for example English as a Second Language (ESL), English as a Foreign Language (EFL), English as Additional Language (EAL) and others; b) English for Specific Purposes (ESP), for instance Business English, English for Science and technology (EST), Professional and Communicational Skills, and others.

Except for students who opt for EFC as their major field, most of the English courses for students who chose to have their major in engineering, medicine, business, science, law, philosophy, psychology, and other fields would be offered ESP which generally aimed for professional conduct of students for future job environment in their respective field. The main ESP courses would be based on communication skills (both in writing and in speaking skills). Undergraduate students are expected to be proficient in written and spoken language as the nature of ESP concentrates more on language in context related and integrated in their subject matter compared to EFC which focuses especially on grammar and language structures. However, due to factors like time and lecturer-student ratio, ESP lecturers generally would hardly commit in solving students language proficiency problems, instead, fulfilling the university ESP syllabus. Often, students who are still chained to their inability to express themselves competently compared to their peers who are more proficient in English language would have to deal with their handicap while undergoing their required undergraduate ESP courses. They would have to struggle harder in making sure there are no fundamental grammatical errors at undergraduate level in submitting their English academic articles, or no unacceptable mispronunciations and grammar slips in presenting their oral presentations. Ideally compared to their more proficient and competent peers, the less proficient and competent students would need more time, space and personal guidance or tutoring to help them to at least be able to perform appropriately in class and later in future job environment. However, as indicated here, it is not possible for the lecturers to fulfil these students' needs due to time and logistic constraints.

Since mobile devices and technology which are readily afforded by the present generation of students, interaction among them is facilitated by social networking unlimited by time and space. Interaction among students of new generation has taken a new form where personal data and mutual interests could be shared and published through robust social softwares ((Isman, Abanmy, Hussein, and Al Saadany, 2012). Mobile Learning (mLearning) or learning mediated through mobile devices and technology coupled with robust mobile interaction environment could offer a viable solution to students to access aid in fulfilling their learning goals or solving their language learning problems. In addition, past researches have evidently stressed on the positive effect of mLearning on students' learning. For example, a mobile learning tool (MOLT) developed by Cavus & Ibrahim (2009) shows that undergraduate students enjoyed and are able to learned new vocabulary using Short Message Service (SMS) text messaging through their mobile phones. It is even indicated in another study that mobile phones is more effective as a vocabulary learning tool compared to traditional vocabulary tool (Basoglu & Akdemir, 2010). Besides these, other past researches has evidently pointed out that mLearning is very effective in teaching and learning. In one study conducted by Saran Cagiltay and Seferoglu (2008), mLearning via mobile phone is found to enhance students 'language skills in the English Language with the incorporation of multimedia use mediated by the mobile device. Students are reported to be more motivated to learn the language even during their leisure hours. The study also revealed that MMS and SMS aided effectively in improvement and retention of vocabulary among the students. Another interesting study involving illiterate students found mLearning as a key success in the ability of the students to read and write (Collet & Stead, 2002; Traxler, 2007).

In the context of the study described in this paper, through synchronous and asynchronous mobile communication, students could gain help in improving their language competence through social networking beyond classroom hours anytime and anywhere. The flexibility of learning which allow students to participate and manage their own learning here stresses the role of the online environment (Isman, 2004) provided by the mobile communication technology. To add, through mLearning as complement to formal classroom learning, students could facilitate own learning (learner's autonomy) and indirectly allowing a sense of ownership. Sense of ownership is about giving choices in learning and this motivates students to learn as they could do things which they chose to rather than being told to do so (Truby, 2010; Dlodlo, Tolmay, and Mvelase,2012) although this means that the customary role of teacher-student is challenged where students take charge of the learning process instead of the teacher (Isman et al, 2012).

In short, in this study, employing mLearning not only could be regarded as a complement to formal classroom learning but also to augment classroom learning (Quinn, 2011; Terras and Ramsay, 2012). Learning activities which are engaged in the classroom could be continued and developed through mobile interaction beyond classroom walls and time, facilitating more students to fulfil course learning outcomes despite of students' individual different learning needs. As a solution, mLearning could help more students especially the low achievers to improve their language competence and communication skills. However, how mLearning is viable as a solution would depend on how it should be implemented. Thus, holding to the idea of mLearning as a solution to aid students to achieve their language learning needs, this study seeks to develop an mLearning curriculum implementation model to overcome language learning needs in an English communication course among undergraduates. The curriculum implementation model would consist of a network of language learning activities connecting both mobile language learning activities and formal classroom activities. The language learning activities would be selected by a panel of experts. Identifying the activities alone is not adequate

without determining the relationship among the activities in guiding both teachers and learners to fulfil course learning outcomes through collaborative interactions. However, determining the appropriate learner's activities in mobile environment alone especially in augmenting formal classroom learning could prove a daunting task as the learning situation is complex and dynamic. It would require a great deal of time and commitment to investigate each activity proposed before it could be selected. The task would further become complex as the relationships among the activities selected need to be investigated in order to produce practical guide for implementers to implement a mobile learning language initiative to aid learners to achieve their learning goals. Thus, based on the circumstances discussed above, Interpretive Structural modeling (ISM) (Warfield, 1982) was employed because not only it could facilitate investigation into the relationships among the learning activities but an overall structural model could be extracted based on the relationships for the intended mLearning curriculum implementation.

THEORETICAL FRAMEWORK

In the development of the mLearning curriculum implementation model, this study employs Vygotsky's Zone of Proximal Development (ZPD) (1978) as learning theory to guide how undergraduate students seek and gain assistance in the mlearning process through interaction. ZPD is one of the three major themes in Vygotsky's Social Development Theory (1978). According to Social Development Theory, Vygotsky envisages that social interaction precedes development where consciousness and cognition is the end product of socialization and social behavior. Vygostky defines the ZPD as "The distance between the actual developmental level as determined by individual problem-solving and the level of potential development as determined through problem- solving under adult guidance or in collaboration with more capable peers" (Vygostky, 1978:86). In other words, referring to Figure 1, ZPD is the distance between the most difficult task someone can do alone and the most difficult task someone can do with help (Vygotsky in Mooney, 2000:83).

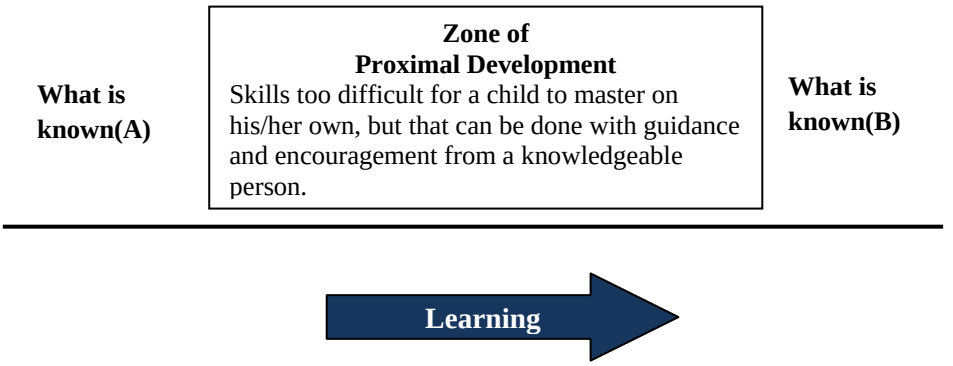

Figure 1. Zone of Proximal Development

In his theory, Vygotsky stresses that interaction is vital for a learner in the edge of learning where the learner can benefit from the interaction to enhance his or her learning achievement. He stresses that interaction between the learner and other more skilful peers could effectively aid in developing the learner's skills and strategies. In the context of this study, lecturers may include cooperative language activities where skilful peers could help less competent language learners within the learners' zone of proximal development. Now, these more skilful peers are what Vygotsky terms as the More Knowledgeable Other (MKO). MKO is an important concept that relates to the difference between what a student can achieve on his own and what the student can achieve with the guidance and encouragement from a more skilled partner. This concept implies that not necessarily higher interlocutors such as lecturers or instructors but other students qualify to be the MKO too. However the MKO may not necessarily be in human form. As an example of this, John Cook (2010) presents an augmented context for development mediated by mobile phones in reconceptualizing Vygotsky's notion of ZPD. He argues that the context of learning for the century is augmented and accelerated by mobile devices and technologies through new digital tools and media. This actually supports augmentation as a fundamental way in conceptualizing mLearning (Metcalf, 2006 in Quinn, 2011; Quinn, 2011).

In order to guide the selection of appropriate mobile learning language activities for the model, the study employs the SAMR model developed by Ruben R. Puentendura (2006). The model was developed by Puentendura to view how one should use or incorporate educational technology. It is also a system to measure the level of technology usage in education. The model aims to assist teachers in the design and development of technology based learning to enhance learning experiences among students to reach their highest potential. The model consists of 4 stages: Substitution, Augmentation, Modification, and Redifinition as shown in Figure 2.

Coincidentally, SAMR itself is an acronym of the stages.

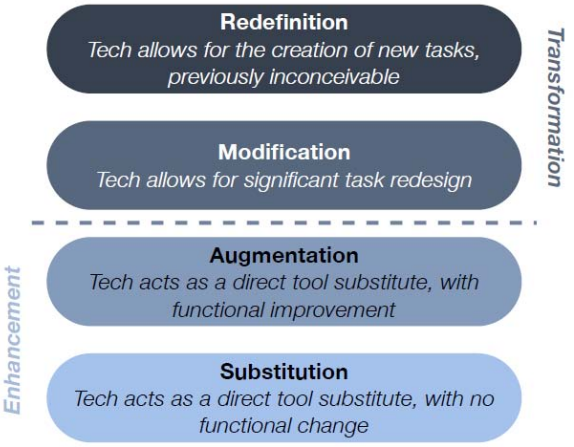

Figure 2. SAMR model

The model is employed in this study in view of sustainability incorporation of technology in education. From the model, we could understand that if a technology is employed merely to do the same things differently, the level of use is only at substitution level. For example, if the current practice involves students referring to science articles from books for information, and if this practice is replaced by referring the articles on websites using a computer, the level of technology use is only at substitution level. The use at this level though is essential may not sustain once the novelty of referring to the internet information wears off. This explains why certain technology incorporations in the formal classroom in the past only sustain for a short period as the use of technology were not developed to higher level of use based on the SAMR model (Figure 2). The authors proposed the selection of mLearning activities by the experts to be guided by the model to determine activities which satisfy all levels of use in the model to incorporate better mLearning in mainstream learning.

METHOD

The focus of this research is the development of Interpretive Structural Mlearning Curriculum Implementation Model of English Language Communication Course for Undergraduates. The development of the implementation curriculum model is based on the integrated view and decision of a panel of selected experts. Thus, the study employs the Interpretive Structural Modelling(ISM) to develop the model. ISM was first proposed by J. N. Warfield (1973a; 1973b; 1974a; and 1976). Warfield (1982) described ISM as "a computer-assisted learning process that enables an individual or a group user to develop a structure or map showing interrelations among previously determined elements according to a selected contextual relationship'. It could also be viewed as a management decision-making tool that interconnects ideas of individuals or groups to facilitate thorough understanding of a complex situation through a map of relationships between many elements involved in the complex decision situation (Charan et al, 2008). ISM is interpretive because it involves judgment whether there are relationships among elements and if so how they should be connected. The method is structural because an overall structure could be generated using the relationships among the elements. Finally, it is a modeling technique because the overall structure and the relationships among the elements could be illustrated in a graphical model. The various steps involved in the ISM technique are:

(1) Identifying elements which are relevant to the problem or issues. In this study, the authors employed a modified Nominal Group Technique (NGT) to identify the elements. The classic NGT (Delbecq, 1975) is an iterative process to integrate multiple individual opinions to reach a consensus in prioritizing issues. The modified NGT employed by the authors begins with a short survey of pre-listed mlearning activities. Not only the list offers a description of the scope of the outcomes the study, it guides the experts a starting point of idea to begin with. This shortened the NGT process from 4 hours to 90 minutes. In response to the survey, experts could agree or disagree with the list of activities. The activities which reach positive consensus would be included in the model. The experts would then present additional ideas on the activities which deem fit for the model. In the scope of this study, in developing a model for English Language Communication Course for Undergraduates, the authors chose to develop it for 'Professional Communication Skills (PCS)' course, an undergraduate English Language course offered by a private university. It is a compulsory subject to be taken in

fulfillment of a four year undergraduate study among engineering students. This course emphasizes the theory and practice of professional communication at the interpersonal level, in teams and to a large group. The course serves to build upon the students' academic and professional knowledge acquired through other core engineering or technical courses and aim to enable them to be highly effective in expressing themselves and in imparting their professional and technological expertise in a variety of jobs, business and professional settings. The modified NGT involves selected experts from the university as well as from other institutions. The experts consist of four (4) Content Experts who are course instructors of PCS from the private institution, two (2) Information Technology or mLearning experts, one policy stakeholder of the institution and one curriculum expert.

(2) Determine the contextual relationship and relation phrase with respect to how the learning activities (elements) should be connected with each other. The contextual relationship defines what is to be accomplished (goal) and any boundary conditions or constraints along the way. In other words, the context provides focus on how the learning activities need to be connected while constructing the ISM. The PCS course outcomes were used to determine the context for the relationship of the activities. As a reference, the course outcomes were:
At the end of this course, students should be able to:
a) apply the principles and practices of professional oral communication skills.
b) present information confidently, accurately and fluently in a variety of professional, business and social settings.
c) persuade effectively in a variety of professional, business and social settings.
d) communicate interpersonally, and work effectively individually and in teams.

In short the course outcomes aim to produce students who are competent in the language and effective as communicators in the professional settings. The relation phrase determines how the relationships between learning activities are analyzed during construction of the ISM. The contextual relationship and the relation phrase were determined by the consensual experts' opinion on how the activities (elements) should be connected.

(3) Develop a structural self-interaction matrix (SSIM) of the learning activities which shows the connection among elements. This was conducted using the aid of ISM software. Pairs of elements would be displayed by the software to allow the experts to decide through voting on the relationship before the next pair of elements was displayed. This process was repeated until all the elements being paired for relationship.

(4) Generate the ISM model. This was done by the software after the pairings of elements was successfully conducted. The software derives the model based on the concept of pair wise comparison as and transitive logic. Transitive Logic states that for any 3 elements (A, B, C) with a given relation when:
• A has the relation to B, (written A→ B),
• And B has the relation to C, (written B→C), • Then A has the relation to C, (written A→C or A→B→C).

(5) The model was then being reviewed by the experts to check for conceptual inconsistency and making the necessary modifications.

(6) The final model was then presented after the necessary modifications were made.

Figure 3 shows a flowchart of the steps presented above to describe the methodology used for this study.

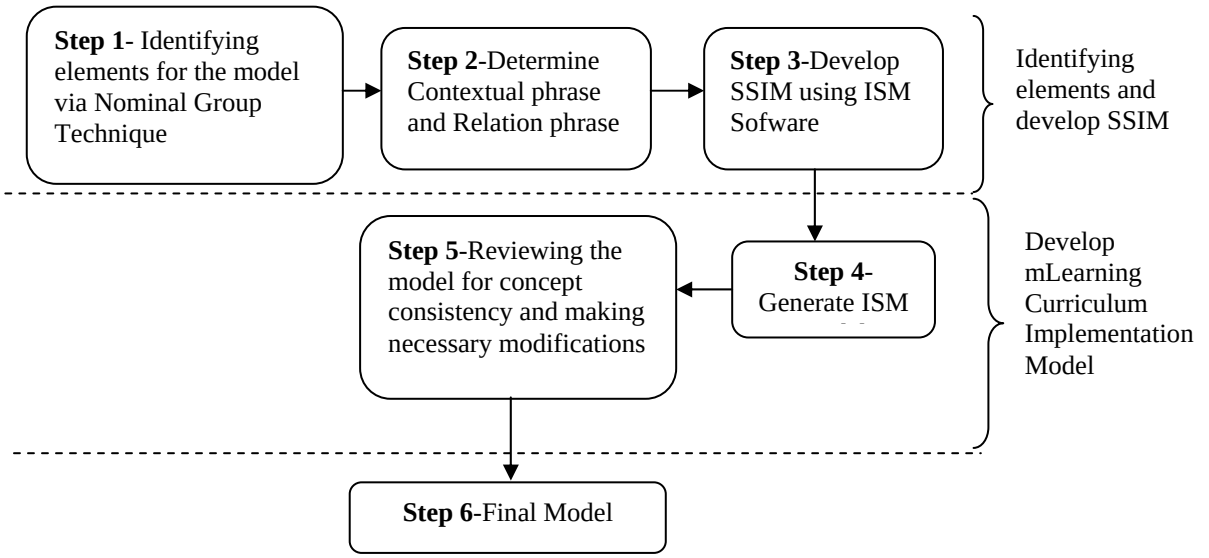

Figure 3. Flowchart of development of mLearning curriculum implementation model

RESULTS

Findings from Step I

Table 1 shows the experts collective views on the learning activities which should be included in the development of the mLearning curriculum implementation model via Nominal Group Technique.

Table 1: Experts' agreement on the elements (learning activities) to be included in the mLearning Curriculum Implementation model.

	Learning activities	*Median*	*Mode*	*IQR*
1	Attend in-class lectures on effective communication.	5	5	0
2	Access and listen to lectures about effective communication on podcasts through mobile devices.	5	5	0
3	Search and browse for information on effective communication, competence and technical use of devices through mobile devices.	5	5	1
4	Listening to or reading online micro information on effective communication, competence (grammar) or technical use of mobile tools and devices through 'push' technology via mobile devices.	5	5	1
5	Develop 'mobile tags' for information and knowledge on communication, language competence and technical use of mobile devices via QR code or social bookmarkings.	5	5	0
6	Record and upload presentations to illicit comments from lecturers and peers via mobile devices	5	5	1
7	Video conferencing with other students and/or the lecturer via mobile devices to improve communicative and competence skills	5	5	0
8	Online group discussions on task given by lecturer via mobile environment.	5	5	1
9	Establish 'learning contract' to be fulfilled through both in-class and informal (online and mobile) learning activities	5	5	0
10	Forming separate online small groups (social blogs) to discuss shared topics in-class or mobile	5	5	0
11	Forming separate online small groups (social blogs) to discuss and solve shared problems in language, communication or presentation.	5	5	0
12	MENTORSHIP to help students or group of students by lecturer or by other more capable	5	5	0
13	Synchronous or asynchronous mLearning FORUM on specific communication or competence issues	5	5	1
14	Collaborative redesign of in-class language activities to improve	5	5	0

	communicative or competence skills			
15	Collaborative redesign of method to improve specific communicative or competence skills	5	5	0
16	Playing mobile language games either individually or in groups.	5	5	1
17	Learning through modelling	5	5	0
18	Search and browse information for content to be used for presentation materials	5	5	1
19	Synchronous online evaluation on students' presentation through mobile devices by the lecturer	5	5	0
20	Synchronous online evaluation on students' presentation through mobile devices by other students	5	5	0
21	Asynchronous online evaluation on students' presentation through mobile devices by the lecturer	5	5	1
22	Asynchronous online evaluation on students' presentation through mobile devices by other students	5	5	0
23	In-class evaluation on students' presentation by the lecturer	5	5	1
24	Reflection on what students have learned and establish new learning target to develop new or higher communication/language skills	5	5	0

*IQR- Inter-quartile range

Based on the Table 1, The Nominal Group Technique session reveals that the experts consensually agreed on all the learning activities (elements) as listed in the table for the construction of the structural model:

Findings from Step 2- Based on the PCS course outcomes and the learning activities agreed upon, the experts identified 'In order to enable more students especially the lower performance ones to be language competent and effective communicators, the learning activity MUST be conducted BEFORE learning activity…' to guide through the SSIM process as the contextual phrase for the study while the phrase 'MUST be conducted BEFORE' is the relation phrase to relate the elements of the model.

Findings from Step 3, 4, 5, 6- These steps aims to develop the model through experts' decision on the relationships of the elements using pair wise technique with the aid of the ISM software as discussed earlier in the methodology section. After the model being generated, the model was reviewed by the experts and the final model is shown in Figure 4 below.

Although mLearning could be used to deliver full courses, but the primary advantage of mLearning is about performance support and complementing learning (Quinn, 2011). In line with this concept, the model should be a guide on how formal classroom learning and informal mLearning could be bridged as a solution to a wide range of learners' learning needs in undergoing a language course like Professional and Communication Skills Course (PCS)-an undergraduate course which was selected by the authors for the study. The model is structural in nature which was developed interpretively by experts constructed through a network of relationships among the learning activities identified as elements of the model. The relationship among the activities was based on the contextual phrase and the relation phrase determined earlier in step 2 of the study. The learning activities, the contextual phrase, and the relation phrase were determined according to the course outcomes of the PCS.

Briefly, the model can be divided into three domain of implementation of activities: a) the Knowledge input activities; b) the Enabling skills activities; and c) the Evaluation and the reflection activities. Based on the contextual and the relation phrase (as mentioned in findings of Step 2), the arrows show the flow from one activity to another activity as sets of sequence activities in the implementation of the three domains which interrelated with each other to form an overall structure of sequence activities for the whole mLearning curriculum implementation. For example, activities 9 or 10 need to be conducted before activities 8, 16, and 17. The activities which share a single box such as learning activities 1 and 5, 7 and 18, 6 and 13, and 19 and 23 means that the activities could be conducted in any sequence or concurrently as the pairs of activities complement each other.

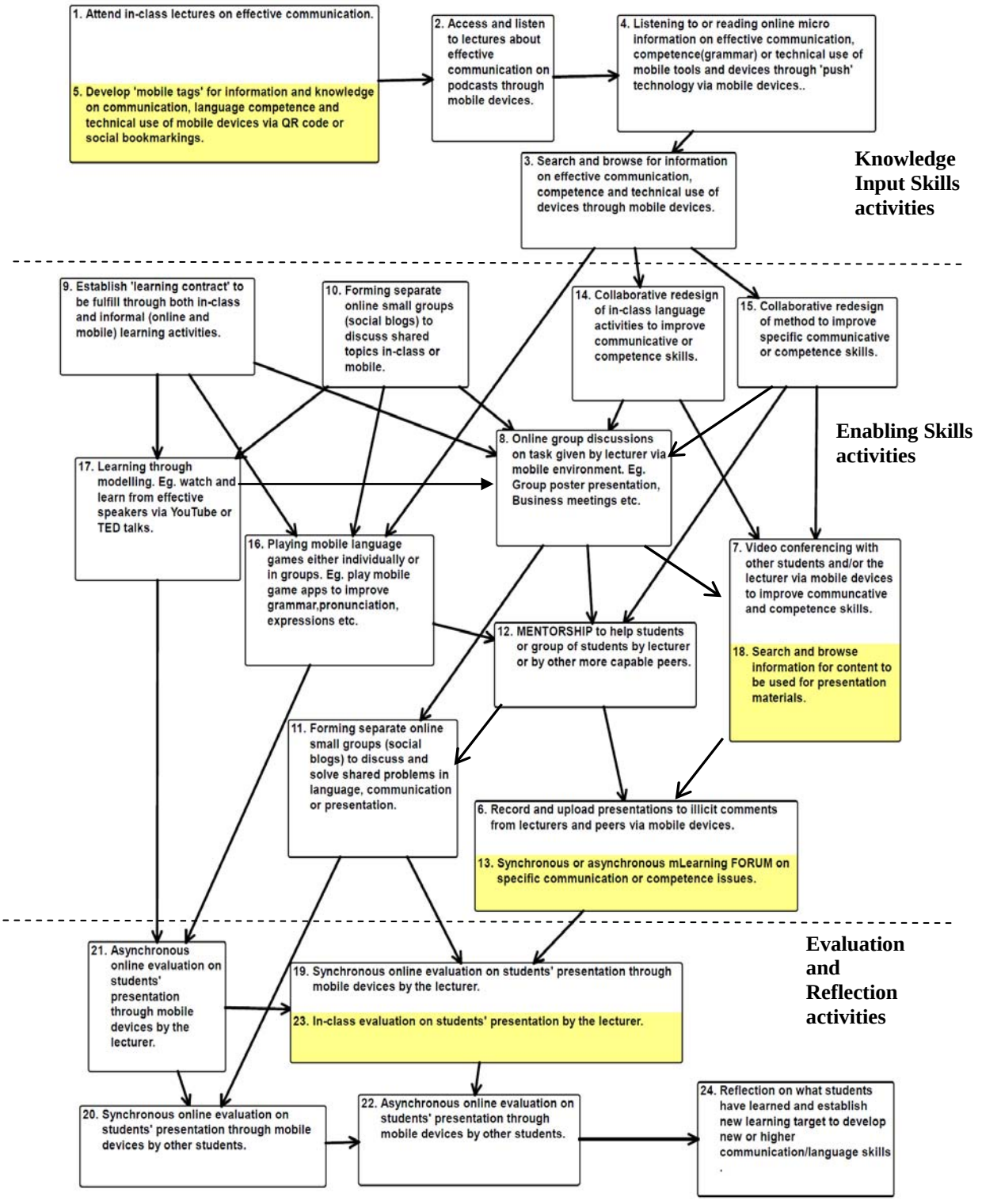

Figure 4. Interpretive Structural Modeling(ISM) based Mlearning Curriculum Implementation Model of English Language Communication Skills for Undergraduates

DISCUSSIONS

Based on Figure 4, activities 1(Attend in-class lectures on effective communication) and 5 (Develop 'mobile tags' for information and knowledge) are positioned highest in the Knowledge Input domain together with activities 9 (Establish learning contract) and 10 (Forming separate online small groups (social blogs) to discuss shared topics in-class or mobile) which are in the Enabling Skills domain. These activities are the most preliminary activities which need to be conducted before other activities as other activities depend on them. Knowledge input is about

delivering content. Though mLearning could be about content delivery, but it is not everything about content (Quinn, 2011). According to Quinn, as it is interactive, mLearning should be more on communication, connecting learners with the right people and resources when and where it is most needed. In learning instruction, it is critical in giving help to learners when and where it is needed and this is the main advantage of mLearning over other technology-based learning. Coincidently, parallel to this concept of mLearning, activities 10 and 9 are more on establishment of communication ground among learners through forming online social blogs and self-management of learning process via learning contracts. These are the activities proposed to be conducted at the beginning of the mLearning curriculum implementation before other activities. Thus, the course instructor could opt to conduct these activities (9and 10) concurrently with content delivery (activities 1 to 5).

Another important point that we could observe is that learning activities 1 to 5 and 9 to 10 as discussed above are integration of formal and informal learning. This is important because mLearning is also about creating a seamless space in bridging formal and informal learning (So, Kim, & Looi, 2008). For example, activity 1 is an in-class formal learning activity but pairing with it is activity 5, an informal learning activity where students collaborate to develop knowledge inputs in the form of mobile tags. This in a way complements the formal learning activity 1, where students assist the lecturer in augmentation of input through mobile context. Though the content in activity 5 could be accessed informally, but the activities to develop the tags could be done as formal learning if it is conducted in-class. However, as discussed earlier, what is more important than content delivery are the learner centeredness and communication aspects to the learning activities in augmenting formal learning experience as proposed through learning activities 9 and 10. While activity 9 allows learners' autonomy to manage own learning experience through learning contracts, activity 10 establishes online communication ground, for example through social blogs among learners to extend in-class discussion anytime and anywhere, not only to obtain information but also in collaborative negotiation of knowledge.

Coincidentally, collaborative negotiation of knowledge strives in continuous communication and here mLearning would serve as an ideal medium (Zijian, G. and Wallace, J.D., 2012). In terms of connection with subsequent activities in the model, these activities (activities 9 and 10) set as a vital precedent in overall successful implementation of mLearning. For example, the establishment of social communication environment in activity 10 is important as grounding for the implementation of activities 8 (Online discussions on task given), 16 (collaborative online language games), 12 (Mentorship), 7 (Video conferencing among learners), 6 (Record and upload presentations to illicit comments), and evaluation activities (activities 19 to 24). In short, preliminary activities (1, 5, 9 and 10) are the most important activities as they have great influence on other learning activities. These activities are situated at the top part of the model (Figure 4) either as Knowledge Input activities or Enabling skills activities.

Referring back to the model in Figure 4, the activities 8(Online group discussions on task given) and 12(Mentorship) positioned at the centre of the model have the most activities leading to them and also the most activities depending on them. These activities could be grouped as Lingkage activities. In other words, they play an important role in connecting the precedent activities and the subsequent activities together. For example, before online group discussions on task given by lecturer (activity 8), online social groups (activity 10) need to be formed first. Based on the model too (Figure 4), the conduct of online group discussion also depends on the competence and communication skills among students which could be developed through collaborative redesign of language activities (activity 14) and collaborative redesign on method (activity 15) as proposed in the model. Activity 8 would lead to proper mentorship (activity 12) for needy students, video conferencing (activity 7) for further discussion on tasks or lead to collecting further content materials for presentations (activity 18) based on what transpired in the online discussions. Furthermore, along the learning process, students who need further assistance during the online discussion would be led to form separate online groups to solved shared learning problems (activity 11).

Learning activities in the preliminary stage (activities 1, 5, 9 and 10) and linkages stage (activities 8 and 12) are in also known as strategic activities. These activities play a key role in the implementation of mLearning in augmenting the conventional classroom learning experience. Hence, activities in these domains require greater attention by the course instructors. The other learning activities either complement the development of language and communication skills among students or evaluating their achievements. Holistically, all the activities included in the model interconnectedly aid in the learning process of the communication course which aims to serve all the students' learning needs using mLearning.

In terms of the attaining the PCS course outcomes, the classified activities as discussed above were based on experts' collective decision with reference to the course objectives as mentioned in the Method section (page 5). Thus, the model derived would guide how the learning activities individually and interconnectedly help in aiding

the learners to achieve the outcomes. However, the activities are not exclusively implemented to serve a particular course outcome. An activity or a set of activities would help fulfilling multiple course outcomes during the learners' learning process. For example, learning activities 1 and 5 or 2 to 4 are essential as input knowledge for the first course outcome 'apply the principles and practices of professional oral communication skills' and activities 8, 9, 10, 11, 12, 14, 15, 16, 17, and 18 would help develop students' skills further in applying the PCS principles and practices, while activities 6, 13, 19, 22, 23, and 24 would gauge to what extend students could apply the communication skills. But these sets of activities apply too to fulfill the other course outcomes. Besides the classification of activities as discussed above, we could also observed that the activities could also fall into types of technology based learning activity as described in the SAMR model (Figure 2) as shown in Table 2.

Table 2. Distribution of Learning activities to SAMR stages.

SAMR Model stages	MLearning Curriculum Implementation Model Learning Activities
Substitution	2, 3, 4, 19, 20
Augmentation	8,10,11, 12, 18, 21,22
Modification	5, 9, 14, 15
Redefinition	6, 7, 13, 16, 24

As proposed in the SAMR model, the learning activities should allow function of technology use (mobile devices and technology) according to all stages as shown in Table 5 to optimize the full capabilities of the technology in aiding the students to fulfil their diverse learning goals as well as the course outcomes to help them to reach their highest potential.

