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A Suggested Technological Approach to Develop Teaching Practice in Egyptian Faculties of Education

Madiha Hassan Mohamed Abd EL-Rahman, Beni Suif Univesrity, Egypt

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Introduction

Teaching practice is the principal course in faculty of education to help student master teaching skills. During teaching practice period, the students practice the actual teaching process in the schools. For that teaching practice can be considered as a pre-service teacher training. There are many attempts to improve or develop it such as:

Integrating the elements of lesson study in pre- service mathematics teacher education. (Elipane, L.E.,2012)

- Using blended learning and on-line learning in pre-service mathematics teacher training.(Arzarello,F. and others, 2012)

But this paper tries to put a suggested technological approach to develop teaching practice in Egyptian faculties of education.

The reality of teaching practice in Egypt:

The teaching practice in Egypt can be described as the following:

1. **The time of teaching practice**:

Each student in faculty of education does teaching practice in the third and fourth grads. In each year, the teaching practice can be divided into two periods:

- Separate teaching practice:

In this period, the students go to school one day per week and spend four hours in it. During the first and the second weeks the students observe some teachers in the school; to learn from them; while in the following weeks, the students practice teaching in some classes and get much educational and scientific guidance from the supervisors.

- Continuous teaching practice:

The students spend two complete weeks in the school at the end of the teaching practice period. During this period; the student must be evaluated and given the teaching practice score.

2. **Supervision of the teaching practice:**

There are three supervisors who extend the help to students during the teaching practice period. Those supervisors are as following:

- The faculty member in curriculum department who is responsible for one school or more. Each school includes some student teacher groups.
- The inspector in the ministry of education who is responsible for one group of students.
- The school principal who is responsible for all activities of the students outside the classroom; and that means he/she gives the students an administrative assessment.

3. **The score of teaching practice:**

The score of teaching practice is hundred points distributed as following:

- 40 points given by the faculty member in curriculum department.
- 40 points given by the ministry of education inspector.
- 20 points given by the school principal.

The Problem:

The teaching practice process in Egypt undergoes some challenges such as:

- The number of students increases yearly.
- The number of professors in faculty of education is limited.
- The number of teaching practice schools is big (one school or more for each professor); and each school has five to six groups; and each group has eight to ten students.
- There are many teaching practice schools which are very far from the faculty of education; and consequently professors face challenges reaching them.

All these challenges hinder the professors to make an optimal follow up to the students during teaching practice period. For that, this paper tries to put a suggested approach depending largely on technology to help the professor in faculty of education to make an optimal follow up for the students.

The suggested technological approach:

These challenges can be handled if we use a new technological approach. This approach has numerous phases:

- **Preparation phase:**

During this phase; the students master some of the prerequisite technological skills during their study for educational technology course in second grade. Cooperation must occur between the following professors:

- The professor of educational technology course must teach the following topics to students:

  - Movie maker program.
  - Skills to use mobile camera to make movies.
  - Movie montage skills.

- The professor of teaching methods must train his students in teaching skills through the micro teaching course.

- **Observation phase.**

The students must observe some teachers in the classroom during the first two weeks in teaching practice period**.** During this period; the students can observe some good models for teaching process.

- **Pre-assessment phase.**

During this phase, the level of each student in teaching practice must be measured by making one movie for his/ her teaching in any class at the beginning of teaching practice by using a mobile camera.

This movie is regarded a pre assessment process for the performance of student in the beginning of teaching practice. The professor can watch this movie in any suitable time for him/ her.

- **Practice phase.**

The students teach one day per week in schools during the academic year. There is an urgent need for making a connection between teaching practice and micro teaching course as following:

  - The student studies one teaching skill in micro teaching course per week.
  - He/ she must apply this skill in the same week of teaching practice and make one movie for his/her performance by using a mobile camera.

    - This skill must be evaluated by student him self, his peers and his inspector before and after watching his/her movie; in order to discover his/her mistakes.
    - The professor of teaching practice evaluates this movie by using observation card: he /she determines student's mistakes and gives him/her an ample chance to modify those mistakes in the following weeks.
    - Before the end of the separate teaching practice period, each student must make some movies which can express his/her performance in each teaching skill.
- **Teaching practice assessment phase.**

This assessment is made during the continuous teaching practice at the end of year by inspector, faculty member and school principal.
During this phase; the student must make a movie which can express his / her best performance in teaching practice in one of classrooms during the continuous teaching practice period.

Operational terminology:
This paper has some operational terminology which defined as following:
- **Technological Approach:**

It is a mechanism for using technology to achieve specific goals.
- **Teaching practice:**

A temporary period of teaching spent by student teachers in schools to master teaching skills in actual teaching environment under supervision of a faculty member, an inspector and a school principal.

The advantages of the suggested approach:
This approach has many advantages such as:
- The student is responsible for his/ her learning and development.
- The approach helps student make self assessment to his/ her performance in teaching practice.
- The approach develops student's skills in using technology.
- The professor can observe the best performance on the part of students in any appropriate time.
- The professor can collect all the best performance movies of all students and make an educational movie bank for the future students.

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Teaching and Learning Science with ICT in Secondary Schools: The Case of Abia State Nigeria

Maryann Chinwe Ndirika, Michael Okpara University of Agriculture, Nigeria
Uche Elekwa, Michael Okpara University of Agriculture, Nigeria

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Abstract

A survey design was used to investigate the status of teaching and learning with ICT in secondary schools of Abia State, Nigeria. Questionnaires were distributed to 60 science teachers and 203 Senior Secondary II science students from four schools randomly sampled from 20 schools in Umuahia education zone. The data were analyzed using percentages and chi-square. Results of the study revealed that a very low proportion of science teachers use ICT resources in preparing science lessons (10%), practical classes (3.33%), preparing presentation (10%) and simulations 1.67%. The dominant use of ICT by teachers is for Word Processing (38.33%) and collecting reference materials (31.67%). The study also confirmed lack of gender parity in access to ICT resources as significant differences were revealed in the use of e-mail, internet and mobile phones, all in favour of the males. Some recommendations were made which include the need to provide relevant ICT training for teaching with modern technologies and encouraging females to embrace the use of ICT in this information age.

Introduction

The current situation of science teaching and learning in Nigeria is a concern to all including government and the society at large. Research indicates that many students found science to be difficult, boring and not interesting to them (Salau, 1995, 1996). Large class sizes, inadequate funding, insufficient curriculum resources, poor teaching skills and lack of supports for teachers among other factors further limit the quality of science teaching and learning in Nigerian schools (Okebukola, 1997). To solve these lingering problems one needs to develop a realistic picture of what is currently happening in the teaching and learning of science in Nigerian schools and also to identify the factors that are limiting the quality of science education. Furthermore, one needs to develop a reasonable ideal picture for which the nation can strive towards within the existing resource limitations.

Education has been acknowledged as a major determinant of economic growth and development because of its pervasive influence on labour productivity. There is now a strong international consensus, that education is a potent medium for transmitting the needed skills, attitude and values that are vital to the achievement of poverty alleviation, economic prosperity and sustainable development (Okebukola, 2007). In the latter half of the 20th century, it became not only impressive but also persuasive to talk about the “information society”, or the “information age” while referring to the impact of information and communication technologies (ICTs) on global economy. A “global” society has evolved in which traditional barriers to communication, time and space has been surmounted (Gaglardi & Byron, 2005). This has resulted in great technological, economic and social development that has diminished the world to a global village. Education industry is by no means exempted from the challenges of globalization. Rather the role of education has become even more critical in a world economy that has become knowledge-driven.

Science remains one of the most important subjects in the school curriculum. Science has hitherto been structured as abstract concepts and taught “from the perspective of uncritical acceptance of logical positivism, and to a large extent as a mastery of abstract concepts and principles, which are rarely explicitly linked to real life experiences (Onwu & Mogari, 2004)). In this way, the link between science education and real world experience is missing in the minds of science students. The failure of students to see the connection between science and their day to day lives will certainly diminish or obscure the relevance of science in their lives. ICT software packages like simulations, expert systems and computer models can now bring the real world of science into the classroom thereby linking concept to real life experience.

ICT on its own has limited uses in the education system except it is integrated to support and enhance teaching and learning in various subjects. Schools cannot seriously claim to prepare students for life in the 21st Century without adequate incorporation and use of new technologies (Yelland, 2000). This stance is further supported by Lemke (1999), in the Milken Exchange and Education Technology commissioned report, where he stated “Today’s students live in a global knowledge-based age, and they deserve teachers whose practice embraces the best that technology can bring to learning”. Teachers could be vital tools in achieving this dream. ICTs have the potentiality of innovating teaching that can stimulate learners to learn actively and independently in a self directed way and, or in collaboration with others (Kirschner and Woperies, 2003).

While there are many stakeholders involved in ensuring effective integration of information and Communication Technology (ICT) in the education system, teachers have a particularly important role to play. According to Carlson and Gadio (2002), teachers are the key to whether technology is used appropriately and effectively. Kirschner and Davis (2003) further asserted the need for teachers to become competent in making personal use of ICT as a tool for teaching and learning. This makes teachers' readiness in terms of possession of relevant ICT skills and competence, the most important factor in any attempt to integrate ICT into teaching and learning of science in secondary schools. There is need to encourage teachers and students to acquire ICT skills for the delivery of quality instruction. This study therefore set out to investigate the status of teaching and learning with ICT in senior secondary schools of Abia State, Nigeria.

Research Questions

The following research questions guided the study:

1. What is the level of teachers' knowledge of ICT skills for teaching in secondary schools?
2. What is the rate and pattern of usage of ICT resources for teaching by science teachers?
3. Is there any significant difference between male and female students frequency of usage of ICT gadgets.

Hypothesis

The following null hypotheses were formulated to answer research question 3:

HO_1 There is no significant difference in the use of e-mail in learning by male and female science students

HO_2 There is no significant difference in the use of internet for learning by male and female science students.

HO_3 There is no significant difference in the use of mobile phones in acquisition of knowledge by male and female science students.

Method

A survey research design was utilized. The area studied is the Umuahia Educational Zone of Abia State, Nigeria. Four schools (one female, one male and two co-educational) were purposively selected out of 56 schools. The sample was made up of 203 Senior Secondary II (SS2) students; (104 males, 99 females) from four schools randomly sampled from 20 schools in Umuahia education zone.. The instrument used for this study was a questionnaire. Reliability of the instrument was determined using the split-half method, and it yielded a reliability coefficient of 0.79. The questionnaire were distributed to the students and collected on the spot. The data were collated and analyzed using percentages and chi-square test to answer the research questions and to test the hypotheses. To answer the research questions the following criteria were set for decisions; **Low** (less than 40%), moderate (40% t0 60%) and high (above 60%). The hypotheses were tested at 0.05, level of significance.

Results

Research Question 1: What is the level of teachers' knowledge of ICT skills for teaching in secondary schools?

Table 1: Percentage responses on Teachers' knowledge of ICT skills

ICT Skill	Yes	No
Word Processing	38.33%	61.67%
Spreadsheet	15%	85%
E-mail	20%	80%
Internet Browsing	26.67%	73.33%
Presentation tools	15.38%	84.62%
Statistical tools	15.38%	84.62%
Graphics	11.67%	88.33%
Database Management	11.67%	88.33%
Web-page designing	6.67%	93.33%

Table 1 indicates that word processing is the dominant skill claimed by 38.33% of teachers studied. Other skills ranged from 11.67% (database management) to 26.67% (internet browsing). Only 15% of the teachers indicated that they possess presentation skills.

Research Question 2: What is the rate and pattern of usage of ICT resources for teaching by science teachers?

Table 2: Percentage responses on Teachers' Use of ICT in Teaching Science

Teaching Activity	Yes	No
Preparing teaching material	15%	85%
Collecting reference material	31.67%	68.33%
Preparing presentation	10%	90%
Preparing lessons	10%	90%

Preparing practical classes	3.33%	96.67%
Simulations	1.67%	98.33%
Communicating with teachers	8.33%	91.67%
Communicating with students	8.33%	91.67%

Table 2 shows the rate and pattern of use of ICT in teaching activities. The table reveals that 31.67% of teachers use ICT for collecting reference materials, which is low. The rates of teachers integrating technologies in other vital teaching activities is even lower (1.67% to 15%). 31.67% of the teachers use technologies for collecting reference materials, 15% for preparing teaching materials, 10% for preparing lessons and presentation.

$H0_1$: There is no significant difference in the use of e-mail by male and female science students.

Table 4 shows the result of analysis for $H0_1$

Table 3: Chi-Square Analysis of Gender Difference in the Frequency of Use of E-mail in the acquisition of science knowledge

Variable	Cal.X^2	Table X^2	Level of Significance	df	Decision
Gender	16.62	5.991	.05	2	Ho rejection

From Table 3, the calculated chi-square (16.62) is greater than the table value (5.991) at .05, level of significance (df, 2). Therefore the null hypothesis (Ho2) was rejected, inferring that the difference between male and female students in their use of e-mail in acquiring climate change knowledge is significant.

$H0_2$: There is no significant difference in the use of internet for acquisition of knowledge in science by male and female students

Table 4 shows the result of analysis for $H0_2$**Table 4: Chi-Square difference in the frequency of use of Internet in the acquisition of science knowledge**

Variable	Cal.X^2	Table X^2	Level of Significance	df	Decision
Gender	14.41	5.991	.05	2	Ho rejection

From Table 4, the calculated chi-square (14.41) is greater than the table value (5.991) at .05, level of significance (2.df). Therefore the null hypothesis (H03) was also rejected, inferring that the difference between male and female students in their use of the internet in acquiring science knowledge is significant.

$H0_3$: There is no significant difference in the use of mobile phones for acquisition of knowledge in science by male and female students

Table 5 shows the result of analysis for $H0_3$

Table 5: Chi-Square difference in the frequency of use of mobile Phones in the acquisition of science knowledge

Variable	Cal.X^2	Table X^2	Level of Significance	df	Decision
Gender	6.47	5.991	.05	2	Ho rejection

From Table 5, the calculated chi-square (6.47) is greater than the table value (5.991) at .05, level of significance (2.df). Therefore the null hypothesis ($H0_3$) was also rejected, inferring that the difference between male and female students in their use of mobile phones in acquiring science knowledge is significant.

Discussion

The use of ICT in teaching and learning of science is highly valuable. However the issue of science teachers' competencies and skills in using ICT infrastructure in teaching remain an issue of utmost importance. The emphasis by the National Policy on Education on the provision of ICT infrastructure in schools and the use of IT in teaching and learning at the secondary school level (FRN, 2013) has led to improvements in ICT resource availability through government and institutional support for ICT integration. The need for teachers to become competent in making personal use of ICT as a tool for teaching and learning has become imperative if teachers must meet with the demand of today's pedagogy. This is why investigating teachers' perception of the impact of ICT integration at school or classroom level is necessary. Findings from Table 1 showed that the level of teachers' knowledge of ICT skills for teaching science in secondary schools is low. The study revealed Word Processing as the dominant ICT skill possessed by 38.33% of the science teachers. It is disturbing that only 15.38% of the teachers claimed to be skilled in presentation with ICT. Also revealed was low rate of science teachers who indicated having knowledge on use of e-mail (20%), internet browsing (26.67%), statistical tools (15.38%) and other aspects of data gathering and management with ICT that are necessary for science teaching. It is hardly surprising therefore, that Table 2 revealed a very low rate of science teachers that use ICT resources in preparing science lessons (10%), practical classes (3.33%), preparing presentation (10%) and simulations 1.67%. With these findings, the hope of science teachers imparting updated knowledge to science students, explicitly linking them to real life experiences that ICT integration can achieve will only be a mirage. This contradicts the call by Onwu and Mogari (2004) for de-emphasizing mastery of abstract concepts in the teaching of science so that its meaning may be retained in the minds of the students. This is also against the background of studies which revealed the positive effects of teaching science with ICT on students' motivation, knowledge, understanding and skills development (Mavis & Davis, 2003) and of using ICT in Science education to collect information on science and interact with IT resources, thus encouraging communication and collaboration (Gillespie, 2006). Results of hypothesis testing in Tables 3, 4, 5 revealed a significant difference in the use of e-mail, internet and mobile phones in favour of males. This could be as a result of most female students being usually occupied with domestic duties rather than having sufficient time and expertise in utilizing ICT for searching information. The finding is also in line with Huyer (2003) cited in Elekwa (2012) who reported a Nigeria study in which women opposed ICT study because it overexposed young women to a Western lifestyle, thus endangering their chances for marriage. Also relevant to this finding is the opinion expressed by Rodenberg (2009), that women lack ownership rights for the means of information, technology and training. This fact could be a major factor which has resulted to gender-stereotyping in science disciplines in many Nigerian institutions with most students having the view that science is a male subject. There is indeed a great need to sensitize female science students on the need to create time for ICT knowledge and use.

Conclusion

This study has revealed that teaching and learning science with Information and Communication Technology resources in Abia State, Nigeria still has a lot of challenges. Science teachers and female students still need to acquire versatile knowledge and skills in various aspects of ICT. This will go a long way towards enhancing teaching and learning of science in Nigerian schools.

Recommendations

The following recommendations are made from the results of the study:

1. School administrators should organize periodical workshops/trainings for science teachers to enable them acquire expertise on complex computer operations.
2. Heads of Science department in schools should monitor and enforce the utilization of ICT infrastructure in preparation and teaching of science lessons.
3. Teachers should give science students assignments that will involve their use of ICT resources.
4. Parents should allocate domestic duties equally to children irrespective of gender to ensure that female students are allowed adequate opportunity to acquaint themselves with use of ICT infrastructures.
5. Curriculum planners should include computer training as part of the science curriculum to enable students develops enough expertise on vital computer operations.

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Effects of Gesture-based Concept Mapping of Engineering Circuit Course on Students' Learning Performance and Attitudes

Sheng-Wen Hsieh, Far East University, Taiwan
Min-Ping Wu, National University of Tainan, Taiwan

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Abstract
The aim of this paper is to propose a Concept Map-oriented approach with Gesture-based Learning System (CMGLS) in Basic Engineering Circuit course (BEC-course). There were 105 participants in the experiments designed with the three learning approaches: Concept Map-oriented Gesture-based Learning Approach (CMGLA), Conventional Gesture-based Learning Approach (CGLA), and Traditional E-book Learning Approach (TELA). The experimental results showed that the CMGLA increased the learning performance and attitudes of the students in BEC-course higher than TELA and CGLA did. The learning performance of CMGLA was also higher than CGLA.