CONCLUSION

The key significance of employment of technology in education is not about how exciting it is in doing things differently compared to conventional practice. Although immediate and positive impact could be realized in the introduction of certain technology and its convenience value is highly appreciated, the key significance in the end is about sustainability. Formal classroom learning has a long history since its introduction as new learning technology replacing the informal education in the past. Back then, learners have to travel far to meet teachers to acquire knowledge. When, formal schooling was introduced, it gave immense positive impact and revolutionized learning and reshape communities and societies globally till to the present. Formal schooling sustains till today not primarily due to its impact or convenience but because it became a solution to the learning needs at large. It solves learners' global problems in attaining knowledge where they do not have to travel far and frequently to meet their mentors anymore. Schools were formed as an institution to gather learners and teachers at one place and this act as a solution. The same notion should apply too in the incorporation of technology in mainstream education, which is it should be incorporated as a solution. However, whether technology could be a viable solution, it depends on how it is implemented. Thus this study was conducted to describe how mLearning as new technology tool of learning could be used as a viable solution in aiding learners to achieve their learning goals. This is accomplished through developing an interpretive structural curriculum implementation model to guide how mLearning could augment formal classroom learning in catering the learning needs of undergraduate students especially the low to intermediate level achievers. The model as discussed in this paper not only shows how mLearning could be implemented but further describes formal and informal learning could be bridged as a solution to cater the students' learning needs. In the process, the model redefines what is mLearning as a tool to augment learning and as performance support (Quinn, 2011; Terras and Ramsay, 2012) rather merely as a system to deliver a course. In directing the development of the model, Vygotsky's ZPD was employed as theoretical framework on selection of appropriate learning activities to be included in the model. Based on the framework, learning activities which are selected should describe how students could interact and collaborate with each other to learn and how they could be aided to achieve their learning goals with the help of others. Besides this, the learning activities should also involve the full capabilities of the mLearning technology. Thus, the SAMR model was employed to guide the experts in selection of relevant learning activities which accommodates all four (4) stages (refer to Figure 2). As discussed earlier, learning activities beyond substitution level would significantly justifies the incorporation of technology as activities in subsequent stages (Augmentation, Modification and Redefinition) describes activities which could not be accomplished by the conventional formal classroom but very relevant in aiding the students to reach their highest achievement. Although the model guides how mLearning could be implemented specifically for language learning among undergraduates, the study could contribute as a proposal on how mLearning implementation models could be developed for other areas of learning disciplines for other types of learners learning using mobile technology-one which is sustainable.

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LEARNING ENGLISH VOCABULARY COLLABORATIVELY IN A TECHNOLOGY-SUPPORTED CLASSROOM

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ABSTRACT
This study was intended to investigate whether computer-assisted collaborative learning is comparable with computer-free and individual learning; in particular, it examined each of their effects on learning English vocabulary, followed by an analysis of their behavior patterns. In a junior high school in northern Taiwan, a normal classroom was first equipped with an interactive whiteboard and seven all-in-one touchscreen desktop computers. All participants from three intact classes, 76 students in total, were asked to finish five review activities of the target English vocabulary and assigned to one of the following groups: the learning for the group of computer-supported collaboration took place in the technology-supported classroom whereas that of computer-free collaboration and that of computer-free non-collaboration in a normal classroom. The results of the vocabulary tests showed no significant differences among the three groups; those learning English vocabulary collaboratively in a technology-enhanced environment outperformed the other two groups in vocabulary retention. In addition, analyses of the group's behaviors before the touchscreen desktop computers echoed and explained their better performances than the other two groups.
Keywords: behavior pattern, collaborative learning, English vocabulary learning, technology-supported classroom

INTRODUCTION

With advancement in information technology, many novel ones, such as the electronic whiteboard and all-in-one computers, have been widely used for assisting instructional activities. These technologies not only facilitated the learning effects but also increased students' interest in learning (Schmid, 2008; Smith, Higgins, Wall, & Miller, 2005; Tang & Austin, 2009). Learning in technology-supported classrooms also has great potential for improving learning skills, enriching their contents, and enhancing knowledge development (Solhaug, 2009; Wheeler, Waite, & Bromfield, 2002). Likewise, classroom practitioners can effectively employ technologies to increasing students' motivation in learning and promoting collaborative learning (Hall & Higgins, 2005; Schmid, 2008; Slay, Sieborger, & Hodgkinson-Williams, 2008).

While technologies have introduced a revolutionary classroom practice, it remains questionable that their applications achieve equal degrees of pedagogical benefits in language teaching and learning. Salaberry (2001) maintained that pedagogical effectiveness of different technologies must be concerned from four aspects: the correlation between technological sophistication and pedagogical effectiveness, the exploitation of new technologies for pedagogical purposes, the integration of technologies into the curriculum, and the efficiency of using human and material resources. Thus, the purpose of this study was to investigate the pedagogical effectiveness of different instructional approaches of technology and collaboration on English vocabulary learning and retention; it also conducted sequential analyses of students' learning behavior in the computer-supported collaborative learning group to verify their performances. The research questions are: (1) Are there any differences in English vocabulary learning effects and retention among different instructional approaches (collaborative learning in the technology-supported classroom, collaborative learning in a normal classroom, and individual learning)? And, (2) what are the learning behavior patterns that promote English vocabulary learning and retention of the participants in the technology-supported classroom?

LITERATURE REVIEW

Computers and collaboration

Collaborative learning has been applied in education since 1980s for such positive effects as enhancing motivation and critical thinking skills as well as improving academic performance and long-term retention (Brown, 2008; Dillenbourg, Baker, Blaye, & O'Malley, 1996). During the collaborative learning process where social interdependence and interaction take place (Salomon & Globerson, 1989), interpersonal skills, positive attitudes towards group work, and social relationships are also developed. Many maintain that collaborative learning theories are deeply influenced by both Piagetian and Vygotskian approaches, which provide the fundamental premise to account for how learning occurs and how social interaction influences cognitive development. Differences between the two, however, are pointed out. Forman (1987) explained that from a Piagetian perspective, both cognitive and social processes derive from individual process through perspective-taking; the intellectual and social coordination of peers, from a Vygotskian perspective, is exercised through the interaction across individuals. In Brandon and Hollingshead's (1999) words, Piagetian "learning occurs through interaction that produces multiple perspectives that generate cognitive conflict" whereas Vygotskyian "learning occurs when individuals are exposed to a slightly higher level of difficulty" than their present levels (p. 117).

Research on computer-supported collaborative learning (CSCL), coined by O'Malley and Scanlon in 1989 and recognized by Koschmann as an emerging paradigm in 1996 (Lipponen, Hakkarainen, & Paavola, 2004), aims to explore how computers can be used to create an effective learning environment that supports collaboration in small groups (Koschmann, 1996; Stahl, Koschmann, & Suthers, 2006), instead of designing computer programs centered on individual learners (Johnson & Johnson, 2004; Stahl et al., 2006). Although the bulk of previous studies has focused CSCL on the use of network, the integration of technology and collaboration should not be exclusive to networking tasks or online communication at the expense of authentic face-to-face interaction where collaboration can also happen with the aid of computers (Stahl et al., 2006).

Despite of the seeming benefits of combining computers and collaboration, the CSCL issues should be tackled carefully in that both elements are involved with complex sub-issues that deserve further investigation (Stahl et al., 2006). For example, Dillenbourg et al. (1996) indicated that factors, such as group size, group composition, nature of tasks, and communication media, may interact with one another in an intertwined way in which causal links can hardly be established between the learning conditions and effects of collaboration. Furthermore, studies under the label of CSCL involve a great variety in terms of methodological approaches, unambiguous definitions of CSCL, roles of computers, task types, learning goals, group composition, social interaction and instructional environments (Johnson & Johnson, 2004; Lipponen, 2002; Stahl et al., 2006; Strijbos, Kirschner, & Martens, 2004). Therefore, the effectiveness of CSCL should not be taken for granted without considering respective instructional settings where these variables interrelate (Strijbos et al., 2004), for fear of overgeneralizing the integration of technology into classrooms. In the field of language education, the application of technology was found to increase learning motivation and interest, develop positive attitudes toward learning, result in higher-order thinking and better recall, as well as improve language skills (Stepp-Greany, 2002). The advancement of technology has triggered its combination with collaborative learning and application in language classrooms. It is assumed that this combination can bring about benefits from applications of both technology and collaboration in language learning.

Vocabulary learning

The critical importance of vocabulary is undeniable because it not only establishes knowledge structure but also facilitates communication (Coady & Huckin, 1997). Second language (L2) vocabulary acquisition, unlike that in first language (L1), requires more efforts and time. L2 learners, particularly in early phases, need to reach the threshold level of frequent words for their language skills and linguistic knowledge to develop (Nation, 2001). In addition to the vocabulary size, the frequency of vocabulary encounters also has an influential impact on its acquisition (Laufer & Hill, 2000). Although the minimum encounters for effective learning have not been agreed upon, learners need multiple encounters in contexts to acquire words (Nakata, 2006). Repeated exposures have remarkable effects on the increase and retention of vocabulary.

In vocabulary learning, two sets of vocabulary knowledge are involved, receptive and productive (Nation, 2001). While the former refers to words used for comprehension in reading and listening, the latter refers to those for communication in speaking and writing. The relationship between the two sets of knowledge is not static and subject to variation (Melka, 1997). When vocabulary learning is concerned, the receptive set means the ability to understand what a word means in a given context and the productive one means that to use a word in an expression (Laufer, 1991). Because the acquisition of receptive and productive vocabulary involves different degrees of difficulty, the instruction should treat them differently. Receptive knowledge usually precedes and exceeds productive knowledge (Clark, 1993) and production requires a "more complete set of information"

(Melka, 1997). Therefore, it is widely acknowledged that the learning of a word usually progresses from reception to production. Moreover, the quantity of vocabulary should be the main goal if reception and comprehension are stressed. When production is emphasized, vocabulary acquisition should be centered on the quality of learning a small set of vocabulary (Nation, 2001).

Whether or not the receptive and productive knowledge of words can be retrieved successfully is a way to determine the effectiveness of vocabulary learning. To help learners enhance their long-term retention, language practitioners suggest deep processing, rather than shallow processing (Craik & Lockhart, 1972). While shallow processing of phonemic and orthographic components leads to a fragile memory trace susceptible to rapid decay, deep processing at various levels results in a more durable and long-lasting memory trace. Questions of shallow processing may only concern the sound or spelling of words, whereas those of deep processing may connect a word to its meaning in contexts. Deep processing that involved more elaborate mental representation was found to yield better long-term retention.

Similar to the concept of deep processing, the involvement load hypothesis (Hulstijn & Laufer, 2001) maintains that retention of unfamiliar vocabulary is dependent upon the amount of involvement, which consists of need, search and evaluation. Need refers to motivational, non-cognitive dimension whereas search and evaluation refer to cognitive dimensions, conditional upon allocating attention to form-meaning relationships (Schmidt, 1994). Search is concerned with the attempt to find the meaning of an unknown word or a form expressing a concept in L1 by consulting a dictionary or a human source. Evaluation needs a comparison of different words or multiple meanings of a word, and an assessment of the suitability of a word in a certain context. Recognizing these differences is referred to as moderate evaluation, while determining how additional words will combine with a target word in an original sentence or text is referred to as strong evaluation. Based on the hypothesis, some empirical studies have proved that incidental tasks that trigger learners' higher degree of involvement load in terms of their need, search and evaluation of unfamiliar words will lead to effective learning (Kim, 2008; Lu, 2008). Both the involvement load hypothesis and concept of deep processing offer useful pedagogical implications in language learning because they highlight the importance of manipulating task features to activate learners' cognitive processing of vocabulary.

Computer-supported collaborative vocabulary learning

This study established a technology-supported classroom, where L2 learners learn and review English vocabulary with their peers. The review activities are designed in such a way that learners are involved in deep processing of each target word for their receptive and productive knowledge. More details of its implementation are given in the following section.

METHOD

Participants

This study recruited 92 eighth graders from three intact classes in a junior high school in northern Taiwan and 76 participants finished the experiment. Based on the vocabulary size around 800 basic words, their proficiency level is considered beginning. None of the three classes, besides, is significantly superior to the others in their English ability according to a one-way ANOVA of their first monthly test results. The participants have four English classes every week and each meeting lasts 45 minutes. English classes take place in a normal classroom, where one computer with the access to the Internet is connected to an LCD projector. The purpose of English classes is to develop their abilities to use the language. Because of competitive entrance exams and parents' concerns, the focus of English classes is sometimes shifted to exam-driven exercises on form.

Learning environment

In the technology-supported classroom (Figure 1 below), four hardware devices and two software systems were installed.

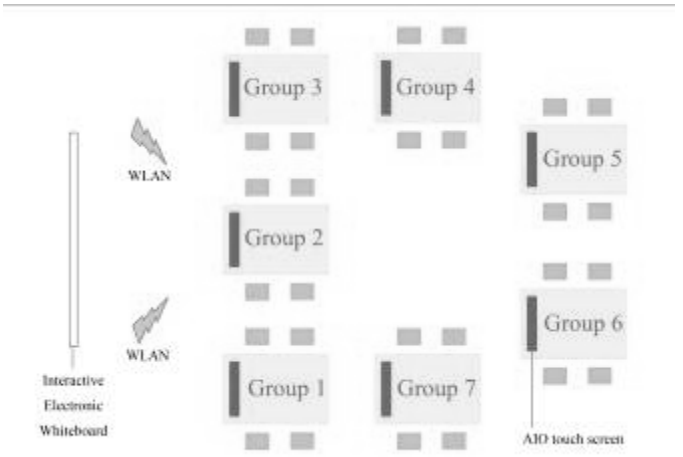

Figure 1. Layout of technology-supported classroom

The hardware devices were an interactive electronic whiteboard, all-in-one touchscreen desktop computers, a material server, and the wireless access point. Interactive electronic whiteboard in the study was a 72-inch touchscreen shown in Figure 2. Connected to a computer and a projector, the whiteboard projected the content of the computer and allowed its users to perform such functions as move, turn, and click to edit and operate with fingers or a touch pen. Not only can the whiteboard present multimedia materials, it can also store operational processes for later access.

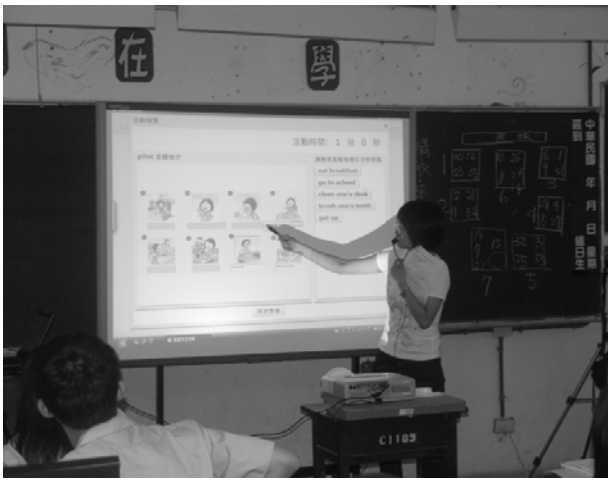

Figure 2. Interactive electronic whiteboard

Figure 3. Students operating touchscreen desktop

A 22-inch all-in-one touchscreen desktop computer was installed for each group (Figure 3). It allowed group members to operate the computer by finger touching; it also served as the platform of collaboration. A material server was used to offer materials to the students and to record students' performances. The teacher could monitor how students respond to questions and decide on necessary follow-up instructions. Finally a wireless access point was set up to promote the interaction between the teacher and the students.

The two software systems were the English Vocabulary Instructional System and the Five Modules of Review Activities of English Vocabulary. The Instructional System was developed with English vocabulary learning strategies (Schmitt, 1997) and long-term memory enhancing strategies in mind (Nation, 2001; Thornbury, 2002). The former learning strategies incorporated those of asking partners for meanings of words, copying and orally repeating words, associating words with pictures, guessing word meanings from the context, enhancing word meaning by using flash cards, using target words in sentences, and translating target words into L1 equivalents (Schmitt, 1997). The latter memory enhancing strategies included repetition, deep processing and pictorial association (Nation, 2001; Thornbury, 2002).

The Five Review Activities consisted of matching, filling in the blanks, translation, unscrambling sentences, and crossword puzzles. The snapshot of each is shown in Figure 4, from left to right, from top to bottom.

Figure 4. Snapshots of five modules

In the matching exercise, students were required to match English vocabulary items with their Chinese equivalents. Submission was allowed after ten pairs were done. Similarly, in the filling-in-the-blanks activity, students were asked to drag a word icon to match its corresponding picture. After all blanks were filled, students could submit their answers. The translation exercise demands students to type in a target word based on its Chinese equivalent given. Each item was evaluated immediately and scores were displayed. In unscrambling sentences, students needed to shift the order of word icons so that a sentence based on the word icons was grammatically accepted. Students could continue trying until the order was correct. Finally, the word puzzle game required students to type in a target word to fill in the blank of a given sentence.

Materials and instrument

The 30 target words in the study were selected by the participating English teacher and the other two veteran English teachers. The target words were not chosen from the textbook to ensure that the participants had no previous encounters. In each instructional session 10 target words were taught and practiced. The participants received the same vocabulary instructions from the same English teacher in a normal classroom. The only instrument for the study was an achievement test of English vocabulary. The test consisted of 30 recognition questions, each of which asked the participants to choose the correct Chinese word equivalent matching its English counterpart out of three options. Each question weighs one point; thus, the highest point of the test is 30, the lowest 0. The achievement test was administered on papers to each student apiece. The immediate posttest and delayed posttest contain identical items but in different orders.

Procedures and data analysis

The study adopted a non-equivalent control group quasi-experimental research design. The three classes of the same English teacher were randomly assigned to computer-supported collaboration group (experimental group A), computer-free collaboration group (experimental group B), and computer-free non-collaboration group (control group). The experimental group A, in seven groups, was asked to learn the target English vocabulary collaboratively in the technology-supported classroom. When doing the exercises they were allowed to look up digital references. In the experimental group B, the students in a normal classroom were divided into seven groups but were asked to solve the same questions on worksheets. They were allowed to consult dictionaries and class notes when necessary. In the control group, each student was given worksheets of the vocabulary exercises; dictionary and note consultation were allowed.

The study took place immediately after the school's first monthly exam, fall 2009; all participants' scores of their English monthly test were used as the pretest scores. Prior to the treatment, the experimental group A received a 30-minute pre-activity instruction to familiarize themselves with the all-in-one computers. The treatment consisted of three review activities of 10 target words in three class meetings, 30 minutes for each and 90 minutes in total. After each instructional session, the three groups received an immediate posttest. Thirty days after the experiment, a delayed posttest of 30 vocabulary items was administered without prior notice. Three sets of scores were collected: the results of the monthly test as the pretest scores and those of the vocabulary test as

the immediate posttest and the delayed posttest. To determine the differences in learning effects and retention, one-way analyses of covariance (ANCOVAs) were used; and, the participants' behavior patterns in the technology-supported classroom were videotaped, coded and categorized.

RESULTS

Learning effects and retention

The pretest scores were those of the English monthly test. A one-way ANOVA was conducted and the results showed no significance among the three groups ($F(2,73)=1.235$, $p>.05$). The descriptive statistics of the two posttests (Table 1) showed that the review vocabulary activities helped our participants learn and acquire the target vocabulary.

Table 1. Descriptive statistics of two posttests

Group	*N*	Immediate Posttest		Delayed Posttest	
		M	*SD*	*M*	*SD*
Experimental Group A	21	26.67	4.44	22.33	6.10
Experimental Group B	27	25.48	5.03	19.19	7.10
Control group	28	27.75	4.35	20.07	7.15

In Table 1, more than 80% of the vocabulary items were learned right after the activities and about 70% were retained 30 days after the treatment. The control group came up with the highest means in the immediate posttest while the experimental group A scored the highest in the delayed posttest.

Based on the results of the pretest and those of the immediate posttest, a test of the equality of variance for the three groups was conducted; and, the homogeneity of with-in regression coefficients was not significant ($F(2,70)=0.382$, $p>.05$). For the learning effects, one-way ANCOVAs were then used to determine whether the differences among the three instructional groups were significant, in which the instructional approaches served as the independent variable, the immediate posttest scores the dependent variable, and the pretest the covariate with the alpha level set at .05. The results from ANCOVA indicated that there is no significant difference among the three instructional approaches ($F(2,72)=2.253$, $p>.05$).

The other test of the equality of variance for the three groups, based on the scores of the immediate posttest and those of the delayed posttest, was performed; and, the results of the homogeneity of with-in regression coefficients did not reach a significant level ($F(2,70)=.045$, $p>.05$). One-way ANCOVAs were then used to determine whether differences in vocabulary learning retention among the three instructional approaches existed, where the instructional approaches served as the independent variable, the delayed posttest scores the dependent variable, and the immediate posttest scores the covariate with the alpha level set at .05. The results from ANCOVA indicated no significance among the three instructional approaches, either ($F(2,72)=1.964$, $p>.05$).

The examination of the differences between the two posttests followed. Differences between the two posttests showed that the control group had the sharpest drop (7.68) and the experimental group A the slowest (4.34). This suggests an analysis in the retention rates, the percentage of the scores of the delayed posttest divided by those of the immediate posttest. The experimental group A had the highest retention rate ($M=86.37$, $SD=16.18$), followed by the experimental group B ($M=74.59$, $SD=23.90$), and the control group the least ($M=71.63$, $SD=24.22$). Three *t*-tests were conducted. While the differences between the two experimental groups ($t=1.938$, $p=.059$) and those between the two computer-free groups ($t=0.455$, $p=.651$) were not significant, the differences between the experimental group A and the control group ($t=2.411$, $p=.020$*) were statistically significant. The participants, learning collaboratively before touchscreen desktops, outscored the other two groups in the delayed posttest and recalled most.

Learning behavior patterns

To answer the second research question of learning behavior patterns, the participants' learning in the technology-supported classroom were videotaped. Their actions were coded, categorized, and analyzed.

Six types of actions were first categorized. They were reading information on the screen (R), consulting references for meanings (C), discussing with group members (D), determining answers (A), touching the screen or using the keyboard (T), and doing something irrelevant to learning (O). Except for the first and the last types, the other four were correspondent with some long-term memory enhancing strategies mentioned earlier (Nation, 2001; Thornbury, 2002). For example, when discussing with group members (D), our participants employed learning strategies of resorting to a group member. Even though the participants' determining answers (A) may

be demonstrated by speaking out the answers in the group, strategies of deep processing and using words in context were involved. Touching-and-moving words on the screen or typing in words (T) involved strategies of using words and retrieving lexical information learned before.

After the coding of 5,304 actions, some sequential patterns were immediately noticed (Bakeman, & Gottman, 1997; Sung, Chang, Lee, & Yu, 2008). A typical sequential pattern observed in the group leaders' collaboration in solving crossword puzzles was that they read the questions first to their group members (R) and discussed to clarify what the questions meant with their group members (D); after the clarification, they decided on answers (A) and typed in answers (T). To record and tabulate sequences of actions in Frequency Transition Table (Table 2), we began with action codes in the rows, "starting action", and found their following action codes in the columns, "subsequent action." Two raters identified 63 and 38 patterns, respectively, and the inter-rater reliability reached a substantial level (Kappa=.62).

Table 2. Frequency transition table

from \ to	R	C	D	A	T	O	Total
R	9	45	134	19	87	8	302
C	14	81	293	134	103	14	639
D	137	242	269	458	565	47	1,718
A	20	96	219	25	528	5	893
T	117	163	743	257	343	14	1,637
O	4	13	60	0	11	27	115
Total	301	640	1,718	893	1,637	115	5,304

Most sequential patterns (92%) fell in the middle cells, from C, D, A and T (starting actions) to C, D, A and T (subsequent actions). To test whether the frequency of the patterns was statistically significant, we conducted a sequential analysis based upon the results of Table 2. The strength of each sequence was listed in Table 3. A sequence of actions was considered significantly different when its *Z* value was greater than 1.96. A behavioral-transfer figure (Figure 5) was drawn based on the *Z* values.

Table 3. Adjusted residuals table (*Z*-Scores)

from \ to	R	C	D	A	T	O
R	-2.08	1.50	3.88*	-4.74	-0.68	-0.60
C	-4.20	0.50	6.80*	2.90*	-7.63	0.04
D	5.92*	3.56*	-18.02	14.68*	2.23*	2.36*
A	-5.18	-1.36	-4.97	-12.29	18.28*	-3.92
T	3.62*	-3.55	13.36*	-1.62	-10.44	-5.22
O	-1.01	-0.24	3.81*	-4.50	-4.20	15.86*

*$p<.05$

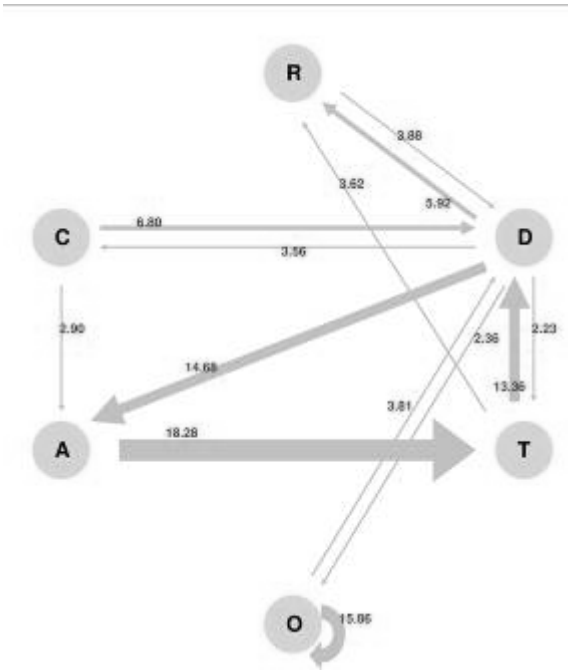

Figure 5. Behavioral transfer diagram

From the *Z*-scores shown above, our participants, learning collaboratively in the technology-supported classroom, mostly performed a sequence of determining answers and entering answers (A to T, 18.28), involved in irrelevant trivia (O to O, 15.86), and elicited answers from group members (D to A, 14.68 and D to T, 13.36). Because of the nature of the learning, their actions centered on discussing with their group members to determine answers (D to A), to enter answers (D to T), and to clarify their comprehension (D to R, 5.92) and their answers (D to C, 3.56).

When analyzing data, we found that our learners' behavior patterns could be further divided. For instance, some participants, after consulting the dictionary (C), would make up their minds (A) and typed in the answers (T); however, there were others, after consulting the dictionary (C), would confirm what they read with their group members (D) before they came up with an answer (A). The class instructor later informed us that the differences observed in comprehending dictionary information could lie in the proficiency levels. After overall analyses individual differences were further noticed and the analyses were conducted in terms of higher proficient learners (top 30% in the pretest) and less proficient learners (bottom 30% in the pretest). Their frequency transition is shown in Table 4.

Table 4. Frequency transition table for higher and less proficient learners

to	R		C		D		A		T		O		Total	
from	H	L	H	L	H	L	H	L	H	L	H	L	H	L
R	2	5	12	22	53	50	5	6	28	32	0	8	100	123
C	1	10	20	53	82	144	67	38	34	36	2	12	206	293
D	51	59	68	123	75	146	245	124	192	229	11	29	642	710
A	11	6	45	32	115	64	12	12	273	113	4	1	460	228
T	34	38	61	50	299	272	131	48	112	124	4	7	641	539
O	0	4	0	13	18	34	0	0	3	6	8	12	29	69
Total	99	122	206	293	642	710	460	228	642	540	29	69	2,078	1,962

Note: H=Higher Proficient Learners; L=Less Proficient Learners

The most common patterns in the middle cells were observed, too. Over 90% fell in these categories, 93.84% for higher proficient learners and 90.27% for less proficient learners. Sequential analyses based on the frequencies were conducted to determine the strengths (Table 5). A sequence of actions was considered significantly different when its *Z* value was greater than 1.96; based on the *Z* values, behavioral-transfer figures for the two groups (Figures 6 and 7) were drawn.

Table 5. Adjusted residuals table (*Z*-Scores) for higher and less proficient learners

to	R		C		D		A		T		O	
from	H	L	H	L	H	L	H	L	H	L	H	L
R	-1.33	-1.02	0.7	0.9	4.18*	0.88	-3.83	-2.34	-0.55	-0.34	-1.24	1.88
C	-3.12	-2.26	-0.1	1.64	2.55*	4.33*	3.52*	0.8	-4.12	-5.84	-0.57	0.62
D	5.34*	3.50*	0.79	2.58*	-12.67	-10.85	12.49*	7.16*	-0.65	3.77*	0.99	1.26
A	-2.99	-2.46	-0.11	-0.4	-2.92	-2.31	-11.43	-3.19	14.10*	7.18*	-1.23	-2.8
T	0.91	1.07	-0.46	-4.69	10.37*	7.60*	-1.32	-2.55	-8.84	-2.76	-2.39	-3.79
O	-1.19	-0.15	-1.72	0.87	3.06*	1.87*	-2.57	-2.93	-2.02	-3.09	12.11*	6.37*

Note: H=Higher Proficient Learners; L=Less Proficient Learners; *p<.05

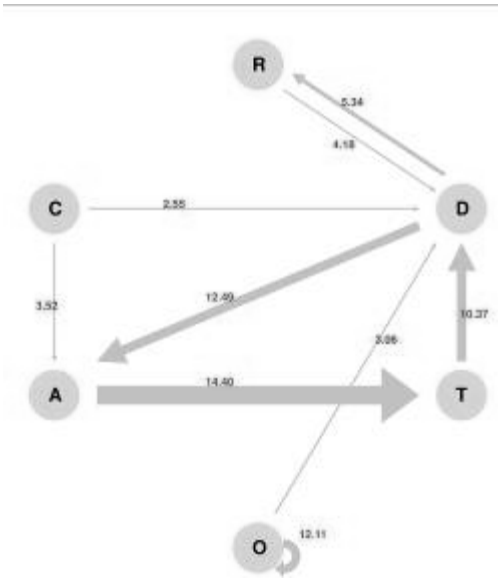

Figure 6. Behavioral transfer diagram: Higher proficient learners

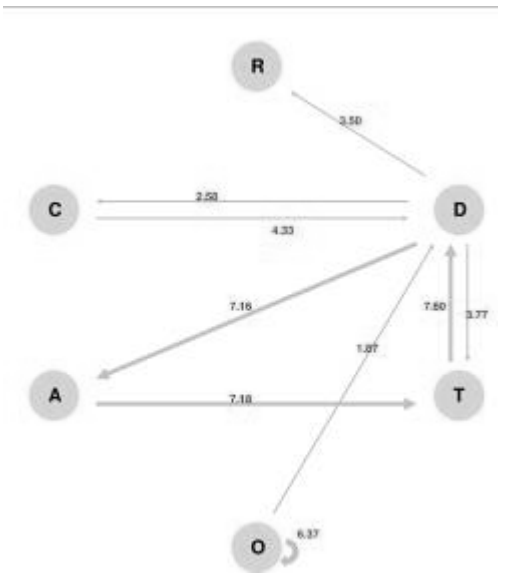

Figure 7. Behavioral transfer diagram: Less proficient learners

Similar behavior patterns between the two groups are correspondent to those of the class discussed earlier. Centering around group discussion, our participants' patterns in both higher and less levels included determining answers and entering answers (A to T, 14.10 & 7.18), eliciting answers from group members (D to A, 12.49 & 7.16), socializing (O to O, 12.11 & 6.37), engaging themselves in discussion or confirming their answers after typed in (T to D, 10.37 & 7.60), clarifying their comprehension (D to R, 5.34 & 3.50), resuming discussing (O to D, 3.06 & 1.87), and discussing what they had from the dictionary (C to D, 2.55 & 4.33).