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Introduction

Since computers became available, various user interfaces designs have been developed. There are two types of interfaces. One is the conventional, such as graphical user interface, based on keyboards and mouse (Jaimesa & Sebe 2007). The other is the non-conventional, such as natural user interface, based on gesture and voice-based interface. For example, Kinect is a motion sensing input system designed by Microsoft for the Xbox 360 video game console, with the devices of a Charge-coupled Device (CCD), a 3D depth CCD and multi-array microphones, the user movements, gestures and voices are able to be captured and traced (Dutta, 2012).

Today, the Kinect sensor is applied in many professional areas, including medicine, entertainment, education, and many other fields (Kean et al. 2011). Some of the scholars emphasize to apply the technical innovation of Kinect to be an educational assistance, but there is a lack of proper strategies or tools to assist learning. Therefore, aside from the fact that this research is mainly technically conducted with gesture-based computing, the teaching strategies are also considered.

To help students organize information, concept mapping provides a learning strategy that shows a diagram linking with related nodes to display the relationships among concepts. Through visual aids to support information organization, concept mapping is the most frequently used learning strategy (Novak & Gowin, 1984). In this study, a Concept Map-oriented approach with Gesture-based Learning System (CMGLS) in Basic Engineering Circuit course (BEC-course) is proposed. There were 105 participants in the experiments designed with the three learning approaches: Concept Map-oriented Gesture-based Learning Approach (CMGLA), Conventional Gesture-based Learning Approach (CGLA), and Traditional E-book Learning Approach (TELA). An experiment has been conducted to investigate the following research questions:

(1) Is the CMGLA in BEC-course helpful to the students in improving their learning achievement?
(2) Do the students have a better performance on BEC-course through concept maps approach?
(3) Do the students have a better performance on BEC-course through the gesture-based learning approach?

1. Literature review

Gesture-based technology includes devices controlled by natural movements of the finger, hand, arm, and body (Johnson et al. 2010). With gesture-based technology, a motion sensing device that performs controllerless interaction for the Gesture-based game (such as Microsoft Kinect) console user movements are able to be tracked and translated into interactions. Kinect is a multi-sensor input system, with the devices of a video camera, a 3D depth camera and an array of microphones (Dutta, 2012), it is a sophisticate natural user interface for users to control and interact with the game console through gestures and voice commands instead of touching any game controllers. Hsu (2011) showed that the kinesthetic features of Kinect and gesture-based interaction will definitely enhance educators to dedicate themselves to kinesthetic pedagogical exercises in indoor instruction. It not only offered a new and revolutionary way of interaction but also had the attention of researchers and product developers in many areas.

However, the current experiments and developments with gesture-based technology still stayed in a stage of primitive position. If gesture-based technology can be operated with some helpful software for teachers to develop their control over computers, it would definitely turned into an efficient interactive educational technology (Hsu, 2011).

Concept mapping provides a learning strategy that shows a diagram linking with related nodes to display the relationships among concepts. It is the most frequently used learning strategy (Novak & Gowin, 1984). It selects one concept as the center, and associates the related concepts and details as the mapping developed from the central to the external (Fisher et al. 1991).

Therefore, this paper has developed a CMGLA to support BEC-course by providing supplementary learning materials to complement the content, and building learners' facility in concept mapping to help them organize their knowledge.

2. Research Methodology

This paper uses the Kinect sensor to develop a CMGLA to support the learning in a BEC-course, and the system functions include speech recognition, gesture recognition, instant quizzes and concept mapping learning guidance. With the use of concept map learning approach, students are able to organize the information, define the important concepts and the relationships between concepts, and identify their learning status related to the "door ring" unit in the basic engineering circuit course via visualizing the learning content and learning status information. The supplementary learning materials as well as the demonstrative concept maps were developed by consulting the two teachers who have more than five years experience in teaching engineering circuit courses and they were informed of the importance of designing phenomenon explanations and providing more realistic illustrations.

Accordingly, to help learners comprehend the learning material, additional learning tools with phenomenon explanations and realistic illustrations were developed which include digital text and images. Learners can learn basic engineering circuit by gesture recognition and voice recognition, just like they interact in the nondigital world. However, when learners get confused understanding caused by a wrong judgment, the system will provide immediate concept mapping learning guidance to make learners revise their knowledge structures.

The participants were 105 students. They were assigned to be experimental group CMGLA (N=35), experimental group CGLA (N=35), and the control group TELA (N=35). The difference between the three groups is the learning treatment. The students in experimental group CMGLA were instructed and guided to gesture-based learning system with concept map-oriented learning approach; those in experimental group CGLA were instructed and guided to gesture-based learning system without access to concept maps; and those in the control group TELA were guided with traditional e-book.

The experimental procedure consists of three steps, the conduction of the pre-tests, introduction to the tools and learning missions, and the conduction of the post-tests. In the step1, the learners took the BEC-course pre-test in 30 minutes. In the step2, it took 10 minutes to instruct the learners the tools and missions of the learning activity. After the instruction, a 20 minute learning activity was conducted. During the learning activity, the learners in experimental group CMGLA were guided to gesture-based learning system with concept map-oriented learning approach through access to the corresponding concept maps and supplementary learning materials via Kinect sensor. The students in experimental group CGLA were instructed and guided to gesture-based learning via Kinect sensor. The students in the TELA used the traditional approach of e-book reading. In the final step, the learners completed the BEC-course post-test.

The BEC-course pre-test was conducted to evaluate the learners' prior knowledge before the BEC-course learning. It consisted of 10 questions, giving a total score of 100. The BEC-course post-test aimed to evaluate the learning performance of the students after receiving different approaches (CMGLA, CGLA and TELA) to learn BEC-course. It also consisted of 10 questions, with a total score of 100. The BEC-course post-test was developed by consulting two teachers who had taught the BEC-course for more than four years.

3. Research Result and Discussion

Before the experiment, a test of basic engineering circuit knowledge was conducted to identify the differences in BEC-course among the CMGLA, CGLA and TELA. The descriptive statistics of the pre-test are presented in Table 1. The result shows that their prior knowledge of CMGLA, CGLA and TELA was not significantly different (F=0.796, p-value=0.454).

Table 1: BEC-course pre-test results

Experimental Group	N	Prior-test mean / S.D.	F
CMGLA	35	19.80/6.13	0.796
CGLA	35	20.77/5.50	
TELA	35	19.03/5.72	

Table 2 shows the ANOVA result on the post-test scores of CMGLA, CGLA and TELA. The means and standard deviations of the post-test scores were 68.06 and 8. 48 for Experimental group CMGLA, 61.20 and 10.15 for Experimental group CGLA, and 57.11 and 12.30 for the control group TELA. It is found that the post-test scores of CMGLA, CGLA and TELA are significantly different (F=9.833, p<.001).

Table 2: ANOVA result of learning achievement on the three groups post-test scores

Groups	N	Mean	S.D.	F
CMGLA	35	68.06	8.48	
CGLA	35	61.20	10.15	9.833***
TELA	35	57.11	12.30	

*p<.05 **p<.01 ***p<.001

The pairwise comparisons (Table 3) show that there is a significant difference between CMGLA and CGLA, and a significant difference between CMGLA and TELA. In other words, the learners in Experimental group CMGLA had significantly better learning achievement than the learners in both Experimental group CGLA and the control group TELA. Consequently, it is concluded that CMGLA was more helpful to the students in terms of learning achievement in BEC-course than CGLA and TELA.

Table 3: Pairwise comparisons (LSD) of the three groups

(I) post-test	(J) post-test	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
CMGLS	CGLA	6.86	2.49	.007**	1.9107	11.8036
	TELA	10.94	2.49	.000***	5.9964	15.8893
CGLA	CMGLS	-6.86	2.49	.007**	-11.8036	-1.9107
	TELA	4.09	2.49	.104	-.8607	9.0322
TELA	CMGLS	-10.94	2.49	.000***	-15.8893	-5.9964
	CGLA	-4.09	2.49	.104	-9.0322	.8607

*p<.05 **p<.01 ***p<.001

4. Conclusion

This study investigated the effects of CMGLA in BEC-course on students' learning achievement. The experimental results showed that the CMGLA had significantly better effectiveness in improving students' learning achievements than the CGLA and TELA. Regarding the effectiveness of the concept maps, the experimental results had indicated the effectiveness of employing concept maps in helping students organize the acquired knowledge.

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Applying Knowledge Management and Concept Map to Improve Students' Self-Learning Performance of Web Programming Course

Krittawaya Thongkoo, Chiang Mai University, Thailand
Nopasit Chakpitak, Chiang Mai University, Thailand
Ratapol Wudhikarn, Chiang Mai University, Thailand

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Abstract
Concerns have been raised that Modern Management and Information Technology (MMIT), College of Arts, Media and Technology pedagogy has limited students' thinking and intellectual development with respect to analyze complex problems. This paper presents integrated-framework between knowledge management and a concept map, in self-learning for students to understand the basic of PHP programming concepts in Web Programming course. This study uses concept maps to explore these concerns. Specifically, the second year of undergraduate students and MMIT department performed a concept mapping exercise for a complex, multifaceted problem in web programming course. Results supported concerns about students' intellectual development. Concept maps indicated show that the students have the ability to distinguish knowledge and also different knowledge bases. In the factors analyzing that affect the teaching effectiveness, the teacher can set knowledge structure for students and highlight misunderstandings by inspecting from the concept maps. The expected result is a useful system for teaching of Web Programming course in promoting the student's thought processing.

1. Introduction

The future direction of education management is evident in the recent literature. Concerns about management education are broad in scope and include the preparedness of MMIT department graduates for managerial and professional positions, the relevance of MMIT department curricula to management practice, and the degree to which MMIT department pedagogy develops critical thinking.

One area that has received increased interest in the recent literature is the intellectual development of MMIT department graduates. It has been suggested that MMIT department pedagogy is centered on small, simple problems that limit students' abilities in the areas of critical thinking, integrative thinking, creativity, and synthetic reasoning. Consequently, MMIT department graduates are seen as not fully prepared to address the complex, interdisciplinary problems characteristic of management practice.

Many studies show that concept maps and knowledge maps have high efficiency for the learner in learning. Concept and knowledge map was given the benefit to the learners across a broad range both of educational levels and subject areas. They have more effective than study by listening and reading. Students can remember main ideas when they learn from a concept map more than when they learn from a textbook.

Although there has been an ongoing interest in integrative knowledge management in the learning education literature, it is usually within the context of specific courses or in terms of functional integration within a course. But there are less attention to the manner in students to organize and assimilate knowledge, especially when management is compared to other disciplines with a practice orientation such as faculty of medicine or faculty of engineering.

The purpose of this study is using knowledge maps could help present e-learning in a structured manner so that readers can easily digest the learning materials. Because of these features, knowledge map-based learning can potentially lead to better learning performance than traditional design of e-learning. It is important to study if the knowledge-based design approach can improve a learner's computer self-efficacy, learning performance and satisfaction level. Scientific evidence about the effectiveness of knowledge map-based materials design approach can promote its use in improving knowledge acquisition process.

2. Literature review

2.1 Use of concept maps

Concept maps were chosen for this study for several reasons. First, they are well suited to assessing how students organize and apply information in disciplines with an applied focus. For example, in nursing education, concept maps have been used to assess how well students integrate diverse information to diagnose a problem and develop a care plan. The notion of integrating knowledge to understand practice-based problem holistically closely mirrors criticisms of management education.

Concept maps have been also used in both nursing and engineering to study depth of knowledge and the level of cognitive complexity demonstrated in problem solving. These issues mirror concerns raised about management education. Since mind maps do not impose hierarchical structures on how concepts are organized they capture how individuals organize and apply knowledge without constraints. We viewed this quality as an important element in assessing concerns about complex problem solving and synthetic reasoning. Finally, concept maps are also relevant to understanding how students and faculty approach programming problems by gaining insight into the relevance of their mental models to management practice in general and strategic thinking in particular.

2.2 Knowledge management

The term knowledge management can be referred to several meanings. It is generally a discipline that promotes an integrated approach for identifying managing and sharing all of an enterprise's information, including database, document, policies and procedures as well as unarticulated expertise and experience of individual workers. (Morey and et. al., 2001). Knowledge management is an emerging discipline with many ideas yet to be tested, many issues yet to be resolved, and much learning yet to be discovered (Jay, 1999).

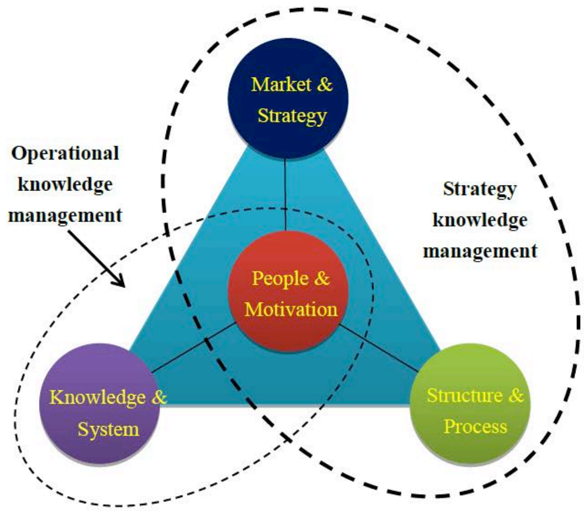

Fig 1. Knowledge management process

3. Methodology

First, we design the e-learning with concept maps. This section presents the processes of applying concept maps to design e-learning. The selection of e-learning subjects and contents, and concept mapping for e-learning, are described in the following two subsections.

3.1. The selection of e-learning subjects and contents

Using e-learning materials for tools in the Microsoft SQL Server database and used programming to experiment with asynchronous and synchronous learning (Chen and Shaw, 2006). They indicated that software tools and application programming are suitable for e-learning. Additionally, computer self-efficacy is positively associated with learning performance of SQL programming (Nickell and Pinto, 1986). Our research uses the core technology of PHP, MySQL, as the e-learning development.

3.2. Concept map-based design

In this research, we attempt to follow the track by converting browse-based e-learning to concept map based ones. The conversion steps as follows:

1. Extracting the main concept words in the first webpage of browse-based as the nodes of concept maps.
2. Defining the relationships between nodes and assigning the attributes of linkages of the concept maps.
3. Organizing the statements and contents in browse-based materials that associate to related node to new web pages.

Browse-based e-learning are represented with HTML web pages. The topics of e-learning are listed in left frame of a web page. When one clicks on one of topics, the learning contents display in the right frame of the web page with texts, graphics, or multimedia.

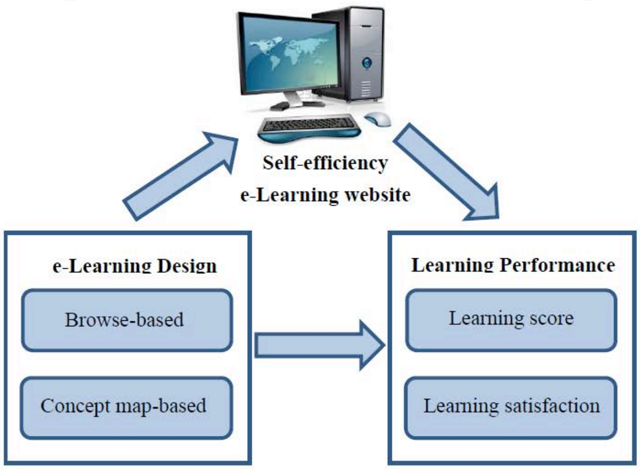

Fig. 2 Research framework

4. Conclusion

In conclusion, the expected result is the construction of concept maps in e-learning has positive effects on learning performance. If knowledge maps can be adequately applied in e-learning design, learning performance and computer self-efficacy may be increased. These results of this research could make a breakthrough and give a big change from existing browse-based e-learning materials design style to knowledge-map based one to gain the better learning performance.

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Five Strategies for Implementing Learning Technology in Higher-Education

Panuchart Bunyakiati, University of the Thai Chamber of Commerce, Thailand
Chadarat Phipathananunth, University of the Thai Chamber of Commerce, Thailand

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Abstract
Recent technological disruption in higher education has greatly increased learners' abilities to acquire information, to communicate and collaborate with peers and lecturers, and to produce and share their findings with the world. Learners in the digital age are empowered with five core learning technologies i.e. mobile computing, online social networks, open content, online learning and collaborative environments. However, despite the fact that technologies have made some significant advances, the ability of academic institutes to deploy them has not progressed in equal measure. Many deployments of these technologies have failed to live up to expectations. This is often due to a common misconception that the primary use of learning technology is a direct substitution of current learning tools e.g. textbooks, paper, pens and clickers. This work examines the possible use of the five core learning technologies beyond substitution level and discusses the implementing and pedagogical strategies to deploy these technologies to increase learning and yield better students' learning outcomes.

Introduction

Learners in the digital age are equipped with various kinds of learning technologies that have the potential to revolutionize how we learn and teach. In 2013, New Media Consortium (NMC) (2013) has identified twelve emerging learning technologies, five of which that have become mainstream are discussed in this paper i.e. mobile computing, online social networks, open content, online learning and collaborative environments. Many students are using mobile devices and online social networks in their daily lives. They check emails and access information from smartphones and share their thoughts on social network platforms.

Many students also enroll in online courses. For instance, in the first version of CS50x from Harvard University on EdX, it is reported that 150,349 students registered and 1,388 were awarded certificates of completion (Malan, 2013). On the supply side, the number of MOOCs (massive open online courses) available on online learning platforms has also increased rapidly. As of June 2014, there are 673 courses on Coursera (http://www.coursera.org) and more than 200 courses on EdX (http://www.edx.org). Many students also use Google Docs (https://docs.google.com) and Microsoft Office 365 (http://mail.office365.com) to work collaboratively. Evidently, these online collaborative tools have increasingly become indispensable because of the changing nature of work that demands more collaboration and teamwork.

This paper examines the possible use of the five core learning technologies using the SAMR (Substitution, Augmentation, Modification and Redefinition) model (Puentedura, 2013) and Bloom's revised taxonomy (Anderson et al., 2000) and then discusses the implementing and pedagogical strategies to deploy these technologies to increase learning. In the next section, the SAMR model and Bloom's revised taxonomy are described as a framework for discussion. The third section demonstrates the use of the technologies at different levels of the SAMR model. And the last section outlines future work and possible research questions.

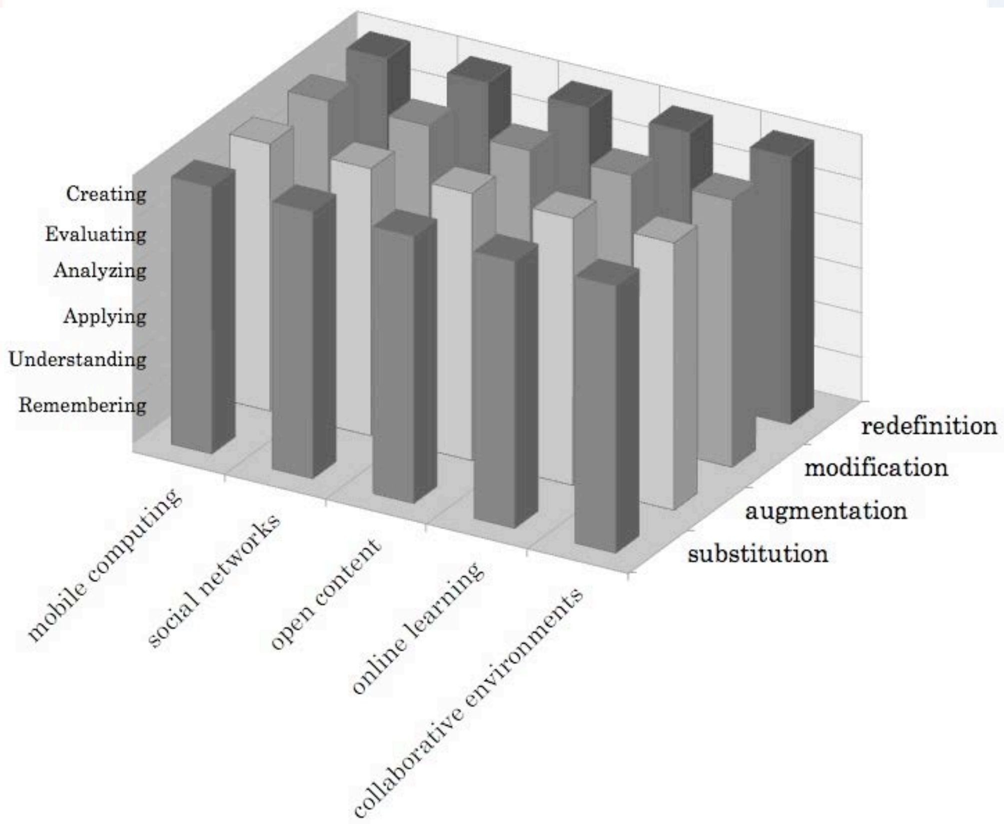
Technology, Use of Technology and the Levels of Cognition

At the core of the implementing strategies for learning technology is the identification of opportunities to increase the levels of cognition in learning, e.g. from remembering and understanding to evaluating and creating through the use of technology. This paper proposes that the role of technology in learning can change from being content-driven tools organized around what lecturers teach - to student-centric tools organized around what students learn. Technology can shift its focus from content delivery to student performance and learning outcomes. For instance, asking students to read e-books on tablet computers is (1) content-centric and (2) a substitution of current activities by simply replacing physical textbooks with digital ones. On the contrary, asking students to create their own versions of e-books using Wikipedia book creator is (1) student performance and (2) a modification of tasks, as students have to understand, evaluate and create their own e-books; hence, an increase in the level of cognition.

There are three aspects of the implementing and pedagogical strategies. The first aspect concerns the technologies under discussion including mobile computing, online social networks, open content, online learning and collaborative environments. The second aspect concerns the use of technology. In this aspect, the SAMR model (Puentedura, 2013) classifies the use of technology into four levels i.e. (1) substitution – the direct use of new technology to replace existing ones without functional change, (2) augmentation – the use of new technology with some functional improvement, (3) modification – the use of new technology to perform tasks that are redesigned significantly and (4) redefinition – the use of technology for newly created tasks that are impossible to accomplish without the technology. With this model, substitution and augmentation function as an enhancement to students' learning, whereas modification and redefinition can transform learning activities. The third aspect concerns the levels of cognition described in Bloom's revised taxonomy i.e. Remembering, Understanding, Applying, Analyzing, Evaluating and Creating (Anderson et al., 2000).

These three dimensions lay out the essential elements of learning-technology implementation presented as a strategic cube shown in figure 1 below. The strategic cube reveals 120 combinations of five learning technologies, four levels of technology use and six levels of cognitive requirement in learning. For a course, each of the levels of cognition in Bloom's revised taxonomy should be covered using a set of technologies, each of which can be at a different level of SAMR model. For instance, students may use social networks for creative activities in the classroom as a modification to their learning.

Figure 1 Technology, use of technology and the levels of cognition



The Five Core Learning Technologies in SAMR

This section describes five technologies under discussion and examines how they can be used at the different levels in the SAMR stack. This section tries to argue that implementing strategies should strive beyond the substitution level because of the fact that levels of cognition in learning cannot be increased, if students are doing the same activities as they do without using the technologies. Consequently, there is no real benefit in student learning outcomes from investing in those technologies.

Mobile Computing

It can be argued that, to find information, it is enough to provide a computer for students to use in a group (Mitra, 2013), as oppose to the one-to-one mobile computing approach. However, Klassem et al. (2013) maintain that mobile learning has become more important in students' self-organization of learning and analyze requirements for mobile version of learning management system. Furthermore, with mobile devices, students can collect data from primary sources, use creativity apps to produce digital media, use productivity apps to create learning artifacts and use collaborative apps to work effectively as a team.

Table 1 shows the SAMR analysis of mobile computing. At the enhancement level (substitution and augmentation), mobile computing can help engaging students and providing real-time feedback through interactive quizzes. When it comes to the transformation level (modification and redefinition) the tasks that students perform can become collecting real data from primary sources and recording their learning process, which are at higher levels in the Bloom's revised taxonomy in term of cognitive requirement.

Levels	Activities
Substitution	Students use mobile devices to search for information and to produce their reports
Augmentation	Students use interactive e-books that provide instant feedback from review questions and use apps to collect data, produce digital media, create learning artifacts and collaborate as a team.
Modification	Students use media creation apps to record data from field research such as recording interviews, observations and behavior of people.
Redefinition	Students document each step of their learning process (in video, audio, photos, written formats) and their reflections.

Table 1 The SAMR analysis of mobile computing

Online Social Networks

Online social networks are communities in which their members share, discuss and learn from others. Table 2 shows the SAMR analysis of online social networks. At the enhancement level, online social networks can help lecturers to connect with students by distributing learning materials, announcing information and asking/answering questions, and allow students to create contents and aggregating those contents. At the transformation level, online social networks can help students to collect primary data by, for example, conducting online surveys with large group of population, connecting with subject-matter experts and creating personal learning networks with peers and lecturers.

One example is the work of Whitty and Anane (2014), who point out that there is a lack of social side of learning in traditional learning management systems (LMS) and argue that social networks have opened new modes of learning i.e. informal learning through socialization, supported by curriculum structure and collaborative activities. They propose a framework for sharing tacit knowledge and co-constructing explicit knowledge through social media and a collaborative tool.

Levels	Activities
Substitution	Students use social networks as platforms for communication with lecturers and among peers.
Augmentation	Students use social networks to engage with others in discussion and to become producers/aggregators of contents by sharing, liking and commenting.
Modification	Students use social networks to conduct online surveys with large group of population and connect with subject-matter experts.
Redefinition	Students use personal social networks to critically determine the direction of their learning and to create their individual learning experiences.

Table 2 The SAMR analysis of online social networks

Open Content

Despite the study of University of Pennsylvania (Perna and Ruby, 2013) reporting a large number of enrollments but a small number of active users and completions in massive open online courses (MOOCs), these courses are increasingly available online. The abundance of open content has changed the learning landscape from information receiving from lecturers to information finding, evaluating, selecting, using and reusing by students.

Table 3 shows the SAMR analysis of open content. At the enhancement level, open content can help lecturers to utilize resources shared by other lecturers. Open content usually comes with its own teaching methods. For instance, the E-learning and Digital Cultures course (Bayne et al., 2013) from University of Edinburgh on Coursera uses various activities for student learning such as readings, participating in discussion forums, composing blogs and creating visual artifacts. At the transformation level, open content has become resources for researching that students can find, select, evaluate and use in their learning process.

Levels	Activities
Substitution	Students use shared materials on MOOCs and iTunes U, etc. as learning resources.
Augmentation	Students are taught using teaching pedagogies that are shared together with the content.
Modification	Students learn and practice skills for selecting, evaluating and using the open content.
Redefinition	Students use open content as resources for their research into the subjects in depth as part of their learning process.

Table 3 The SAMR analysis of open content

Online Learning

In blended learning, online learning can support traditional education to increase learning and to flip the classroom. At the enhancement level, learning resources can be made available online together with computerized quizzes. As an example, a hybrid learning methodology (Bunyakiati and Songsangterm, 2010) at University of the Thai Chamber of Commerce (UTCC) can improve students' learning outcomes by delivering learning resources that are facts and figures (the "what" aspect of the courses) through virtual learning environment. These online resources are integrated with traditional classroom learning, which focuses on the "why" and "how" aspects such as implications and applications of the content. At the transformation level, students can use online learning to receive peer and professional reviews and to acquire multi/interdisciplinary knowledge. Table 4 shows the SAMR analysis of online learning technology.

Levels	Activities
Substitution	Learning resources are made available online for students to access.
Augmentation	Students use blended learning, video lectures and computerized quizzes.
Modification	Students use discussion forums, peer and professional reviews of student work.
Redefinition	Students use online learning tools to acquire multi/interdisciplinary knowledge required to solve the problems.

Table 4 The SAMR analysis of online learning

Collaborative Environments

Table 5 shows the SAMR analysis of collaborative environments. At the enhancement level, students use collaborative environments to share data, to cooperate and to provide feedback. At the transformation level, students use online collaborative environments to facilitate projects and collaborate with students in other schools and professionals in local community, to solve problems, to make decisions, to monitor and observe their learning progress and to reflect what was learnt from the collaboration.

Levels	Activities
Substitution	Students use collaborative workspaces to share data and to cooperate.
Augmentation	Students use online collaborative workspaces to give feedback and to work iteratively by tracking versions of documents.
Modification	Students use online collaborative workspaces to facilitate projects and collaborate with professionals in local community/students in other schools.
Redefinition	Students use online collaborative workspaces to solve problems, to make decisions, to monitor and observe their learning progress and to reflect what was learnt.

Table 5 The SAMR analysis of collaborative environments

Conclusions and Future Work

It is possible that the five technologies discussed here can be used in combination or separately depending on many factors such as the context of the courses, availability of capital and technology capability of different institutions. These technologies can also be used at different levels of SAMR. However, using the abovementioned technologies should cover all of the six levels of cognition. The cube in Figure 1 can help technology implementers to keep track on the levels of cognition as well as SAMR that they are using those technologies for. For future works, a collection of case studies will be documented to share experiences in the classroom and students' learning outcomes. Future studies should also be conducted to find the combination of technology use that works best.

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Attention, Relevance, Satisfaction and Confidence of Pre University Students towards Multimedia-assisted Mastery Learning Courseware in The Learning of Cellular Respiration

Fazzlijan Mohamed Adnan Khan, Universiti Sains Malaysia, Malaysia
Mona Masood, Universiti Sains Malaysia, Malaysia
Mohd Ali Samsudin, Universiti Sains Malaysia, Malaysia

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Abstract
The aim of this research is to examine learner's perceived motivation concerning the attention, confidence, relevance and satisfaction of using Multimedia-assisted Mastery Learning Courseware (MMLC) in the learning of cellular respiration among pre university students. A courseware entitled "Cellular Respiration" was systematically developed using mastery learning elements to assist students who had difficulties in mastering and acquiring the concept of the topic. It incorporates motivational design strategies derived from Keller's ARCS (Attention, Relevance, Confidence and Satisfaction) model. To what extent did this courseware benefited the learners in terms of their motivation towards the instructional material? This quantitative study employed Instructional Material Motivational Scale (IMMS) questionnaire by Keller (1987) to measure students' motivation towards multimedia instruction and applied the Rasch model to analyze the data. Results showed that attention, relevance, confidence and satisfaction of the respondents towards MMLC was high. Based on Rasch analysis, all the items in this survey are fit to this survey. From the results, it is indicated that most of the higher perceived motivation are relates to the study material and lesson content. They highly agreed that MMLC has helped them pace their studies in the learning of cellular respiration processes. As a conclusion, this innovation in other ways is expected to enhance student's performance and understanding of biology subject in a richer and more meaningful manner.

INTRODUCTION

Biology education reform stressed the need for computer technology to be integrated into learning, teaching, and assessment. In the past decade, the advent of Information and Communication Technology (ICT) made it pivotal to have an effective instructional design for better education in science (Dow, 2006). Since Malaysia is committed to developing and providing world-class educational systems, there was a need, in various fields, for an effective instructional medium which incorporates an appropriate learning environment. This study explains the design and development of a Multimedia-assisted Mastery Learning Courseware (MMLC), using a mastery learning strategy to enhance the learning of cellular respiration. It was reported that biology was a subject which contained many abstract concepts that was difficult to understand and affected students' learning outcomes. In particular, the cellular respiration was identified as a difficult topic in biology (Wandersee, Fisher & Moody, 2000). Unfortunately, this topic is the fundamental concept in cell biology which again students face difficulties in understanding.

Problem Statement

Throughout the last century, a great deal of work has been done by researchers and educators to improve student learning outcomes in basic science, especially biology courses, through the introduction of innovative teaching strategies. However, in the last few years, the advent of ICT eased the burden on the necessary resources for the teaching and learning processes. The use of computers, as a ubiquitous teaching device, has become prevalent in the Malaysian education context. As such the use of computers, in conjunction with effective teaching strategies, has a tremendous potential in the teaching and learning processes.

Biology education delivers a truly broad scope which studies living organisms and how they interact with each other and their environment. Rice (2013) reported that biology was an abstract area which existed in unorganized structures and, therefore, it often results in students' learning difficulties. Complex processes and the use of technical terms made it difficult to learn some topics such as cellular respiration (Petro, 2008; Rice, 2013). Thus, the development of this courseware was aimed to help biology students at the Matriculation level in Malaysia to better grasp the complex processes of cellular respiration. Before developing the MMLC, the researcher conducted a needs analysis by identifying the problem, the context, and the situation of biology education in Malaysia. A qualitative method, using unstructured interviews and observations were carried out to gather useful information to elicit the students' current problem in succeeding in biology and the need for any new instructional strategies. The researcher identified ten respondents, with various academic abilities, from two Matriculation colleges to participate in these interviews. The finding of this preliminary investigation confirmed that the current students faced problems in the learning of biology. The results revealed that there was a lack of good quality resources of learning materials for them to refer. Besides, limited time for revision and exploring each topic are deemed to be problems which needed to be solved in order to enhance their performance and understanding of biology.

Courseware Design and Development Model for Multimedia Instruction

The approach to designing the interactive multimedia courseware was based on Bloom's proposed mastery learning strategy, Mayer's Cognitive Theory of

Multimedia Learning, Alessi and Trollip's instructional systems design, and Gagné's nine conditions of learning.

Mastery Learning

Mastery learning plays an important role in fostering students' understanding of basic concepts of biology topics, and hence, in meeting the standards necessary in the learning of biology. It provides a systematic instruction which promotes the students' meaningful and efficient process of information (Figure 1).

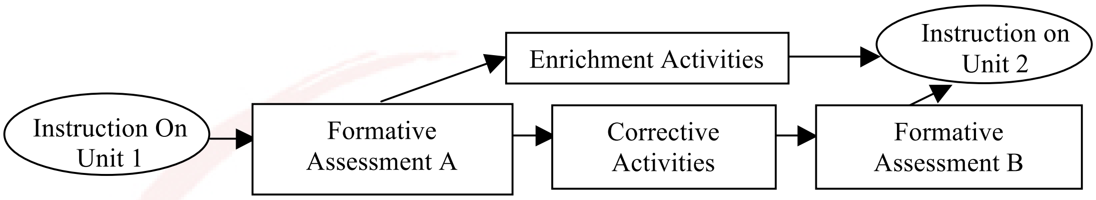
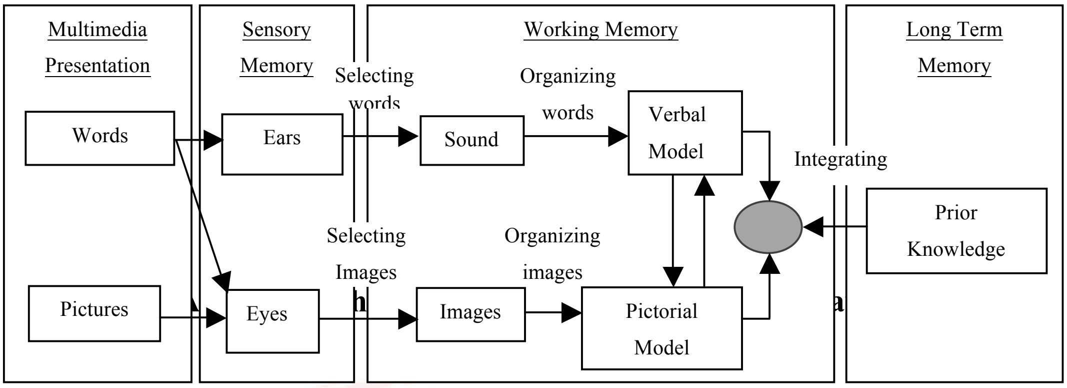


Figure 1. The Process of Instruction under Mastery Learning (Guskey, 1997)

The mastery learning method divides subject matter into units and each unit has a specific module to complete with predetermined objectives. In performing the unit tests, students should achieve mastery, typically 80%, before moving on to the following units. Students who do not achieve mastery, receive remedial instruction and students who achieve mastery, have the opportunity to participate in enrichment activities. With the use of the computers, mastery learning has a high potential to become an effective and extensive teaching and learning tool (Guskey, 1987; Kulik et al., 1990; Fike et al., 2011). For each learning module, students are allowed to test and re-test until competency is achieved on each unit. This allows students to proceed at their own pace based upon their unique learning styles and capacities for learning. Each time when a student completes a test on a learning module, they are promptly informed of their performance and will receive immediate feedback on those items below the competency level. Accordingly, students who learn at a slower pace or have inadequate academic backgrounds are provided the opportunity to catch up with those students who have stronger backgrounds or learn at a more rapid pace. This tends to create an equalizing effect for students. In this study, all the instructional elements, in mastery learning strategy, are delivered via multimedia interactive tools.