Differences in our participants' linguistic proficiency were shown in their behavior patterns. What distinguished the two groups were that participants with higher proficiency tended to clarify their comprehension after reading the questions on the screen (R to D, 4.18); and, with their better proficiency, they were likely to determine answers after dictionary consultation (C to A, 3.52). For the less proficient participants, after their discussing with group members, they differed from their counterparts by entering answers to questions (D to T, 3.77) or consulting a dictionary to ensure their comprehension (D to C, 2.58).

One sequence of actions that cannot be ignored is our participants' doing something irrelevant (O to O), second place in the whole group and third and fourth in the higher and lower proficient groups, respectively. This attention dispersion was found in those participants when the touchscreen or the keyboard was dominated, when higher proficient ones were answering questions, or when questions were challenging. They would, most likely, chat with someone next to them, such as exchanging campus information, commenting on classmates' trivia, and discussing after-school activities. Their excluding themselves from the learning activities served as a temporary escape and relief.

DISCUSSIONS AND CONCLUSIONS

The learning effects of collaborative learning in the technology-supported classroom were competitive with those of other two groups. Not only did learning collaboratively in the technology-supported classroom help our participants learn the target words, it also helped them retain the target words. The benefits of vocabulary retention or long-term memory confirmed the findings in previous studies (Brown, 2008; Dillenbourg et al.,

1996). The feature, different from other studies, was the touchscreen technology that allowed every group member to participate in the English vocabulary review activities. Surrounding their touchscreen desktops, group members were able to clarify and confirm their comprehension and decisions with each other. Reaching a consensus among group members and later receiving positive feedback from the learning systems facilitated their learning and acquisition.

Explanations for the differences among the instructional approaches, however, were necessary. The participants learning individually showed better vocabulary gain than those in the collaborative groups in the immediate posttest. Because vocabulary is individual-inclined learning, it is reasonable that the control group showed a better learning effect when offered individual-inclined exercises and assessed accordingly. For those in collaborative groups, they may be faced with the problem of attention dispersion. As pointed out, team members tend to exert unequal mental effort on given tasks (Salomon & Globerson, 1989). One of the reasons can be their different perceptions of roles, leading to debilitating effects derived from social loafing, free-riding (Johnson & Johnson, 2000), or differential status (O'Donnell & O'Kelly, 1994). Less proficient learners hid themselves once higher proficient ones took over, especially when tasks were disjunctive and group performance depended on how well the most proficient members did. They abandoned the chances to learn and avoided the responsibility. Being deprived of chances to operate the computer, they acted passively. The fact that passive learners hardly identified themselves with their roles accounted for their lack of devotion. Nevertheless, the insignificant difference of the vocabulary scores between the three groups indicates that those learning collaboratively with computers were not outperformed in vocabulary tests. The treatment of computers and collaboration does not debilitate vocabulary acquisition, even with individual-inclined exercises and assessment. Moreover, learning collaboratively helped learners remember longer and forget less than those learning individually (Kolich, 1991), confirming studies on both collaborative learning (e.g., Johnson & Johnson, 1989) and the use of technology (Stepp-Greany, 2002).

Behavior patterns emerged in this technology-enhanced collaborative vocabulary learning were supportive for Piagetian and Vygotskyian claims. That is, our participants' deep-processing English vocabulary was in agreement with either perspective-taking or interaction view of learning (Brandon & Hollingshead, 1999; Forman, 1987). No matter what their proficiency levels are, our participants in the technology-supported classroom would reach a consensus before taking a next move. Such behavior patterns were demonstrated by their toggling between group members and various sources, including texts on the screen, dictionary on the desktop, and answers typed in. Group consensus dominated their learning. Our participants' exchanges of opinions were highlighted in those initiated by less proficient participants. Because of their inferior knowledge about the English vocabulary, the uncertainty about their comprehension of information on the dictionary and about their answers always led them to reconfirm with group members. The interactions between higher and less proficient participants helped both groups construct and reinforce the target knowledge structure of English vocabulary. Their collaboration before touchscreen desktops exemplifies small group collaboration via computer technology (Koschmann, 1996; Stahl et al., 2006), whose learning effects resulted from perspective-taking and intellectual and social coordination (Forman, 1987).

Two points of pedagogical implications can be drawn. First, because of dissatisfaction with appointed grouping, students sometimes should be allowed to form homogeneous groups with members of similar achievement levels or characters. Self-selection may reinforce students' stereotyping and have the effect of polarizing groups (Ingleton, Doube, Rogers, & Noble, 2000). Once they are familiar with group works, they should be aware of positive interdependence (Johnson, Johnson, & Smith, 1998), understanding that the success of the whole group depends on each member's participation and contribution. Second, teaching students their responsibility for each role in a group is essential. Although most students have a positive perception towards collaborative learning, they often lack the ability to collaborate, their passiveness to deal with communicative problems and uneven participation. A pre-instruction raising students' awareness of collaborative learning and individual roles periodically may, therefore, help the groups function effectively.

The significance of findings in the present study is partly restricted by limitations of the number of participants, grouping and research design, therefore, suggestions for future research. First, a larger number of participants are suggested to be recruited lest unpredictable student absence during the data collection process should influence the validity of the results. Second, an ideal number of group members in such a learning context should be under three for fear that at least one or two group members are easily left out or marginalized in a group of 4 to 5 peers. Next, there should be one group for participants to learn individually with computers, so that the learning effects and process can be compared between four groups, with a 2x2 design including treatment of computer/no computer and collaboration/no collaboration. As for data collection, a longer period (Scanlon, Issroff, & Murphy, 1999) and an examination of a group product are strongly recommended to generate more active collaborative

behaviors. Also, the behavior patterns found in the current study should be examined with other variables, such as gender, age, personality, learning styles, or affective factors that may influence learners' behaviors when learning with peers and technology support. In this way, more effective and fruitful learning activities are likely to be arranged and designed, not only to promote collaboration but facilitate language learning.

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LEARNING OBJECT TO ENHANCE INTRODUCTORY PROGRAMMING UNDERSTANDING: DOES THE SIZE REALLY MATTER?

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ABSTRACT
Learning Object (LO) is the breakdown of larger content into smaller pieces of information that accomplishes a single learning outcome. The smaller piece of content is incorporated with multimedia elements to promote meaningful learning. The prevailing focus on learning objects for introductory programming promising in terms of enhancing the programming concepts and syntax learning. However, the size of learning object that determines the amount of information to be placed on a single learning object still debatable. There are no prominent guidelines found in literature to assist the design the size of the learning object for introductory programming modules. This study aimed to investigate the effects of different sized learning objects on programming learning. An experiment was carried out and one hundred and one novice programming students participated in this study. Two different sizes of LO was developed as a learning support tool in a lab setting. The results of this study found that smaller learning objects (named as Micro Learning Object) are useful in delivering programming knowledge and actively engaged students in learning the programming concepts and syntax.
Keywords: Learning objects, granularity, programming ability

INTRODUCTION

The design and development of educational material has changed dramatically from being a course to smaller pieces of content. The decomposition of contents into meaningful smaller pieces of content is known as learning object (Wiley, 2000; Allen and Mugisa, 2010)**.** Literally, the term Learning Object (LO) was coined by Wayne Hodgins when he named one of his working groups and eventually it was used widely in the computer mediated learning field and content creation (Polsani, 2003). Hodgins conceived the idea of learning objects when he watched his children playing LEGO ™, apparently, both of them, who had different learning preferences, met their needs equally when playing with the blocks (Hodgins, 2004). This term also has been popular in the E-Learning field (Seung, 2007).

Higher educational institutions benefit from learning objects because it is able to: (a) develop and deploy learning content efficiently and quickly (b) deliver content between LMS (Learning Management System) and LCMS (Learning Content and Management System) or other E-learning platforms and (c) reduce content development, maintenance time and delivery costs (Learning Circuits, 2005). Learning objects for programming have been widely used in several universities and in high schools across the world. Studies have reported learning objects have been designed for programming languages in higher education institutions, such as Java and C++, which helped students to learn better and understand the abstract concepts of programming (London Metropolitan, 2004; Tempere University of Technology, 2012).

Nokelainen (2006) and Waston (2010) pointed out studies on LO related to pedagogical aspects are more scant than technical ones. Attention on how LO would be meaningful for novices in the learning context seems limited in existing literature. The granularity of learning objects is seen as a pedagogical issue. The size of learning objects is unclear and there is uncertainty in determining how much amount of content is just right to facilitate the process of learning. Yau (2004) studied learning objects for Java programming and reported the size of learning objects does not make it clear in determining how much content a single learning object should contain. The other issue with learning object is the reusability that is associated with the size of learning object. Wiley (2000) highlighted that the degree of reusability is high when the size of learning object is small. When LO is highly reusable it is expected to be reused in different learning context. However, when several types of learning objects are aggregated, the degree of reusability is relatively low. The purpose of this study is to

explore the effect of different sizes of learning objects used as a support tool in a programming lab. The following questions are addressed in this study:

1. Is there any difference between sizes of LO in improving the programming knowledge?
2. How does the size of LO facilitate or hinder programming learning?
3. Would it be useful to integrate different sizes of LO for programming learning?

REVIEW OF LITERATURE

The idea of breaking content into smaller chunks of information is a new approach to content creation, which is just right and uses the lowest possible size to accomplish a single learning outcome. The chunk of content attributed to be highly reusable in various learning contexts. Some literature refer to learning objects as reusable learning object (Jacobsen, 2002; Sicilia and Garcia, 2003; Seung, 2007). Although, it has emerged with different name, the concept of reusing the chunks is the key concern. Balatsoukas, Morris, and O'Brien (2008) reviewed several learning objects' frameworks that define the structure and aggregation of learning objects. The study outlined the existence of ambiguity in terms of granularity. Even though learning object appears with different nomenclature, the ultimate goal is relatively similar. Substantial amount of literatures seem to point out the same underlying characteristics for learning objects. The main characteristics are reusability, granularity (size/level) and self-contained (independent) and aggregation (assembled into larger collection) (Wiley, 2000; Bergtrom, 2006; Beck 2010).

Literally, the smallest unit of information known as raw media, element or asset and includes images, video clips, audio clips, animation, photographs, java applets, tables, guidelines, and examples, summaries and so forth. The raw data is aggregated to form information units that represent various types of concepts, facts, procedures, processes, or principles. Several units of information are then aggregated to form learning objects that are built to carry a single learning outcome. At this point, the objects are highly reusable in different leaning context. A learning object can be integrated for a single lesson unit or several independent learning objects can be integrated for a single lesson which might carry various skills or content. The degree of reusability drops when several learning objects are sequenced to form a learning component such as a course. The highest level combines several learning components for a collection of courses (Advanced Distributed Learning, 2012; IEEE, 2002). The learning objects' level of aggregation as illustrated by Krull and Mallison (2004) based on Hodgins's preliminary ideas, depicted in Figure 1.

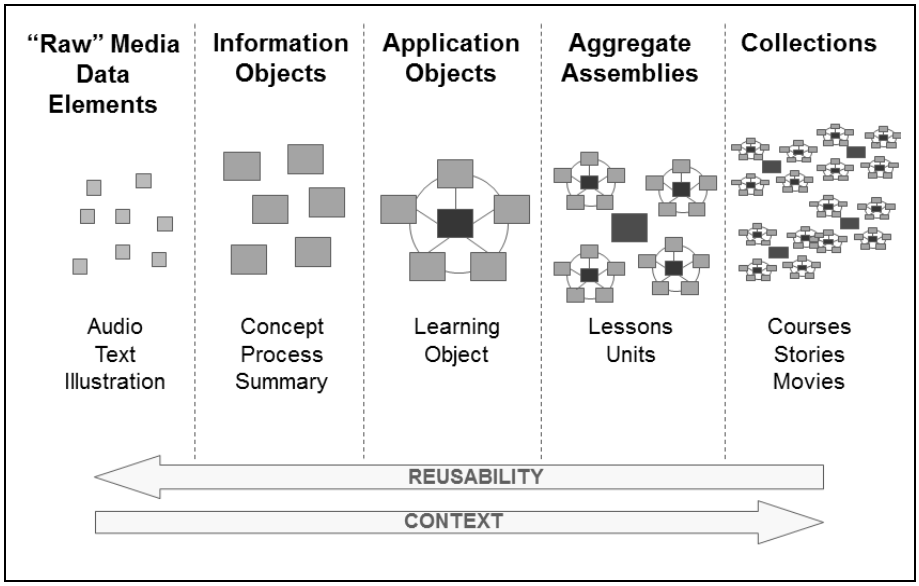

Figure 1: Modular content hierarchy

METHODS

PARTICIPANTS

One hundred and one engineering foundation students enrolled in Introduction to C programming module took part in this study. Students are randomly selected and assigned into two groups. The first group consisted of fifty students and the latter with fifty one. Most of the students are with little or without prior programming knowledge.

INSTRUMENTS

Two types of learning objects are designed and developed for C programming. LO is not merely presentation of information, it engages students and they must interact in order to learn. Fetaji, M, Loskovska, Fetaji, B, and Ebibi (2007) pointed out that programming knowledge cannot be transferred from instructor to learner, therefore, the responsibility of learning needs to be shifted to students. These LO intended to support the cognitive and learning process. Each LO designed to accomplish a single learning outcome. The size of learning object is determined by the number of pages, access time and logical content. Smaller Learning Objects (Micro LO) vary from 5 to 15 minutes whereas the larger LO that is aggregated with several LO (Macro LO) varies from 20 to 30 minutes. To ease reporting, the micro learning objects are named as Content Object (CO) and Self-assessment Object (SO) (see Table 1). Two cognitive learning approaches (learn and practice) identified to be used in the programming lab with the use of CO and SO respectively.

Table 1: Size of learning objects

Micro LO	Size	Macro LO	Size
Content object (CO)	5 - 10 minutes	Main Page + Help Page + Content object (CO) + Self-assessment Object (SO)	20 - 30 minutes
Self-assessment object (SO)	5 - 10 minutes		

CO are designed to aid the understanding of abstract programming concepts in C programming (i.e., what is a compiler? What happens in the computer's memory when a variable is created? How a nested selection structure works? and so forth). Visuals and animation are used to explain the concept in order to ease the understanding. Figure 2 shows an example of CO created for the concept of computer variable. The pseudocode shows as assignment of string values in a variable called StudentName and an integer value in another variable is named as StudentAge. The animation on how the memory locations created for the given variables are played as the student clicks pseudocode line by line. When the last line is reached, the student will not be able to click the line of codes randomly. This is to show that the complier executes the program codes in a linear form and also to give the novice learner an understanding on how the program is executed. Animated text for each line of codes is used to enhance the understanding.

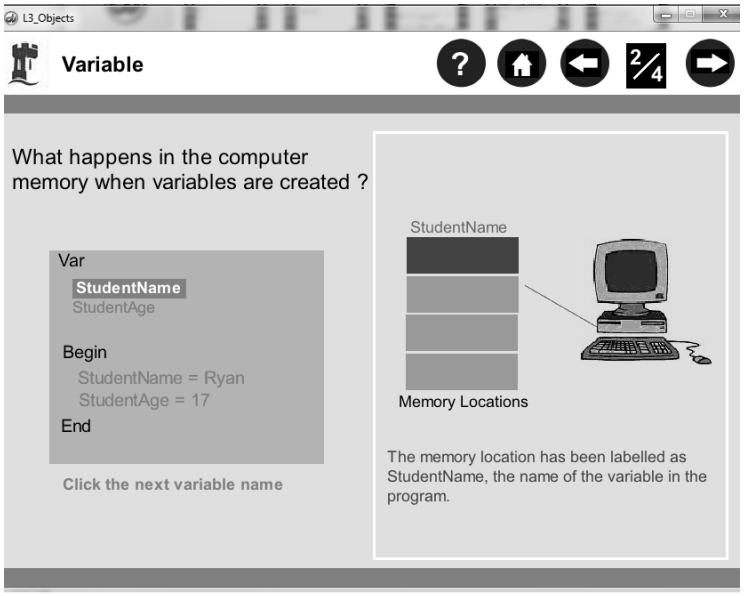

Figure 2: An example of Content Object for computer variable

SO is designed to help students to understand the programming syntax and codes. Students are exposed to SO after they have used the CO. The aim is to match the concept learnt in CO. As the CO enhances the understanding of the concept of programming, the SO helps students to learn programming syntax and codes.

Figure 3 shows an example of SO which is coherent with the programming concepts learnt in CO. Novice learners have difficulty in remembering the codes (Matthews, Hew, and Harprith, 2008) and this SO is aimed at helping them to recall the syntax required to write a program. An immediate feedback is displayed when students make mistakes. The feedback is the most important aspect in the SO that helps students avoid misconception. Knowing the common mistakes made when writing a program is one of the learning approaches used to aid the understanding. It is also helps students figure out the syntax error and the meaning of the error. Tracing the output and matching the correct syntax are the other type of questions used in SO.

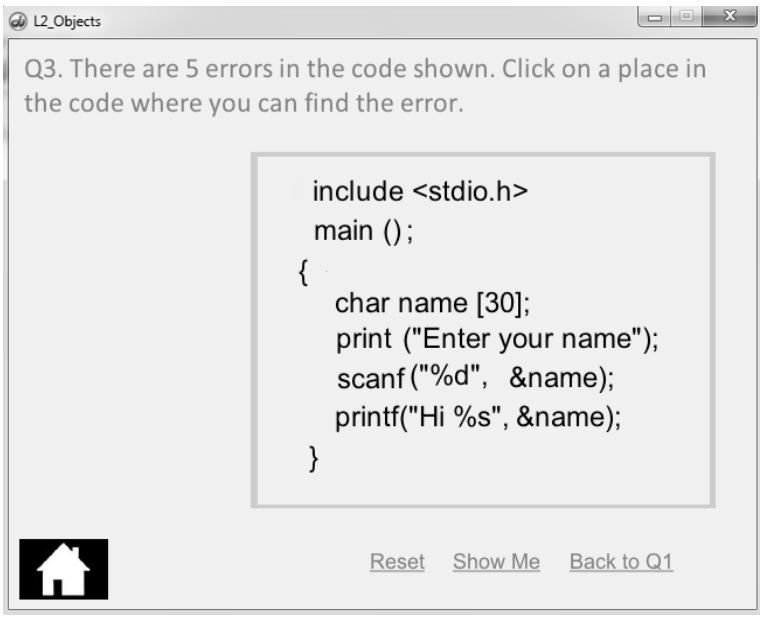

Figure 3: An example of Self-assessment Object for computer variable

Macro LO is packed with learning objects designed in a sequence following learning activities. It consists of a main page (see Figure 4) and a help page and navigations icons to switch back and forth when accessing the learning objects. Each Macro LO is accompanied with a learning objective on the home page to ease the understanding of when to use the LO and its aim. Students have the freedom of choice to select the type of LO they prefer to use after they have learnt the programming concept and syntax.

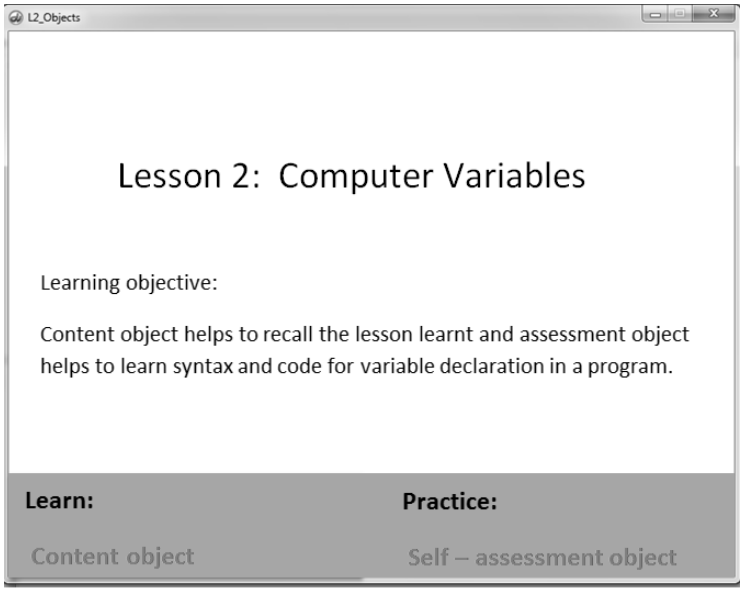

Figure 4: An example of Macro Learning Object

A formative evaluation method (quiz) is used to explore the progress of students' understanding at the end of each lesson. The quiz consisted of five multiple choice questions, two or three which traces the output of a program questions while the last questions requires students to write programs. Data collected from quizzes explores how different sizes of LO helps or hinders the programming learning. In order to address research question 3, a survey form designed with 12 items. Table 2 shows how the survey items are divided into three subscales and codes used to ease reporting. Item codes ranging from C1 to C5 is to understand students' learning experience in using content object and S1 to S5 is for self-assessment object. A 5-point Likert scale is used for each item as follows: 1. Strongly agree; 2. Agree; 3. Uncertain; 4. Disagree; and 5. Strongly disagree. Codes ranging from R1 to R2 require students to rank the learning objects based on the following 5-point Likert scale. 1. Most useful; 2. Moderately useful; 3. Useful; 4. Least useful; and 5. Not useful at all.

Table 2: Coding for survey items

Code	Items
C1	Content object is useful to recall the programming concepts before I learn a new lesson
C2	Content object helps to relate the programming concepts that I learn in every lesson
C3	I always make sure I use the content object before the lecture is started.
C4	The time allotted to use the content object during the class time is just right.
C5	I would like to use content objects to review every lesson.
S1	The self-assessment object helps me to understand the lesson learnt.
S2	I always access the self-assessment object before I start the lab activities.
S3	I find the self-assessment object as an important learning activity.
S4	The self-assessment object helps me to reflect the programming concepts and syntax.
S5	The solution for the self-assessment object is useful.
R1	Rank the content object in terms of its usefulness in learning introductory programming concepts and C programming
R2	Rank the self-assessment object in terms of its usefulness in learning introductory programming concepts and C programming

PROCEDURE

This study carried out with a two group pre-test and post-test design. One hundred and one engineering foundation students in the final semester were required to take Introduction to C programming as a core module. Students were randomly assigned into two groups. One group was randomly selected to expose them to Micro LO and named as Micro LO group (n=50), and the latter is Macro LO group (n=51). The C programming class was conducted weekly for three hours, in a lab over eight teaching weeks. Table 3 shows the experimental procedure on how the programming classes were conducted. A pre-test was administered in the first week to investigate the difference in the level of prior knowledge between the groups. The Micro LO group used CO after the first hour of the lecture to recall the lesson learnt and SO as part of the practical programming activities, whereas Macro LO group had the freedom of choice to use the desired LO. However, as part of the class instruction students were asked to use the LO after the lecture and SO during the practical session. Similar procedures were used in both groups and the same instructor conducted programming lessons for both groups. At the end of every class, students were required to take a 20-minutes quiz related to the lesson learnt. The quizzes are numbered as Q1 to Q6 tailing the lesson L1 to L6. At the end of the teaching week, a post-test was conducted. The post-test consisted of two parts, first part with 30 multiple choice questions, and the latter with two programming questions.

Table 3: Experimental procedure

Week	Lesson	Topics	Quizzes
W1	-	pretest	
W2	L1	C integrated environment	Quiz 1 (Q1)
W3	L2	Computer variables	Quiz 2 (Q2)
W4	L3	Types of operators for C programming	Quiz 3 (Q3)
W5	L4	Selection structures	Quiz 4 (Q4)
W6	L5	Control structures	Quiz 5 (Q5)
W7	L6	Array	Quiz 6 (Q6)
W8	-	posttest	

RESULTS

DESCRIPTIVE STATISTICS

The sample size of this study is one hundred and one. In Micro LO group (n=50), 80% of the students were male (n=40) and 20% were females (n=10), whereas 90% male (n=46) and 10% female student (n=5) were observed in Macro LO group (n=51). Most of the students were in the age range of 17 to 19 (Micro LO group n=48, 96%, Macro LO group n=48, 94%) and the rest of students were in the age range of 20 to 22 (Micro LO group n=2, 4%, Macro LO group n=3, 6%). Ninety four percent of the students in Micro LO group were Malaysian and 90% of Malaysian students were observed in the Macro LO group. Three international students were in the Micro LO group and five in the Macro LO group were from the Middle East, Indonesia, China, and Africa. Pre-test mean score between Micro LO group (n=50, m=4.66) and Macro LO group (n=51, m=4.51) suggests that the level of students' prior programming knowledge were similar.

HYPOTHESES FOR COMPARISON

The following hypotheses formulated to compare the significant difference between Micro LO and Macro LO in enhancing the programming knowledge. Statistical significant was set at $P < .05$.

$H_{0:}$ The post-test mean between Micro LO group and Macro LO group is not significantly different.

$H_{1:}$ The post-test mean between Micro LO group and Macro LO group shows significant difference.

Shapiro-wilk test conducted on the dependent variable revealed data was normally distributed for both groups and Levene's test for equality of variance indicated there was homogeneity of variance. The Micro LO group gained higher post-test mean score (n= 50, m=28.33) than Macro LO group (n=51, m=24.31). The result of an independent t-test, $t(99) = 3.615$, $p=0.00$, suggested there was significant mean difference between Micro LO group and Macro LO group. Thus, reject H_0 in favour of H_1. Smaller LO works better in aiding programming learning compared to larger LO.

Data collected on weekly quiz marks was examined for further analysis on how the different sizes of LO either facilitated or hindered programming learning. Figure 6 shows the comparison of the quiz mean scores between the Micro LO and Macro LO groups.

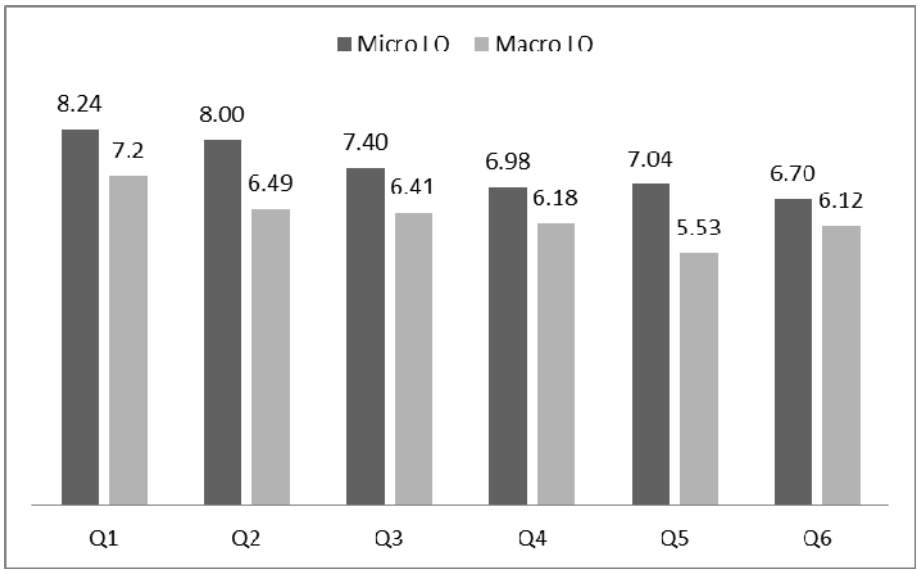

Figure 6: Quiz mean score for Micro LO and Macro LO groups

The weekly quiz mean score shows Micro LO group has been performing better than Macro LO group in all the quizzes. Micro LO seems to be useful in imparting programming knowledge as it is precisely on what the students have to understand. It is observed that the size of learning object has played a role in improving the knowledge in every lesson. Lesson 1 to Lesson 3 (see Table 3) is regarded as easier compared to the other three lessons (L4 to L6). The mean score from quiz 1 to quiz 6 shows Micro LO performed better than Macro LO and it suggests that the size of LO could be one of the reasons for this. A strong understanding on the low-level

programming concepts is important to write a program which requires the integration of several low-level concepts. The post-test results showed that students in Micro LO performed better than Macro LO group. The Micro LO group inclined toward progress of being able to perform better in the post-test.

PERCEIVED USEFULNESS OF LEARNING OBJECTS

A survey data collected on students' learning experience in using the LO's in the lab setting and was aimed to find out how useful the learning object would be in delivering the programming knowledge to novices. Table 4 shows the Cronbach's alpha for the survey items and the results indicates a high reliability.

The survey results for items ranging from C1 to C5 (see Table 5) shows that the Micro LO group did not respond negatively at all compared to the Macro LO group. However, the median score in Macro LO groups (item C3, median = 3) suggests few students do have lack of interest in using the CO. Overall, students in both groups agreed that CO have helped them in learning programming. A similar result was observed for SO (see Table 6). Overall, students in both groups responded positively towards the use of SO.

Table 4: Internal reliability values for Content Objects

Items code	subscales	α
C1 – C5	Learning experience in using Content Object	0.871
S1 – S5	Learning experience in using Self-assessment object	0.874
R1 – R2	Perceived usefulness of Content object and Self-assessment object	0.823

Table 5: Survey results for Content Object

Item code	Group	1 Strongly Agree	2 Agree	3 Uncertain	4 Disagree	5 Strongly Disagree	Median
C1	Micro LO	17 34%	30 60%	3 6%	-	-	2
	Macro LO	18 35.3%	19 37.3%	14 27.5%			2
C2	Micro LO	14 28%	31 62%	5 10%	-	-	2
	Macro LO	13 25.5%	24 47.1%	13 25.5%	1 2.1%		2
C3	Micro LO	11 22%	34 68%	22 68%	-	-	2
	Macro LO	9 17.6%	16 31.4%	24 47.1%	2 3.9%		3
C4	Micro LO	10 20 %	28 56%	12 24%	-	-	2
	Macro LO	10 19.6%	25 49%	15 29.4%	1 2%		2
C5	Micro LO	17 34%	26 52%	7 14%	-	-	2
	Macro LO	15 29.4%	18 35.3%	17 33.3%	1 2%		2

Table 6: Survey results for Self-Assessment Object

Item code	Group	1 Strongly Agree	2 Agree	3 Uncertain	4 Disagree	5 Strongly Disagree	Median
S1	Micro LO	16 32%	31 62%	3 6%	-	-	2

	Macro LO	15 29.4%	23 45.1%	12 23.5%	1 2%	-	2
S2	Micro LO	15 30%	24 48%	9 18%	2 4%	-	2
	Macro LO	7 13.7%	19 37.3%	24 47.1%	1 2%	-	2
S3	Micro LO	14 28%	27 54%	9 18%	-	-	2
	Macro LO	11 21.6%	26 51%	13 25.5%	1 2%	-	2
S4	Micro LO	14 28%	29 58%	7 14%	-	-	2
	Macro LO	10 19.6%	24 47.1%	16 31.4%	1 2%	-	2
S5	Micro LO	13 26%	28 56%	9 18%	-	-	2
	Macro LO	10 19.6%	24 47.1%	16 31.4%	1 2%	-	2

Table 7 shows that Micro LO group ranked content object (RI) more useful than Macro LO group. Eighty-six percent (n=43) of the students in the Micro LO group found CO useful whereas 51% of students in the Macro LO group (n=26) rated CO useful. Similarly, 82% (n=41) of students in the Micro LO group responded positively towards the usefulness of the SO (R2) compared to those in Macro LO group (61%, n=31). Even though the Macro LO group did not respond negatively towards the use of the LO in the lab but the post-test mean score (Micro LO group n= 50, m=28.33; Macro LO group, n=51, m=24.31) shows that the larger LO did not really aid in programming learning. The Micro LO group responded positively to all subscales compared to the Macro LO group and the result indicated that students benefitted from using the LO when they are smaller.