Cognitive Theory of Multimedia Learning

The Cognitive Theory of Multimedia Learning (CTML) describes how people learn from words and pictures (Mayer, 2003). Figure 2 depicts the CTML which is intended to represent the human information processing system. Mayer's CTML encompasses three fundamental assumptions for multimedia design. These assumptions informs us how humans possess separate channels for processing visual and audio information, the reasons humans are limited in the amount of information that they can process in each channel at one time and engaging in active learning by attending to relevant incoming information besides organizing selected information into coherent mental representations, as well as integrating mental representation of other knowledge.



Referring to the third assumption, Mayer explains his philosophy for meaningful learning. According to Mayer, for meaningful learning to occur in a multimedia environment, the learners must engage in five cognitive processes. Firstly, the learner selects relevant words for processing in his/her verbal memory. Secondly, the learner selects relevant images for processing in his/her visual working memory. Thirdly, the learner organizes selected words into a verbal mental model. Then, the learner organizes selected images into a visual mental model and, lastly, the learner integrates verbal and visual representations. In line with CTML, Mayer (2009) proposed twelve research-based principles for the design of a multimedia application. The Multimedia Design Principles explain how students learn better from the multimedia elements. In this study, eight relevant principles were adopted in designing and developing the multimedia learning application. The eight principles are Multimedia Principle; Spatial Contiguity Principle; Temporal Contiguity Principle; Coherence Principle; Modality Principle; Redundancy Principle; Signalling Principle and Segmenting Principle.

The Model for Motivation

The modes of visual presentation designed for this study include multimedia presentations to encourage learners to engage in active learning by mentally making connections between pictorial and verbal representations. The ARCS model of motivation developed by Keller (1987) is used in this study as a measure of motivation among biology Matriculation students towards biology and multimedia instruction. Keller's model suggests strategies for increasing motivation to learn. ARCS is an acronym for the four essential strategy components for motivating instruction namely (1) Attention strategies for arousing and sustaining curiosity and interest, (2) Relevance strategies linked to learner' needs, interests and motives, (3) Confidence strategies that help students develop a positive expectation for successful achievement and (4) Satisfaction strategies that provide extrinsic and intrinsic reinforcement for effort. Attention involves the arousal of interest in learners, the stimulation of an attitude of inquiry and the maintenance of attention. Relevance refers to tying instruction to make it relevant to the student's personal interest or goals. Confidence refers to the students' expectations for success and Satisfaction refers to the process or results of the learning experience. Therefore, Keller (1987, 2010) suggested that this A ARCS model could be used in multimedia environments and also in traditional learning environments.

Model of Instructional System Design

In addition to the CTML and in reference to the mastery learning model, it is considered to be closely aligned with the use of instructional objectives and the systematic design of instructional programs. Therefore, instructional design plays an important role in this matter. The combination of systematic design, integration of mastery learning, and interactive multimedia might have a great impact on the teaching and learning of subjects, such as biology, whereby hierarchical and abstract knowledge are known requirements of the field.

A macro design stage, used in the development of this courseware, was adapted from Alessi and Trollip's instructional design model (Alessi & Trollip, 2001). This model is flexible and one can mould it according to individual needs and styles of work. On the whole, Alessi and Trollip (2001) created a comprehensive model for developing interactive materials. These have three attributes that are always present and three phases, each comprises a variety of issues to be addressed and actions to be taken. The three attributes are standards, on-going evaluation, and project management. The three phases are planning, design, and development. This means that, during the three phases in the design and development process, the courseware's designer and developer should bear in mind these three attributes constantly.

Figure 3. Biology teacher character interacting with the user

Figure 4. Example of instructional material using enhanced cues

Methodology

This research examined the learner's perception concerning the attention, relevance, satisfaction and confidence level of using Multimedia-assisted Mastery Learning Courseware (MMLC) in the learning of cellular respiration. The research was conducted on a sample of pre university students from three Matriculation colleges in Malaysia using purposive sampling. On the first day of the data collection, students were given a briefing on the learning strategies. Next, students were given the courseware to explore the cellular respiration topic. The subtopics covered in the whole process were (1) Types of respiration : aerobic and anaerobic, (2) Aerobic respiration, (3) Glycolysis, (4) Krebs cycle, (5) Oxidative Phosphorylation, and (6) Anaerobic respiration.

The whole lesson took four to six hours to finish. Students took a formative test after each subtopic independently. Students who failed to meet the success level of 80% as evaluated by the computer received supplementary instruction and correctives activities immediately until the requirement was met. At the end of the lesson summative test was given to overall evaluate the topic.

Analysis and Findings

The data of student's perceived motivation on the usage of MMLC was collected and analyzed using were analysed using Winsteps software Version 3.72.3, applying the rating scale Rasch model. There were no missing data in this survey among 155 respondents. According to Ren et al (2008) claims that the Rasch is mathematically identical to the most Item Response Theory (IRT model) but however, it is a comparatively more viable proposition for practical testing since it can be applied in the context in which persons interact with items. This rating scale specifies that the whole set of items shared the same rating scale. With the assumption of a one-dimensional domain being measured, hence, all the data must fit into the model. All through this analysis, there are several tables and figures used to explain and analyze learners' perceived motivation and difficulty level of the whole survey.

One statistical summary table is generated to define the separation rate which is the number of statistically different performance strata that test can identify in the sample and the reliability rates which show whether the test discriminates the sample into enough levels for the intended measure. Besides, the variable map illustrates the empirical hierarchy of the items which is connected to the students' level of willingness to endorse each item with sincerity and carefulness. Each item is reported in a logit. A logit (log-odds unit, pronounced "low-jit") is a unit of interval measurement which is well-defined within the context of a single homogenous test (Bond & Fox, 2007).

Students' Perceived Motivation Reliability and Separation

The results of this analysis were in the form of a statistical summary table of respondents and the items which investigated the reliability and validity of the instruments to the associated respondents. The person's reliability in this study was 0.84, with separation of 2.27 whereas the item reliability was 0.96, with separation of 4.65. Assuming that the acceptability threshold of 0.80, both the reliabilities for the person and item scales were reliable and useful for the purpose of this research. Besides, the Cronbach alpha value of 0.89 indicated that all the items had high internal consistency.

Meanwhile the separation of person and item reliability more than two indicated that there are wide ranges of person measures and an excellent item difficulty spread across the measurement ruler. It also revealed that the number of items in this survey is just adequate. The person reliability (0.84) and item reliability (0.96) is good enough. The perfect reliability number is 1.00. The person reliability can be fit to 1.00 if we increase the sample size or testing learners with more extreme attitudes such as very satisfied or very unsatisfied to MMLC. On the other hand, reliability of item can be increase if we increase the number of very good item in this survey. As a consequence, this results appears to have functional reliability as a whole.

Students' Perceived Motivation Fit Statistics

Table 1 illustrates that all the items in this survey fit the expectation of aRasch model. In particular, all of the items fall within the acceptable infit and outfit Mean-square fit statistics (MNSQs) limits. Fisher (2007) suggested that items that produce standardized scores that differ by more than ±2.0 from the actual score are items that are only weakly related to the rest of the item comparing the scale. When addressing infit and outfit, a mean squared value range cutoff is determined by the size of sample. Specifically the items of this study was agreed to fall within the acceptable infit and outfit limit of 0.6 to 1.5 (Bond & Fox, 2001) which is less than 2. The acceptable range below 2.00 was cut off from the common because we wish to get more accurate measurement.

As long as the infit and outfit MNSQ fall within the acceptable range, it means that the feedback on this survey are relevant and appropriate to fit the purpose of this study. From table 2, both of the Mean of infit and outfit MNSQ is 1.02. This result is good as the best Mean for infit and outfit MNSQ are 1.00. If the amount in near 1.00, it means all these items are appropriate and relevant for this survey.

Table 1 Fit Statistic for Perceived Motivation Criteria

Item		Infit MNSQ	Outfit MNSQ
confi25	After working on this lesson for awhile, I was confident that I would be able to pass a test on it.	1.40	1.40
relev6	It is clear to me how the content of this material is related to things I already know.	1.40	1.40
confi1	When I first looked at this multimedia courseware, I had the impression that it would be easy for me	1.19	1.37
confi13	As I worked on this multimedia courseware, I was confident that I could learn the content	1.31	1.00
attent2	There was something interesting at the beginning of this multimedia courseware that got my attention	1.17	1.25
attent11	The quality of the writhing helped to hold my attention	0.99	1.05
attent15	The pages of this multimedia courseware look interesting and appealing	0.97	1.00
relev33	The content of this multimedia courseware will be useful to me	0.99	0.99
attent22	The amount of repetition in this multimedia courseware are not to get me bored.	0.89	0.93
confi34	I really understand all of the material in this multimedia courseware	0.93	0.87
confi35	The good organization of the content helped me be confident that I would learn this material	0.88	0.89
atten8	These materials are eye-catching	0.87	0.88
relev18	There are explanations or examples of how people use the knowledge in this multimedia courseware	0.86	0.82
confi3	This material wa0.82s not difficult to understand than I would like for it to be	0.82	0.83
relev23	The content and style of writing in this multimedia courseware convey the impression that its content is worth knowing	0.82	0.78
satis14	I enjoyed this multimedia courseware so much that I would like to know more about this topic	0.82	0.80
Mean		1.02	1.02
SD		0.21	0.22

Students' Perceived Motivation Empirical Hierarchy

Variable map is an empirical hierarchy of Rasch model which is another visual guide to inform the relatives' scale. Figure 5 present the variable map of the items and persons. M represent mean, S represent standard deviation and T represent two standard deviation in Figure 5.

The right side illustrates the map of items. It is ranked by the level of difficulty to endorse. From the top to the bottom, items had been identified from the most difficult (not very satisfied) to endorse to most easiest (very satisfied) to endorse items by the respondents. The most difficult item is the least favourite item while the easiest item is the most favourite items for respondents.

From Figure 5, the variable map shows that there is one item which is most difficult to endorse by respondents which is item confi25. Item confi25 is "After working on this lesson for awhile, I was confident that I would be able to pass a test on it". The students were concern on time allocation to finish the materials.

However, the variable map in Figure 5 shows that there is one easiest item to endorse which is item confi13 : that is, "As I worked on this multimedia courseware, I was confident that I could learn the content". The result from the students for this item shows that they are satisfied on MMLC which help them pace their studies and the contents of the information received were useful and powerful.

On the other hand, the left side of the map ranked the respondents from the learners who are most satisfied with MMLC to the least satisfied. Most of the respondents were satisfied with the items except for the nineteen respondents who were not so satisfied with the items asked in this survey. Overall, this variable map is considered good as the respondents were satisfied to the newly launched MMLC program.

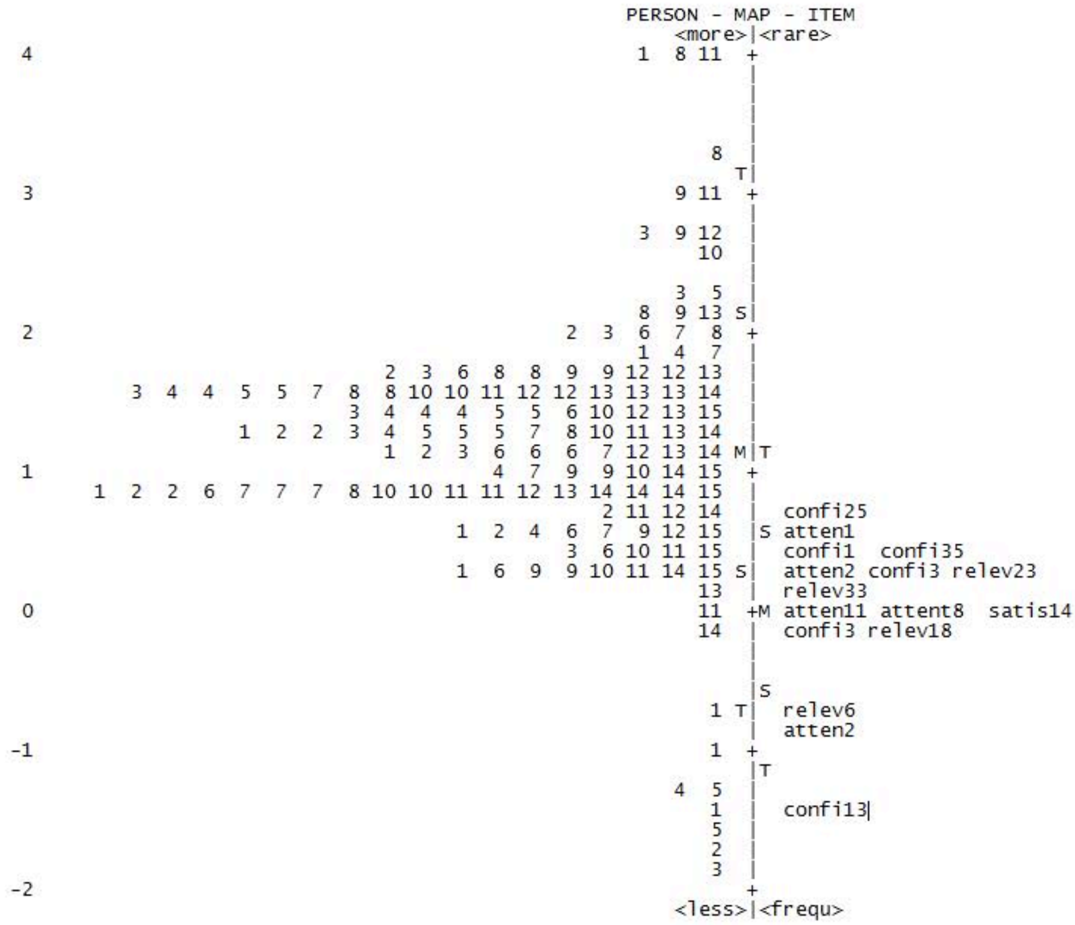


Figure 5. Variable map of students' perceived motivation

Conclusion

The objective of developing the multimedia interactive courseware, choosing an appropriate strategy with a suitable instructional design are critical components to the success of the courseware. As a conclusion, the result of this survey shows a positive impact on perceived motivation of students after using our MMLC. The students felt supported as this method involved a systematic instruction strategy. The finding of this study propose a simple yet powerful approach to facilitate the learning process of students through the use of multimedia integrated learning system with a series of high quality instructions in mastery learning.

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Smart Classroom as the Innovative Learning Environment to Promote Lifelong Learning Education

Khanita Tumphasuwan, Chiang Mai University, Thailand
Pitipong Yodmongkol, Chiang Mai University, Thailand

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Abstract
Education is a basic foundation for human resource development. Educational system in Thailand is divided into four levels which are primary education, secondary education, vocational education and higher education. A unique intellectual in higher education contributes to society's efforts to achieve sustainability by the practices of skills, consultancies, trainings, and sharing of knowledge. University researchers are the first priority to alert the challenging environments, and assist to spearhead a multidisciplinary of social solutions. To promote lifelong learning education and support Thailand educational strategic plan, the executives of Chiang Mai University recognizes the need to integrate the innovative learning environment and the intellectual educational tools to bring up students cognitive learning skills to a higher quality and excellent level. The expected result is the policy to support core strategies in improving Thailand human resource development, and create highly competent knowledge workers. This paper is conducted using a case study of College of Arts, Media and Technology (Lamphun Campus), Chiang Mai University, Chiang Mai, Thailand.

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1. Introduction

It is generally accepted that education is the basis of human resource development. Education plays a key role to resolve problems in desirable way i.e, the problems about economic, social, environmental, health, politics, culture, technology innovation, quality of life and tourism. It can also lead to a sustainable development and a competitive ability against the civilized countries as it changes "the foundation of wisdom" of human resources. Education is beneficial for human resource development in many aspects as follows.

- Education develops human resources in terms of psychological and ethical of individuals.
- Education introduces social skill to people, for example, the way to behave as good citizens so as to work and live happily with others. Furthermore, they are likely to have a responsibility, understand rights and freedoms of the individual and others according to law.
- Education improves the potential of human resources. It makes people to have competency and professional skills towards their careers. It can also encourage people to have a good quality of living.

Education in Thailand includes a nine-year compulsory education: the first to the sixth year in an elementary level and the other three years in a secondary level. After that, students can choose to study in high schools or vocational colleges and continue their education in the higher levels which are bachelor, masters and doctoral degree. In addition, the government needs to push education to all the citizens and there is also an effort to encourage lifelong educational system. With the changing pace of the world, people have also changed their ways of life, for example, the advent of real time video and audio technology makes it easy to communicate across the continent. Additionally, computers lead to a technological-driven society where they are likely to replace human labours. Human therefore should continue seeking for further knowledge apart from the basic education to keep pace with these changes. However, the progress in technology is likely to provide an easier access to vast amounts of information which can also support lifelong learning.

College of Arts, Media and Technology, Chiang Mai University has encouraged the use of technology to both teachers and learners by providing an access to a wide range of available knowledge and information from the Internet. CAMT has also recently developed a pilot project to maximize the teaching and learning potential with a smart classroom at Lamphun campus. This project is aimed to introduce an alternative way to apply technology for education as well as enhance the interaction between the learners and the learners, and between the learners and the instructors. The smart classroom project will be started up the operation in the first semester of 2014.

Smart classroom is a classroom equipped with three E-boards or screens with the size of 55 inch installing at the front, the side and the back of the room. Besides, there are 30 tablets and a classroom management system in the smart classroom. Each student is given one tablet to sync and exchange information with each other and the teacher. During the course, the instructor will present learning contents via the tablet. The contents will subsequently be displayed on the LED boards and also on the tablets of the students. Meanwhile, if the students have any inquiries or feedbacks, they can be retrieved to the screen for the discussion. This will promote an enjoyable teaching atmosphere. Moreover, the students can directly download the learning and discussion contents to their tablets.

Smart classroom tends to reduce restrictions on one-way communication from the instructor within the classroom. Students are also likely to have the opportunity to develop their self-learning and researching skills via their tablets. Smart classroom can stimulate interactive learning as the students have to work as a group, give comments or questions via tablet. The teacher has to ask questions, create learning activities and pull the students participation to exchange ideas and information through the devices. Studying in the smart classroom allows learners to have an unlimited access to information resources which ultimately leads to self-development throughout their lives by using information technology as a tool.

2. Literature review

Motivation and desire to engage in the Statecraft X project was contingent with the understanding of a variety of literature on learning. Video games, or more appropriately in today's mobile context, digital games, have immense potential as learning tools, Games are multidimensional, challenging and are designed to allow for learning to take place. They alter the belief that thinking is an activity that takes place in solitude and instead, identifies how the combination of emotion and pleasure derived from play are keys to thinking and learning (Gee, 2007).

In developing as well as developed societies that prize inclusiveness, approaches to learning have to factor in the growth of creative differences in individuals. This must be supported by the need for experience in environments, in the Deweyan sense of educational pragmatism, where consequence, action and thinking in learning come together without a mechanical, predictable end result (Elkjaer, 2009). To the extent that this is so, learning cannot and should not be regarded as an individual activity, and must take place in social contexts, taking in consideration that constructs of what we know, and how we make meanings of them are situated in communities (Wenger, 2009).

Learning should not take place with an emphasis on the capacity of the students' capabilities, but rather, the action being enacted, so as to ensure learning through performance, which is reflexive in nature (Baumann, 1989). A performance oriented model of learning is advantaged when compared to the human information processing model, which regards learners largely as storage machines, as performance leads to the creation of new meanings and understandings of existential occurrences only possible by a biological being. That in these perspective explained, is why Statecraft X accentuates digital contexts and socialized learning with opportunities for performance.

Lifelong learning means the continuous development and improvement of the knowledge and skills needed for employment and personal fulfilment through formal and informal learning opportunities. Learning is therefore part of life which takes place at all times and in all places. It shares mixed connotations with other educational concepts, like continuing education, permanent education and other terms that relate to learning beyond the formal educational system. Lifelong learning is the lifelong, voluntary, and self-motivated pursuit of knowledge for either personal or

professional reasons. It not only enhances social inclusion, active citizenship and personal development, but also competitiveness and employability (Watson, 2003)
The concept of lifelong learning spans a wide range of education and training issues and speaks to many different audiences. In the actual global economic and educational environment, main challenges for lifelong learning process are:

- Inducement of informal learning opportunities.
- Stimulation of self-motivated learning.
- Acceptance of self-funded learning.
- Stimulation of universal participation to the learning process.

Lifelong learning offers a systemic view of learning, since it examines the demand for, and the supply of learning opportunities, as part of a connected system covering the whole lifecycle and comprising all forms of formal, non-formal and informal learning. Also, it emphasizes the centrality of the learner and the need for initiatives that cater for the diversity of learner needs. This represents a shift of attention from the supply of learning to the demand side. Lifelong learning is focused on the motivation to learn, and draws attention to self-paced and self-directed learning and it stresses the multiple objectives of education policy, which include economic, social or cultural outcomes; personal development, and citizenship. The lifelong learning process also recognizes that, for the individual, the priorities among these objectives can change over the lifecycle; and that each objective has to be taken into consideration in policy development (Smith & Ferrier, 2002).
In the specialist opinion, the main lifelong learning characteristics are (Isaila, 2011): educators are guides to sources of knowledge; educators serve as facilitators for the student's acquisition of knowledge; people learn by doing, or action learning; people learn in groups and from each other; assessment is used to guide learning strategies and to identify pathways for future learning; educators develop individualized learning plans; educators are lifelong learners. Initial training and ongoing professional development are linked; people have access to learning opportunities over a lifetime; learning is put into practice; learners reflect upon learning and analyse their personal development.

There are ten main benefits offered by lifelong learning, such as (Nordstrom, 2008):

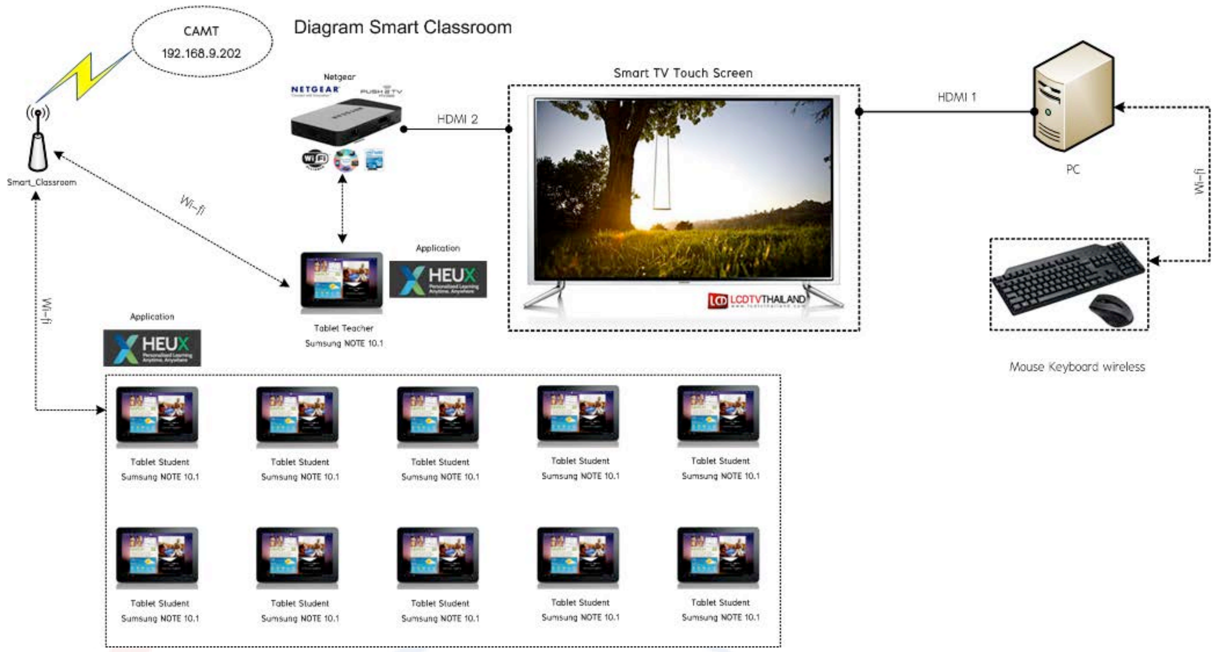
- Helps fully develop natural abilities.
- Opens the mind.
- Creates a curious, hungry mind.
- Increases our wisdom.
- Makes the world a better place.
- Helps people to adapt to change.
- Helps people find meaning in our lives.
- Keeps us involved as active contributors to society.
- Helps us make new friends and establish valuable relationships.
- Leads to an enriching life of self-fulfillment.

A smart classroom is equipped with multimedia components which are designed to enrich the teaching and learning process. Technology in education has played a significant role in educating and connecting the students to the existing and future learning opportunities. **Smart Classrooms** have been enhanced with advanced technological learning aids, thereby revolutionizing the whole teaching and learning process. In many impoverished districts and states, technology has allowed students to experience world-class education and actively participate in advanced placement courses. There are a number of new trends that are creating new opportunities for the education providers and learners so that information can be effectively accessed by the end-users, including people with disabilities. Assistive and Learning Management Solutions are enabling the teachers to deliver special education in **classrooms** and not in segregated special needs **classrooms.** The constant progression of technology in education has helped educators to create **classrooms**, which are concrete, developed and collaborative, conducted entirely through web services Ed Tech is used to improve education with various types of devices used such as tablets, interactive displays, interactive whiteboards, adaptive devices and many other types of products used for educational purpose. There is still time for the education system to utilize technology in education to its fullest potential because of logistics hurdles - finances being the main hurdle.

The major vendors offering Ed Tech products and services to the end-users are Apple, Blackboard, Discovery Communication, Dell, Dynavox Mayer-Johnson, HP, Jenzabar, IBM and Toshiba. Therefore, the tremendous advancements in Ed Tech have led to the development of speech and recognition technology, interactive software, and utilization of portable products. This research report categorizes **Smart Classrooms**/Ed Tech to forecast the revenues and analyze the trends in each of the following sub-markets: On the basis of educational hardware: Interactive whiteboards Projectors Interactive displays Printers Interactive tables Audio systems Others On the basis of educational systems: Learning Management Systems (LMS) Learning Content Management Systems (LCMS) Learning Content Development Systems (LCDS) Student Response Systems (SRS) Assessment systems Collaboration systems Classroom management systems Document management systems Content creation systems On the basis of enabling technologies: Educational gaming Educational analytics Educational Enterprise Resource Planning (ERP) Educational security Educational dashboard On the basis of verticals: KindergartenK-12Higher Education On the basis of regions: North America (NA) Europe (EU) Middle East and Africa (MEA) Asia Pacific (APAC) Latin America (LA) (Ed Tech Worldwide Market Forecasts and Analysis, 2013 - 2018).

3. The proposed methodology

1. Make a decision on which modules will be taught in the smart classroom.
2. Develop learning contents and classroom activities to promote interactions between the instructor and the students.
3. Configure and set up all devices and equipment’s in the smart classroom.
4. Manage classes in the smart classroom.
5. Apply an assessment on classes in the smart classroom for future improvements.
6. Create additional teaching and learning activities that encourage information exchange and the interest in the smart classroom.



Smart classroom system

4. Conclusions and further development

1. Smart classroom is likely to promote information sharing, problem solving, creative thinking and an equal access for teaching and learning process.
2. Students have active engagement and collaborative learning.
3. Learning style is changed from writing on the paper to the use of technology such as tablet and e-board. Learners can engage in teaching and learning process instead of studying by individuals.
4. Instructors and students have the skills to use technology for accessing information which encourages lifelong learning.
5. There will be an alternative teaching and learning approach that applies technologies for the accordance with globalization.

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Scaffolding Business Analysis Course With Instructor Feedback For Effective Learning

Raymond Tham, University of Newcastle, Australia
Lesley Tham, RegCom International, Singapore

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Abstract
This paper seeks to examine the effectiveness of instructor feedback utilising different approaches in supporting student learning in a Business Analysis course in an online collaborative learning environment. The aim is to achieve high student success rates in completing their Business Analysis tasks over a period of 13 weeks. Instructor support was offered through regular feedback using emails, discussion forum, etc. Detailed evaluation was conducted the impact of instructor feedback on the overall performance and learning outcome of students. The results showed active student participation and positive learning outcomes.

Keywords: Blended Learning, Lecturer Feedback, Scaffolding Tools, Collaborative task, Pedagogy and Strategy

1. INTRODUCTION

***"Action without feedback is completely unproductive for a learner" Diana Laurillard
(Laurillard, 1993, p. 61).***

In a blended learning environment, educators assume multiple roles encompassing pedagogical, intellectual, social and technical roles. They have to be skilful in online communication technologies such as WebCT and Blackboard and be able to engage students in online learning, encouraging deeper analysis of the course material, fostering a cohesive online learning community. To promote learning effectiveness, it is crucial for instructors educators to provide proper instruction, guidance, facilitation and monitoring of students' progress, as well as mentoring. This will involve regular feedback to students to ensure that they are on the right track in achieving their learning goals. Bob Sullo (2009) posited that the need to belong and connect is the social need of human beings. Since students are driven by a social imperative, effective teachers structure their lessons so students can meet this need while engaging in rigorous academic work. Failure to offer students a chance to interact for long periods only invites off-task behavior that compromises learning.

This paper seeks to explore the efficacy of instructor feedback in scaffolding student learning through different modes of instructor feedback in an online collaborative learning environment in Singapore's higher education. What is the impact of instructor scaffolding on the learning experience of students in a project-based course? What type of instructor feedback can be employed to achieve learning effectiveness?

2. LITERATURE REVIEW

Research shows that concept of classroom scaffolding is derived from the socio-constructivist model of learning (Vygotsky, 1978). According to social constructivists, classroom scaffolding is defined as "the social interaction among students and teachers that precedes internalization of the knowledge, skills and dispositions deemed valuable and useful for the learners" (Roehler & Cantlon, 1997, p. 9). Davis and Miyake (2004) described classroom scaffolding as assistance without which a learner cannot attain a goal or engage in an activity. Typically, classroom scaffolding is provided by more capable others to help learners to achieve what they cannot accomplish independently; scaffolds are generally faded as the locus of responsibility shifts to learners. Research involving different domains, classroom settings, and student age and ability has generally shown that scaffolding tends to be effective when provided through verbal discourse, teacher modeling, and pedagogical tools, such as triggering student sense-making (Quintana et al., 2004), task-problematization (Reiser, 2004), visualization and representations of knowledge (Linn, Clark, et al., 2003), and construction of arguments and explanation (Aleven & Koedinger, 2002).

Consistent with Vygotsky's (1978) and Davis & Miyake (2004)'s description of scaffolding, the author defines scaffolding as assistance, guidance and support from an experienced and knowledgeable person who is able to facilitate learning and enable learners to successfully achieve their learning goals. Effectively, dynamic scaffolding is a holistic, integrated, and synergic approach utilizing multiple resources such as experts, peers, technologies, and learning context in a complementary manner.

The importance of instructor feedback as a tool to guide learning is well documented in educational literature. Instructor feedback is said to promote self-efficacy and performance of students (Wang & Wu, 2007)- Interaction between students and their instructor is critical for student engagement and performance. It enables the instructor to have a good guage and an accurate understanding of students' learning as well as to correct any misconceptions in the students' mind. On the part of the students, interactions with the instructor greatly alleviate their frustrations in completing their course assignments. Research indicates that frequent instructor feedback and interactions with students have a positive impact on student motivation to learn, persistence in learning, student retention and positive learning outcomes (Zavarella & Ignash, 2009; DiRamio & Wolverton, 2006; Tripp, 2010; Zavarella, Calvin & Freeburg, 2010). Through interactions with the instructors, students are able to stay on track in fulfilling their goals and expectations of the course.

According to Kim and Hannafin (2011), instructor scaffolding for student online interactions are typically static or dynamic. Static scaffolding is provided in the form of fixed guidelines, procedures, or information that typically do not involve negotiation between the students and the scaffold source (e.g., text, tool, or technology). Dynamic scaffolds provide interactive methods to assess learners' progress and provide feedback in response to differential learners' needs (e.g., cues and prompts). Learners assume responsibility for regulating the amount and pace of scaffolding and determine which and when scaffolds are deployed. Kim and Hannfin highlighted four scaffolding purposes, namely, procedural, conceptual, meta cognitive and strategic. Procedural scaffolds guide the student in addressing operational aspects of the learning environment while conceptual scaffolds help students to identify essential knowledge gaps between what they already know and what they need to know. Metacognitive scaffolds assist students in assessing their state of understanding, reflect on their thinking, and monitor their problem-solving processes. Lastly, strategic scaffolds help students to consider alternative approaches to addressing problems.

3. METHOD

1.1. OBJECTIVE

The objective of this study is to determine the impact of instructor feedback in scaffolding student learning through different modes of instructor feedback in an online collaborative learning environment in Singapore's higher education. Wagner (1994) defines instructional interaction as "an event that takes place between a learner and learner's environment and its purpose is to respond to the learner in a way intended to change his or her behavior toward an educational goal" (p. 9). Thurmond and Wamback (2004) defined instructor feedback as information exchange between the instructor and the student about course activity and assignments, which will promote student learning. For the purpose of this study, we define instructor feedback or interaction as a response to the learner regarding his/her progress, performance or achievement in relation to the course goals and intended to instil a grasp of high quality work and how it might be achieved.

1.2. QUALITATIVE STUDY

A group of 33 undergraduate students from the Bachelor of Information Technology program at a private higher education institute in Singapore was invited to participate in the survey and focus group study at the end of course for this paper. These undergraduate students attended a Business Analysis (BA) course conducted by the author.

In this course, 33 students were assigned to work in groups of four to five to produce a 10,000 words project report for the BA Software, which they develop for their client. In their group, students are to collaboratively complete their project within 13 weeks. The BA course was set up using Blackboard version 8 Campus Pack which students are familiar with. The technology-enhanced support tools to scaffold student project based learning are :-

- Weekly meeting with Lecturer on the progress
- Blackboard Collaboration online environment
- Discussion forum

An online survey was launched at the end of the BA course in week 13 to analyse student's collaborative learning experience using Blackboard Campus Pack as scaffolding tools in their BA course. The survey also analyses the motivation factors surrounding students completing this course. The survey has 4 subscales using 7 likert scale questionnaires.

The 2 subscales are to analyse the scaffolding tools used namely Lecturer Support through feedback, and Discussion Forum. These scales seek to analyse how well the scaffolding tools in a blended learning and collaborative environment support students' learning experiences.

1.3. COURSE DESCRIPTION FOR BUSINESS ANALYSIS

The course, Business Analysis, is offered to 33 Computer Science final year students in Trimester 3, 2012. The course seeks to provide students with the understanding and skills in project and team management as well as integrate these with the student's existing domain expertise. Students will experience all aspects of the Project Life Cycle through the completion of integrated unifying exercises.

All aspects of contemporary business analysis practice will be covered, with guiding principles used in formulating exact content and delivery methods. The Project Management Body of Knowledge will provide the conceptual framework and examples that are tailored to suit the background and interests of students will be utilised to demonstrate and re-enforce concepts.

The Business Analysis Course is set within a blended setting incorporating collaborative learning and motivational factors in the course design. The emphasis will be on student-centered learning.