Table 7: Survey results for usefulness of Learning Objects

Item code	Group	1 most useful	2 moderately useful	3 useful	4 least useful	5 Not useful at all	Median
R1	Micro LO	19 38%	24 48%	7 14%	-	-	2.00
	Macro LO	10 19.6%	16 31.4%	43 45.1%	1 2%	1 2%	2.00
R2	Micro LO	25 50%	16 32%	9 18%	-	-	1.50
	Macro LO	17 33.3%	14 27.5%	20 39.2%	-	-	2.00

DISCUSSION

Collectively, learning objects are useful in learning programming in a lab setting. Novice learners have a great interest in using the LO as a learning support. As lecturing was regarded as one the ineffective ways of delivering programming knowledge to students, it is vital to understand how effective LO would be, if it is used to engage students actively. The size of the LO object is one of the important pedagogical aspects when it is used as a tool to aid the programming learning process. Even though students showed interest in using the LO in the lab but that could not be one of the factors in determining the success of the LO in delivering the knowledge. The Micro LO group performed better in the post-test and is aligned with the quiz mean score. Students who had a strong understanding of the low-level programming concepts such as computer variable, operators, selection and control structures have performed better in the post-test.

A student's ability in writing a complete program depends on the understanding of low-level concepts (Ala-Mukta, 2003). A complete program requires them to integrate several low-level concepts and the right choice of structures to solve the programming problem. When the students build the understanding gradually, they tend to show their ability in writing a program. The mean score on quizzes showed that the Micro LO students have built their understanding from the first lesson until the difficult lesson on the concept of an array. Smaller LO object that carries a single learning outcome is useful to improve the programming knowledge. Self-assessment object helps students to evaluate their own understanding and misconception. Sequencing the smaller LO is essential to ensure it tails the instructional programming activities (Wiley, 2000). The prevailing focus on learning objects is mainly to overcome the issues of cognitive overload. Therefore, the size of LO really matters if the concern is towards this above-mentioned issue. Integration of LO is encouraging as several types of LO could be assembled for a particular lesson. However, it has the possibility of the LO itself developing cognitive overload. As the idea behind the LO is to reduce the cognitive overload, the size has to be small, but the proper instructional plan on sequencing several LO is essential.

Table 5 shows that both the Micro LO (item C4, 76%, n=38) and Macro LO groups (item C4, 69%, n=35) rated the size of the object just right based on the time allotted to access the LO. Even though students respond positively towards the size but the effect on programming learning is different. Obviously, the post-test mean score and quiz mean score revealed the Micro LO group performed better than the Macro LO group. Smaller LO contains i.e. content object, which carries a specific low-level programming concept that requires a student to master before learning to write a complete program in order to solve programming problems. Students gradually master the interrelated concepts and then they learn to integrate them when writing a program. Shaffer, Doube, and Tuovinen (2002) pointed out that the schema formation is a dynamic process that builds more complex schema by assimilating lower level schemas into higher-level schemas. A similar scenario is possible when several types of smaller LO is integrated in the programming lesson. Students have the ability to write a program when they have strong understanding of low-level concepts with the use of smaller LOs.

Keeping the size of the LO smaller is promising because it is highly reusable. Pedagogically, the LO can be used in other learning environments such as blended E-learning or E-learning environments. It is cost effective if higher institutions invest on LO as part of teaching and learning practice. As the size of LO grows bigger, the degree of reusability and reliability in delivering the programming knowledge declines greatly. Numerous studies have pointed out the fact that the smaller and more specific the learning object, the greater its reusability will be (Silveira et al., 2005). Macro LO requires additional support pages such as help page, home page, or site map to ease the learnability and accessibility. The problem of cognitive load occurs as students need to learn and understand several pages before they can actually engage in cognitive activities in the LOs. Using Macro LO in the lab is also challenging because students have the freedom of choice in selecting the LO to use during the lesson. This can also impede the learning because programming requires both declarative and procedural knowledge (Schulte and Bennedsen, 2006). It is important for students to understand the concepts (declarative knowledge) before knowing how to use the syntax in writing the program (procedural knowledge). The Micro LO group used the CO after they have learnt the concepts and SO during the practical activities. Even though the similar procedure is used for the Macro LO group but the possibility of students mismatching the LO is not deniable. Therefore, to enhance programming understanding, the Micro LO should be integrated with proper instructional goals and activities in the lab which works better than Macro LO.

CONCLUSION

This study found that the size of LO has some effects on programming learning. Micro LO which are the smaller LO are highly reusable and useful in delivering programming knowledge to novices. Students showed interest in using the LO in a lab as a support learning tool. However, students' interest may not be a factor to determine the success in learning programming. Even though, students showed relatively positive respond toward the use of Macro LO (the larger LO), the result of performance in post-test and quizzes reflected their understanding is not strong than those used the Micro LO. The size of LO is important to ensure it is reliable in playing a role in the programming learning process. There are no guidelines on how small a LO should be. Academicians, instructional designers, and content developers may have different insights on the sizes of LO. Polsani (2003) suggested that the concept or idea should determine the size of the learning object (logical size). This study suggests a small LO should be accessed within five to ten minutes (physical size) and it should contain the key programming concept to accomplish a single learning outcome (logical size). Several types of LO is essential to promote the declarative and procedural knowledge acquisition. However, the LOs have to be self-contained to support the learning outcome, and also to ensure it is highly reusable.

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RELATIONSHIP BETWEEN ICT VARIABLES AND MATHEMATICS ACHIEVEMENT BASED ON PISA 2006 DATABASE: INTERNATIONAL EVIDENCE

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ABSTRACT
The purpose of this study is to determine the predicting power of mathematics achievement from ICT variables including the Internet/entertainment use (IEU), program/software use (PRGUSE), confidence in internet tasks (INTCONF) and confidence in ICT high level tasks (HIGHCONF) based on PISA 2006 data. This study indicates that the ICT variables account for significant and low variance in mathematics achievement for each participating country. The IEU and PRGUSE are a negative and significant predictor of mathematics achievement whereas the INTCONF and HIGHCONF are a positive and significant predictor of mathematics achievement for the majority of participating countries. The results support the implication that the ICT is not entirely integrated into classroom and school environment.
Keywords*:* Internet/entertainment use (IEU), program/software use (PRGUSE), confidence in internet tasks (INTCONF), confidence in ICT high level tasks (HIGHCONF), mathematics achievement.

INTRODUCTION

The twenty-first century is called information age. In this century, the development level of countries is directly related to the importance that they give to education, human beings and information. Currently, information is accepted as the most important key factor for the economic development of the countries and people can access the information easily and quickly by means of technology. Therefore, educational systems aim to bring up individuals who can get the information, use the information to make a decision, and find solutions to problems in the information age. Not only is information and communication technology (ICT) the essence of learning environment, but also it enables students to broaden their horizons, foster students' knowledge, gain new occupational skills, and to have life-long learning skills. The contribution of ICT to provide education facilities for distant rural areas is so great, that it can't be ignored (Çavaş, Kışla, & Twining, 2004).

Organization for Economic Co-operation and Development's (OECD) (1996) is emphasized that the ability of analytical and mathematical thinking, the ability of mastering technological knowledge and using them scientifically are among a few of the life-long learning skills. The level of using ICT and the number of students per computer are also signs of the quality of education (European Commission, 2000; UNICEF, 2002). Computers which are the most important elements of ICT are indispensable for our life. Nowadays, with the help of computers and the Internet, students do homework own their own. Moreover, they also prepare for the exams with educational software and online course. Therefore, computers seem to have an unquestionable place starting from teaching basic skills, reinforcing and enhancing knowledge, knowledge-retention, and skills to accomplishing high-level goals such as problem solving, model building and critical thinking (Aşkar, 1991).

The recent developments in ICT have also affected the learning and teaching process of mathematics. In the past, the teacher was the speaker and the student was the listener during the mathematics lessons. Currently, mathematics is taught with computer-based materials in elementary and secondary mathematics classes hence, it gives an opportunity to take individual differences among students into account seriously (e.g., Cockcroft, 1982; NCTM, 2000). Integration of ICT in mathematics teaching is enabled using ICT tools throughout the curriculum to accomplish teaching goals and strengthen the student's learning (Cartwright, & Hammond, 2003). In addition to this, it is known that the attitudes of students and teachers towards computers are important in order to use ICT effectively at schools (e.g., Zhang & Espinoza, 1998).

With the development of technology, many countries participated in the international benchmarking studies such as Programme for International Student Assessment (PISA), Progress in International Reading Literacy Study (PIRLS) and The Trends in International Mathematics and Science Study (TIMSS), which provide opportunity to evaluate the participating countries' current education systems. OECD is one of the institutions which concerns with lifelong learning skills, to what extent the students improve these skills, and the importance and reflection of these skills on educational policies in the world. The PISA, which is administered with the support

of OECD, is the largest international comparative research concentrating on program-based learning outcomes (Güzeller & Akın, 2011, p. 350). PISA 2003, PISA 2006 and PISA 2009 assess the three major domains that are called mathematics, scientific and reading literacy, respectively. PISA also collects the data of students' demographic features, computer familiarity, learning styles, parents, school environments, students' beliefs about themselves, and their motivations of the three major domains via student and ICT questionnaire (OECD, 2007).

Using ICT for teaching mathematics reveals the hypothesis that ICT variables may be one of the factors which affect mathematics achievement (e.g., House, 2005; Kim, Seo, & Park, 2008; Kubiatko & Vlckova, 2010). Therefore, the studies related to factors affecting students' mathematics achievement in terms of ICT variables are regarded important.

The Relation between ICT and Achievement

ICT which is the necessary equipment of teaching and learning activities has a significant role in improving knowledge and skills of teachers and students apart from preparing them for the life in the education and training (Aşkar & Olkun, 2005). It is necessary to understand how ICT is used in the classrooms, which educational purposes it serves, what role it plays for the success of the learning process, educational program and educational policy (Papanastasiou, Zembylas, & Vrasidas, 2005). The frequency of ICT use is related to student's achievement, socioeconomic status, and the level of technology infra-structure in schools (e.g., Papanastasiou, 2002; Papanastasiou, & Ferdig, 2003). The findings of most of studies (e.g., Kim et al., 2008; Kubiatko & Vlckova, 2010) show a positive and significant relation between the frequency of ICT use and the achievement of students, while the results of the few studies demonstrate a negative (e.g., Papanastasiou, 2002; Papanastasiou & Ferdig, 2003; Şahinkayası, 2008) or insignificant (e.g., Papanastasiou et al., 2003; Wittwer & Senkbeil, 2008) association between the frequency of ICT use and the achievement of students.

The results of PISA indicate that Hong Kong, Korea and Chinese Taipei perform above the OECD-average in mathematical literacy. The results can be explained that students from these countries spend their time mostly on understanding, explaining and proving mathematical arguments or theorems during the mathematics lessons by using computer software for mathematics education (House, 2002; Stigler, Gallimore, & Hiebert, 2000).

The similar results of other studies related to PISA 2006 (Kubiatko & Vlckova, 2010; Kim et al., 2008) demonstrate that the Czech Republic students who use ICT activities in the learning process have higher science achievement than the students who do not use it, and the Korean students who have used ICT for a long time achieved higher mathematics, reading and science scores than their counterparts. Using ICT in the educational process helps to create a better learning environment, and the educational software also gives students the opportunity to provide a personal and direct feedback (Papanastasiou et al. 2003; Wenglingsky, 1998).

According to PISA 2000 results, even though there is a significant and positive relation between academic achievement and the availability of computers at schools, the relation between the computer access at school and mathematics achievement gets insignificant when the effect of the variables related to family background and school characteristics are controlled (Fuchs & Wößmann, 2004). For example, an insignificant association exists between the frequency of computer use and science achievement and also the negative relationship exists between educational software use and science achievement of students from USA who participate in PISA 2003 (Papanastasiou et al., 2003). In a similar way, there is not a significant association existed between the computer access and mathematics achievement, and the frequency of computer use at home and mathematics achievement of students from Germany who participate in PISA 2003 (Wittwer & Senkbeil, 2008). Although the results of PISA 2000 indicate that the students from Germany and USA use computers more frequently at school for software and programming than the students of other countries, students from these countries perform below the OECD-average in mathematical literacy and scientific literacy (Papanastasiou et al., 2005; Papanastasiou & Ferdig, 2003). Students' frequency of computer and internet use, and their self-confidence in ICT high level tasks have mostly negative and small associations with their problem solving and mathematical literacy scores in all participating countries in the PISA 2003 (Şahinkayası, 2008). Another study related to TIMSS 1995 shows that a negative relationship exists between the frequency of computer use in the classroom and mathematics achievement of students from Cyprus, Hong Kong and USA. The reason for this relation may be explained with the occasional help of the teachers to the students, with low abilities and lack of understanding the topics, while using computer and educational software (Papanastasiou, 2002).

The Relation between Confidence in ICT and Achievement

In psychology, self-confidence is defined by Brown and Chronister (2009) as "a sense of one's power and ability to carry out a desired task or function" (p. 47-48). A student whose self-confidence is low might consistently expect help from the others, not make a decision on her/his own (Akın, 2007). Although self-confidence and

self-efficacy are different from each other in general, they are used interchangeable in literature (e g., Akın, 2007). Self-efficacy is defined as "a personal belief within an individual as to the capacity to accomplish a certain task" (Kotaman, 2008, p. 112). Therefore, the definitions of these concepts also indicate that self-confidence and self-efficacy are similar psychological constructs. Student's self-efficacy is only measured at task-specific level whereas student's self-confidence is not only measured at task-specific level but also measured at a more general/domain specific level (Bandura, 1997; Bong & Skaalvik, 2003). ICT self-efficacy is closely related to the tendency to engage in ICT (Zhang & Espinoza, 1998). The student with high ICT self-efficacy reacts less to the technological developments and adopts them more quickly than student with low ICT self-efficacy (Gürcan, 2005). But only a few studies (e.g., Contreras, 2004; Gardner, Dukes, & Discenza, 1993; Kim et al., 2008; Şahinkayası, 2008) examine the relationships among ICT self-confidence/self-efficacy, predictors of ICT self-confidence and academic achievement. For instance, Gardner et al. (1993) investigate the associations among ICT attitudes, ICT self-confidence and ICT literacy on 309 students from the 7th to the 12th grades. The results indicate that there is a mutual positive relation between ICT attitudes and ICT confidence, and both of these factors positively affect computer literacy. PISA 2003 results demonstrate that the medium and positive association exists between self-confidence in routine computer tasks and mathematics and problem-solving achievement, and also the weak and positive relationship exists between self-confidence in Internet tasks and mathematics achievement, for the most of participant countries. On the contrary, the study reveals that the weak and negative relation observed between the frequency of internet use and mathematics achievement, for all countries (Şahinkayası, 2008). Contreras (2004) points out the importance of studies related to the relationship between ICT self-confidence and academic achievement with this sentence: "If no relationship between computer self-confidence and academic performance exists, investigations of computer self-confidence may be moot" (p. 178). Therefore, the purpose of this study is to examine the predicting mathematics achievement from ICT variables such as internet entertainment use (IEU), programme software use (PRGUSE), self-confidence in internet tasks (INTCONF), self-confidence in high-level tasks (HIGHCONF) based on the PISA 2006 data.

METHOD

Regression analysis is used to investigate the predicting mathematics achievement from ICT variables in this study. Therefore, the type of current study is a relational research.

Participants

The research conducted the ICT questionnaire data of the PISA 2006. The ICT familiarity questionnaire for PISA 2006 was completed by the total number of 223,278 15-year-old students who were randomly selected in 28 OECD member countries and 12 non-OECD member countries. The sample sizes of the countries were range between 318 in Liechtenstein and 19,712 in Italy.

Instruments

Mathematics achievement test. Mathematics literacy test is composed of 85 items in various difficulty levels from four areas as geometry, algebra, arithmetic and probability. Chronbach's alpha coefficients of the mathematical literacy test was .92.

Internet/entertainment use (IEU). The IEU involved the six items (e.g. Browse the Internet for information about people, things, or ideas) which were measured with 5 point Likert-type scale (see Appendix). Cronbach's alpha of the IEU was .83.

Program/software use (PRGUSE). The PRGUSE comprised of the five items (e.g. Use educational software such as Mathematics programs) which were measured with 5 point Likert-type scale ranging from "almost every day" (=5) to "never" (=1). Cronbach's alpha of the IEU was .81.

Confidence in internet tasks (INTCONF). The INTCONF included the six items (e.g. Download files or programs from the Internet) which were measured with 4 point Likert-type scale. Cronbach's alpha of the IEU was .86.

Confidence in ICT high level tasks (HIGHCONF). The HIGHCONF composed of the five items (e.g. Use software to find and get rid of computer viruses) which were measured with 4 point Likert-type scale ranging from "a few times each week"(=4) to "never" (=1). Cronbach's alpha of the HIGHCONF was .84.

Statistical Analysis

In this study, multiple linear regression analysis was conducted to determine the effects of ICT variables (including IEU, PRGUSE, INTCONF and HIGHCONF) predicting mathematics achievement based on the PISA 2006 data. This analysis was performed with SPSS 13.0 software.

RESULTS

In this research, the multiple regression model was run for each participating country in PISA 2006. Therefore, the multiple regression analysis investigated if the IEU, PRGUSE, INTCONF and HIGHCONF could significantly predict students' mathematics achievement. Table 1 showed the percent of total variance explained on mathematics achievement for each participating country.

Table 1. ***The Percentage of the Total Variance Explained by the Multiple Regression Model for Each Participating Country***

Country	Mean (SE)	Variance explained (Adjust R^2)	N
Finland	548 (2.3)	2%	4442
Korea	547 (3.8)	15%	5029
Netherlands	531 (2.6)	5%	4170
Switzerland	530 (3.2)	7%	11033
Canada	527 (2.0)	6%	19669
Macao-China	525 (1.3)	11%	4101
Liechtenstein	525 (4.2)	9%	318
Japan	523 (3.3)	9%	4822
New Zealand	522 (2.4)	12%	4428
Belgium	520 (3.0)	6%	7846
Australia	520 (2.2)	8%	13075
Denmark	513 (2.6)	5%	3864
Czech Republic	510 (3.6)	11%	5218
Iceland	506 (1.8)	5%	3504
Austria	505 (3.7)	9%	4570
Slovenia	504 (1.0)	10%	5834
Germany	504 (3.9)	7%	4102
Sweden	502 (2.4)	2%	3995
Ireland	501 (2.8)	9%	3669
All countries-average	498 (.5)	11%	223278
Poland	495 (2.4)	11%	5149
Slovak Republic	492 (2.8)	14%	4200
Hungary	491 (2.9)	13%	4069
Norway	490 (2.6)	4%	4158
Lithuania	486 (2.9)	15%	4122
Latvia	486 (3.0)	13%	4314
Spain	480 (2.3)	6%	17266
Russian Federation	476 (3.9)	10%	5092
Croatia	467 (2.4)	13%	4371
Portugal	466 (3.1)	20%	4800
Italy	462 (2.3)	8%	19712
Greece	459 (3.0)	15%	4239
Serbia	435 (3.5)	16%	4111
Uruguay	427 (2.6)	12%	3609
Turkey	424 (4.9)	18%	4012
Thailand	417 (2.3)	24%	5721
Bulgaria	413 (6.1)	15%	3678
Chile	411 (4.6)	15%	4274
Jordan	384 (3.3)	15%	4967
Colombia	370 (3.8)	15%	3506
Qatar	318 (1.0)	15%	4219

Note. SE: Standard Error

The model for all participating countries-average in the PISA 2006 indicated that the ICT predictors accounted for 11% of the total variance in mathematics achievement ($p < .01$). In all countries, this model was significant at .01 confidence level and the percent of the total variance explained varied from 2% to 24%. The findings of the Thailand for the regression model explained the largest percent of the total variance in mathematics achievement whereas the results of the Finland and Sweden for this analysis explained the lowest percent of the total variance in mathematics achievement. The model for each low-performing country was generally more powerful for explaining the percentage of the total variance in mathematics achivement than the model for each high-

performing country and all countries-average, while the model for each high-performing country generally accounted for the lower percent of the total variance in mathematics achivement than the model of all countries-average. Although the European Union Member Countries mainly performed above the OECD-average in mathematical literacy, their proportions of the total variance explained were small and close to each other (e.g. Netherlands: adjusted R^2= 5%; Belgium: adjusted R^2= 6%). Most of Asian countries, except for Macao-China, Japan and Korea, represented the low-performing country in the PISA 2006. However, their proportions of variance explained were higher than the most of participating countries (e.g. Jordan: adjusted R^2= 15%; Turkey: adjusted R^2= 18%; Thailand: adjusted R^2= 24%). In general, the percentage of the total variance explained for each participating country in America (e.g. Uruguay: adjusted R^2= 12%; Chile: adjusted R^2= 15%) and Australia continent (e.g. New Zealand: adjusted R^2= 12%) was slightly above the average variance explained and close to each other.

Table 2. Relationship between ICT Variables and Mathematics Achievement Based on PISA 2006 Database: Result from Standard Multiple Regression Analysis

	Mathematics Achievement							
	IEU		PRGUSE		INTCONF		HIGHCONF	
Country	*B*	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
Finland	-.21	.30	-1.50***	.40	.98	.78	.1.88***	.33
Korea	-3.02***	.30	-1.30**	.38	12.23***	.88	4.34***	.26
Netherlands	-.64	.35	-1.87***	.37	11.08***	1.03	1.14**	.35
Switzerland	-1.46***	.19	-4.09***	.24	3.81***	.48	3.40***	.24
Canada	-.62***	.14	-2.65***	.16	6.22***	.37	1.95***	.16
Macao-China	-2.36***	.31	-.92**	.37	6.14***	.60	3.02***	.31
Liechtenstein	-.34	1.18	-5.33***	1.51	.78	3.41	5.69***	1.48
Japan	-.80**	.29	-2.46***	.42	3.90***	.48	1.95***	.31
New Zealand	-1.37***	.28	-4.67***	.35	5.96***	.70	2.80***	.37
Belgium	-1.30**	.35	-1.41**	.40	5.44***	.90	3.91***	.38
Australia	-1.21***	.17	-2.58***	.22	4.85***	.45	3.84***	.22
Denmark	-1.52***	.33	-1.23**	.41	4.75***	.77	2.62***	.38
Czech Republic	.11	.29	-4.50***	.37	5.26***	.85	5.40***	.39
Iceland	-3.09***	.37	.07	.42	7.25***	.89	1.23**	.40
Austria	-.32	.29	-4.10***	.39	2.92***	.76	5.43***	.41
Slovenia	.84**	.24	-4.75***	.28	4.79***	.56	1.77***	.32
Germany	.33	.31	-5.22***	.40	1.02	.77	4.40***	.40
Sweden	-2.02***	.32	-.36	.41	6.73***	.87	-.42	.35
Ireland	-1.06***	.26	-2.86***	.34	5.20***	.53	1.30***	.30
Poland	.02	.23	-3.61***	.30	3.72***	.54	3.46***	.34
Slovak Republic	-.34	.28	-3.29***	.32	5.51***	.52	2.86***	.30
Hungary	-.57*	.27	-3.22***	.35	5.62***	.58	3.28***	.34
Norway	-.01	.36	-2.90***	.39	5.98***	.90	.57	.40
Lithuania	-.31	.27	-3.08***	.31	9.07***	.62	1.66***	.35
Latvia	.41	.26	-4.24***	.31	6.02***	.66	3.55***	.33
Spain	-.97**	.30	-2.47***	.36	5.82***	.71	1.47***	.35
Russian Federation	-1.44***	.25	-2.22***	.31	.76*	.37	4.19***	.25
Croatia	-.37	.25	-2.85***	.29	5.99***	.52	2.21***	.32
Portugal	-.37	.26	-4.61***	.31	1.90**	.60	7.35***	.36
Italy	-1.66***	.43	-2.41***	.51	4.49*	.77	1.58***	.53
Greece	-1.33***	.29	-4.52***	.36	6.80***	.52	2.00***	.31
Serbia	-1.60***	.26	-2.90***	.32	5.91***	.47	2.59***	.33
Uruguay	-.05	.34	-2.06***	.38	5.53***	.64	2.64***	.38
Turkey	.51	.31	-5.82***	.35	9.35***	.59	-.87*	.36
Thailand	1.53***	.25	-6.32***	.30	8.58***	.42	-.47	.27
Bulgaria	-.58	.34	-3.59***	.34	7.36***	.65	2.44***	.39
Chile	1.29***	.28	-4.31***	.30	4.53***	.59	3.15***	.33
Jordan	-1.18***	.21	-2.72***	.26	2.69***	.35	3.50***	.24
Colombia	.53	.30	-3.68***	.36	6.34***	.58	1.66***	.35
Qatar	-.71*	.31	-3.91***	.31	5.08***	.55	2.51***	.33

Note: *B*: unstandardized regression coefficient, *SE*: standard error of *B*, $^{***}p< .001$, $^{**}p< .01$, $^{*}p<.05$.

Table 2 presented the regression coefficients for the standard multiple model to predict mathematics achievements in the PISA 2006. The results indicated that the IEU was a negative and significant predictor of mathematics achievement for the 20 participating countries at .05 level, whereas the regression coefficient of the IEU on mathematics achievement was positive and significant for several countries such as Chile, Slovenia and Thailand. Therefore, the association between the IEU and mathematics achievement was negative and significant in the majority of participating countries. The unstandardized B coefficients for the IEU were ranged from -3.09 (Iceland) to 1.53 (Thailand). In a similar way, the regression coefficients of the PRGUSE on mathematics achievement were negative and significant for almost all participating countries excepting Iceland and Sweeden at .05 level, and they were varied between -.92 (Macao-China) and -6.32 (Thailand). The INTCONF was a positive and significant predictor of mathematics achievement for the 37 participating countries excluding Finland, Germany and Liechtenstein at .05 level. The unstandardized B coefficients for the INTCONF were ranged between .76 (Russian Federation) to 12.23 (Korea) at .05 level. The regression coefficients of the HIGHCONF on mathematics achievement were positive and significant for nearly all of the participating countries excepting Norway, Sweeden, Thailand and Turkey at .05 level and they were varied from -.87 (Turkey) to 7.35 (Portugal).

DISCUSSION

The purpose of this study was to determine the predicting power of mathematics achievement from ICT variables such as the IEU, PRGUSE, INTCONF and HIGHCONF based on PISA 2006 data. This study indicated that the ICT variables accounted for significant and low variance in mathematics achievement for each participating country and the results for each Asian, European, American or Australian participating country were generally comparable and close to each other. Therefore, we could imply that Asian, European, American or Australian countries were similar between each other in regard to their cultures, educational systems and our findings. Surprisingly, the results showed that the regression coefficients of the IEU and PRGUSE on mathematics achievement were negative and significant for the majority of participating countries. The astonishing finding of this study was in line with studies such as Papanastasiou (2002), Papanastasiou et al. (2005) or Şahinkayası (2008) which revealed a negative and significant relationship between students' ICT use and academic achievement. For example, although the findings of TIMSS 1995 demonstrated that the students from Cyprus, Hong Kong and USA used computers most frequently at school, students from these countries performed below the TIMSS-average in mathematical literacy and scientific literacy. The results of the study supported the hypothesis that more time spent on computer or Internet-related activities might related with lower mathematics performance gets over time (Wenglinsky, 1998). Papanastasiou et al. (2005) also explained this finding that the students who spent most time on computer-related activities (including the IEU, PRGUSE) might neglect their school work which results to poor academic performance. However, in general, we could not deduce from our findings that the IEU and PRGUSE reduced mathematics performance, or vice versa (Papanastasiou et al., 2005).

The INTCONF and HIGHCONF were positive and significant predictors of mathematics achievement for almost all participating countries at .05 level. The finding demonstrated that as the participants perceived more confidence in internet tasks and ICT high level tasks, their mathematics achievements tended to increase. This result was consistent with previous studies (e.g., Gardner, et al., 1993; Şahinkayası, 2008) which indicated students' academic performance was positively influenced by their ICT confidence. Literature findings generally showed that self-efficacy/confidence was a better predictor for students' achievements than other psychological constructs (e.g., Ferla, Vackle, & Cai, 2009). Similarly, computer efficacy/confidence was the stongest predictor/mediator of academic performance, and technology uptake (Ellen, Bearden, & Sharma, 1991). Therefore, computer confidence which was a key element of attitudes towards ICT helped to improve mathematics achievement (Sen, 2005).

CONCLUSION

Nowadays, although the use of ICT is a central part of our life, this study indicates that a low relationship exists between ICT variables and mathematics achievement based on PISA 2006 data. The results support the implication that the ICT is not entirely integrated into classroom and school environment (Güzeller & Akın, 2011). Future research should investigate the predicting mathematics achievement from many predictors/mediators including the ICT variables so as to account for more variance in mathematics achievement.

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Appendix

Q4. Internet/entertainment use items (INTUSE)
How often do you use computers for the following reasons?
1. Browse the Internet for information about people, things, or ideas.
2. Play games.
3. Use the Internet to collaborate with a group or team.
4. Download software from the Internet (including games).
5. Download music from the Internet.
6. For communication (e.g. E-mail or chat rooms).

Items are rated on a 5 point Likert scale ranging from (5) “almost everyday” to (1) “never”.

Q4. Program/software use (PRGUSE)
How often do you use computers for the following reasons?
1. Write documents (e.g. with <Word ® or WordPerfect ®>).
2. Use spreadsheets (e.g. <Lotus 1 2 3 ® or Microsoft Excel ®>).
3. Drawing, painting or using graphics programs.
4. Use educational software such as Mathematics programs.
5. Writing computer programs.

Items are rated on a 5 point Likert scale ranging from (5) “almost everyday” to (1) “never”.

Q5. Confidence in internet tasks (INTCONF)
How well can you do each of these tasks on a computer?
1. Chat online.
2. Search the internet for information.
3. Download files or programs from the Internet.
4. Attach a file to an E-mail message.
5. Download music from the Internet.
6. Write and send E-mails.

Items are rated on a 4 point Likert scale ranging from (4) “I can do this very well by myself” to (1) “I don’t know what this means”.

Q5. Confidence in ICT high level tasks (HIGHCONF)
How well can you do each of these tasks on a computer?
1. Use software to find and get rid of computer viruses.
2. Edit digital photographs or other graphic images.
3. Create a database (e.g. using <Microsoft Access ®>).
4. Use a spreadsheet to plot a graph.
5. Move files from one place to another on a computer.
6. Use a word processor (e.g. to write an essay for school).
7. Copy data to a CD (e.g. make a music CD).
8. Create a presentation (e.g. using <Microsoft PowerPoint ®>).
9. Create a multi-media presentation (with sound, pictures and video).
10. Construct a web page.