1.4. THE PROJECT

There were five project teams formed for the online collaborative learning using the above tools from Blackboard Campus Pack for the Business Analysis course.

1.5. RELIABILITY OF DATA

To ensure the reliability of data for the survey, principal components factor analysis is used in the screening sets of items forming a scale. In addition, the alpha coefficient of reliability will be calculated for each scale, and the dimensionality of the scale will be investigated. Scale reliabilities will be calculated using Cronbach's alpha coefficient. When using Likert-type scales it is imperative to calculate and report Cronbach's alpha coefficient for internal consistency for all scales or subscales. The further analysis of the data then uses these summated scales or subscales when considering relationships. The alpha coefficient for the all items with sample size of 33 is above .70, suggesting that the items have relatively high internal consistency. This is shown in table 1 below.

Name of Sub-Scale	Cronbach's Alpha
Lecturer Feedback (Face to face)	.894
Online lecturer feedback using discussion forum and email	.846

Table 1. Sub-Scale Item Reliabilities

1.6. SURVEY FINDINGS

Table 2 below is the summary statistics for each of the 2 sub scales mentioned in Table 1 above. The overall results have an average mean of 4.

Sub-Scale Name	N	Mean	Std. Deviation	Skewness
Lecturer Feedback (Face to face)				
Frequency of Interaction with Lecturer	33	4.15	1.278	-.396
Student satisfaction with interaction with Lecturer	33	4.06	1.197	-.007
Student satisfaction with Email support from Lecturer	33	4.58	1.3	-.495
Overall student satisfaction with Lecturer Support in the course	33	4.45	1.416	-.464
Online lecturer feedback using discussion forum and email				
Student satisfaction with Lecturer support in Discussion Forum	33	4.42	.272	-.715
Enjoyed Discussion Forum	33	3.73	.911	-1.260
Effectiveness of Discussion Forum	33	4.03	.918	-.836
Performance with Discussion Forum	33	3.79	.960	-1.799

Table 2. Summary of Sub Scales Statistics

The overall results show promising and encouraging trends on the effectiveness of Lecturer feedback to enhance and improve the learning experience of students in a technological driven environment for learning.
As show in the table above, students ranked lecturer feedback higher during formative classroom feedback than during discussion forum. This is because classroom feedback is immediate whereas online feedback is available only when the instructor is

online. However, students indicated that they are satisfied with the support Lecturer provided during Discussion forum and indicated that it is effective in supporting and enhancing their learning experience, their knowledge, and performance in the BA course in a technology-enhanced collaborative environment. It has also effectively support them in completing all their tasks required in the BA course.
We will now examine the effectiveness of each of the each item in scale in enhancing learning effectiveness, in greater detail.

1.7. LECTURER FEEDBACK DURING THE COURSE

The mean score for Interaction Frequency with Lecturer is 4.15 out of a scale of 6. This indicates that students regarded this factor to be an important factor in providing guidance and support to either individual in their inquiry processes of the subject matter. This is an important element as he plays an important role in aiding students to understand the project better to achieve maximum learning benefit in the course.

The mean score for Satisfied with Interaction with Lecturer is 4.06 out of a scale of 6. Students are generally satisfied with lecturer support in a collaborative environment in their inquiry processes of the subject matter.

The mean score for Satisfied with Lecturer Support during the course is 4.45 out of a scale of 6. This indicated that Lecturer support is an important factor in provides feedback that students can know where they go out and improve their work in their learning.

The overall results indicated the important role the Lecturer plays throughout the course in providing formative feedback to students on their progress. This interaction and frequency of meetings between Lecturer and students are crucial as shown in this study.

1.8. DISCUSSION FORUM

The mean score for Satisfied with Email support from Lecturer is 4.58 out of a scale of 6. Email is also an important factor for Lecturer to aid student in providing guidance and support in their inquiry processes of the subject matter.

The mean score of - Satisfied with Lecturer support in Discussion Forum is 4.42 out of a scale of 6. This indicates student's preference in posting questions to discuss with their peers and the lecturer.

The mean score of Enjoyed Discussion Forum is 3.73 out of a scale of 6. This indicates student enjoy the interactions with Lecturer during Discussion forum. This score is moderate which may indicate that some students may not have interacted much during the discussion forum sessions.

The mean score of Performance with Discussion is 4.03 out of a scale of 6. This indicates student's performance in the course has direct relationship with Lecturer feedback with their problems they encountered. This also contributed to their weekly meetings feedback and progress in their work.

The mean score of Effectiveness of Discussion Forum is 3.79 out of a scale of 6. This score is moderate compared to the rest, which indicates student's perception of how effective they consider Discussion Forum.

The overall results in using Discussion Forum to scaffold Lecturer interaction with in groups does indicated that it allows students to interact and learn not only among students but also from the lecturer's interaction in the form of feedback, guidance in a collaborative technology-enhanced environment. Students' supports through lecturer feedback sessions both through individual email and group discussion forum provide support for them to interact and learn in a deeper way. As the learning process does not end in class but continues outside the class room being supported via technology-enhanced o from the lecturer's interaction in the form of feedback, guidance in a collaborative technology-enhanced environment.

2. OUTCOME OF COLLABORATIVE TASK PERFORMANCE

The outcome of the Business Analysis course in this research is most encouraging. The class of 33 students achieved a 98% pass rate. The program course review by students was also obtained a high rating of 4.4 out of 5. This shows that students were very satisfied with the course and their learning outcome in terms of having attained their learning goals.

3. DISCUSSION OF FINDINGS

Overall, students were positive about the opportunity to interact with the lecturer. They however, found formative feedback from the lecturer in class to be more beneficial compared to interactions via discussion forum. Both forms of feedback – face to face and online instructor feedback produced positive learning outcomes for students in completing their course assignments and project. Students found the instructor's corrective feedback to be highly beneficial in keeping them on the right track. Students like the immediate feedback from the lecturer. The discussion forum was a useful platform for lecturer-student interactions but is less effective as the feedback is not immediate compared to classroom face-to-face interactions with the instructor. As noted by Konold et al., (2004), the most useful feedback is well planned, constructive, and specific to the task at hand, as well as being timely, accurate, and encouraging.

This study demonstrates the importance of lecturer feedback in promoting effective learning of students with positive learning outcomes. Many theoretical and empirical researches have emphasized that strong instructor support in terms of frequent and personalized feedback is required to ensure maximum online learner satisfaction and effective online learning (Liu, 2009, 2010; Gallien and Oomen-Early's 2008). In addition, group feedback, individual feedback and self-reflection through the use of discussion forum are also useful instructional strategies (Bonnel, Ludwig and Smith, 2007). Instructors play a crucial role in ensuring that online collaborative learning promotes higher order thinking skills, co-construction of knowledge and social interaction (McLoughlin and Mynard, 2009; Hull and Saxon, 2009). They scaffold students' analysis and responses by providing guiding questions and feedback (US Department of Education, 2009, Williams et al., 2007).

According to Martins (2008- as cited by Wajeeh Daher, 2012), interactions in discussion forum encourages the emergence of different perspectives, and thus facilitates diversified contributions to the resolution of problems. A strong sense of community among learners can be nurtured by the online instructor to enhance the effectiveness of group work and learning and enable learners to enjoy the full benefits of collaboration in achieving their educational goals (Rovai, 2007; Delfino and Persico, 2007). This is especially when the social cues inherent in face-to-face interactions that support communication and collaborative work are absent in an online environment.

4. CONCLUSION AND FUTURE RESEARCH DIRECTIONS

Scaffolding student learning through good instructor support in terms of frequent feedback and guidance can positively contribute to deeper learning experiences, improve learning outcomes and learner satisfaction with online courses as well as reduce the potential of learner isolation that can occur in an online learning environment. Bonnel (2008, p 293) posited that “Good feedback helps students reflect on information, construct self-knowledge, and further learning goals.” It is also important to provide timely and appropriate feedback that can help a student improve study skills as well as get a better understanding of specific material.

Future research can conducted on the effectiveness and value of the different types and frequencies of feedback. Further research is needed to clarify the specific characteristics of corrective feedback that are critical for assisting student learning. In addition, further research is needed to determine, the types of tasks and problems for which a model comparison feedback method is effective, and the feasibility of making Web-based feedback corrective in nature. Future research can also examine the influence of culture in student response to instructor feedback as Asian students have different learning styles compared to their Western counterparts (Cheng, 1998 cited by Tham & Tham, 2011).

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Factors Contributing to the Successful Implementation of Information and Communications Technology in the Classroom

Munienge Mbodila, University of Venda, South Africa
Muhandji Kikunga, University of Venda, South Africa
Mmafani Serote, University of South Africa, South Africa

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Abstract
During the last decades the use and availability of information and communication technology (ICT) in teaching and learning is ubiquitous in the classroom. Mentioning ICT usually encourages thoughts of creativity, advancement, innovation, improvement and progress. We are living in a global society that is based on a vast network of interconnection and communication. The classroom has not been exempt from this general thinking. The use of information and communications technology is not just additional to teaching and learning but it is critical to the global society. In this article we review a number of factors which contribute to the successful implementation of ICT in the classroom, we also highlight the role of pedagogy and we finally suggest that it is the skills and beliefs of the instructor that are central to determine the effectiveness of the ICT into the curriculum for implementation in the classroom.

Keywords: *ICT, teaching and learning, classroom, global society, curriculum*

1. Introduction

Today, in the 21st century teaching is becoming one of the most challenging professions in our society where knowledge is expanding rapidly and modern technologies are demanding teachers to learn how to use these technologies in their teaching (Jung, 2005). During the last decades the use and availability of ICT in teaching and learning is ubiquitous in the classroom. Mentioning ICT in today's e-society, usually encourages thoughts of creativity, advancement, innovation, improvement and progress. Although information and communication technology (ICT) itself is not an answer for all educational problems, but today's technologies are essential tools to use in the classroom for teaching and learning in higher education. To use these tools provided by information and communication technology (ICT) effectively and efficiently in the classroom, teachers need visions of the technologies' potential, opportunities to apply them, training and just-in-time support, and time to experiment. Only then can teachers be informed and confident in their use of new technologies (Bowes, 2003). However researches have shown that higher education in general, in both developed and developing countries, faced challenges during the implementation of ICT in education. Currently with the fast increasing in diversity of technology use for teaching and learning, the barriers in implementing the use of ICT into teaching and learning environments have been discussed in many studies. According to Ertmer (1999), the barriers for ICT implementation can be divided into two main categories: first-order and second-order barriers. Whereby he defined first-order barriers as obstacles concerning essentially different types of resources (e.g. equipment, time, training support), which are extrinsic to teachers. The second-order barriers are related to teacher's underlying beliefs about teaching and learning, teacher-student roles, curricular emphases, assessment practices, etc. The reality in today's society still the same following its arguments that learning to use new technology tools and taking major steps in implementing it in one's classroom for teaching and learning practices will be a challenge for most educators in higher education. In one of the study conducted by Bingimlas (2009), identifies two main categories of barriers in implementing ICT for teaching and learning in the classroom: teacher-level barriers and school-level barriers. According to his study the major teacher-level barriers are lack of teacher confidence, lack of teacher competence, resistance to change and negative attitudes toward the use of technology. By comparing second-order barriers by Ertmer (1999) we can underline some similarity in their studies. The basic school-level barriers according to Bingimlas (2009) are lack of effective training, lack of accessibility to ICT-based resources and lack of technical support in the classroom. In their study Serkan and Ibrahim (2012), argued that there are multifaceted relationships between the barriers and for successful integration of ICT into teaching and learning environments, all of these components must be taken into account in the process. This paper present a number of factors which contribute to the successful implementation of ICT in the classroom, and highlights also the role of pedagogy. Finally, we conclude that it is the skills and beliefs of the instructors that are central to determine the effectiveness of the ICT into the curriculum for implementation in the classroom.

2. Background

In today's society, a diversity of information and communication technology (ICT) can simplify not only delivery of education, but also teaching and learning process. Likewise, ICT can encourage collaboration and engagement in the classroom. There's a range of ICT options – from videoconferencing, internet, social media through multimedia delivery - which can be used to meet the challenges teachers are facing today in the classroom. In fact, Walsh (2008), in his study states that "information technology is of no value in itself or by itself". The potential of the ICT-based tools depends on their innovative qualities regarding teaching methods and content knowledge. The lack of infrastructures (buildings, internet access, multimedia tools etc.), innovative and quality teaching resources is a very important obstacle against the effective and productive implementation of ICT into teachers' classroom practices. The following section defined few terms that are major in this paper in implementing ICT in the classroom.

2.1 What is ICT?

In the past few decades, information and communication technologies (ICTs) have provided society with a vast range of new communication capabilities. ICTs are defined as a diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. These technologies tools and resources include computers, tablets, smartphones, the Internet, broadcasting technologies (radio and television), and telephony. ICT in Education means "Teaching and Learning with ICTs tools and resources. Different researches have shown that the effective use of ICT in education increases teachers' training and professional development needs. ICTs can be important tools to help meet such increased needs, by helping provide access to more and better educational content, aid in routine administrative tasks, provide models and simulations of effective teaching practices in the classroom, and enable learner to collaborate, engage, both in face to face and distance learning environments, and in real time.

2.2 Classroom space

Higher education institutions worldwide are faced with tough challenges. Budgets are tight, infrastructures in terms of building, equipment, access are not adequate for the use of new technology provided by ICT but pressure on the implementation of ICT in the classroom keeps growing. There still major concern that we still have to look at in term of classroom infrastructure before implementing ICT in the classroom. According to Meredyth (1999), the integration of ICT into most Australian schools is still uneven, differentiated according to location, type of school and level of ICT integration. Most higher education institutions worldwide are over thirty or fifty years old, with some having existed for over a century.

Thinking of the implementation of ICT use in this classroom space, will be a different story than thinking about a classroom built in 21st century. The classroom spaces we operate in, were designed to reflect the traditional way of teaching, whereby the teacher is the only person in charge. While some funding maybe available for renovation and rebuilding classroom spaces, the reality for most higher education institutions is that existing spaces must, in the short term anyway, be adapted to accommodate new learning tools or technologies provided by ICT. Little research has been carried out into the effects of classroom space or room arrangement/setup in implementing ICT in the classroom for teaching and learning.

Bernard Hollkner (2000), argued that “The Cast of Players in a student’s learning experiences has increased dramatically. Convergent technologies now allow experts, peers and collaborators to join the student’s world, enriching learning experiences.” Having that in mind we must ask the following questions before ICT implementation in the classroom: Are we creating barriers to the outside world with our classrooms? Or are we providing collaboration in the classroom by making use of ICT tools? Where should the computers and the desks be? What do we know about the placement of ICT infrastructure in the classrooms? Figure 1, figure 2, figure 3 and figure 4 display different classroom spaces.

Figure 1: classroom space (1) [19]

Figure 2: classroom space (2) [19]

Figure 3: classroom space (3)

Figure 4: classroom space (4) [19]

Looking at the above figures, it shows that there is a need to think differently about the classroom space in the 21st century from a normal or traditional classroom.

2.3 Role of the Teacher / Instructor

Researches have argued that the use of Information and Communication Technology (ICT) will improve the quality of teaching and learning process (Paul, 2002; Papert, 1987; Voogt & Pelgrum, 2005). ICT itself will not change the process of teaching and learning without teacher’s skills and beliefs of the technology to determine the effectiveness of the ICT into the curriculum for implementation in the classroom. Teachers need to be prepared for this by being educated to use ICT effectively and creatively. In most developing countries, however, most teachers have minimal or no ICT skills themselves and therefore cannot develop these in learners. According to Sara H. et al (2010), two of the most important supports for ICT integration into teaching and learning are effective Initial Teacher Education (ITE) and Continuing Professional Development (CPD). Both have the greatest impact on the beliefs and practice of teachers, and yet professional development time in particular is often not budgeted for (Venezky, 2004). The use of ICT in the classroom shift in the role of a teacher to that of a facilitator but does not remove the need for teachers to serve as leaders in the classroom; traditional teacher leadership skills and practices are still important into the classroom especially those related to lesson planning and preparation. Many institutions still perceive the lack of ICT-related knowledge of teachers as a major obstacle to the realisation of their ICT-related goals (Pelgrum, 2002).

3. ICTs contribution in Education

It is clear that the effective introduction of technology classroom is also mainly dependent upon the availability and accessibility of ICT. Obviously if technology cannot be accessed by the teacher, then it will not be used. Five (5) areas where ICTs can contribute to education according to Haddad and Draxler (2002) are: Expanding access, Promoting efficiency, improving the quality of teaching, enhancing the quality of teaching, improving management systems. For the purpose of this paper, the following section explain in details four of five areas.

Expending access to education with ICT
The technology provided by ICTs offers diversity of tools to use. For instance, broadcast technologies have been used to reach geographically dispersed populations and makes also distance education and open learning possible to marginalized sectors.

Promoting efficiency with ICTs
The use of new technology increased learning time without extending classroom time through self-study, it's also supplement conventional delivery mechanisms to make education provision more cost-effective.

Improving quality of learning
The use of new technologies provided by ICTs motivates students to collaborate and engage in the learning process. It also facilitated acquisition of basic skills and new knowledge. These tools also develop student's skills that are needed for 21st century workplace.

Improving quality of teaching
The use of ICT tools provide the teacher with variety of online resources and empower them to be more creative, to network and to also be innovative in the classroom. The interest of the teacher by applying these tools brings new change in the classroom.

4. Thinking differently about ICT

The increase and fast development in Information and Communication Technologies (ICT) in recent years has opens new horizons in the field of education. There have been many significant developments in ICT-based teaching techniques and materials, but until now there is still not yet full implementation of these techniques in the classroom. ICTs as a catalyst for transforming classrooms and the practices of teaching and learning, there are few factors that need to be investigate for successful implementation of ICT to transform classrooms.

Teachers (attitudes and beliefs)

Few teachers are confident in using a wide range of ICT resources, and limited confidence affects the way the lesson is conducted in the classroom. Most teachers need to change the focus from teacher centred to student centred classrooms. The way ICT is used in classroom is influenced by teacher skills and knowledge about their subjects, and how ICT resources can be utilized and related to it. Modern developments of innovative technologies have provided new possibilities to teaching professions, but at the same time have placed more demands on teachers to learn how to use these new technologies in their teaching (Robinson & Latchem, 2003). The challenges of modern technologies provided by ICT require teachers to continuously retrain themselves and gain new knowledge and skills while maintaining their jobs (Carlson & Gadio, 2002).