Items are rated on a 4 point Likert scale ranging from (4) “I can do this very well by myself” to (1) “I don’t know what this means”.

SERVICE LEARNING FOR MEDICAL STUDENTS: PROGRAM DEVELOPMENT AND STUDENTS' REFLECTIONS

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ABSTRACT
We designed a cross-disciplinary interdepartmental volunteer program, which involved student participation in "community care teams for the elderly living alone." Our aim was to enhance communication between students and the elderly. Students were expected to meet and learn to get along with the elderly, to develop listening and communication skills, and learn to cooperate with student participants in other services. Students were required to devote at least 14 hours per semester to this two-semester program. Between September 2008 and June 2009, 19 students (1st semester), 34 students (2nd semester), 7 students (both 1st and 2nd semesters), respectively, and 15 elderly participants became involved in the program. Students were divided into 15 groups (each with 2–4 students), and each group visited the assigned elderly person at least 6 times per semester. According to student accounts, these visits improved their interpersonal and communication skills and their ability to express concerns with self-confidence. Our analysis of students' reflections found that early exposure to such community experiences increases their capacity for self-reflection and teaches them how to show respect. The opportunity to develop empathic communication skills with the elderly and learn to cooperate with faculty and colleagues can be beneficial to students in their future medical practice and strengthen the quality of community care.

INTRODUCTION

Medical care reflects not only scientific knowledge, but also communications skills and desire to improve the quality of medical care. In clinical practice, doctors frequently miss opportunities to respond to patient emotions and to strengthen the patient-physician relationship (Avdi, Barson, & Rischin, 2008). Because of the brevity of doctor-patient interactions, it is difficult to establish trust (Rhodes et al., 2004; Klig, 2005).

Klig (2005) and Little (2002) both proposed that teaching medical humanism could improve the relationships between health care providers and patients and that health care providers could be trained to treat every patient humanely, and to be sensitive to patient values, culture, and ethnicity. Shapiro et al. (2009) suggested that periodic visits to members of the patient's family would increase a student's understanding of how the psychological, spiritual, or economic circumstances of patients impact the course of their diseases. Students would understand the true meaning of caring. Students would thus become more thoughtful medical professionals for the sake of their patients.

The major goal of medical education should be improving the empathic communication skills of medical students (Avdi et al., 2008). In Afghani's study (Afghani, Besimanto, Amin, & Shapiro, 2011), 55% of responders (3rd and 4th year students) thought that empathy could be taught. Evans and colleagues reported that a consulting skills course could improve students' empathic behavior. In the study by Borges and Hartung (2007), 87% of students were inclined to volunteer their time to the indigent. Community service learning has been shown to increase communication skills. However, most previous studies on service learning were short term, and their findings were based on questionnaire surveys. One study revealed that 10-week service learning activities significantly increased medical and nursing students' overall knowledge of aging and their understanding of mental health needs in old age. However, the effect was not long-lasting (Leung et al., 2012). There has been little research on service learning over a longer period of time and using repeated exposure and feedback to sustain attitude change toward older adults.

Leung, Liu, Wang, and Chen (2007) commented that planned feedback as well as the opportunity to work with different people as a team are necessary for the program to succeed. Therefore, we developed a multidisciplinary

service-learning program aiming to enhance the student caring experience through longer exposure to the community. In this program, students learned listening and communication skills during visits with elderly individuals living alone, and how to cooperate with students in other departments. This article describes the program's development and provides student feedback about this program.

THE STUDY

Fu-Dey Citizen House is located at the center of the capital Taipei. The residents were low-income, similarly aged elderly people who lived alone. Most were jobless and relied solely on low-income subsidies from the Taipei City Government. In addition, many residents were physically impaired, sick, handicapped, and facing the possibility of resettlement due to demolition of their homes. They were therefore afraid of leaving their familiar environment and uncertain of the future.

This community consisted of 3 three-story and 3 four-story buildings, and a house used as an activity center. Each household contained a bathroom, kitchen, and living room. The actual space available was very limited, accounting 216 square feet per room. The average age of residents was 80.4 ± 11.2 years for males and 67.8 ± 16.0 years for females.

Taipei Medical University is located in the municipal area of the capital city, and offers caring experience courses intended to preserve community health and teach students how to serve and communicate with the elderly. The service learning courses were given to first-year students of our university. Two semesters per year were offered as an optional non-credit course. The curriculum was free and open to all students, but at least 14 hours of service per semester were required to pass the course.

The course was tutored by two teachers (SHY, WPC) and two teaching assistants (CHL, HTP) with service experience. Between September 2008 and June 2009, a total of 26 and 41 students attending nine different schools were assigned to community care teams for the first and second semesters, respectively. Students were from departments of Medicine (1st semester, 4; 2nd semester, 10), Dentistry (2, 6), Pharmacy (2, 2), Medical Technology (2, 3), Health Care and Nutrition (3, 12), Public Health (3, 3), Hospital Management (6, 0), Nursing (1, 4), and Nursing & Health Care for the Elderly (3, 1). Of these participants, 7 students completed two semesters of the course.

Four social workers selected the family services provided to residents of the Fu-Dey Citizen House. Initially, the elderly of 384 households were screened based on their service needs, compliance with a set of criteria, and absence of mental illness. Finally, a total of 8 men and 7 women (15 households) were chosen to participate for 2 semesters.

On the first day of the 1st semester, the community health center staff held a one-day garden party to introduce students to all residents of the 384 households, increase their familiarity with one another, and allay feelings of strangeness and fear. In addition to the students enrolled in caring experience courses, 120 second-year medical students joined and participated the garden party day. Activities covered the basic health check, depression scales assessment, and health education to prevent falls and address nutrition concerns.

After the garden party day, each group of students (2–4 people per group) was assigned one elderly person. At least 6 visits per semester to the same venue and regular scheduling of service were required to complete the course. The services selected were decided during the first home visit after the needs of the clients were determined. Needs were roughly divided into static and dynamic services. Static services included chess playing, newspaper reading, and information (current photos and data on the hometowns of the elderly) sharing. The dynamic services included assistance with climbing stairs, showering, and walking. In addition, students provided the elderly with the experience of warmth by giving cards and small gifts to them at certain festivals in particular. If the students could not visit the elderly regularly, they would mail their cards instead.

Students were accompanied by their teachers on the first and second home visits and were unaccompanied on follow-up visits. In addition to providing conversation, the students documented the life stories of the elderly after receiving their consents.

Before the first visit, the teacher briefed students on the basic characteristics of the community and clients to be served, to eliminate the tension and to familiarize students with the curriculum support system.

After the first home visit, each student (by completing the "Table of Learning Program Experiences") summarized the background data collected from the elderly subjects, the plans for future learning experiences,

and the expected outcome of that experience.

On subsequent visits, students chatted with the elderly, so that they would have someone to talk to. Information gained from these visits was recorded in the "Learning Log", including the dates of each visit and the names of the families visited (Part I) and observations, feelings, reflections, changes, etc. (Part II).

The students met to share experiences after the end of the course, and express their opinion on the services offered the elderly during the semester. Furthermore, the students submitted final reports describing their impressions of the services they provided, the difficulties they encountered, the solutions to problems, event-related growth and change, service-related issues, ways to improve the course, and insights into future volunteer service.

The learning support system included contact links between teachers and students by phone and via online social networking. Teachers and students engaged in interactive discussions before, during, and after the courses, to ascertain the student's level of progress and need for help to deal with problems or difficulties.

Students' reflections were qualitatively analyzed. Representative feedback was quoted when we thought it was relevant to the goal of the project (Côté & Turgeon, 2005). A non-quantitative process was used to interpret and conceptualize the original data. Statements with similar meanings were merged into one category and the number of people expressing the same thought was noted. The datasets were based on the classification of student skills into communications and interpersonal skills, decision-making and critical thinking skills, processing and self-management capabilities (Taiwan Health Promoting School, 2012). (Table 1)

Table 1: The Hypothetical Variables of "Skill-based Life Health Education"

Communications and interpersonal skills	Decision-making and critical thinking skills	Processing and self-management capabilities
1. Interpersonal skills	1. Decision making and problem solving skills	1. Ability to increase self confidence, self discipline, and take responsibility, influence, or promote change
2. Negotiations and rejection capabilities	2. Critical thinking skills	2. Ability to control ones' emotions
3. Understanding the feelings of others		3. Ability to control ones' emotions and anti-stress
4. Cooperation and team work		
5. Advocacy capabilities		

Modified from “Taiwan Health Promoting School” (2012)

FINDINGS

Interviews of elderly clients by students elicited the following information.

For example, as quoted from the records of Student A5, "At first I did not know what to talk about, but finally I felt encouraged to speak with him, and the dialogue eventually seemed to become more natural. This was very encouraging to someone like myself who had always been at a loss for words."

As quoted from the records of Student A4 commenting on interpersonal skills: "The elderly are actually very eager to be taken care of, and we should be more active in looking after them."

As quoted from the records of Student B5 commenting on understanding the feelings of others: "Caring means knowing when someone needs to be cared for. It is a matter of give and take, and it can not be achieved unilaterally" (spirit of serving). However, the ability to negotiate and reject was not significantly improved because most of the time students are listening and so they are unable to make recommendations except at a superficial level. Students could raise issues and comment on them, but they could not troubleshoot them. Student A6 provided an example: "Social change has led to increased numbers of single people and double-income-no-kids families. Thus the number of vulnerable families and vulnerable elderly has increased. More volunteers devoted to caring are highly encouraged" (advocacy capabilities).

From observations during their period of service, students were able to comment or raise issues bearing on the care and environment of the elderly. For example, "I found that many elderly people have serious hearing impairments, so that we must speak loudly and slowly."--Student B22.

An example of focus on issues of the elderly: "The actions of students can be more focused on community care

by encouraging more participation and meaningful community service activities."--Student B29.

An example of focus on current environmental issues: "Recruiting young students to establish social service teams in order to regularly help with clean-up work."--Student C3.

An example of raising issues of current service, not just silently receiving service: “Listen to what the elderly say, and find practical ways to help them, other than ways that we think subjectively are ideal and feasible."--Student B15.

"One day we will finish the course and never visit uncle Chen again. What will he think of us then?! What will the other elderly not served by us think of us then?!"--Student C4.

Students who provided more substantial feedback indicated that the service learning program helped enhance their confidence, ability to handle issues and take responsibility, and self-management skills. Through visits, students overcame communication barriers with others, addressed the concerns of others appropriately, identified personal strengths and weaknesses, and recognized self-value.

For example: "I’ve learned how to express other peoples' concerns, how to initiate conversation and chat with people."--Student B9. "Service not only helped others, but also enabled us to gain experience, adopt new attitudes, and find practical ways to resolve problems."--Student A11. "Participation in social service activities will greatly influence our future service as doctors and nurses. Only by providing service at basic levels, can we become good doctors in the future!”--Student B19.

Students learned that it was sometimes necessary to provide services under poor hygienic conditions. Controlling emotions and stress in such circumstances was a challenge. For example: "Some old people were incontinent, and they were unable to get rid of the flies attracted to their faces and feet. I need to learn to accept such a situation which I would never have tolerated before."--Student C5.

The feedback from our students can enhance future service learning as summarized below.

An excellent medical staff needs to be knowledgeable and needs to have good communication skills. Our students will be members of future health care teams. Though their backgrounds, abilities, and attitudes currently vary and their social class and environment may differ from those of their elderly clients, students find through service learning courses and listening that the elderly are not that difficult to get along with.

During service-learning courses, students discover their shortcomings and identify issues. "I used to think that the elderly at home were annoying, but now I can adapt and take the initiative to care for the people around me, especially the elderly at home. Caring must be self-initiated, through empathy for the feelings of the elderly, changing one's attitude for the sake of the elderly, and learning how to care for them."

Having learned how to think and see things from different perspectives, students then thought about "how to improve the health of the elderly", "whether visits to provide services would disturb the elderly", "what aspects of life would be changed for elderly who received visits and those who did not at the end of the course", etc. Thus the attitudes of students toward the elderly were improved.

During the service learning period, students gained greater respect for service, the efforts made by their teachers, the importance of the community of volunteers, and the hard work of enthusiastic volunteers.

Students learned that there were community elderly in need of care, identified the social problems, and learned that basic education, concepts, and work improved these problems. Vulnerable groups need love in addition to material support. Learning to help the elderly living alone, students become more confident in their ability to provide care. Service learning enhanced empathy, self-satisfaction, and knowledge of how to care for vulnerable people and how to communicate with others. Service learning is expected through the process of sharing to reduce future occurrence of medical malpractice.

CONCLUSIONS

Traditional medical education including classroom teaching and internship training cannot meet the needs of those with chronic diseases, especially the elderly (Shapiro et al., 2009). More and more scholars have recommended exposing students to real patients as early as possible during training (Shapiro et al., 2009; Borges & Hartung, 2007). In Shapiro’s study (2009), students taking the course "long-term community care" noted that

the elderly were in fact their teachers. Second-year medical students visited chronically ill patients on average of 4.4 times during eight months. The course was highly rated by students for its impact on enhancing their appreciation for patient-centered care, improving their knowledge of community resources, and improving their understanding of the roles of allied health professionals. In Borges' study (2007), first-year medical students spent six hours helping to prepare and serve food to clients at community-based agencies. Most students endorsed volunteering their time to assist the indigent. Our project involved more students and longer and repeated home visits (at least six times or 14 hours per semester). Through direct experience, students can learn and improve communications and interpersonal skills, decision-making and critical thinking skills, and processing and self-management capabilities.

The American Association of Medical Colleges includes altruism, compassion and empathy, trust and honesty among the qualifications of twenty-first century physicians. Effective communication increases the level of satisfaction of both doctors and patients, supports the treatment program, and facilitates the making of more appropriate medical and policy decisions. Service courses teach students to pay attention to the cultural and ethnic background sensitivities of their patients (Klig, 2005). Crandall and Marion (2009) believe that use of effective communication tools and multiple opportunities to practice these skills paired with constructive feedback provided by educators will preserve and enhance student attitudes. In our project, students were able to overcome the language barrier, identify subjects of conversation, and reduce the barrier to student-elderly interaction by being willing to listen.

Though negative attitudes toward medically underserved patients have declined (Crandall & Marion, 2009; Chen, Lew, Hershman, & Orlander, 2007), empathy level was reported to be highest in first-year students but lower by the end of internship and throughout residency (Chen et al., 2007). The attitudes of students in traditional or problem-based learning curricula become increasingly negative over the four-year period of study (Prince et al., 2000; Seabrook, 2004) and are not influenced by the preclinical curriculum. A lack of attending and resident role models and time pressure were described as major barriers to empathy (Afghani et al., 2011).

The present study has a few limitations. The reflections of students who visited elderly living alone program were self-reported. Similar to other studies (Leung et al., 2007), our study found it difficult to determine 'real' feedback outcome even by objective assessment. Long-term outcomes are often difficult to obtain. Further research on community service volunteerism before college admission may predict a change in social attitudes. Such an achievement requires proper supervision and guidance.

Through experiencing, students learned to recognize the differences between the living environment of others and their own living environment, view things from a new perspective, communicate with others, and then change themselves. Experiencing also improved doctor-patient communication and increased the student's capacity for empathy, ensuring that students will look forward to their future as medical practitioners.

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STUDENTS' OPINIONS ON FACEBOOK SUPPORTED BLENDED LEARNING ENVIRONMENT

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ABSTRACT
The first purpose of this study was to determine students' opinions on blended learning and its implementation. The other purpose was to explore the students' opinions on Facebook integration into blended learning environment. The participants of this study were 40 undergraduate students in their fourth semester of the program. Participants had no prior experience in Blended Learning Environment, but they were well informed about online distance education. A combination of qualitative and quantitative approaches was used in this study. Quantitative data were collected through a scale called as "Students' Views on the Use and Implementation of Blended Learning" and qualitative data were collected through open-ended questions. Based on the result of the study, it appears that students have quite positive opinions on blended learning and its implementation. The highest score given to face-to-face environment throughout the process of implementing blended learning. However, students have also positive opinions on the blended learning method. The findings from this study indicate that Facebook may be an appropriate tool for communication and interaction whereas, the online environment may be appropriate for sharing content, homework / projects.

INTRODUCTION

21st century brings different challenges for educational institutions. Many institutions are embracing the new technologies into their system. Technology has a vital role to play in building up 21st century skills, and today's students come pre-skilled with technology proficiencies to schools and a built in acceptance for new technologies.

New technologies can contribute to universal access to education, equity in education, and the delivery of quality learning and teaching. Furthermore, the development of Internet technologies has resulted in the delivery of a great majority of distance learning being conducted through the Internet. Besides, these new technologies have also changed teaching paradigms. In recent years the terms like e-learning or online learning have occurred as a result of the integration of new technologies in education. E-learning, or online learning is continuing to grow and it has increased the demand for distance education. The system of online learning has been largely used in higher education, and a lot of studies have been done to discover both its strengths and weaknesses (Pohl, 2004; Markovic, 2010). Many higher education institutions today have multiple modes such as on-campus, at a distance, online or a blended learning for teaching (Wang, 2010; Yuen, 2010; Taylor & Newton, 2013). There have been a number of factors impeding the large quantity of technology in education across all sectors as well as universities. In recent times, factors (such as information explosion, twenty first century skills, demands of workplaces, easy access to technology) have emerged which have strengthened and encouraged moves to adopt technologies into classrooms and learning settings (Ugur, Akkoyunlu, & Kurbanoglu, 2011).

Discussions on some disadvantages of e-learning, or online learning environments such as lack of face-to-face communication resulting in inhibiting the socialization process of individuals bring new approaches and new environments. This new environment called as blended learning, hybrid or mixed learning combines e learning and classical learning environments (Lim, Morris, & Kupritz, 2006). Blended learning combines face-to-face and online experiences to engage learners, and extend learning beyond the classroom walls. Dziuban, Hartman and Moskal (2004) emphasized that blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment.

Definition of Blended Learning

As Clark and Mayer (2007) noted that there is no exact definition of blended learning and it may refer to different meanings for different people. Singh and Reed (2001) define blended learning as a learning program where more than one delivery mode is being used with the objective of optimizing the learning outcome and cost of program delivery. Blended learning is used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning" (Valiathan, 2002). Generally, blended learning is defined as any combination of learning delivery methods that includes face-to-face instruction with asynchronous and/or synchronous computer technologies (Osguthorpe & Graham 2003). In the same context, another definition of blended learning is the effective integration of various learning techniques, technologies, and delivery modalities to meet specific communication, knowledge sharing, and information needs (Finn & Bucceri, 2004). Mortera-Gutierrez (2006) outlined that blended learning is the combination of multiple approaches to learning, combining several different delivery methods, such as collaboration software, web-based courses or computer communication practices and traditional face-to-face instructions. Mayadas and Picciano (2007) define on the other hand blended learning as simply a combination of on line learning and face-to face instruction. The authors discussed blended learning as the mix of different didactic methods and delivery formats which are independent. According to Tucker (2012), "Blended learning is any combination of face-to-face instruction and online learning. Tucker takes together of instructional mediums – in person and online – to maximize learning outcomes for students. Staker and Horn (2012) define blended learning as "a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home. Staker and Horn (2012) define blended learning from student perspective and it is a student-centric definition. Consequently, blended learning is defined as a combination approach and the different definitions of blended learning show us diversity and strength of this type of learning. Blended learning gives learners and teachers a potential environment to learn and teach more effectively.

For the purposes of this paper, blended learning means integrating the online and face-to-face formats to create a more effective learning experience than either medium can produce alone and took the form of a combination of face-to-face classroom teaching with lecture and class formats and the use of an asynchronous online environment with supporting social media (Facebook). According to Shih (2011), blended learning that integrates online and face-to-face instruction could create an effective teaching and learning experience for both instructors and students.

In blended learning environment, students are able to communicate at their own pace and consider comments and responses; however, we need more space to extent communication and relationship between peers and lecturers. Facebook was chosen as supported media in the study. Researchers assumed that to integrate social media (Facebook) into an Instructional Design Course could help create a sense of community among students; furthermore, the interactions among students that take place outside of classrooms can prove to have pedagogical values through thoughtful instructional designs. The researchers chose Facebook, because the site's popularity ensured that a large number of students would already be familiar with its layout and operation, and would be comfortable utilizing it during the term (McCarthy, 2010).

In today's students are currently enrolled in higher education with a new set of characteristics and values. They are heavily engaged in social media (i.e., blogs, twitter, podcasts, wikis, social network sites, virtual worlds, video sharing and photo sharing) and Internet that play an increasingly important role in their social and academic life (Monaco & Martin, 2007). Most of the studies showed that social media tools support educational activities by allowing active participation, collaboration, interaction, information and resource sharing (Ajjan & Hartshorne, 2008; Mason, 2006; Selwyn, 2007). Social media has emerged as a highly useful personal communication technology (Tess, 2013).

Students today have more autonomy, collective personality, connectivity and interaction besides, they ask socio-experiential learning opportunities in their learning contexts and also construct their knowledge. Educators need to consider how to meet the needs of their students by utilizing social media and Internet. Recently, social media has started to use both in daily lives and teaching - learning process (Manca & Ranierit, 2013). Today Facebook is considered as one of the most popular platforms for online social media among youth and university students. As Selwyn (2007) stated Facebook has quickly become the social media of choice by university students. Therefore, it is inevitable to integrate social media into the education.

There has been rapid growth in blended learning researches focused on its implementation and students and teachers' opinions on the implementations (Hsu, 2011; Lopez-Perez, Perez-Lopez, & Rodriguez, 2011; Perez

Marin, Santacruz & Gomez, 2012; Al-Qahtani & Higgins, 2013) or on usage of social media in education (Bosch, 2009; Roblyer, McDaniel, Webb, Herman, & Witty, 2010; Yang, Wang, Woo, and Quek, 2011; Coklar, 2012; Irwin, Ball, Desbrow and Leveritt, 2012; Manca, & Ranierit, 2013) but very limited research focused on using blended learning environment through social media (McCarthy, 2010; Shih, 2011; McCarthy, 2013).

The first purpose of this study was to determine students' opinions on blended learning and its implementation related to easy use of web media, online media, content, face-to-face media, blended learning method and evaluation. The other purpose was to explore the students' opinions on Facebook integration into blended learning environment. Two questions were addressed in the current study:

1. What are the students' opinions on blended learning and its implementation?
2. What are the students' opinions on Facebook support in blended learning environment?

METHODOLOGY

A combination of qualitative and quantitative approaches was used in this study. Quantitative data were collected through a scale called as "Students' Views on the Use and Implementation of Blended Learning" to answer the question 1, qualitative data were collected through open-ended questions to answer the question 2.

The Study Group

The participants of this study were 40 students in their fourth semester of the program. From their first to third semester, they had taken courses such as "Information and Communication Technologies, Programming Languages, Computer Hardware etc." Therefore, all of them were advanced computer users. Participants had no prior experience in Blended Learning Environment, but they were well informed about online distance education.

Data Collection Process: The data required for this study were collected by the researchers through a scale on learners' opinions on blended learning and its implementation, additional data were gathered by open ended questions relating to facebook support.

The Scale of Students' Views on the Use and Implementation of Blended Learning: The scale developed by Akkoyunlu and Yılmaz-Soylu (2006) consists of 50 expressions with scores from 1 to 10. There are two main sections, the first 35 expressions aim to highlight the learners' views on the use and implementation of the blended learning method (easy use of web environment, online media, content, face to face media, blended learning method and evaluation) the remaining 15 expressions are used to determine the students' views on blended learning in general.

On a ten-point Likert scale, anchored with notations "0 = not at all", and "10 = totally true" the students were asked to assign a score between 1-10 for each expression. From "1- 5" is regarded as "low", from "5.01-7" as "Medium" and "7.01-10" as "High". In order to ensure a high reliability, the test repeat method was used and the alpha reliability coefficient of the first section was determined as $\alpha = .78$, for the second section as $\alpha = .79$ and in general as $\alpha = .78$ (Akkoyunlu & Yılmaz-Soylu, 2006).

Open-ended Questions: Open-ended questions were posed at the end of the semester in order to quantitatively determine the views of students on blended learning and its implementation, and then address them in detail. Thus, through open-ended questions, students were given an opportunity to explain their feelings concerning any difficulties they had during the course and share their experiences on online learning environment and face-to-face sessions. Besides, the students' opinions on Facebook support in blended learning environment were also determined through open-ended questions.

Procedures of the Study

Background of the Course: "Instructional Design" is a core course of the undergraduate curriculum at the Department of Computer Education and Instructional Technologies (Faculty of Education) The students take the course in their forth-academic semester. Approximately 60 students enroll to the course each academic year. Researchers decided to implement the blended learning model in "Instructional Design" course. Therefore, researchers redesign the course content for blended learning environment. First of all, researchers analyzed the course objectives with the aim of deciding which of them were to be achieved through the online method and which of them were to be accomplished within the face-to-face learning environment. Secondly, the parts were defined with part of the course for classroom instruction and the other part for the online instruction. Thus, same learners were involved in online and face-to-face learning activities. This model was defined as Type 1, a blended classroom involving the same learners in both face-to-face and online activities

by Osguthorpe and Graham (2003). Secondly, researchers decided to use Facebook as supported media and mixed with face to face and the online environments in the study. One week the students received the course over the web and facebook, the next week they were exposed to face-to-face education for two hours. Lastly, researchers redesigned the course content and developed the course text and online material. The content of courses was designed according to principles of tutorial instruction. Information in texts was presented in small units followed by questions. Animations, graphs and pictures as visual materials were also planned and used by the researchers. According to Kerres and de Witt, (2003) the learning objectives of the course and the learning environment have to be analyzed in order to define required time for online and face-to-face activities.

Blended Learning Environment: In this study the course was delivered in a blended format includes the online and face-to-face formats with supporting social media (Facebook). Online learning environment was constructed by WordPress web template system to implement the study. The minimal approach was adopted for both content and appearance in designing online learning environment. Links defined at the beginning of the term were released in time parallel to face to face learning and updated regularly (announcements, weekly assignments, etc.) Online learning environment was also displayed on mobile devices. Online learning environment was all open for registration of students and after a week their IDs were defined and their authorization were increased. Then, online learning environment was closed for the registration. Students accessed the online learning environment with a user name and a password. Only students and course instructors/researchers were allowed to access to the online learning environment. A Facebook group was created parallel to online learning environment. Student engagement with the course *Facebook* page was strongly encouraged by the course instructors; however there was no formal assessment or incentive associated with students' participation. Students were also encouraged to share their opinions, experiences, with their classmates. The instructor and students also used the "message" function to communicate with each other. Interactions on Facebook were typically short and direct. The instructors acted as moderators by responding to questions and comments, keeping the discussion on track and evaluating student performance in the process. In other words, the Facebook environment allowed for peer-to-peer, student – instructors, and instructor – student communication and gave students opportunities for sharing their experiences, questions etc. with each other and with the instructors.

The instructions, course materials assignments, pre-discussions, discussion questions were shared through weekly links. Students could ask any questions on the course using comment box available under the each links.

Students' assignments were displayed on the homepage. Comments and explanations were send to the students using boxes available under the assignments, and discussions were possible with students. One of the characteristics of online learning environment was to define categories, in this way, assignments were categorized according to topics and when clicking the category link or students' username, it was possible to reach their activities and comments.

Face-to-Face Sessions: The face-to-face meetings were held every two weeks. During the time in between, the instructors communicated through online environment and facebook . Syllabus of the course and learning environment were presented to students on the first face-to-face session. Before face-to-face session, the students were asked to read the course notes pertaining to that week's content provided on the online learning environment. During face-to-face sessions the questions of students concerning the course content and the points which could not be understood by students were discussed face-to-face and resolved.

Participation in the online environment, facebook and face-to-face sessions was obligatory and students were encouraged to participate and contribute to the process. Besides, the students' reflective reports and their feedback were also gathered in several ways.

FINDINGS AND DISCUSSION

Findings of the study according to the questions are listed hereby below:

What are the students' opinions on blended learning and its implementation?

General mean score obtained from the questionnaire corresponds to 7.40 (Table 1). The scores as presented above are categorized as follows: "1-5: low", "5.01-7: medium", "7.01-10: high". The average score is at high level.

Table1. Student's opinions on implementation and reliability results of BLE dimensions

	M	*SD*	Cronbach *α*
Ease of use of Web Environment	7.59	1.31	.84
Online environment	7.25	1.60	.84
Content	7.48	1.60	.94
Face-to-face environment	7.73	1.70	.92
Evaluation	7.62	1.92	.89
Blended Learning Environment	7.16	1.41	.88
Total	7.40	1.16	.94

It is found out that the highest mean corresponds to face-to-face aspect of this implementation (= 7.73). This finding can be explained with students' study habits and face-to-face interaction could be met their expectations on the face-to-face interaction of students with each other and with the instructors. The students may prefer in the face-to-face session for communicating with instructors. Results of the findings showed that face-to-face interaction is a must for students. Students' answers that supported these findings include the following:

"Face to face learning was more efficient because we got immediate feedback. During the face-to-face sessions we repeated the subject in online environment and face-to-face instruction helped me understand the course concepts better. So, I preferred face to face sessions." H. A
"Face-to-face instruction was a better way for me to learn the content/course materials. I liked the teaching way of class. The teacher used an interesting way to teach us. Being in a class with face-to-face communication was more convenient for me, and the face-to-face learning environment contributed to my overall satisfaction of the course"" İ. Ö.

"*We received the information in the online environment and ensured a higher level of learning. However, Face-to-face interaction reinforced me and met my expectations since the course instructors provided us with guiding information."D. A.*

As Dzibuan, Hartman and Moskal (2004) stated, "students are still able to anchor their learning experience on the familiar face to face class meetings". However the highest mean corresponds to face to face aspect of this implementation, as Table 1 showed that students' opinions on the use and implementation of the blended learning method (easy use of web media, online media, content, face to face media, blended learning method and evaluation) are also at high level. Findings showed that the blended learning was highly appreciated and positively rated by students. Blended courses offer flexibility both in time and space for students. That is why, students could be positive about the blended learning environment (Dziuban, Hartman, Cavanagh, & Moskal, 2011). Use of blended learning technology could provide students with the flexibility to learn at their own pace and other outside responsibilities. The results of open-ended questions concerning students' opinions on online environment demonstrated that blended learning environment adds to the interest of students.

"I had access to lecture notes whenever I needed and I could ask the questions which sticked in my mind. It was a flexible environment and studied whenever I wanted. Face-to-face course was a good method which enabled us to ask the details about the topics we did not understand. "

"I like the practice of blended learning (a combination of online learning with classroom learning). Compared to classroom learning, I found it easier to participate in online discussions in blended learning." F. K.
Most of the studies showed that the most efficient approach for learning-teaching process is neither the use of only face-to-face instruction methods nor only web-based methods; but, it is the combination of both these approaches by taking their most attractive aspects that produces the most effective approach (Adas & Wafa, 2011; Ginns & Ellis 2007; Futch, 2005). As Yuen (2010) stated Blended learning, which is a relatively new learning approach, has the quality to have an influence on teachers, students and instruction activities.

What are the students' opinions on Facebook support in blended learning environment?
Students were asked to determine their opinions on facebook support in blended learning environment. The question was "which environment you prefer facebook or online developed for the course to conduct the activities." Students' answers were grouped into two categories as interaction and content. 18 students preferred online environment whereas 13 students preferred Facebook. In the next step, in order to get more

detailed answers, students were asked to share their opinions on Facebook usage in the process and compare Facebook and online environment.

Students anticipated that Facebook support would enhance the quantity of information passed from instructors to students and facilitate interaction between students regarding course content. In other words, students underlined that Facebook should be used for communication and interaction, giving immediate feedback and motivation whereas, the online environment should be used for sharing content, homework / projects and providing the belonging of the course.

Comments from the students reflected this feeling quite well:
"When Facebook used in order to inform us about activities, it helped and guided us to go to online environment. Sometimes it was not easy to access the online environment in any time, but it was easy to access Facebook in any time and in anywhere. However, it was very useful to use the online environment to share the content and to find detailed learning activities." C. O.
"We used the online environment for only the course, however, I was already on Facebook, the page was a quick and easy way to get information and keep up to date. Therefore, it was great idea and allows much quicker and convenient access to needed materials and/or information." M.T.

"*When the course content was shared only in the online environment sometimes students may not see them. I always checked first Facebook for the course information and then go to the online environment. Besides, if we had any question on the course it was so easy to get answer or immediate feedback."* S.Y.
"We could reach the announcement about the course immediately through Facebook, because I was already on Facebook, the page was a quick and easy way to get information and keep up to date. Therefore, it was useful to use Facebook for communication but online environment was better in order to upload the course content or our projects. Therefore, both of them were very practical for online activities." B.K.

Students underlined that Facebook allowed much easier access as it has already become part of their lives.With the increasing popularity of smart phones, Facebook is within their fingertips. Since "everyone uses it every day", they regarded Facebook as "more immediate and direct than online learning environment. Many of these students are using technology and social media in their daily lives and social media has mostly been part of their lives, they use it seamlessly on a daily basis (Kirschner & Karpinski, 2010; Roblyer, McDaniel, Webb, Herman, & Witty, 2010). As Shih (2011) underlined the interaction between teacher and students is important and may influence students' learning motivation and effectiveness. Baran (2010) cited that his empirical research revealed students felt that the use of Facebook in the classroom strengthened their communication as a group and felt that Facebook was a valuable part of their distance education course.

CONCLUSION

The purpose of the study was to measure students' opininons on blended learning and its implementation and explore the students' opinions on Facebook integration into blended learning environment.

Based on the result of the study, it appears that students have quite positive opinions on blended learning and its implementation. The highest score given to face-to-face environment throughout the process of implementing blended learning. However, students have also positive opinions on the blended learning method.

The findings from this study indicate that Facebook may be an appropriate tool for communication and interaction whereas, the online environment may be appropriate for sharing content, homework / projects.

LIMITATIONS AND IMPLICATIONS OF THE STUDY

This study has a limitation and a discussion of the limitation of this study deserves examination. The study is implemented within the period of a spring term to a small group of students who do not have previous experience on blended learning. This limitation might limit the generalizability of the findings. Future studies should involve larger numbers of students to be able to generalize the results. It would also be interesting to compare the effects among solely online instruction, *Facebook*-integrated blended learning, and face to face instruction.

The results can be seen as recommendations of how to combine face-to-face learning and social media components with online learning components from students' point of view. They prefer Facebook components for the dissemination of information to communicate each other.

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STUDENTS' PERCEPTION TOWARD PERSONAL INFORMATION AND PRIVACY DISCLOSURE IN E-LEARNING

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ABSTRACT
This research investigates East Asian students' perceptions towards e-learning privacy. The survey was first carried out in Japan (N1= 255) and China (N2=307) in 2009. In 2012 the same survey was conducted again in these two countries but with different participants (N3=175, N4=63). To survey in different countries is to verify whether e-learning privacy perceptions have cultural factors. To conduct the same survey with a three-year interval is to verify whether e-learning privacy perceptions change over time. Actual registered private information on two e-learning systems is analyzed, too in order to confirm the findings in the survey. The findings are: while students are indeed concerned about their private information being online, they support their teachers collecting and using their private information for learning purposes. East Asian students consider personal photo, mobile phone number, and physical address to be very private and are reluctant to register these items even in e-learning systems
Keywords: e-learning, privacy perceptions, art and language education, e-learning system design

INTRODUCTION

Personal information/privacy protection is an ongoing concern in our information society. The majority of countries in the world have drafted laws to protect its peoples' personal information/privacy from intrusion (OECD Report, 2006). In e-learning, learner concerns over the security of their personal information/privacy heavily influence a learner's willingness to disclose information themselves in online activities. The more learners are concerned about the security of their online personal information, the less they will disclose about themselves (Dinev, Hart & Mullen, 2008). Teachers cannot force or pressure students to provide personal information even for learning purposes. However, when an e-learning teacher better knows the personal information/privacy concerns of their students, they will be better able to decide what information to collect and how it should be used. Teachers can feel more secure collecting information that students are willing to divulge than information learners are hesitant to disseminate. Not only should teachers be familiar with personal information protection laws, they should also ask what concerns their learners have about e-learning privacy and personal data disclosure.
Our questions are:

1. How much are East Asian, mainly Chinese and Japanese students concerned about their e-learning privacy and what types of e-learning private information are they concerned about most?
2. What are students' perceptions toward online private information collection and monitoring by their teachers for learning purposes?
3. Do students in different countries have different perceptions on their online private information and are these perceptions changing over time?

The relationship of personal information/data and privacy

While there is no universally agreed upon definition of "privacy" (Lanier, 2008); one definition is that privacy is the "desire of people to choose freely under what circumstances, and to what extent, they will expose themselves, their attitude, and their behavior to others" (Westin, 1967). Another definition holds that "privacy is the right to be let alone" (Warren & Brandeis, 1890).

In Japan, "personal information" is defined as "information about a living individual which can identify the specific individual by name, or other description contained in such information, including such information as will allow easy reference to other information and will thereby enable the identification of the specific individual" (Cabinet Office, Government of Japan, 2005) Therefore, privacy could also be understood as the right to exercise control over disclosure of personal information that could expose a person's identity. In this

paper, the authors mainly consider privacy issues in relation to issues of disclosure and use of personal information.

Personal information and privacy protection in e-learning

It is usually unavoidable that an e-learning teacher collects a considerable deal of personal information about a student, either manually or through a program/system, for the purposes of better class management or better tutoring. Such information may include student name, e-mail address, mobile phone number, birthday, birthplace, age, or facial photo. The learning system itself may automatically record the learners' learning preferences, learning history, and learning outcomes through cookies or any other preset programs. Also, uploaded homework, collaborative online projects, and grades of online assignments can be considered private information. In a digital era, personal information stored electronically can leak and be spread much more easily than in the past when such information was stored on paper (Shimakawa, 2005). Student personal information needs to be protected, not only in PC e-learning systems or programs, but in any form of learning using Information Communication Technology (ICT) such as mobile learning (mLearning). E-learning teachers need to address how to use learners' personal information without inadvertently intruding upon students' privacy.

E-learning privacy and technical security

"Security" in e-learning usually refers to the security technology used in an e-learning program with respect to hardware and software (Weippl, 2005). An e-learning system which is technically highly secured can minimize learner concern over unauthorized access to students' personal information, theft of accounts and passwords, or virus attacks (Lim & Jin, 2006). As issues of security technology are solved mainly by system designers, network specialist, or e-learning organizing institutions, rather than by teachers, these issues will not be addressed in this paper.

METHOD

Participants

For the purpose of verifying if students' perceptions of e-learning privacy vary over time and country regions, surveys were carried out in two East Asian countries: Japan and China - during April 2009, and July 2012. Totally 800 students took part in the surveys. All participants were familiar with studying in one or more e-learning environments. There is no big gap in participants' ages.

Table 1. Participants of e-learning privacy survey

Survey year	Country	Number of participants			Average age	Surveyed universities
		Male	Female	Total		
2009	Japan	151	104	255	19.1 (SD=2.7)	Hiroshima Shudo University, Yamaguchi University
2009	China	83	224	307	21.3 (SD=3.3)	Yangzhou University, Shandong University of Chinese Traditional Medicine, The Open University of Nantong City, Ningbo University of Technology, Jiangnan University
2012	Japan	120	55	175	20.2 (SD=0.8)	Shimane University
2012	China	43	20	63	20.7 (SD=2.12)	Anhui Jianzhu University

Aside from the above questionnaire, the investigation on user registration information from Moodle – a popular open-source LMS and another e-learning program called InterCussion was conducted in 2013 by one of the authors in Japan. Profiles of 152 users on Moodle and 109 registers on InterCussion were examined.

Data collection

The survey conducted in 2009 were in paper-and-pencil format. The printed questionnaire was distributed in class by the teachers and collected in class when it was answered. Completed questionnaire sheets collected from 5 different universities in China were posted to Japan for manual transcribing. The survey in 2012 was carried out online. Students were asked to access the survey URL and finish the questionnaire online. On Japan side, students filled in the questionnaire in PC classrooms with their teacher in class. On China side, the survey URL

was sent to 78 students by email. And 63 students responded within a one week duration. As the survey was answered at ones' own volition for Chinese students, it was designed to refuse repeated submission from the same IP address. When survey data was gathered and analyzed, one author in Japan accessed Moodle and InterCussion as a system administrator role to analyze real registered users' profile information.

RESULTS

Survey Results

The questionnaire consisted of 8 questions and a request to give one free comment (See Appendix or the URL of https://ix1.inter-scc.jp/ic/e?i=TBp0Ag1K8Hk). The first question gathered demographic data such as the participants' gender, age and grade level. Questions 2-8 elicited participants' perceptions and attitudes to e-learning privacy disclosure. These questions (2-8) can be grouped into the following three categories:

1. Questions investigating participants' self-assessment of their knowledge of privacy protection laws (Question: 2)
2. Questions investigating participant attitudes toward the current use of their private information by their teachers (Questions: 3, 6, & 7).
3. Questions investigating the degree of participants' concerns over specific items of private information (Questions: 4, 5, 8).

Most of countries in the world have promulgated laws to protect people's privacy (OCED,2006). However, in different countries, people's understanding and recognition of the laws may be different. Question 2 asks students in Japan and China to self-rank their knowledge toward privacy protection laws. See Fig.1 below.

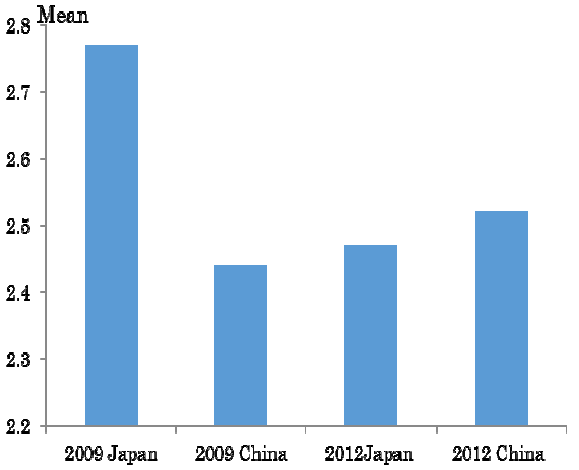

Figure.1 Students' self-assessment on privacy protection law knowledge
(5: Very familiar; 1: Don't know at all)

The data shows that students in both countries are aware of the existence of privacy protection laws, but are not very confident with their knowledge on the laws.

In 2009, Japanese students self-ranked higher than Chinese students, and in 2012, the result reversed. However, both differences are not statistically significant according to *t*-test ($t(560)=1.423$, $p<.05$, $t(368)=0.190$, $p<.05$).

Students' attitude toward teachers' collection of their online registration information as well as learning information are the very factors that this study tries to delineate. If students are too much fearful of their online private information being stolen, leaked or sold to a third party they will not be willing to join any e-learning program or actively involve in any online-learning activities. Therefore, it is not overstating to say that online privacy issues are one of the keys for a successful e-learning project (Jerman-Blažič & Klobučar, 2005). The data in terms of students' attitude towards email address collection, online-learning monitoring, as well as their concerns of private data leakage are shown as follows.

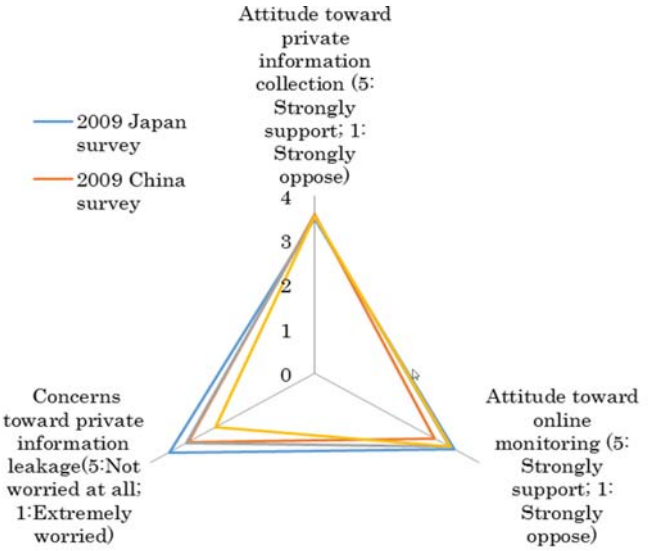

Figure. 2. Students' perception of their e-learning privacy

The graph clearly shows that in general students in both countries support their teachers' collection of their email addresses, and understand and trust their teachers' monitoring their learning history and learning preferences on e-learning systems. However, degrees of support and understanding are different. Japanese students are more supportive of letting their teachers use their private data while Chinese students are more cautious. (Online monitoring: $t(560)=5.54$, $p<.05$; Concerns of private data leakage: $t(560)=5.88$, $p<.05$). Statistically, there is no difference between the attitude of Chinese students and Japanese students toward email address collection by their teachers. Difference between data in 2009 and 2012 is not significant, either.

Question 4 asked about what communication tool, PC email or mobile phone email/Short Message Service (SMS), that students preferred to use for contacting and being conducted in terms of e-learning matters. The result shows in the following graph.

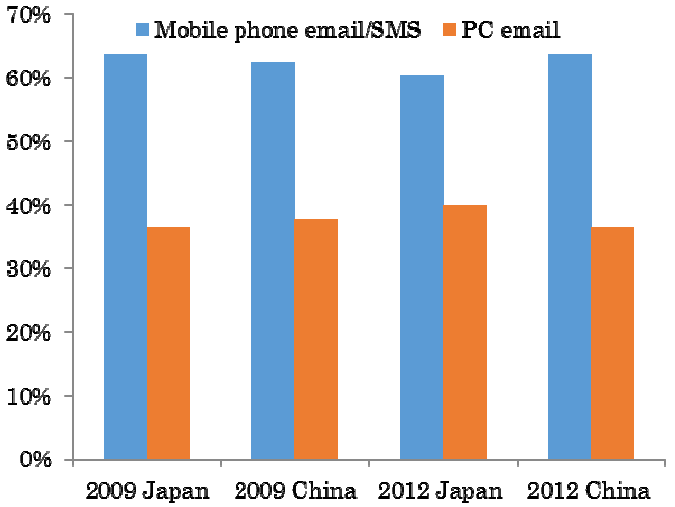

Figure 3. Students' preferred email tool for e-learning communication

The data implies that majority students both in Japan and China preferred to use mobile phone for message communication in e-learning. And these preferences did not change with passing time.

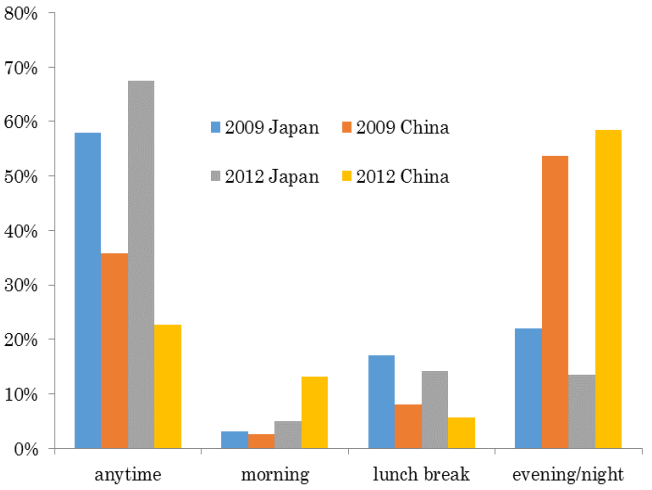

Figure 4. Student preferred time to be contacted

Question 5 investigated students' preferred time for being contacted via mobile phone. The data shows more than half of Japanese students (58% in 2009 and 67% in 2012) think they can be contacted at any time. Chinese students (54% in 2009 and 58% in 2012) preferred evenings or night for e-learning contact. A very small percentage of Chinese students regard lunch time as a good time for contact. See Fig. 4.

The purpose of Question 8 is to find out when students register with an e-learning system what type of private information they are most reluctant to share. The results show that regardless of regions, 2012 or 2009, the private information that students are most reluctant to disclose is personal photos, mobile phone numbers, and physical address. The data further indicates that Japanese students (51% in 2009 and 45% in 2012) regard personal photo as the top sensitive information and they do not want to upload to e-learning systems. While Chinese students (35% in 2009 and 32% in 2012) think their mobile phone number is the private information that they are most cautious to disclose. The other sensitive private information and less sensitive private information are also shown in Figure 5. There is no statistical significance between the student participants in the same country in 2009 and in 2012, which means no change over time can be seen in students' perception towards what is sensitive private information.

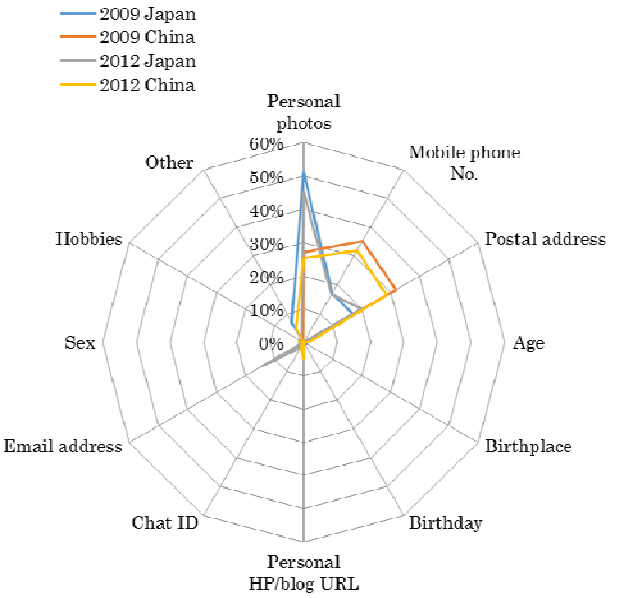

Figure 5. What type of private information are students most cautious about?

For most of survey items participants are encouraged to write down reasons for their answer. And the final item of the survey is to ask participants' general comments on e-learning privacy. These comments directly from learners provide the first hand source to expound the survey outcomes. The Discussion part will look closely into students' written feedback.

Registration Results in e-learning Systems

Three of the surveys were administered in classrooms with teachers in class. Students answered the questionnaires, either by paper- and- pencil or online, then turned them in to the teachers. The existence of teachers could give students a certain kind of pressure so that students may "positively" rank their attitude regarding survey items in which teachers seemed to be involved (Yoshimura, 2001). Thus, in order to confirm the results obtained in the subjective surveys, the objective registration data in e-learning systems is gathered. We first investigated students' registration information on an email magazine project performed in 2012 which aimed at improving students' English reading ability. Among the 109 students who registered at their own volition, 72 (66%) registered with their mobile phone email addresses, and only 32 (34%) registered with their PC email address. This result conformed with what was discovered in previous surveys: mobile phone email address is preferred for e-learning contact.

Moodle's "edit profile" module provides many fields for users to share their private information. See Figure 7 and Figure 8. One author investigated profiles of 152 registers as a Moodle administrator. He discovered that all of the students registered their real names, cities, countries. Regarding email addresses, as they were told that Moodle is mainly a PC-oriented LMS, all of them registered with PC email addresses. Nobody uploaded their personal photos or registered any other private information.

Figure 6. Moodle user profile page (a)

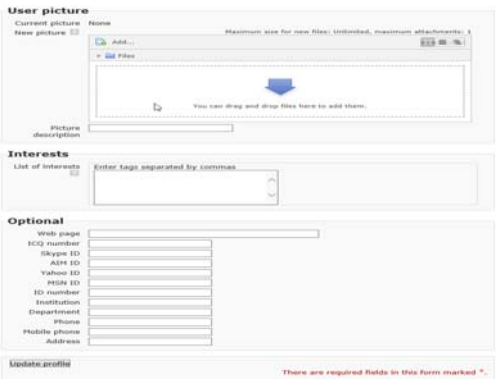

Figure 7. Moodle user profile page (b)

DISCUSSION AND RECOMMENDATIONS

Personal information/privacy protection is an ongoing concern in our information society. The majority of countries in the world have drafted laws to protect its peoples' personal information/privacy from intrusion (OECD Report, 2006). In e-learning, learner concerns over the security of their personal information/privacy heavily influence a learner's willingness to disclose information on themselves in online activities. The more learners are concerned about the security of their online private information, the less they will disclose about themselves (Dinev,Hart & Mullen, 2008). Teachers cannot force or pressure students to provide personal information even for learning purposes. However, when an e-learning teacher better knows the personal information/privacy concerns of their students, they will be better able to decide what information to collect and how it should be used. Teachers can feel more secure collecting information that students are willing to divulge than information learners are hesitant to disseminate. Not only should teachers be familiar with personal

information protection laws, they should also ask what concerns their learners have about e-learning privacy and personal data disclosure.

In Japan the Act on the Protection of Personal Information (Cabinet Office, Government of Japan, 2005) is strictly enforced and widely publicized by mass media. In China there has not been a special private protection law so far, however, privacy protection is formulated within other laws, such as the China Civil Law. In recent years, China has witnessed a breath-taking development in Internet use and now has the most Internet users in the world (CNNIC, 2013). Online privacy has become a daily topic for ordinary Chinese people. Further, in both countries, cyber-crimes are often reported in the news. This makes online privacy concern deeply-rooted among the citizens. However, being aware of the existence of privacy laws does not mean students have read and understand details of the laws or use the laws to protect their cyber interest. This may explain why students in both countries did not rank their knowledge of the law very highly.

Since university students claim to have some degree of knowledge of privacy laws, e-learning teachers too should undoubtedly also read concerning private information/privacy law provisions, and/or attend their institution's training seminars regarding the laws, in order to be equipped with enough legal knowledge to address issues of private data disclosure in e-learning.

Email is still the most commonly used private information for exchanging e-learning content (Levy & Stockwell, 2006). Thus collecting email addresses is very common in an e-learning class. In some e-learning systems, like Moodle, email based registration is a must. The surveys we carried out in Japan and China show that learners in both countries, to a large degree, support email address collection and see it as a necessary, or at least as a "have-to" requirement. For the sake of convenience, the majority of young students prefer to use mobile phone to receive messages from teachers. This is because mobile phone is a carry-on tool and can deal with any urgent task anytime, anywhere. In Japan, almost all mobile phones are internet-connected and every mobile has a unique email address. In China, mobile phone email is not recommended by telecommunication contractors, but SMS is always available at good service. As smart phone has now rapidly become the norm for a progression of university students, Yahoo email, Gmail and Hotmail - which were regarded as PC email accounts - are now also checkable at fingertip.

Nevertheless, one Japanese survey participant commented:

> For class announcement or short, text e-learning materials, I would like to receive on mobile phones, but for a big chunk of materials, please send to my PC email address.

This comment reminds teachers of the fact that the mobile phone is an ideal tool for message communication, but not good for heavy e-learning tasks.

Besides positive attitude toward email collection, students in both countries also understand teachers' online monitoring on their learning progress. One Chinese participant commented:

> I don't feel comfortable when I realize that my leaning is being watched by teachers. However, without "spying" on us, our teacher would not know how well or how poorly we are doing online. Monitoring or even tracing our learning history is acceptable to me as it is for learning purpose.

Students are cautious about their online private information, but are not worried about their private data being leaked to a third party. Two students' comments may backup this confidence:

> I am not worried at all about our private information stored in e-learning systems. First of all, I trust our teachers can safely handle our private information in a secure way. Second, if by any chance, the system is hacked, who want to buy our learning information? Our credit number is not there! (20 year-old first year Chinese boy student)

> I think the security of our e-learning system is tight. And I don't think our teachers will neither "sell" nor "tell" our private information to other people. It is not worth anything. (19 year-old first year Japanese girl student)

Interestingly, either in 2009 or 2012, Chinese students were found to be less forgiving than Japanese students in terms of online monitoring and online-learning security. The reason for this might be due to the factor that in China e-learning is mainly used for degree education (Kang & Song,2007) and is not integrated to general high

education as widely as in Japan. And Internet security is not receiving the same attention as in Japan. Five Chinese students commented in 2009 survey that they have experienced email virus or fraud calls to their mobile phones.

Chinese students and Japanese students differ in preferred time being contacted via mobile phone. Most Chinese students take a nap at noon. Therefore the lunch break is not considered to be a good time for any learning task. They feel relaxed and have most free time in the evening or at night. Evenings or night is the best time to contact student's' mobile phone. While for Japanese students, most of them do not sleep at noon and they tend to place their mobile phones on manner mode whenever they are busy. This explains why the majority of Japanese students think they can be contacted "anytime".

Neither Japanese nor Chinese university students consider age, personal URLs, birthplace, chat-ID (Instant Messenger ID), and email address to be very sensitive; whereas they are very concerned about uploading their personal photos, telephone numbers and physical addresses. The top sensitive private information for Japanese students is personal photos while Chinese students regard mobile phone numbers as the most sensitive. The reason for this difference remains unclear to the authors and needs to be probed from cultural, social and economic points of view.

Students can control the content of their blogs and home pages. Similarly their chat-ID and e-mails can contain as much, or as little, self-revealing content as the student wishes (for example, you can give yourself any "name" you wish in your e-mail). However, students cannot control the information contained in their facial photos, home addresses or telephone numbers (Boston, 2009). One obvious recommendation therefore is that e-learning teachers in Japan and China avoid collecting or encouraging registration of students' facial photos, telephone numbers, and postal addresses. Regardless of the type of private information being collected from students, e-learning teachers should always make clear the reasons they collect private information from students, and always allow the students to refuse. When using private information, teachers must notify the learners. If personal student information is to be provided to a third party: for example, to another e-learning teacher - this requires consent from the individual student/s. Finally, when learners request modification of their personal information, the request has to be met (Japan Personal Information Act, Chapter 4, Article 18).

CONCLUSION

Perceptive data from the surveys coupled with objective data from actual in-use e-learning systems is carefully analyzed in this study. The findings show that learners in both China and Japan have positive attitudes toward private/personal data collection by their teachers if for learning purposes, although they did express concerns about some particular privacy items, such as personal photos, postal addresses and phone numbers. Japanese students are the most cautious with uploading of personal photos, while Chinese students are most reluctant to give out their mobile phone numbers. When having options, students in both countries choose to use mobile phones for message communication unless the message contains a large size of attachment. Although learning messages can be sent to Japanese students' mobile phones at any time; for Chinese students, evenings or night is the most ideal time for them to read and respond. Lunch time is fine for Japanese students, but should be avoided for Chinese students, as most Chinese take a nap after lunch.

There is no statistical significance found to imply that students in the same country perceive e-learning privacy differently from what they did three years previously.

By looking into the registration information in two e-learning systems, the above findings obtained from surveys were confirmed. E-learning privacy concerns prevent students from sharing any further information other than required items even with their teachers and cohorts.

The findings via this research indicate that teachers should collect as little personal information as possible. If really necessary, teachers should take into account that students are more concerned with some aspects of their privacy than others, and therefore teachers should do their best to find out which information their learners are apprehensive about providing. For the e-learning system designers, they should take the findings in this paper into account and design a system that is both effective and privacy risk-free.

RESEARCH LIMIATIONS

The surveys were only conducted in Japan and China. Certainly, Japan and China are important East Asian countries; however another advanced country in e-learning, Korea, is not concluded in this research. This could heavily lower the research reliability as a research from "East Asia". Further, on Japan side, this research only surveyed Japanese learners of English. On China side, this research mainly surveyed students majoring in

English language or art. And analysis on actual e-learning registration was not performed in China as such an investigation needs a system administrator account. The results may display limitations unique to the region and foreign language learners; the same questions posed to learners in Korea and other academic disciplines might yield different responses.

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Appendix - A Survey on personal data disclosure – learner side

1. Which year are you currently in?
   1) first year 2) second year 3) third year 4) fourth year 5) fifth year
   6) sixth year 7) graduate student
   Sex 1)male 2)female
   Age_____

2. Are you familiar with the Protection of Personal Information Act of Japan/ privacy protection laws in China?
   5 4 3 2 1
   Very familiar □ □ □ □ □ Don't know at all

3. What is your attitude toward teachers asking for private information such as your e-mail address?
   5 4 3 2 1
   Strongly support □ □ □ □ □ Strongly oppose
   Reason（ ）

4. Do you prefer to be contacted through your mobile e-mail address/SMS or your PC e-mail address?
   1) Mobile phone e-mail 2) PC e-mail 3) either one is fine
   Reason ( )

5. Considering your own privacy, which part of the day do you prefer course-related material to be sent to your mobile phone?
   1) morning 2) lunch break 3) evening /night 4) any time
   Other time ( )
   Reason ( )

6. In e-learning, some of your online activities, such as your login time-learning history, and learning preferences will be recorded and monitored. What do you think of this?
   Strongly support. 5 4 3 2 1 Strongly oppose.
   □ □ □ □ □
   Reason ( )

7. Are you worried that the personal data stored in your e-leaning program will be stolen or passed on to a third party by your teacher?
   5 4 3 2 1
   Not worried at all □ □ □ □ □ Extremely worried

8. When you register your personal information with an e-learning program, which of the following personal items are you most reluctant to release?
   1) e-mail address 2) mobile phone number 3) birthplace 4) age 5) address 6) photo 7) personal homepage/ blog site 8) chat ID (Instant Messenger ID) 9) other ( )

9. Feel free to write down your comments on the issues regarding e-learning and personal data use and protection.

TABLET PCS AS INSTRUCTIONAL TOOLS IN ENGLISH AS A FOREIGN LANGUAGE EDUCATION

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ABSTRACT
The main goal of the study presented in this paper was to investigate the perceptions of 40 pre-service English as a Foreign Language (EFL) teachers about the effectiveness of Tablet PCs as instructional tools in EFL classes. The study was conducted at a state university in Turkey and the data collection was mainly done via two questionnaires. Quantitative data analysis done on participants' responses revealed that the majority of pre-service ELF teachers regarded Tablet PCs as effective instructional tools in teaching most of the subcomponents of English. The paper discusses the results in detail with implications and suggestions for educators.

INTRODUCTION

Use of Tablet PCs in our daily lives is becoming more common each day; however, use of Tablet PCs as instructional tools in different fields of education is relatively at its infancy stage. This is partly due to the lack of receiving formal training on the part of the teachers and partly due to lack of funding in most institutions. There are also educators who are doubtful about the use of Tablet PCs as they are generally considered as new instructional tools and not much research is done on their effectiveness in education. A limited number of studies done on the effectiveness of Tablet PCs in instruction showed that Tablet PCs are useful in providing a more flexible way of presentation to the instructors with the options of editing and revision instantly (Xiang, et. al., 2009), in freeing students from physical barriers in assessment (Siozos, et.al, 2009), and facilitating collectively discourse capabilities (Alvarez, Brown, and Nussbaum, 2011).