Pedagogies

Introducing technology alone will not change the teaching and learning process. The existence of ICTs does not transform teacher practices in and of itself. However, ICTs can enable teachers to transform their teaching practices, given a set of enabling conditions. Teachers' pedagogical practices and reasoning influence their uses of ICT, and the nature of ICT use by teachers impacts student achievement. ICTs can be used to support change and extend existing teaching practices in the classroom. Basically, pedagogical practices of teachers using ICT can range from only small enhancements of teaching practices using what are essentially traditional methods, to more fundamental changes in their approach to teaching. ICTs can be used to reinforce existing pedagogical practices as well as to change the way teachers and students interact. A study done by McLoughlin & Oliver (1998) defined pedagogical roles for teachers in a technology- supported classroom, including settings of joint tasks, rotating roles, promoting student to be self-manager, supporting meta-cognition, fostering multiple perspectives and scaffolding learning. According to Hawkridge (1990) assumption, the use of ICT has changed pedagogical roles of teachers, and a compelling rationale for using ICT in schools. It is evident that the use of ICTs in the classroom can re-enforce traditional pedagogical practices and divert focus from the content of what is being discussed or displayed to the tool being utilized.

Classroom design

The successful implementation of ICT in the classroom involve strategies and planning. Lack of resources, both physical and financial, make it vital that best practice guide decision-making in higher education institutions regarding both planning for the implementation of ICT and the way in which classroom design are changing to meet identified needs of students. Brett Hunter (2011) believes today's classrooms need Internet access for research, distributed multimedia curriculum online, access to digital libraries, distance education courses and remote collaborative tools. Research has revealed that, although some classrooms remain apparently untouched by technology, many classroom structures have changed to integrate easy access to the computer(s) and to facilitate the collaboration, problem solving and decision-making that inevitably follow their use. It is evident that the fast increase and use of ICT in education has demanded to the classroom teacher to develop more customized approaches to the learning needs of students in the classroom, also building or redesigning a flexible, and an Ideal Classroom for the 21st century.

5. Conclusion

The implementation of ICT use in the classroom for teaching and learning involved planning, methods and approaches. In order to successfully implement the use of ICT in the classroom depends on many factors, starting from the physical, financial and approaches to teaching. Teachers require extensive, on-going exposure to ICTs to be able to evaluate and select the most appropriate resources to use for successful delivery of the curriculum in their teaching. Few teachers are confident in using a wide range of ICT resources, but they are limited in the way classroom space are structured. Many researches have demonstrated that technologies goes hand-in-hand with students who have digital natives. There seems to be a great divide between student familiarity and the usage of ICTs than the knowledge and abilities of teacher to use ICTs. However, the development of appropriate pedagogical practices is seen as more important that technical mastering of ICTs. This suggests that teacher inexperience and skill deficiencies may often be an important factor inhibiting the effectiveness of ICT implementation in the classroom. Finally, more attention should be paid in how to addresses these factors but it is the skills and beliefs of the instructor that are central to determine the effectiveness of ICT into the curriculum for implementation in the classroom.

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Blended Learning and Teaching - a Panacea for Students with Learning Disabilities: Innovations in teaching and learning: the use of blended learning in promoting proficiency in reading comprehension for students with difficulties

Edith Gotesman, Ashkelon Academic College, Israel
Miri Krisi, Ashkelon Academic College, Israel

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Abstract
This research was born out of a necessity to accommodate students with learning disability, who study English for academic purposes (EAP) at the Ashkelon Academic College in Israel. It intends to examine whether the convergence of traditional teaching and learning and computer technology complemented by e-learning could assist students with learning disabilities (LD students) bypass their initial disadvantages. The subjects are LD students enrolled in the EAP course at the college. Students in both groups were given five regular and two guided reading tests. The goal of the pilot study was to examine whether the use of blended learning improved the reading comprehension abilities of students in the sample group, as compared to the control group. The analysis of the results of this pilot study will be followed by extensive research.

Keywords: dyslexia, learning-disabled (LD) students, assistive technology, e-learning, blended learning, text-to-speech programs

We are moving from the teacher centered to a learner focused system of education. New developments in learning and technology provide opportunities for creating well-designed meaningful learning environments for diverse learners. With the advent of the computer based education and online learning methodologies and technologies, providers of education are combining teaching methods to fulfill the needs of their learners. Academic institutions are now increasingly using the internet and digital technologies to deliver instruction and training. Many instructors are encouraged to design courses in which students can benefit from blended learning, an educational strategy which combines the use of online teaching and learning with the best features of classroom interaction. The use of blended learning was born out of the necessity to accommodate students with learning disabilities who study English for academic purposes (EAP) in higher education. We would like to share our experience in the field by discussing the practical use of blended learning: frontal teaching and the use of assistive technologies (AT) combined with e-learning.

1. Teaching English for academic purposes in higher education

In the world of globalization, reading academic texts in English is a basic requirement of higher education. As part of the academic requirements in Israel, all students have to reach an advanced level, exemption, in order to receive a degree. Those students who are unable to read texts in English find themselves at a disadvantage. In order to help those students who have not reached the advanced level of proficiency in reading comprehension, special courses at different levels, from beginning to advanced levels, are provided for all students at the institutions of higher education so that they can meet the requirements.

However, in addition to the regular students, there are those students who have been identified as having language-related disabilities, for example, dyslexia. These students, by definition, struggle to attain literacy in their mother tongue, yet they are required to meet the same standards as those without disabilities. This student population faces failure before they have even begun. The question thus arose: How can we help these students? We reasoned that as they had been unable to learn using regular teaching methods, perhaps the use of AT combined with e-learning could facilitate their understanding of texts in English and also lead to their becoming autonomous learners.

2. Dyslexia

In order to establish who our subjects are, we start by defining dyslexia followed by a definition of assistive technology. Dyslexia is a difficulty in the acquisition of literacy skills that is neurological in origin. It is evident when accurate and fluent word reading, spelling and writing develop very incompletely or with great difficulty" (Siegel & Smythe, 2004: 135)
Within the context of our study, we would like to emphasize 'literacy skills' which include comprehension and not only word recognition and decoding.

Students who have dyslexia, often find reading texts extremely difficult in the L1, and almost, if not, impossible in English as a foreign language. Our goal in the college has been to provide these students, who have been diagnosed as having dyslexia and other language-related difficulties with the possibility of learning to read fluently and cope with the texts to achieve reading fluency and to succeed in their academic studies.

After using different teaching strategies we came to the conclusion that assistive technology, specifically text-to-speech programs, might help these students.

3. Assistive Technologies

The use of technology has been shown to be effective in many areas, including education. AT has also proved effective in assisting students with learning disabilities perform better and more accurately, gain knowledge and confidence, gain independence in performing tasks, and in general have better achievements.

3.1 Definition and types of AT

Assistive technology (AT) is defined by Raskind and Higgins (1998) as “any technology that enables an individual with a learning disability to compensate for specific deficits". AT covers a wide range of software which helps students read, write, organize information and spell.
We will present the way AT can be used to assist specific needs (Table 1) and show examples of various existing software (Table 2).

Table 1 *Matching AT to students' specific needs*

STUDENT'S INDIVIDUAL NEED	ASSISTIVE TECHNOLOGY
Decoding (sounding out words) Reading comprehension	**Text-to-speech programs**
Handwriting Directionality	**Speech-to-text programs**
Expressing words in written form	**Word processors Word prediction programs**
Encoding (spelling)	**Proofreading programs Spell checkers**
Organization	**Outlining/brainstorming programs**

3.2 Research on assistive technology and learning disabilities

The use of technology has been shown to be effective in a wide range of content areas (Ashton, 2005; Edyburn, 2004; Okolo, Cavalier, Ferretti, & MacArthur, 2000). Research says that use of Assistive Technology (AT) can contribute to strengthening students' skills in decoding, comprehension and reading with fluency (Elkind, Cohen & Murray 1993, Higgins & Raskind, 2000), word recognition, reading comprehension, spelling and reading strategies (Raskind & Higgins, 1999), spelling (Dalton, Winbury & Morocco, 1990), organizing, reading and synthesizing information (Anderson, Inman, Knox-Quinn & Homey, 1996, Anderson, Inman, Knox-Quinn & Szymanski, 1999), proofreading (Raskind & Higgins, 1995) and writing (Raskind & Higgins, 1995).

3.3 Selecting the appropriate technology and matching it to students’ individual needs

According to Raskind and Higgins (1998) and Raskind (1998), selecting the appropriate technology for an individual with a learning disability requires careful analysis of the interplay between the individual, specific tasks or functions to be performed, the specific technology and the specific context of interaction (See Figure 1).

TYPE OF DIFFICULTY	AT TO CONSIDER	INTERNET SITE
Reading	**ReadPlease** **Natural Reader** **TextAloud** **TextAssist** **Kurtzweil** **Read&Write**	www.readplease.com www.naturalreader.com www.textaloud.com www.textassist.com www.kurzweiledu.com http://www.texthelp.com

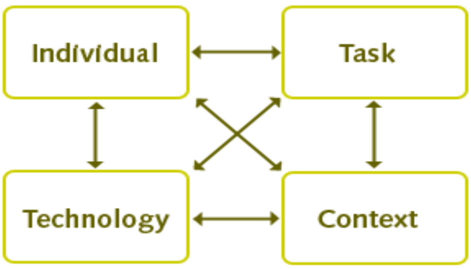


Figure 1

The interplay of individual, task, context and technology (Raskind, 2006)

Each individual should make use of the technology that best complements his or her needs. The chosen type of assistive technology could help an individual with a learning disability to function at a level that is commensurate with their intelligence. Table 2 presents types of AT to be chosen according to the type of learning difficulty: difficulty in reading, writing, planning and organization of material, spelling and word prediction.

Table 2

AT according to types of difficulty/impairment

Writing	**DragonNaturally Speaking** **Intellitalk**	www.nuance.com/naturallyspeaking www.intellitools.com
Planning and organization	**Inspiration**	www.inspiration.com
Spelling and word prediction	**WordQ** **Predictor Pro**	www.wordq.com www.readingmadeez.com/products/PredictorPro.html

3.4 Text-to-speech programs

Individuals with severe learning disabilities, such as dyslexia, who have difficulty decoding and understanding written text, may comprehend printed content much better when it is read out loud. These individuals may have substantial gains in reading scores and comprehension when the text is read aloud for them. Text-to-speech programs allow the electronic text to be synchronized with audio in order to help people with reading difficulties. These reading programs are very useful not only for dyslexic students. They are also valuable for visually impaired students who can use one of the software features in order to enlarge font, change background and/or listen to the text uploaded to the screen of the reader.

Our choice for text-to-speech software was TextAloud. This reading program provides multi-modal reading, which means that the text- to-speech is combined with word-by-word highlighting. The program can read digital text aloud. Students can adjust the reading rate and the font size according to their individual needs. The software provides options for voice type. One of its advantages over other text-to-speech programs is that it can turn text files into audio files. Our LD students use TextAloud to listen to the texts of their articles both in class when they work on assignments and at home when they do homework. TextAloud offers AT&T voices, which sound less artificial and are better understood by students.

4. E-Learning

E-learning can be viewed as an innovative approach for delivering well-designed, learner-centered, interactive and facilitated learning environment to anyone, anyplace, anytime, by utilizing the attributes and resources of various digital technologies alongwith other forms of learning materials suited for open and distributed learning environment (Kahn, 2001).

The theoretical framework for our special course is based on Khan's e-learning framework (http://asianvu.com/bk/framework/), *The Octagonal Framework* (see Figure 2).

Figure 2
Khan's Octagonal Framework

According to Khan (2005), a variety of factors are required to be addressed in order to create a meaningful learning environment, many of which are interrelated and interdependent. Since the learning requirements and preferences of each learner tend to vary, it is essential to use a blend of learning approaches and teaching strategies in order to cater for their needs. Placing the learner at the center of Kahn's framework, we identified the critical issues of the learning environment for our particular group of students an adopted the teaching philosophy which best suits the needs of our students: *blended learning*.

5. Blended learning

"The widespread adoption and availability of digital learning technologies has led to increased levels of integration of computer mediated instructional elements into the traditional F2F (face to face) learning experience," write Bonk and Graham, in the Handbook of Blended Learning.

Blended learning represents a shift in educational strategy. It is an educational method that combines the benefits of e-learning, computer technology and the conventional face-to-face teaching methods in order to optimize the teaching and learning process. It intends to take the best of both worlds. Students take advantage of teacher driven presentation and selection of relevant content, benefit from social interaction, live instruction and immediate feedback. Blended learning supports personalized learning, thoughtful reflection, and differentiate instruction from student to student across a diverse group of learners. According to Dziuban, Hartman and Moskal (2004), "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."

6. The pilot project study

6.1 Rationale, problems and solutions

Pupils with reading disabilities become students with reading disabilities. In order to meet the needs of students with learning disabilities attending institutions of higher education, these institutions offer various adjustments for students who have been diagnosed as having a disability. The assessment is the key determining factor in deciding whether a student will benefit from a text-to-speech output accommodation. A student who has difficulty decoding multisyllabic words, loses his or her place on the page, or has difficulty comprehending printed text, may benefit from text-to-speech output.

The Ashkelon Academic College offers assessed LD students enrolled in the EAP program the opportunity to complete their English requirements. Students formally diagnosed as learning-disabled are entitled to accommodations. The accommodations offered to these students include:

a. a modified version of the text. This means that the original text of the article to be studied is rearranged in a different way. It shows a number of paragraphs followed by the questions referring to them, another set of paragraphs followed by a question or questions and so on. This helps LD students better focus on their assignment;
b. time extension;
c. use of TextAloud for listening to the text and related questions.

6.2 Aim of the project

The pilot study aimed at examining whether employing blended learning could facilitate the understanding of English texts of LD students and improve their reading comprehension abilities thus leading to their becoming autonomous learners.

6.3 Methodology

Two groups of assessed LD students participated in the pilot study. The sample group consisted of 20 students enrolled in the special course for LD students, and the control group consisted of 7 assessed LD students who were entitled to the same accommodations, but chose not to be part of the special course. Each group undertook five reading comprehension exams during the annual course. The exams varied in terms of level of difficulty, length of the text and vocabulary. Students took the first exam at the beginning of the annual course, and the last exam was the final exemption test at the end of the course.

6.4 Discussion

The twenty students whose teaching and learning process took place in the computer lab used TextAloud for class assignments on a regular basis. In order to be able to practice the material taught in class and complete homework assignments by using the reading software, the teaching and learning process was supplemented by e-learning. LD students had access to the learning materials and the TextAloud program available online. They benefited from blended learning: frontal teaching, use of AT and e-learning. The seven LD students in the regular courses did not have a computer or a laptop for listening to the text in class. They benefited from the reading of TextAloud only when they took the final exam.

The teaching and learning process took pace in a computer lab. Each student had access to a personal computer. Using blended learning as a teaching and learning strategy, face-to-face teaching and learning was combined with the use of AT. The instructor taught LD students traditionally, providing explanations of the reading strategies and explaining new vocabulary. The students' independent learning followed in the second part of the lesson. They put on their headphones and used TextAloud in order to listen to the text of the article. The instructor supervised, answered questions, and provided immediate feedback and technical assistance.

The software assists LD students decode by reading aloud the text copied into the program window. The program's features allow each student to choose the preferred "natural voice" of a male or female reader, to adjust the speed and pitch of the reading, as well as go back and forth through the text as needed. Students benefit from individual work. They can concentrate better listening to the text through their headphones. They listen to the text and questions and can go back and forth listening again and again to parts of the text. The students work at their own pace, they choose the voice that sounds better to them. All the students appreciate the option of reading speed adjustment. They can adjust the reading speed according to their individual needs.

How did we solve the problem of listening to the texts at home, when doing homework? In the past, students would download the trial version of TextAloud and work at home, but the artificial computer voices the free trial version provides were not clear enough to them. The solution we came up to work on-line from home. Students virtually connected to the desktop of the college main computer by using their username and password. In this way they could use the college purchased version of TextAloud and listen to the text being read by more natural voices.

6.5 Findings

The 27 students in the pilot study took five exams during the academic year 2010-2011. The results of their exams were statistically analyzed. Table 3 presents the means and standard deviations of the scores on the exams of the students in the specialized class. The results point to a significant improvement in the students' scores over time ($F(4,76) = 11.6, p < 0.01, \eta^2 = 0.38$). A subsequent Bonferroni test indicates a significant difference between second and third exams and the last exam.
Mean Standard Deviation

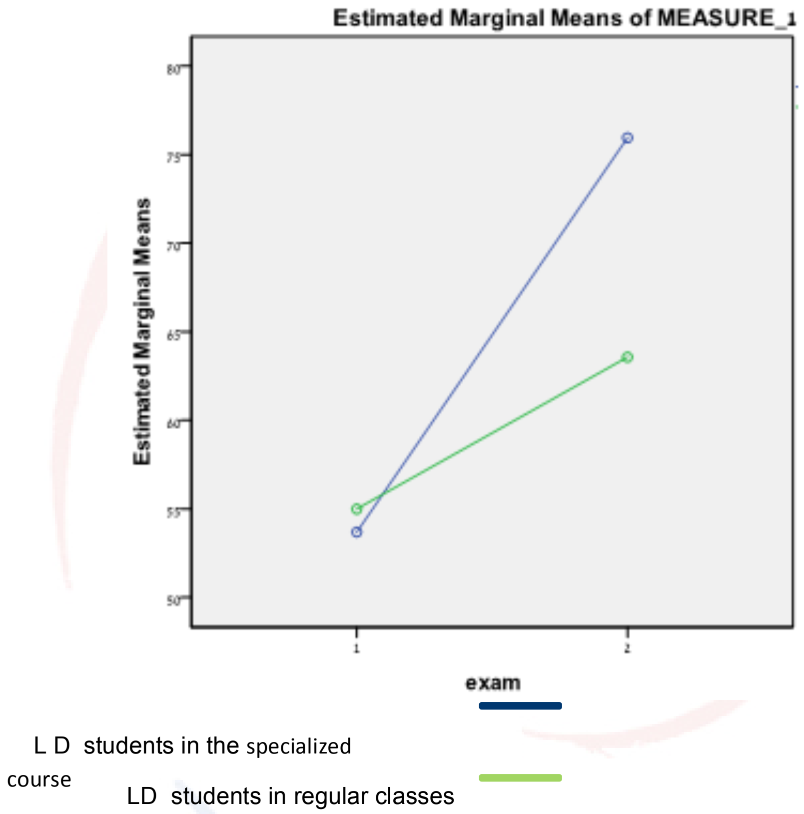
Table 3
Mean ± Standard Deviations of exam scores of LD students in specialized class

	M (N=20)	SD (N=20)
2^{nd} exam	53.60	13.869
3^{rd} exam	56.45	13.987
4^{th} exam	69.10	11.675
5^{th} exam	63.10	11.787
Final exam	76.15	17.064

In addition, a comparison between the results of the LD students in the special class with those of LD students in the regular classes indicates that although both groups showed a gradual improvement in exam scores, students who attended the special class appeared to achieve greater improvements. That is, while no significant differences between groups are found in the scores on the first exam (t(28)=-0.207, p=0.84), significant differences are found in the scores on the exemption exam given at the end of the course (t(28)=1.5, p=0.144**)**.