In addition, there are also other benefits of Tablet PCs in education due to their mobile nature. Like any other mobile device, Tablet PCs provide learning on the go and free of time/space. Bulun, Gülnar ve Güran (2004) suggest that with the help of mobile learning, lifelong, peripheral, and adaptive as well as contextual learning is possible. In order to utilize the benefits of Tablet PCs in instruction, there is a need to do more research on the effectiveness of these tools, especially in different areas of discipline.

In this study, English as a Foreign Language (EFL) discipline was selected to be investigated in relation to the effectiveness of Tablet PCs because language learning and language teacher education are multidisciplinary fields of study that need versatile tools of technological instructional tools such as Tablet PCs. Moreover, as a part of FATIH project initiated in Turkey, students in K-12 are expected to receive individual Tablet PCs in a couple of years. However, the majority of the teachers who will be teaching these students do not have formal training courses in their undergraduate programs and go into teaching without any kind of teaching experience with Tablet PCs. As Ertmer, et al. (2012) pointed out "the most cited reason for lack of implementation of new technology is lack of professional development" (p. 425). Thus, if Tablet PCs are to be used as instructional tools in schools, prospective EFL teachers as well as teachers of other disciplines need training in using Tablets and the opportunity to evaluate the effectiveness of Tablet PCs in education.

On the other hand, the number of studies done to investigate the effectiveness of Tablet PCs in education is scarce. The number of studies done to investigate the effectiveness of Tablet PCs in relation to EFL by taking prospective teachers' perceptions into account is almost non-existent. Even though there has been a growing interest in MALL (Mobile Assisted Language Learning) as defined by Wang and Heffernan (2009), the number of studies done in this area is not increasing as fast as the technological developments. To keep up and even surpass and shape the technological developments, educators and researchers need to do more research to understand the nature of the coexistence of technology and pedagogy.

Therefore, the main purpose of the study presented here was to find out the perceptions of 40 volunteer prospective EFL teachers on the effectiveness of the use of Tablet PCs in relation to EFL. The main research question asked in the study was:
What are the perceptions of EFL pre-service teachers' on the effectiveness of the use of Tablet PCs as instructional tools in teaching components of English
a) before they use Tablet PCs in relation to EFL teaching/learning?
b) after before they use Tablet PCs in relation to EFL teaching/learning?

The rest of the paper gives details on the methodology used in the study, the results of the study, and the discussions sections with implications and suggestions for further research for educators, researchers, or other individuals who wish to maximize the use of Tablet PCs as instructional tools especially in the EFL context.

METHODOLOGY

Participants

The participants of the study were 40 prospective EFL teachers who were sophomores in a state university in Turkey. All were enrolled in an EFL B.A. program at a Foreign Language Education Department in which the medium of instruction was English. All participants were given consent forms before the study began and only the volunteer participants took part in the study. Nine out of 40 participants were males whereas the rest (31) were females. The average age of the participants was 20. In addition, all participants were in a methodology course in which they were being trained on how to teach speaking, listening, and vocabulary in English.

Data collection and analysis

The data collection took place in one full academic semester in three phases and mainly via two surveys. Figure 1 below summarizes the data collection process of the study:

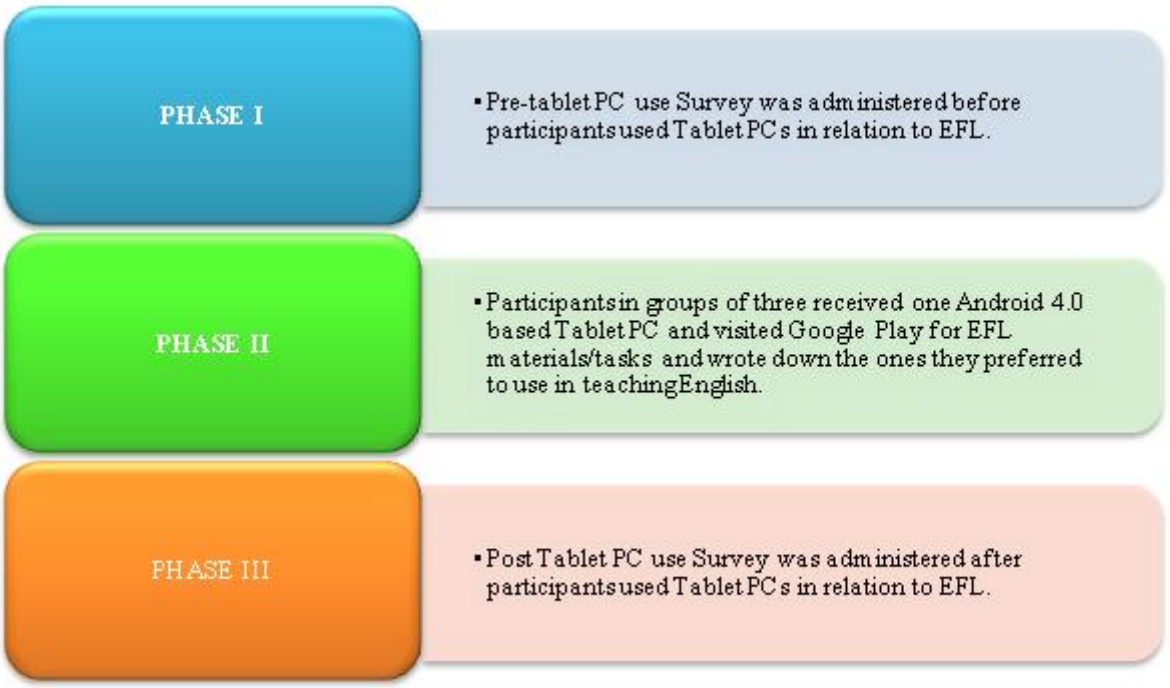

Figure 1. Data collection process

Phase I, Pre-tablet use Survey (Survey A): This survey done at the beginning of the semester included questions to collect data on the participants' perceived basic technological competencies, background in using Tablet PCs, and general attitude toward the use of Tablet PCs in EFL. In addition, the survey included items with four point Likert scale (Strongly Agree, Agree, Disagree, Strongly Disagree) to gather data on the initial perceptions of the participants before they used Tablet PCs in integration with EFL teaching and learning. In these items, participants were asked to evaluate the effectiveness of Tablet PCs in teaching the subcomponents of English language. Total six subcomponents of English were listed to gather data: "Tablet PCs are effective in teaching…

grammar in EFL.
vocabulary in EFL.
listening in EFL.
speaking in EFL.
reading in EFL.
writing in EFL."

Phase II, Tablet PC use in relation to EFL: After the volunteer participants were identified and the pre-tablet use survey was administered, participants were put into groups of three and in pairs. Grouping the participants was done due to the limited number of Tablet PCs. Each group and pair received one Android 4.0 based Tablet PC

with a wireless connection to the Internet. Then, all participants received a three hour technical training session on how to use Tablet PCs and navigate in Google Play. In order to provide participants the experience of using Tablet PCs in relation to EFL, participants were asked to visit Google Play and search for free and open access EFL materials/tasks. At the end of their group work, all groups submitted a list of EFL materials/tasks that they wish to use in teaching English via Tablet PCs.

Post Tablet use Survey (Survey B): After participants had experience in using Tablet PCs in relation to EFL, Post Tablet use Survey was administered. The main aim of carrying out this survey was to gather data on participants' general attitudes toward the use of Tablet PCs in EFL and perceptions on the effectiveness of Tablet PCs in teaching the subcomponents of English after the participants' experience with Tablet PCs. The same set of English components was used to gather data to investigate whether there was a change in participants' attitude and perceptions.

All phases of the data collection process took place in English and in the classroom environment. Data analysis was carried out via quantitative means. Descriptive analysis with frequencies and percentages was done to analyze the responses of the participants in both surveys.

RESULTS

In this section, the results of the study are reported under three main headings. Under the first heading, the results of the data analysis done on the questions asked in the pre-tablet use survey to gather demographic data and participants' perceptions on their technological competencies are given. Under the second one, data analysis results done on the participants' general attitude toward to use of Tablet PCs in EFL are reported. Finally in the third one, the data analysis done to provide the answer to the research question of the study is presented.

Participants' perceived technological competencies

Data analysis done on the participants' responses in the Pre-tablet use Survey (Survey A) on the participants' perceived technological competencies, which is reported in Table 1, revealed that a majority of the participants' (87.5%) believed they had "Intermediate" level of skills as a computer user. In addition, more than half of the participants (60%) believed that they were again at "Intermediate" level in terms of their skills as Internet users. The majority of the participants (70%) were also considered themselves at "Intermediate" level in describing their skills as prospective teachers that can integrate technology into EFL learning.

Table 1: Participants' self-evaluations on their basic technological competencies

		Novice		*Intermediate*		*Advanced*	
	Questions	*f*	%	*f*	%	*f*	%
1	How would you describe your skills as a computer user?	2	5	35	87.5	3	7.5
2	How would you describe your skills as an Internet user?	1	2.5	24	60	15	37.5
3	How would you describe your skills as prospective teacher that can integrate technology into EFL learning?	10	25	28	70	2	5

Participants' perceptions on their own technological competencies in Table 1 illustrated that in general more than half of the participants believed that they had "Intermediate" level skills in general technological competency. On the other hand, the analysis done on the statements regarding the use of Tablet PCs and Android operating systems, which is given in Table 2, showed that the participants had not had much experience with Tablet PCs. For example, none of the participants had had a personal Tablet PC and only 20% of the participants had had experience with using the Android operating system before the Tablet PC experience started.

Table 2: Participants' experiences with Tablet PCs, Android, and touch pad devices

		Yes		*No*	
	Statements	*f*	%	*f*	%
4	I have a personal Tablet PC.	0	0	40	100
5	I use Android operating system.	8	20	32	80
6	I use touch pad devices.	24	60	16	40

The number of participants who had had experience with using touch pad devices was relatively higher (24 out of 40); however, informal interviews that took place after the survey with the participants revealed that the

participants had had the experience in using Android and touch pad screens via their smart cell phones, not Tablet PCs.

Comparison of participants' general attitudes toward Tablet PCs in pre and post Tablet PC activity

When participants were asked to compare their general attitude toward the use of Tablet PCs in relation to EFL, it was seen that participants' attitude had become more positive after they had the experience in using Tablet PCs. Table 3 below shows the results of the data analysis done on the participants' responses to the questions regarding their general attitude toward the use of Tablet PCs in EFL.

Table 3. Comparison of participants' perceived general attitudes toward the use of Tablet PCs before and after Tablet activity.

		Positive		*Neutral*		*Negative*	
	Questions	*f*	%	*f*	%	*f*	%
1	Participants' perceived attitudes toward the use of Tablet PCs in EFL teaching/learning **before** they used Tablet PCs in relation to EFL.	19	47.5	13	32.5	8	20
2	Participants' perceived attitudes toward the use of Tablet PCs in EFL teaching/learning **after** they used Tablet PCs in relation to EFL	31	77.5	7	17.5	2	5

As seen in Table 3 less than half of the participants (47.5%) held positive attitudes toward the Tablet PC use in EFL before they had experience with Tablets. After their experience with Tablet PCs, the percentage of participants who held positive experience increased up to 77.5%. In addition, 20% of participants held negative attitude before they used Tablets; however, this percentage decreased down to 5% (two out of 40 participants) after the use of Tablet PCs in relation to EFL.

Comparison of participants' responses toward the use of Tablet PCs in relation to teaching the subcomponents of EFL before and after Tablet PC experience

In order to find the answer to the research questions of the study, the participants were asked to give their opinions on the effectiveness of the Tablet PCs in teaching the subcomponents of EFL both in Survey A and Survey B. Figure 2 illustrates the data analysis done to compare and contrast the views of the participants' between two surveys.

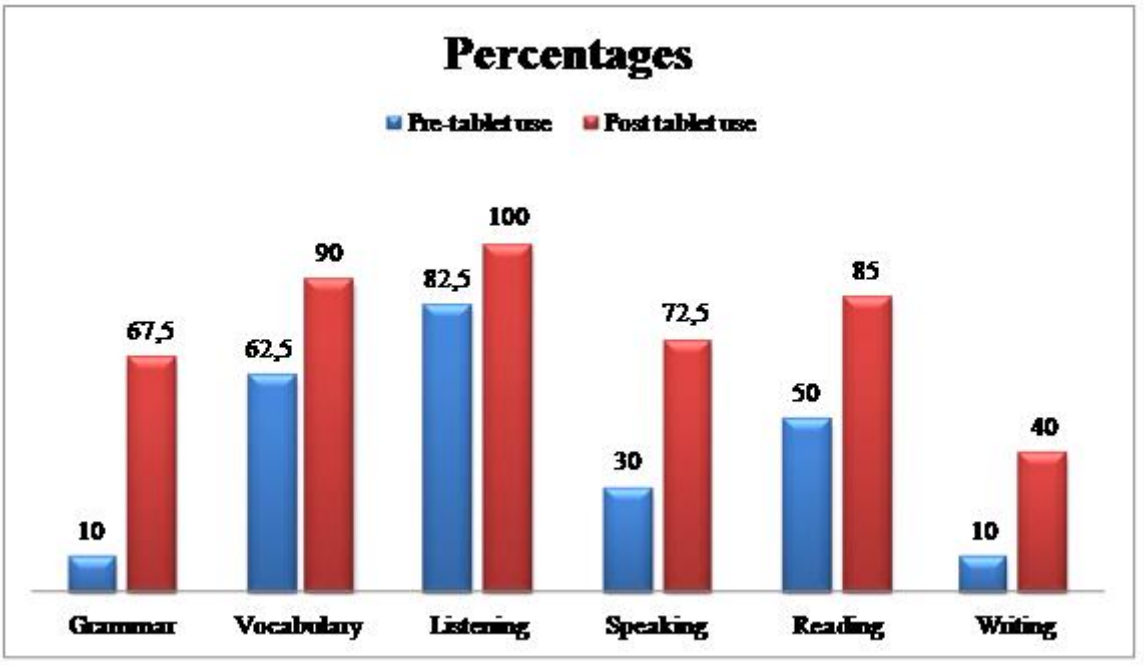

Figure 2. Illustration of the comparison between participants' views on the effectiveness of Tablet PCs in teaching subcomponents of English

As seen in Figure 2 before they had experience with Tablet PCs, in general the participants thought that Tablet PCs were effective in teaching Listening (82.5%), Vocabulary (62.5%), and Reading (50%) more than teaching

Grammar (10%), Speaking (30%), and Writing (10%). This trend also continued in Survey B; however, there was an overall increase in the perceived effectiveness of Tablet PCs in teaching all of the subcomponents of EFL. For example, after participants had the Tablet PCs experience, the perceived effectiveness of Tablets in teaching Grammar increased up to 67.5%.

In addition, effectiveness in relation to teaching Speaking in English increased up to 72.5%. One interesting finding was that all participants after the Tablet PC experience thought that Tablets were effective in teaching the Listening skill in English. The subcomponent of English with the lowest percentage was Writing (40%) in Survey B. In fact, Writing was the only subcomponent of English that received less than half of the participants support in using Tablet PCs to teach with. Nevertheless, it increased from 10% up to 40% after the Tablet PC experience.

DISCUSSION AND CONCLUSIONS

The results of the study have several implications for researchers and educators who wish to use Tablet PCs in relation to teaching EFL. First of all, the results show that prospective teachers can develop more positive attitude toward the use of Tablet PCs in teaching EFL as they gain more experience in using these instructional tools. This finding was in line with Tingerthal's (2011) suggestion that technical problems that teachers face when they start teaching with Tablet PCs become less problematic in time as the instructors get used to using Tablet PCs and it becomes a part of their regular teaching routines. In addition, it is possible that the example tasks and materials of EFL in Google Play provided the prospective teachers a more detailed understanding of the possibilities that Tablet PCs can provide in instruction. Learning by and through examples and sample activities is extremely important for prospective EFL teachers as they have less actual teaching experience in a real classroom. If teacher educators wish to utilize Tablet PCs as instructional tools in EFL, it is essential that prospective teachers are given training and experience in using these devices.

In addition, the results of the study can imply that there should be more tasks, materials, and applications in teaching Writing skills in English via Tablet PCs. Software designers and researchers in the field of Instructional Technology can do more research and projects to develop more writing applications that can be used with an EFL classroom in mind. To do this, software designers, researchers, EFL teacher educators, and prospective as well as in-service teachers can work in collaboration to design more tasks/materials that would meet the needs of EFL learners and maximize the potential of Tablet PCs as instructional tools.

To sum up, in this study it was seen that the participants developed more positive attitude toward the use of Tablet PCs in relation to EFL as they gained experience in using Tablets. This study was carried out in one academic semester and with 40 participants in one BA program at a state university. More research is required across different institutions and different profile of prospective teachers over a longer period of time.

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THE USE OF SOCIAL NETWORK SITES BY PROSPECTIVE PHYSICAL EDUCATION AND SPORTS TEACHERS (GAZI UNIVERSITY SAMPLE)

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ABSTRACT
Social network sites are widely used by many people nowadays for various aims. Many researches have been done to analyze the usage of these sites in many different settings. In the literature the number of the studies investigating the university students' usage social network sites is limited. This research was carried out to determine the social network sites usage of physical education and sports students for social and educational purposes. This research was carried out by using descriptive/survey method. The research was done at the School of Physical Education and Sport of Gazi University in Turkey. The participants of the study were comprised of 167 students who are attending the School of Physical Education and Sports of Gazi University. The data were collected by the researcher and analyzed by using several statistical techniques like t-test, Anova, frequency and percentage with SPSS program. according to the results of the study, most of the students who are attending the School of Physical Education and Sports think that social network sites can be used by university students for educational purposes effectively.
Keywords: Social Network Sites, Physical Education, Internet.

INTRODUCTION

The Internet as a technological innovation has changed our lives in unimaginable ways (Forkosh-Baruch & Hershkovitz, 2010). In Web 1.0 users were passive "consumers" of information and characterized as "the public" without having any contribution or active involvement, whereas with the technological advancement in information technology and telecommunications, in Web 2.0. users are allowed to participate (Eteokleous, Ktoridou, Stavrides, & Michaelidis, 2012). Web 2.0 described as web-based technology that makes easier and enhances communication and sharing among others worldwide, turns one-way communication into a two-way communication and process of information (O'Reilly, 2005; Eteokleous, et al., 2012).

In late 1990's social network was born within Web 2.0 having features of blogging and posting and is described by user-generated content, online identity creation, and relational networking(Tariq, Mehboob, Khan, Ullah, 2012; Ghobadi Pour, 2013). It offers online advanced features for users to find and have friends, and some attractive opportunities for communication and sharing information (Forkosh-Baruch & Hershkovitz, 2010; Tiryakioğlu & Erzurum, 2011) A typical social networking service is based on the maintenance and sharing of users' 'profiles' - online spaces where people can show up themselves to other users through the representation of personal information, interests, photographs, social networks and so on (Selwyn, 2012)

People use social networks for different purposes. Social network sites have been considered as an important tool to share communication and obtaine new information as well as make new friendships. Moreover, social network environments introduces facilities for personal statements, creating interest groups, ensuring cooperation, and sharing information.(Aydogan & Akyuz, 2010, Arquero & Romero-Frías, 2013). With the increasing use of social networking websites, the need for information sharing between people and communication is rising and social networks are providing an informal education (Bicen & Uzunboylu, 2013). When all purposes are evaluated together; having fun, contacting friends and sharing information come to the fore. (Akyıldız & Argan, 2012).

Social networks are that one can make contact with someone who is over a great distance within a few seconds(Miah, Omar, Allison-Golding, 2012). Social networks enhance communication skills, participation as well as social commitment, improve peer support, and ensure realization of education based on collaboration strategies (Gülbahar, Kalelioğlu, & Madran, 2010). Social sharing, online and offline communication, ease of use and usefulness, quick access to information and news, and high interaction independent from location are the charasteristics features most favored by the users of the social network(Gülbahar, 2013) Enabling new opportunities for the presentation of the self, learning, having of a wide circle of relationships are also the advantages of social networks (Livingstone & Brake, 2010)

On the other hand, there are also disadvantages that social networking increases the likelihood of new risks to the self, these centring on loss of privacy, bullying, harmful contacts and cyber bullying (Livingstone & Brake, 2010; Griffith & Liyenage, 2008). Not being in a secure environment and inadequate privacy issues are the issues that are disliked by users (Gülbahar, 2013) The risk of being used of personal information for unethical reasons is also a corcern (Miah et al., 2012).

Although the main focus of student should be education, today's students are emphasizing on such site which can be a complete wastage of time and it has has become an addiction for students, teenagers and even adults. All attention and concentration of the students lead them non educational, unethical and inappropriate actions such as useless chatting, time killing by random searching and not doing their jobs. Moreover, social networks provide a virtual life to the students who cannot even speak in front of anyone could feel freedom in their virtual life (Tariq, et al., 2012).

Social Networks in Education

Social networking sites have been used for a variety of educational purposes and help students in educational settings (Akyıldız & Argan, 2012; Arquero &Romero-Frías, 2013) The "social spaces" available to students can enable a more individualized experience for learning in an online environment and can contribute what is taught in a traditional classroom setting (Griffith & Liyenage, 2008).

Most of the students use social networking sites in conducting group projects and assignments and have been found to be very useful in having group work(Zanamwe, et al., 2013) Students are also enhanced by the amount of information disclosed on a teachers' or academics'SNS and the sharing of information amongst groups can have a positive effect on students (Griffith & Liyenage, 2008)

Social networking sites improve technology excellency, enhance social skills and motivates students communicate in new ways with new people (Zanamwe, Rupere, Kufandirimbwa , 2013). Bicen and Uzunboylu (2013) depicts that "it maintains the team-working skills; helps one's personal development; could increase the students' successes; could be helpful for both teachers and students when used as a supportive material in lessons; allows to share information between colleagues' could make students show more interest in lesson; could make learning more enjoyable; helps teachers and students to know each other better via the profile pages; could increase students' motivation by allowing them to communicate with each other; encourages colleagues to learn more; could increase students' will to learn by sharing extra resources about their homework; helps students to find out what goes on in the world through daily news; enables them to share information about scientific studies.

Social Networks and Physical Education

When physical education is considered, it is believed that web tools can be used by PE (Physical Education) teachers to develop their own performances and to foster students' learning processes (Balcıkanlı, 2012)

Mohnsen (2008) stated that social networks helps, students understand PE-related concepts, introduces students to motor skill techniques, provides simulations and practice experiences, supports self-paced learning and unlimited practice, provides immediate and constructive feedback, and accommodates various learning styles.

Such technologies are likely to help students reconsider the learning process, which ultimately makes them to be aware of their competencies more effectively. At that point, Web 2.0 technologies can be effectively utilized for PE students who receive both theoretical and applied lessons (Balcıkanlı, 2012).

According to Balcıkanlı's research (2012) social networks offer great opportunities for students and teacher to interact with each other in a social manner, it allows students to reach the class content and materials posted very easily online;it encourages students to share their assignments and projects with each other; it offers a platform where students and teacher can discuss the relevant topics and give feedback to each other's work; it enables students to focus on the class materials outside the classroom, which is closely linked to independent learning and it increases students' motivation to do more research about the topics in question.

METHOD

This research was carried out by using descriptive/survey method. Data collection tool was developed by Herguner (2011) and it has four dimensions. In the 1st dimension of the instrument, there are questions about the usage purposes of Social Networking sites and in the 2nd dimension there are items about the usage times of internet and Social Networking sites. In the 3rd dimension, determining the information and thoughts of individuals concerning the reliability and intervention of Social Networking sites to private lives of persons were

aimed. In the 4th dimension personal/demographic information was obtained. Validity and reliability of survey revealed that Cronbach Alpha value was found as 0,901. The instrument was applied to 167 students who were attending Gazi University School of Physical Education and Sports. The data were analyzed by using several statistical methods like mean, percentage and frequency.

Participants

The participants of the study were comprised of 167 students who are attending the School of Physical Education and Sports of Gazi University. The participants were from different departments like physical training and sports teaching, sports administration, coaching and recreation in the School of Physical Education and Sports. Data collection was carried out by researcher. 12 questionnaires were eliminated before the analysis of the data because they were incomplete and wrong.

Data Collection and Analysis

All of the procedures concerning the data collection and analysis were carried out by the researcher himself. The questionnaires were distributed to the students and they filled the questionnaires were filled by the students themselves. Identical information were not stated on the questionnaires with the purpose of being answered the questions objectively.

The data collected was analyzed by SPSS program. Bartlett-Ball test was applied to decide on whether there is the same variance for each variable by calculating factor analysis results made on survey variables and results showed that the data obtained was suitable to factor analysis.

KMO test value of the questionnaire was found in the previous application which is revealed by Herguner (2011) as 0, 859, and because this value is bigger than the value of 0, 5 it was seen that the results of factor analysis was acceptable. Cronbach Alpha reliability parameter was controlled to measure the reliability of factor analysis and this value was found 0, 901. 8 dimensions were determined following the factor analysis results of variables in the usage scale of social networking sites (Herguner, 2011).

T-test and Anova test were used to analyze the qualitative data. Results were evaluated in 95% confidence interval and at the p<0, 05 meaningfulness level.

FINDINGS

The findings of the study are as follows.

Table 1: The Distribution of the purpose of the use of SNS

Aims for using SNS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I have a good time.	9,6	13,8	18,0	45,5	13,2
I guess the results of sports matches.	9,6	10,2	19,2	44,3	16,8
I meet new people.	12,0	16,8	13,2	41,3	16,8
I share my photos and videos with people.	11,4	10,8	13,2	49,1	15,6
I share/discuss developments on the agenda with my friends.	9,0	10,2	12,0	44,3	24,6
I get rid of my loneliness.	22,2	19,2	21,6	28,1	9,0
I can reach my old friends.	10,2	10,8	12,6	41,3	25,1
I can express myself more comfortably.	15,0	14,4	21,6	36,5	12,6
I can have a good time during the day.	11,4	13,2	15,6	42,5	17,4
I can be informed about lot of subjects.	7,2	16,2	21,6	37,7	17,4
I can be informed about technical developments in Physical education and Sports.	6,6	13,2	20,4	39,5	20,4
I enjoy logging on these sites.	9,6	14,4	21,0	43,7	11,4
I can share my feelings and opinions.	9,6	13,2	21,6	43,1	12,6

I think I strengthen my social ties.	12,6	18,6	25,1	34,7	9,0
I feel more peaceful and happier.	12,0	19,2	26,9	30,5	11,4
I can learn what my friends are doing.	7,8	8,4	16,8	51,5	15,6
I keep informed about sports organizations.	9,6	10,2	15,0	45,5	19,8
I am recognized more easily among colleges/students.	9,6	13,2	25,7	38,3	13,2
I can reach funny/interesting photos, videos and notes.	9,0	12,0	15,6	44,3	19,2
I can communicate with prominent people in my field.	12,6	11,4	21,6	39,5	15,0
I can spend my free time.	10,8	10,8	17,4	48,5	12,6
I can be away from the environment that makes me feel bored.	15,6	15,0	19,8	34,1	15,6
I can look at the photos of my friends and see how much they change.	9,6	6,6	13,2	52,1	18,6
I can keep informed about the events on Physical Education and Sports.	9,6	14,4	16,8	44,9	14,4
I improve my culture of Physical Education and Sports.	10,2	14,4	19,2	44,9	11,4
I can share my knowledge and opinions on Physical Education and Sports.	9,0	12,6	22,2	44,3	12,0
I can find solutions to the problems I face in my profession field.	9,0	19,2	18,6	40,1	12,6
I can learn the lives of people prominent in my field.	7,8	17,4	16,8	44,9	13,2
I think I spend my time effectively.	12,6	19,8	25,1	31,7	10,8
I can share my political and social opinions.	11,4	18,6	22,8	35,9	11,4

When we analyze the answers on the distribution of with which aims social networking sites are used, we learn that 52,1 % of the participants agree with the statement "I can look at the photos of my friends and see how much they change.", 51,5 % agree with the statement "I can learn what my friends are doing", 49,1 % agree with the statement "I share my photos and videos with people", and 48,5 % agree with the statement "I can spend my free time". When we analyze the items which students agree less, we can see that, 28,1 % of the participants agree with the statement "I get rid of my loneliness", 30,5 % agree with the statement "I feel more peaceful and happier", and 31,7 % agree with the statement "I think I spend my time effectively". It can be understood from the table that the students in Physical Training and Sports Teaching are frequent users of Social Network Sites. The fact that the statement which is preferred at the highest level is related with friends shows the aim of social networking sites by university students is to realize communication and share among themselves.

Table 2: Gender distribution of the participants

	N	%
Male	59	35,3
Female	108	64,7
Total	167	100

It was determined that 35,3 % of the participants consist of males, and 64,7 % consist of females.

Table 3: The distribution of the place where the participants have lived during most of their lives

Place where they have lived during most of their lives	N	%
Big Cities	125	74,9
City	24	14,4
Town	15	9,0
Small Town	2	1,2
Village	1	,6
Total	167	100

It was determined that 74,9 % of the participants have lived in cities, 14,4 % have lived in cities, 9,0 % have lived in towns, 0,6 % have lived in metropolitans. It can be seen that most of the participants have lived in big

cities. Nowadays, parents are trying to create an environment in which their children can enjoy good conditions, and so they prefer big cities instead of small places.

Table 4: The distribution of with whom the participants live

With whom they live	N	%
Alone	7	4,2
With a Friend	10	6,0
With Family	134	80,2
In a Dormitory	12	7,2
Other	4	2,4
Total	167	100,0

It was determined that 4,2 % of students live alone, 6,0 % of the participants live with their friends, 80,2 % live with their families and 7,2 % live in a dormitory. It is understood that the first choice of university students is to live with their families.

Table 5: The results of ANOVA test on the relationship between the purpose of use of SNS and the place where they have lived

	N	Mean	Sd.	F	P
Big Cities	125	3,16	1,00	0,93	0,448
City	24	2,92	0,88		
Town	15	3,20	0,86		
Small Town	2	4,00	0,00		
Village	1	4,00	.		

There is no statistically meaningful relationship between the aim of using social networking sites and the place where they have lived. In todays world, there is an internet access everywhere, there are no place and time boundaries for logging into these social networking sites.

Table 6. The results of ANOVA test on the relationship between the purpose of use of SNS and with whom they

	N	Mean	Sd.	F	P
Alone	7	3,6	1,0	0,5	0,739
With a Friend	10	3,3	1,1		
With Family	134	3,1	1,0		
In a Dormitory	12	3,0	1,2		
Other	4	3,0	0,8		

There is no statistically meaningful relationship between the aim of using social networking sites and with whom they live. And yet, in average, those who live with their friends use social networking sites more. It can be said that they encourage each other to talk to their mutual friends, to search the things they wonder, or to communicate with their families.

Table 7: The frequency of the information and the thoughts of participants about the intervention of SNS to private lives of persons

Their thoughts about whether social network sites intervene in private lives of persons	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I think social network sites (Facebook, Twitter, and YouTube etc.) are indispensable communication sources of our day.	18,0	14,4	21,0	30,5	16,2
I think social network sites (Facebook, Twitter, and YouTube etc.) are secure sites.	15,6	21,0	34,7	23,4	5,4
I think social network sites (Facebook, Twitter, and YouTube etc.) have more negative effects than positive effects.	16,2	13,8	29,9	26,9	13,2
I think social network sites (Facebook, Twitter, and YouTube etc.) cause intervention of private life of persons.	12,0	10,2	23,4	39,5	15,0
I think social network sites (Facebook, Twitter, and YouTube etc.) keep my personal information, photos, and videos safely.	16,2	18,6	29,9	25,7	9,6
I see no harm to upload photos and videos to social network sites (Facebook, Twitter, YouTube etc.).	13,2	14,4	29,3	33,5	9,6
I think social network sites (Facebook, Twitter, and YouTube etc.) take necessary precautions to protect my photos and videos.	18,0	19,8	32,9	22,2	7,2
I am concerned that unwanted persons and/or the people I don't know can reach my information, photos and displays through social network sites (Facebook, Twitter, YouTube etc.).	10,8	15,6	31,1	34,1	7,8

When the answers of participants about the intervention of Social Networking sites to private life of persons given to the scale concerning information and thoughts of persons are analyzed, participants agreed with the hypothesis that "I think Social Networks (Facebook, Twitter, YouTube etc.) are indispensable source of communication of our day" at the rate of 30,5 %.

It is seen that 23,4% agrees with the hypothesis that "I think Social Networks (Facebook, Twitter, and YouTube etc.) are secure sites" . This result is an indication that the young find social networking sites highly unsecure. 26.9% agreed with the hypothesis that "I think Social Networks (Facebook, Twitter, YouTube etc.) have more negative effects than positive effects" in total. It is seen that 29.9% are undecided. According to this result, although students are users, they are aware of the negative sides of social networking sites.

It is seen that 39,5% agrees with the hypothesis that "I think Social Networks (Facebook, Twitter, YouTube etc.) causes intervention of private life of persons" in total. This result indicates that the young perceive the Social networking sites as the intervention factor to their private life. On the other hand, 18,6% doesn't agree with the hypothesis that "I think Social Networks (Facebook, Twitter, YouTube etc.) keep my personal information, photos and videos safely" in total. It is seen that they confirm their opinions about the unreliability of social networking sites with this result.

33,5% agrees with the hypothesis that "I see no harm to upload photos and videos to Social Networks (Facebook, Twitter, and YouTube etc.)" in total. It is seen that 19,8% doesn't agree with the hypothesis that "I think Social Network (Facebook, Twitter, YouTube etc.) take necessary precaution to protect my photos and videos". It shows that social networking sites are perceived as unsecure by the participants. It is stated that 34,1 % agrees with the hypothesis that ": I am concerned that persons unwanted and/or I don't know can reach my information, photos and displays through Social Networks (Facebook, Twitter, YouTube etc.)" in total.

Table 8: T test results of the relationship between the information and thoughts of individuals and gender in terms of the intervention of SNS to private lives of individuals

	N	Mean	SS	t	P
Male	59	3,5	1,2	1,094	0,276
Female	108	3,3	1,2		

A statistically significant relation was found between information and thoughts of individuals and gender concerning the intervention of social networking sites to private lives of individuals.

Table 9: The distribution of the intended uses of the Internet by participants

Intended uses of the Internet	N	%
Chat	13,0	7,8
Playing Games	19,0	11,4
Research and information	76,0	45,5
Entering SNS(Facebook, Msn,etc)	48,0	28,7
Other	10,0	6,0
Total	167	100

It is seen that intended use of internet of 45.5% of participants is to make research, 28,7 % of participants is to enter SNS, and 11,4 % is for playing games.

Table 10: The frequency of daily Internet use of participants

Frequency of daily internet use	N	%
Less than an hour	37	22,2
1-2 Hours	51	30,5
3-4 Hours	46	27,5
More than 4 Hours	32	19,2
Total	167	100,0

It is determined that 30,5% of participants use internet for 1-2 hours daily, 27,5% uses internet for 3-4 hours daily, 22,2% uses internet for less than an hour daily. It is seen that the majority of participants uses internet for 1-2 hour daily.

Table 11. The distribution of the relationship between the time spent for SNS by participants and time spent on the Internet

Time Spent to SNS	Time Spent on The Internet								Total	
	Less Than an Hour		2-3 Hours		3-4 Hours		More Than 4 Hours			
	N	%	N	%	N	%	N	%	N	%
Less Than an Hour	27	7,5	7	1,94	1	2,77	1	2,77	36	100
1-2 Hours	31	6,08	19	3,73	1	1,96	0	0	51	100
3-4 Hours	11	2,39	12	2,61	20	43,48	3	6,52	46	100
More Than 4 Hours	10	3,03	13	3,94	7	21,21	3	9,09	33	100
Total	79	4,76	51	3,07	29	17,47	7	4,22	166	100

It is determined that there is a statistically meaningful relation between the time spent to social Networks by participants and time spent in internet ($p<0,001$).

DISCUSSION AND RESULTS

In modern world, the social network sites are used by most people very frequently. Especially young people are using the social network sites very frequently and actively in their social life. On the other hand, with the spread of social network sites usage into the lives of people, educational usage of these sites are come into discussion very much. Many researches have been done to analyze the usage of these sites in primary and secondary schools. But the need for studying and investigating the university students' usage social network sites is apparent.

Concerning these needs, this research was carried out to determine the social network sites usage of physical education and sports students for social and educational purposes. The research was done at the School of Physical Education and Sport of Gazi University in Turkey. The data were collected by the researcher and analyzed by using several statistical techniques with SPSS program.

The gender of the participants was not found to effect the reason of using social network sites. In addition, any significant relationship wasn't found between the usage reasons of social network sites and the variables of the place where they live and with whom they live. The results of the study also revealed that the university students have almost similar habits concerning the usage of social network sites regardless of the gender, place and income.

Most of the university students in the School of Physical Education and Sports are not confident about the reliability of the social network sites and they do not trust them. Most of them think that they can cause intervention to their private life, and their negative effects are more than positive effects. On the other hand, most of them think that these sites can be used for educational purposes if they are used truly and effectively.

In addition, most of the students who are attending the School of Physical Education and Sports think that social network sites can be used by physical education and sports students for educational purposes effectively. These sites can provide a good communication basis for achieving their educational aims.

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USE OF INTERNET FOR ACADEMIC PURPOSES AMONG STUDENTS IN MALAYSIAN INSTITUTIONS OF HIGHER EDUCATION

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ABSTRACT
Students in institutions of higher learning should take advantage of information available on the Internet in their coursework. The Internet is also utilised for social and other non-academic functions. Hence, it is desirable, for students to strike a balance in the time spent online for academic and non-academic purposes. In this study, the durations spent on the Internet for academic and non-academic purposes were investigated based on a survey on 1675 students randomly selected from five different fields of study, viz. social sciences, sciences, engineering, agriculture and computer sciences. On average, the participants accessed the Internet 4.48 hours per day. There were also significant differences in the time spent using the Internet among students in different fields of study, with computer science students spending more time online (5.61 hours per day) than the others. In terms of Internet use for academic purposes, students in social sciences, agriculture and computer sciences scored the highest. In an analysis involving all the students in this study, the total time on the Internet was found to be weakly correlated with the time spent online specifically for academic purposes. For social science students, a low but significant positive correlation existed between the overall time spent online and the time spent on the Internet for academic research. In a similar analysis carried out for science students, a negative low correlation was observed. In the fields of agriculture, engineering and computer sciences, however, no correlation was found between Internet access duration and the use of the Internet for academic purposes. The very low correlations encountered above, even though statistically significant, showed that students who spent more time on the Internet did not make much greater use of it for academic purposes as compared with students who used the Internet less.
Keywords: Internet, use of Internet for academic purposes, time spent on the Internet

INTRODUCTION

The number of Internet users is growing explosively worldwide, with 44.8% Internet users coming from Asia alone (Internet Usage, 2012). In Malaysia, Internet users have increased very rapidly too, from 3,700,000 in 2000 to 17,723,000 in 2010, the latter figure representing 61.7% of the country's population (International Telecommunication Union, 2010). This is a reflection of the current digital era, with the Internet being integrated into our everyday lives. A recent Nielsen analysis revealed that 1, 321 Malaysian surveyed Internet users spent an average of nearly 20 hours online each week (The Malaysian Insider, 2011). More than half of the respondents (53%) accessed the Internet daily while another 35% accessed it several times per week. Six percent of the respondents accessed the Internet once per week and 5% went online once or twice per month (The Nielsen Company, 2011). Based on this report, it can be assumed that Malaysia has one of the highest Internet usages in the South East Asian region. The Malaysian Communications and Multimedia Commission (2010) reported that for the year 2009, 19.2% of Internet home users in Malaysia were between 15 and 19 years old. Those between 20 and 24 years of age made up 14.2% of users.

Table 1: Percent share of household users according to age

Age category	2005	2006	2008	2009
Below 15	6.5	7.3	6.8	8.1
15-19	18.6	18.7	17.9	19.2
20-24	17.2	16.3	15.7	14.2
25-29	12.5	11.3	11.9	12.9
30-34	12.2	12.3	11.7	11.4

35-39	9.9	10.4	11.2	9.5
40-44	9.6	10.6	9.3	9.4
45-49	5.1	6.1	6.1	5.1
50 and above	8.4	7.1	9.4	10.2

(Malaysian Communications and Multimedia Commission (2010, p. 10)

These statistics reveal that most Internet users in Malaysia were aged between 15 -34 years; thus this age group encompasses Malaysian higher education students who are normally of ages between 19 and 34 years. Besides the library, the Internet is an important source for information for learning and research. The Internet allows students to broaden their academic experience, access important information and communicate with others within the academic community (Tella, 2007). This has a significant impact on learning, especially for students in higher learning institutions (Edmunds, Thorpe & Conole, 2010).

Despite the many obvious advantages of the Internet to students, the amount of time spent by some higher education students online might be cause for concern. Students who have difficulty controlling their time spent online may suffer from Internet Addiction, resulting in their studies being adversely affected (Young, 1998; Chen & Peng, 2008, Cao & Su, 2007). Much research has been conducted to examine the time spent by students accessing Internet. For example, Yu (2001) found that, on average, university students spent 164 minutes per day on the Internet. Robinson (2005) found that 47% of African-American college students spent an average of two hours per day online while a small percentage of the students spent 5 – 6 hours. In a research involving students from nine different faculties in a Turkish university, Toprackci (2007) found that 15.4% accessed the Internet more than 3 hours per day, while 62.9% accessed the Internet between 1 to 3 hours per day. A study by Guan, Mohammed Isa, Hashim, Kumar Pilai and Harbajan Singh (2012), based on a sample of 162 medical students in Malaysia, revealed that the average duration of time spent by these students on the Internet was 13.31 hours. In Nigeria, the findings of Awolleye and Siyanbola (2006) indicated that, on average, university students would acces the Internet one hour per week. Tella (2007) reported that a majority of students from a Botswana university accessed the Internet 1-5 hours per week.

There are also comparative studies on the time spent online by students from different fields of study at the university. An earlier study by Odell, Korgen, Schumacher and Delucchi (2000) showed that science students accessed the Internet on an average of 8.5 hours per week, as compared with 4.6 hour per week for social science students. Anderson (2001) divided students according to various groups, such as physical science students (majoring in chemistry, computer science and engineering), students taking a combination of arts and life sciences (majoring in biology, criminal law and psychology) or liberal arts students (majoring in business, English and history). On average, the students accessed the Internet 100 minutes per day, but physical science students spent more time on the Internet as compared with students from the other two groups. A similar study conducted by Sam, Othman and Nordin (2005) on Universiti Malaysia Sarawak undergraduate students found that they used the Internet 9.2 hours per week on average. Students from the Faculty of Computer Science and Information Technology and the Faculty of Applied and Creative Arts were found to be online longer than those from the other faculties (Faculty of Resource Sciences and Technology, Faculty of Engineering, Faculty of Social Sciences, Faculty of Economic and Business, Centre for Language Studies, Faculty of Cognitive Sciences and Human Development). This shows that science students, including those taking engineering and computer science, were online for a longer period compared to students in social sciences and other fields.

Advances in computer technology have enabled the Internet to serve as a platform not merely to seek information, but also to exchange ideas and knowledge with other users, and obtain expert opinions via email, teleconferencing, chatting and other avenues. Nevertheless, the advent of social network sites such as Facebook, Twitter, Linkedin and others that include chatting and online games have changed the perception on Internet use from one that is associated with learning to that of a socializing facility. Such website applications have resulted in the Internet being used for both academic and non-academic activities.

Several studies have been conducted to identify the use of Internet among youth and students in institutions of higher education. For example, a study by Chan and Fang (2007) on young people in Hong Kong found that the Internet was used for different purposes such as for making friends, shopping, listening to music, having fun, completing homework, and searching for information on further education. Aslanidou and Menexes (2008) who collected samples from 418 high school students in four Greek cities found that Internet access remained at a very low level and was insufficiently used for academic purposes. In a research conducted on 883 school students in Lebanon (Hawi, 2012), 84.2% students used the Internet for communication and email, 65.7% for information search and for research, and 51.8% for entertainment such as online games and music.

Tadasad, Maheswarappa and Alur (2003), who carried out studies at the PDA College of Engineering, Gulbarga, observed that Internet use among students in several engineering fields was confined to general or recreational purposes such as receiving and sending emails, games and entertainment. Rüzgar (2005) surveyed 744 students at Marmara University in Istanbul and found 52% of the respondents spent 6 to 20 hours a week surfing the Internet. The majority of them used the Internet for e-mail services. A research conducted by Omotayo (2006) among 664 undergraduate students at the Obafemi Awolowo University, Nigeria, indicated that 97.1% of the respondents used the Internet for e-mail and 53.9% for academic information. Toprackci's (2007) finding showed that 32% of the higher education students went online for various reasons such as chatting, reading news (41.7%), courses related activities (49.1%), e-mail (59.2%) and playing games (29.5%). Findings from Shen and Shakir (2009) in one public and one private university in United Arab Emirates showed that 86% of the respondents accessed on the Internet daily for the following purposes: to seek information (24%), e-mail (15%), chatting (13.6%), entertainment (13.4%) and online discussions (6.84%). Only 4.95% stated that they used Internet for academic purposes. Findings from Ritter and Lemke (2000) indicated that 89% of the students utilized the various media and facilities available on the Internet for study purposes.

In Malaysia, Noor Ismawati (2003) reported that students in Universiti Malaya used the Internet for communication, online purchasing, assignments, personal activities and searching academic resources. She also found that students used the Internet more for social and entertainment purposes than for academic activities. A similar study by Sam, Othman and Nordin (2005) reported that the Internet was used for e-mail (98.6%), research (95.9%), entertainment (85.1%) and for gathering product and service information (82.4%). Other non-academic Internet use included the downloading of software and games (66.2%), assessing newsgroups (56.8%) and chatting (50%). On average, the students spent 9.2 hours per week on the Internet. Balakrishnan (2010), in a study of 92 undergraduate students in a Malaysia university revealed that even though the majority of the students used the Internet to find books in the library, 32.6% reported that they never used the Internet to search for books. Students preferred to use search engines such as Yahoo, Google and others to supplement materials provided by the University library, such as Proquest, university E-Learning resources, university web resources and university library publications.

Previous studies have also shown that students (especially those in institutions of higher learning) used the Internet for different purposes, *viz.* academic research, online socializing and entertainment. The time spent using the Internet also differed in each study. In this connection, studies on the time spent by students browsing the Internet should be conducted frequently since the technology is continually changing. More and more applications via the Internet have been developed. The latest trend shows social and entertainment websites to be gaining popularity, with the number of users subscribing to such websites increasing every day. Websites could influence how students use the Internet in future, and how learning styles change.

RESEARCH OBJECTIVES

The purposes of this study were to identify:

a. The time spent on the Internet among students in institutions of higher education
b. The differences in the time spent on the Internet among students from different fields of study in institutions of higher education
c. The time spent on the Internet for academic purposes among students in institutions of higher education
d. The differences in Internet use for academic purposes among students from different fields of study in institutions of higher education
e. The relationship between the time spent on the Internet and the extent of Internet use for academic purposes among students in institutions of higher education

RESEARCH METHODOLOGY

This survey study was conducted in a Malaysian university. The study population comprised students from five fields of study in a Malaysian university, namely social sciences, sciences, engineering, agriculture and computer science. A stratified random sampling was implemented with the aim of identifying differences that might exist between the different fields of study. This approach also ensured that the samples selected were representative of each subject field (Salkind, 2005). From a total of 1675 respondents, 388 respondents were from the social sciences, 393 from the sciences, 331 from engineering, 325 from agriculture and 237 from computer science. Respondents was those who volunteered and confidential. The questionnaires were distributed during week nine to twelve in the university calendar. First of all, the researchers will look into the academic time table to identify which class consists of targeting participants to make sure we get the minimum number of respondents. The second steps is to seek permission form the lecturer to distribute questionnaires to the respondents at the end of the lecture.

For the purpose of the study, a questionnaire was prepared for a survey to obtain information on the use of the Internet for academic purposes as well as the overall time spent on the Internet by students in institutions of higher education. This questionnaire was administered to participants using print-based survey. The instrument for the study was a questionnaire consisting of two parts. Part A gathered demographic information of the respondent. To measure the use of the Internet for academic purposes, we developed 11 items.This instrument was based on a 5-point Likert scale, with the highest score (5) representing a positive attitude (strongly agree) and the lowest score (1) denoting a negative attitude (strongly disagree). Items used for this part will measure how the respondents use Internet to seek information for their academic activities. Besides that, respondent also will give their opinion how they use emails, forum and library website when log in to Internet.

A pilot study was conducted on 66 students in the same university to measure the reliabilty of the instrument in section B. The reliability of the instrument to measure the Internet usage for academic purposes are 0.860, was deemed acceptable for the actual study.

FINDINGS

In institutions of higher learning, time management is very important since the duration of study per semester is short (14 weeks). Students need to attend lectures and to participate in other academic activities. Besides that, they are also involved in college activities and other pursuits. Accordingly, students who access Internet excessively could face problems such as absenteeism due to tiredness, non-participation in sports, failure to complete assignments and other shortcomings that could affect their academic performance.

The first objective of the study was to determine the time spent on the Internet by students in institutions of higher learning. In this study, the Internet access time was measured based on the number of hours students spent online daily (Table 2).

Table 2: Demographic Information

		N	%
Gender	Male	782	46.7
	Female	893	53.3
Respondents	Computer Science	237	14.1
	Social Sciences	388	23.2
	Sciences	394	23.5
	Engineering	331	19.8
	Agriculture	325	19.4
		Mean (hours)	SD
Internet Access	Computer Science	5.61	3.38
	Social Sciences	4.54	2.83
	Sciences	3.87	2.73
	Engineering	4.92	3.31
	Agriculture	3.85	3.10

The overall mean for time spent using the Internet was 4.48 hours per day (SD= 3.11). Comparing the fields of study, computer science students spent the most time browsing the Internet, spending 5.61 hours per day. This was followed by engineering students (4.92 hours per day) and social science students (4.54 hours per day). Respondents studying agriculture spent the least time on the Internet time (3.85 hours per day). An analysis of variance (ANOVA) was conducted to evaluate these differences statistically (Table 3).

Table 3 : Analysis of variance (ANOVA) on the time spent using the Internet

	Sum of Squares	df	Mean Square	F	Significance
Between groups	641.12	4	160.28	17.257	.000
within groups	15501.65	1669	9.29		
Total	16142.77	1673			

Table 3 shows a significant difference among the overall means for the duration on the Internet for students from different subject fields [F(4,1669) = 17.26, p= .000]. The Tukey Post-Hoc Test was used to identify significant differences between pairs of means (Table 4).

Table 4: Tukey Post-Hoc Test on the time spent using the Internet

field (i)	field (J)	Significance
Social Science (M=4.54)	Sciences (M=3.87)	0.020
	Agriculture (M=3.85)	0.024
	Computer Sciences (M=5.61)	0.001
Science (M=3.87)	Engineering (M=4.92)	0.000
	Computer Sciences (M=5.61)	0.000
Engineering (M=4.92)	Agriculture (M=3.85)	0.000
Agriculture (M=3.85)	Computer Sciences (M=5.61)	0.000

Table 4 indicates that there were significant differences in the time spent on the Internet between students of computer science (M=5.61) and students of the social sciences (M = 4.54), science (M = 3.87) and agriculture (M=3.85). Besides that, engineering students were also online signifcantly longer than students in the sciences (M=3.87) and agriculture (M= 3.85). Finally, social science students also accessed the Internet signifcantly longer than students in the science (M=3.87) and agriculture (M= 3.85). This analysis showed that in terms of the time spent browsing the Internet by students, there was significant variations accoding to the area of study the students were registered in.

This study was also examined whether the time spent on the Internet had been for the purpose of academic research. Eleven items created by the researcher were used to determine this.

Overall mean duration in Internet use for academic purposes was 3.64 hours (SD = .645). Students in social sciences, agriculture and computer science attained the highest means, while those in the sciences used the Internet least for academic purposes (Table 5).

Table 5: Overall mean Internet usage for academic purposes

	No of respondents	Mean (hours)	Standard Deviation
Social sciences	388	3.68	0.62
Sciences	393	3.52	0.66
Engineering	331	3.64	0.65
Agriculture	325	3.68	0.64
Computer Science	237	3.68	0.64
Overall mean	1675	3.64	0.65

The mean and standard deviation for the 11 items to measure the use of the Internet for academic purposes are as shown in Table 6. The highest mean is related to the use of the Internet to seek information for learning activities (Mean = 4.18, SD = .85). Students in agriculture (Mean =4.34, SD = .73) scored the highest for this item, followed by social science students (Mean = 4.23, SP= .75) and science students (Mean = 4.20, SD = .88). The second highest mean for Internet use for searching for materials to complete assignments (Mean = 4.17, SP = .83). Students in agriculture (Mean = 4.31; SD = .76) achieved higher mean scores as compared to the social science students (Mean = 4.23; SD= .78) and science students (Mean = 4.22, SD = .82). The item relating to the usage of e-mail to communicate with the lecturers received the lowest score (Mean = 3.27, SD = 1.16). Analysis by field of study showed that students in computer sciences used e-mail to communicate with their lecturers more often (Mean =3.53, SD =1.05), followed by engineering students (Mean = 3.55, SD = 1.12). Science students did not seem to use the e-mail so much for this purpose (Mean = 2.93, SD = 1.22).

Table 6: Internet use for academic purposes based on fields of study

	Social Science		Science		Engineering		Agriculture		Computer science		Overall mean	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
I seek information from the Internet for learning activities	4.23	.75	4.20	.88	4.02	1.01	4.34	.73	4.08	.79	4.18	.85
I search for materials from the Internet to complete my assignment	4.23	.78	4.22	.82	3.98	.97	4.31	.76	4.05	.78	4.17	.83
I inform my friends concerning useful websites related with the courses taken.	3.71	1.03	3.55	1.01	3.60	1.00	3.67	1.01	3.62	.90	3.63	1.00
I put bookmarks to websites related to my course of study so that I could access them easily in future.	3.59	1.13	3.14	1.16	3.62	1.08	3.51	1.14	3.70	1.00	3.49	1.13
I use email to communicate with my lecturers.	3.28	1.11	2.93	1.22	3.55	1.12	3.21	1.13	3.53	1.05	3.27	1.16
I exchange e-mails with my colleagues to discuss matters related with my academic work.	3.35	1.07	3.16	1.17	3.43	1.04	3.29	1.09	3.57	.97	3.34	1.09
I use the Internet as the main source of information for my studies.	4.11	.78	4.09	.84	3.94	.91	4.18	.78	3.87	.88	4.05	.84
I frequently use the Learning Management System portal (Putera LMS) as part of my learning activity.	3.47	1.08	3.59	1.10	3.58	1.16	3.52	1.06	3.41	1.21	3.52	1.12
I seek the latest information online to enhance my knowledge related to the courses taken in the university.	3.73	.97	3.60	1.03	3.69	1.01	3.77	.96	3.75	.97	3.70	.99
I use forums to exchange opinions on academic matters with my friends.	3.35	1.11	3.12	1.12	3.31	1.03	3.27	1.06	3.40	1.07	3.28	1.08
I access the library website to search for academic books.	3.41	1.11	3.15	1.24	3.41	1.10	3.46	1.21	3.50	1.11	3.37	1.17

M=mean; SD= standard deviation

A one-way ANOVA was used to analyze the differences on the use of Internet for academic purposes based on the field of study (Table 7). The results showed significant differences among students in the different fields of study [F(4,1674) = 4.29, p = .002].

Table 7: One-Way ANOVA on Internet use for academic purposes among students in different fields of study

	Sum of Squares	Df	Mean Square	F	Sig
Between groups	7.08	4	1.769	4.291	.002
within groups	688.60	1670	.412		
Total	695.68	1674			

The Tukey Post-Hoc Test was conducted to identify student groups which differed significantly in their use of Internet for academic purposes (Table 8)

Table 8: Tukey Post-Hoc Test on Internet use for academic purposes among students in different fields of study

Field (i)	Field (i)	Significance
Science (Mean =3.52)	Social science (Mean =3.68)	0.006
	Agriculture (Mean=3.68)	0.007
	Computer science (Mean = 3.68)	0.025

Table 9 indicates that students in the social sciences [Mean =3.68, SD = 0.62], agriculture [Mean = 3.68, SD = 0.64] and computer sciences [Mean = 3.68, SD = 0.64] spent significantly more time using the Internet for academic purposes as compared to science students [Mean = 3.52, SD = 0.66]

To explore the relationship between the duration of time spent and the use of Internet for academic activities, the Pearson correlation was performed using data from each field of study (Table 9). Overall, the analysis showed that there was a significant difference in the overall duration spent on the Internet and the use of Internet for academic purposes (r= .056, p = 0.05). A comparison by each field of study indicated that there was a significant difference between these two variables for social science students (r = .194**, p = 0.01). For science students, the analysis showed a negative significant correlation between the variables (r = -0.105*, p = 0.05). However, for students in agriculture, engineering and computer science, there was no correlation between time spent using Internet and the use of Internet for academic purposes.

Table 9: Relationships between the time spent using the Internet and the use of the Internet for academic purposes

	Social Sciences	Sciences	Agriculture	Engineering	Computer Science	Overall
Internet time	.194**	-.105*	.001	.043	.124	.056*
Strength of relationship according to Connolly and Sluckin (1971)	Low Positive Correlation	Low negative Correlation	No correlation	No correlation	No correlation	Low Positive Correlation

* significant at 0.05;
** significant at 0.01

DISCUSSION

The Internet is widely used by students in institutions of higher education to seek relevant information and materials to complete their assignments or projects. Besides that, most libraries in universities and colleges also subscribe to online journal databases, online books and other academic resources for their students' usage. Clearly, the Internet plays a vital role in the lives of students. Nevertheless, the amount time spent online should be utilized productively. The results of this study showed that students accessed the Internet for 4.48 hours per day on average. Students in the fields of computer science, engineering and social sciences spent the longest time on Internet, as compared with students in the sciences and agriculture. These durations were not far from the results of the Nielsen survey that found Malaysian Internet users spending nearly 20 hours online per week. 4.48 hours per day = 31.4 hours per week, which is one and a half times the Nielsen figure of 20 h. However,

previous studies have shown students spending much less time on the Internet. For example, the study by Yu (2001) found that students spent an average of 2 hour 44 minutes per day on the Internet. Perhaps this is because the study was done in 2001, more than a decade ago when Internet access was not so readily available. Nowadays even smart phones allow Internet access. The same argument may also hold for the following studies. The time spent online from other studies were: Robinson (2005) (2 hours per day), Tropackci (2007) (1 – 3 hours per day), Guan et al. (2012) (13.3 hours per week), Sam, Othman and Nordin [2005) (9.2 hours per week), Ruzgar (2005) (6 – 20 hours per week) and Awolleye and Siyanbola (2006) (1 hour per week). This indicates that students in this study spent considerably more time browsing the Internet as compared with the time spent by students in a number of previous studies.

A previous investigation by Odell et al. (2000) and Anderson (2001) also showed that Internet access time by students also differed according to the field of study. This finding indicated that students in computer science seemed to browse the Internet longer as compared with other students possibly because of the nature of their course which required frequent use of the computer. (For example, they might need to search for computer source codes for their programming work.) Meanwhile, engineering students spent more time on the Internet compared with science and agriculture students. These findings are in line with the results of Sam, Othman and Nordin [2005) who also noted that Malaysian computer science students tended to f longer compared with students of other academic disciplines.

There are various reasons for using the Internet. For example, findings by Chan and Fang (2007), Hawi (2012), Toprackci (2007) showed that students used the Internet both for academic and non-academic purposes. Findings by Aslanidou and Menexes (2008), Tadsad, Maheswarappa and Alur (2003), Shen and Shakir (2009) suggested that use of the Internet among students was more towards non-academic purposes. However, other findings by Omotayo (2006), Ritter and Lemke (2000), Sam, Othman and Nordin (2005) showed the opposite, i.e. the main use of the Internet among students was related to their studies. In the present investigation, the use of Internet for academic purposes was at a moderate level, although social science and agriculture students used the Internet for academic purposes significantly more than students from other fields. Correlation analyses showed a low but positive significant relationship between the time spent by the students and the use of Internet for academic purposes. When the analyses were broken down according to academic discipline, however, only social science students showed such a significant positive correlation whereas no correlation was observed when data for agriculture, engineering and computer sciences students were used. For science students, a significant but negative low correlation between the two variables was found. The very low correlations encountered above, even though statistically significant, implied that students who spent more time accessing the Internet did not make much greater use of it for academic purposes as compared with students who used the Internet less frequently.

CONCLUSION

Research related to Internet use need to be an ongoing endeavor because computer technology advances rapidly and usage habits change accordingly. A myriad of Internet applications have been developed in recent years for different purposes. Applications that are developed for non-academic purposes are more inclined towards socialization and entertainment. Higher education students in different fields of study need to be aware of this so that the amount time spent browsing Internet can be utilized wisely and profitably. This study indicates that there is a difference between the time a student spends on the Internet and the use of Internet for academic activity according to his or her field of study. For example, computer science and engineering students seemed to spend the longest time spent browsing Internet but the correlation analysis indicated that there is no correlation between the amounts of time spent using the Internet and the use of Internet for academic purposes. Hence, whether university students really utilize the Internet purposefully for academic pursuits, or otherwise, is a matter of some concern. A substantial portion of students' time spent surfing the Internet should be dedicated towards the searching of materials related to their studies. Besides that, the Internet should be a medium for students to communicate with their lecturers and friends. The need to access Internet for academic purposes is important in view of the research findings by Cheung and Huang (2005) that link Internet use in the university to better academic performance. Tella (1997), Comunale, Sexton and Voss (2002), Kuh and Hu (2001), Asdaque, Nasir Khan and Abbas Rizvi (2010) and Ogedebe (2012) have also found evidences showing that that accessing the Internet, especially for academic research, contributes significantly to higher academic performance.

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