Table 4
Comparison in means of 1st and final exam

	Dyslexic students in the special course	**Dyslexic students in regular courses**
1st exam	53.7 (14.98)	55 (13.13)
Exemption exam	75.96 (16.5)	63.6 (26.5)



6.6 Conclusions and recommendations for further research

The pilot study aimed at examining whether employing blended learning could facilitate the understanding of English texts of LD students and improve their reading comprehension abilities thus leading to their becoming autonomous learners.

Overall, the results point toward a tendency of improvement for both groups. Nevertheless, while both groups benefited from the participating in the course as shown by their improvement in reading English academic texts, those students who took part in the special course were able to make greater progress. It appears that the use of blended-learning including the use of assistive technology and e-learning best suited the students' needs, and provided the necessary tools to supplement the face-to-face teaching. The use of the computer for reading texts in class helped students to understand the lesson better, increase their participation in the lesson and be better prepared to read articles in their individual field of study. Moreover, participating in the special course provided students with the opportunity to learn, apply, develop, maintain and generalize new reading strategies, leading to improvements in their reading fluency. This resulted in better grades and motivation to read articles in English.

The twenty LD students in the sample group benefited from TextAloud, which assisted them in bypassing their reading disability. The LD students in the regular class had to rely mainly on the instructor's help during the lesson for reading and comprehending the texts, which in turn put them at a disadvantage since the instructor's attention focused on the majority of regular students.

Students' access to TextAloud at home assisted them in doing homework assignments on their own. This enabled them to practice the various strategies and new vocabulary. LD students who attended the regular classes did not have access to the text-to-speech program from home. Consequently, completing their homework assignments was much more difficult, often leading to frustration and neglect to complete their assignments.

When asked about their experiences with blended learning, most students in the control group expressed satisfaction with the level of instruction as well as the multitude of teaching media, stating that the use of AT and e-learning greatly contributed to their accomplishments in the course.

More importantly, students claimed that their ability to "handle texts on their own" had also helped in boosting up their self-esteem, proving their ability to succeed in the academic studies despite reading difficulties.

An interesting point to mention was the way students related to the software. They responded differently. Some of them could not do without the reader and used the software all the time. Others used it only when they really did not understand difficult words they were trying to read by themselves. All of them acknowledged the advantages of the reader over the tapes they had used in high school: easier movement in the text, possibility to enlarge fonts, arrange text according to individual preferences, adjust the speed/pace of reading, choose the voice of the reader (male or female) which best suited their needs. The fact that students were able to use the reader by working on line from home, did contribute to their success. Students realized that the software could not only help them read in order to understand the texts studied during the course. They could also benefit from the features of TextAloud later in life.

Nonetheless, some caveats should be mentioned that future implementation of AT and e-learning should take into consideration. Some students pointed to the lack of inflection and intonation of the reading program, which slightly impaired their understanding. They would rather listen to human voices, to a real person sitting across them and reading to them. In addition, instructors observed that some students found it hard to multitask while working individually during the lesson.

We need follow up research on a larger population of LD students and a longer period of time. We consider using more varied research tools by adding interviews and case studies in order to observe individual variation. Research carried out thus far on e-readers indicates that, as is often the conclusion in educational research, individual variation merits greater attention than mere examination of group means (Hecker et al., 2002). The effectiveness of e-readers appears to be highly dependent on individual student traits.

The present study shed some light as to the contribution of blended learning in improving the reading comprehension of LD students. It provided them with the appropriate learning environment and the necessary tools for maintaining an open and flexible learning environment. Educators should not hesitate to integrate technology features into instruction for students who struggle with academic tasks. These approaches can support learning by building literacy, language skills and independence.

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The Effects of Multimedia E-book (mE-book) on Students' Reading Comprehension and Perceived Motivation in Language Classroom

Subashini Annamalai, University of Science, Malaysia
Balakrishnan Muniandy, University of Science, Malaysia
Zarina Samsudin, University of Science, Malaysia

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Abstract
In this digital age, students are more comfortable with the text-visual media and when it comes to language learning, they expect similarities applied especially in reading. This expectation has inspired language educators to consider the possibility of converting their traditional reading instructional setting into multimedia e-setting which students are currently exposed. Based on the literature reviews, two modes of multimedia E-book (mE-book), namely multimedia E-book with narration (mE-book$_n$) and multimedia E-book without narration (mE-book$_w$), were designed and developed to be employed in Polytechnics' language classrooms. This study attempts to examine the use of mE-book in the English language classroom of a group of diploma students at two national Polytechnics in Malaysia. Among the aspects that were examined in this study were the students' reading comprehension and their perceived motivation towards the developed mE-book modes. A set of tests and a questionnaire were used as data collecting instruments that were given to the students after they have experienced using the two modes of mE-books. Data collected from the language classroom intervention were analysed to answer the research questions. The results revealed that the students who used mE-book$_n$ showed a significantly higher reading comprehension and perceived motivation compared to students who used mE-book$_w$ as was mE-book$_n$ more engaging, motivating and entertaining.

Keywords: multimedia, E-book, Polytechnic, English language, reading comprehension, perceived motivation

1.0 Introduction

In line with National E-learning Policy (DePAN) (Ministry of Higher Education, 2011), Polytechnics in Malaysia have been swiftly extending the use of technologies to improve the quality of teaching and learning. Among the initiatives adopted to place more importance on adapting the e-learning policy is by extending the prudent use of the multimedia in instructional technologies that could serve as a useful learning supplement to promote effective, meaningful and enjoyable learning. The use of multimedia in classrooms showed that it improves students' motivation, attitudes and interest (Ministry of Higher Education, 2011). Based on the call of DEPAN policy, two modes of multimedia E-book (mE-book) were designed and developed to be implemented in the Polytechnics' English module classroom. It is an attempt for the language educators to introduce a fun, engaging and motivating multimedia reading material based on appropriate learning theories. To further investigate this postulation, this study was carried out to determine the effects of mE-book on Polytechnics students' reading comprehension and their perceived motivation of the mE-book in their language classroom.

2.0 What is mE-book?

Multimedia E-book which also known as mE-book is a digital representation that integrates new multimedia features and hypertext links (Vassiliou & Rowley, 2008, Dillon, 2001; Rao, 2003; Ismail & Zainab, 2007). Labbo (2000) defined mE-book as an interactive digital version of stories that employ multimedia features such as animation, music, sound effects, highlighted text and modeled for fluent reading. Similarly, Shamir and Korat (2006) described mE-book as book that integrate different kinds of expression and allows easy integration of video, audio, and interactivity. mE-book is also able to "read by itself" with audio narration and offers interactive self-tests throughout the chapters which creates a much more enjoyable and engaging reading experience beyond the printed format (Itzkovitch, 2012). Due to familiarity and preference for visual media, young readers are also choosing to read mE-book for a simple reason- they are entertaining to read.

mE-book is important in promoting the ideas of visual literacy and accommodating students who might be classified as visual learners. Students prefer to read books that offer the combination of visuals and words that work together to increase comprehension (Little, 2005). In addition to aiding visual learners, mE-book can also be a beneficial tool for reluctant or struggling readers because it is helpful in specific areas of reading instruction. The visual images in mE-book also support vocabulary development. Students may see an unfamiliar word, but with the help of visual context clues, are able to decode it by themselves (Pennella, 2009).

The content of mE-book is presented in an interactive way by adding graphic, colourful text, animation and audio. These elements will attract readers to read more as animations and graphics can convey more information (Mayer, 2001; 2009). The integration of audio features such as narration and sound in mE-book is also beneficial in language learning, especially for reading in English as Second Language (ESL) classrooms. When students read mE-book, they can hear and see and this provides greater recall of the story rather than printed books. This will interest them in reading and improving their literacy.

mE-book also provides a multi-genre reading space that supports flexible learning strategies which engages and draws students into a different interaction while reading text (Barker, 1999). These flexible modes of learning have the potential to increase students' engagement in learning by giving them more control over the nature of the learning content and activities, and over the time and place that they choose to study (Gordon, 2002). In addition, the students would also feel more motivated to read by integrating mE-book in the language classroom.

2.1 Designing mE-book

Designing mE-book for language learning needs greater effort in the presentation of the book contents since this will partly determine the success of the language learning process. It is important to carefully design the content to be structured, organized, and presentable. For this study, the mE-Book design is supported by six multimedia elements; visual, text, music, narration, hyperlinks and videos. Each mode will have activities that support at least one learning style. The pages of mE-book may include two or three multimedia elements at one time.

mE-book was designed and developed based on Keller's ARCS Model of Motivational Design (1987), that serves as the foundation for the instructional content design of mE-book. The design of mE-book integrates four components of ARCS model: attention, relevance, confidence and satisfaction. Attention component is integrated into mE-book by creating the ability to capture the interest of the students and arousing their curiosity using multimedia elements such as text, voice, visual, music, videos and hyperlinks. mE-book also fulfil the students' personal needs and goals through its content (relevance) and establish positive expectations for achieving success among students through its interactivity (confidence). The satisfaction component is integrated into the mE-book design with the combination of extrinsic rewards and intrinsic motivation by giving them the positive feedbacks.

3.0 Research Objectives

The objectives of the study are to investigate the effects of the 'mE-Book with Narration' compared to 'mE-Book without Narration' treatment condition on students' reading comprehension and their perceived motivation.

4.0 Research Questions

This study is designed to address specifically two sets of questions:

1. Is there any significant difference in reading comprehension among students in treatment condition 'mE-Book with Narration' and 'mE-Book without Narration'?
2. Is there any significant difference in students' perceived motivation between treatment condition 'mE-Book with Narration' and 'mE-Book without Narration'?

5.0 Research methodology

This study employed a quasi-experimental research design. The purpose of this study is to determine the effects of mE-book on the dependent variables: namely students' ESL reading comprehension and perceived motivation. Table 1 illustrates the factorial design for the study with factor X_s and O_s.

Table 1. Factorial design of the study

Independent Variable	Dependent Variable
mE-book	O_1
(X_1, X_2)	O_2

X_1 Multimedia E-book with narration (mE-book$_n$)
X_2 Multimedia E-book without narration (mE-book$_w$)
O_1 Reading comprehension
O_2 Perceived motivation of the mE-book

The pre-test and post-test measures the students' total achievement score of comprehension of an ESL module topic.

5.1 Variables

The study involved two types of variables as follow:

1. Independent variables: Comprising two modes of mE-book, which are the multimedia E-book with narration (mE-book$_n$) and the multimedia E-book without narration (mE-book$_w$). mE-book$_n$ is an electronic book which incorporates text, narration, visual and other multimedia elements such as animations and videos, whereas mE-book$_w$ is basically the electronic version of paper-based book that only contains text and visual.
2. Dependent variables: comprising students' reading comprehension and their perceived motivation of the mE-book modes.

5.2 Research Instruments

The instruments used for this study includes pre-test and post-test questions to measure students' reading comprehension in the 'Greetings and Introductions' topic, and Instructional Material Motivational Scale (IMMS) (Keller, 1993) to measure the student' perceived motivation of the mE-book.

5.3 Intervention

This study was conducted on one hundred Semester 1 students from two national polytechnics in Malaysia. It aimed to investigate the effects of two mE-book modes on students' reading comprehension and their perceived motivation of the instructional material. The study lasted for two weeks and was conducted with intact classes, thus the students were tested under four instructor's supervision. A pre-test were administered before the execution of the treatment using mE-book. The students were then divided randomly into two groups and each group was assigned to one treatment mode (mE-book$_n$ or mE-book$_w$). One group received mE-book$_n$ which is an electronic book that incorporates text, narration, visual and other multimedia elements such as animations and videos. Another group received mE-book$_w$ which is basically the electronic version of paper-based book that only contains text and visual. Both mE-book modes include an interactive post-test that measures the students' comprehension level. Immediately after the treatment, the students were also given a questionnaire, which is the Instructional Material Motivational Scale (IMMS) to measure the students' perceived motivation of the mE-book.

6.0 Data Analysis

The data collected in this study were analysed using the Statistical Package for the Social Sciences (SPSS version 18.0). All the data are statistically analysed by using 0.05 ($p < .05$) significant levels.

This study observed two dependent variables, which are the students' comprehension scores and perceived motivation scores. The data collected from the study were analysed using parametric statistic analysis that involves the pre-test and post-test scores to measure the reading comprehension and IMMS questionnaire scores to measure the students' perceived motivation. Table 2 illustrates the descriptive statistical analysis of the distribution of the students.

Table 2. Distribution of the students

Mode	Number of students
mE-book$_n$	51
mE-book$_w$	49
Total	100

For this study, 51 students used mE-book$_n$ and 49 students used mE-book$_w$. It is reported that the *p*-value of Levene's Test for reading comprehension is 0.420 (df = 58, t = 5.67). This result indicates that the two experimental groups used for this study were homogeneous as the *p*-value of Levene's Test is greater than 0.05 (p >. 05).

Table 3 illustrates the descriptive analysis for the students' reading comprehension. The statistical analysis shows that the total mean of the students' reading comprehension scores for mE-book$_n$ is 17.176 with a standard deviation of 11.03. For mE-book$_w$, the mean is 10.591 (SD = 10.13). It was found that students who used the mE-book$_n$ obtained higher reading comprehension scores compared to mE-book$_w$ with a difference of mean of 6.585.

Table 3. Descriptive statistics for reading comprehension by treatment modes

Variable	Mode	N	Mean	Std. Deviation	Std. Error Mean
Reading Comprehension	mE-book$_n$	51	17.176	11.033	1.545
	mE-book$_w$	49	10.591	10.130	1.447

An independent t-Test statistical analysis was carried out to determine if there was a significant difference in reading comprehension scores among the students of the two treatment modes. The analysis reported that there is a significance difference at a *p*-value of 0.02 in the reading comprehension scores between the two treatment modes, indicating that the mE-book$_n$ mode has a higher impact on students' reading comprehension.

This study also attempts to investigate the effects of the two mE-book modes on the students' perceived motivation of the instructional material. Table 4 illustrates the statistical analyses for their perceived motivation scores.

Table 4. Statistical analyses for students' perceived motivation by treatment modes

Component	Mode	Mean	Std. Deviation	Std. Error Mean	p	Difference of Mean
Attention	mE-book$_n$	4.423	.182	.025	.028	.079
	mE-book$_w$	4.343	.174	.024		
Relevance	mE-book$_n$	4.442	.233	.032	.097	.079
	mE-book$_w$	4.362	.240	.034		
Confidence	mE-book$_n$	4.461	.253	.035	.408	.037
	mE-book$_w$	4.424	.197	.028		
Satisfaction	mE-book$_n$	4.457	.290	.040	.348	.052
	mE-book$_w$	4.404	.267	.038		
IMMS	mE-book$_n$	4.443	.168	.023	.052	.064
	mE-book$_w$	4.378	.160	.022		

The statistical analyses reported that both mE-book modes have high impact on students' perceived motivation. The total mean for the students' perceived motivation in mE-book$_n$ is 4.443 with a standard deviation of 0.168. For the mE-book$_w$, the mean score was 4.378 (SD = 0.160). For the overall analysis using IMMS scores, mE-book$_n$ shows a slightly higher mean score compared to mE-book$_w$, whereby students perceived mE-book$_n$ as more motivating compared to mE-book$_w$. It is also reported that students who used mE-book$_n$ showed a significantly higher attention score (p= 0.028) with a mean difference of 0.079, compared to the students who used mE-book$_w$. However, the findings revealed that both treatment modes were not significantly different in terms of the relevance, confidence and satisfaction components. This indicates that both mE-book$_n$ and mE-book$_w$ are equally motivating for the students.

8.0 Conclusion and Discussions

This study was conducted in an attempt to investigate the effects of the 'mE-Book with Narration' (mE-book$_n$) compared to 'mE-Book without Narration' (mE-book$_w$) treatment modes on students' reading comprehension and their perceived motivation of the instructional materials.

In this effort, 100 students from two national Polytechnics in Malaysia were chosen randomly as the respondents. The findings of this study revealed that Polytechnic students who used mE-book$_n$ showed significantly higher reading comprehension compared to students who used mE-book$_w$. This is because the students prefer to read multimedia electronic book that is able to "read by itself" with audio narration which gives them a much more enjoyable and engaging reading experience. However, they perceived both mE-book modes as equally motivating.

There were several limitations found in the conduct of this study. Among them are the small sample size, the inclusion of only two polytechnics in Malaysia, and the limited

amount of variables studied. A bigger and longer scale study needs to be conducted for more reliable results, and with the inclusion of more variables are related specifically with digital reading in the language learning. Future studies should focus more on how reading can actually take place using computers and digital devices.
In conclusion, using mE-book will encourage the students to explore the reading process in an alternative medium other than conventional books. This technology-based reading will motivate them to read more as the students, who are digital-natives, are more keen to use computers and technologies for learning. By increasing their motivation to read, the students will be reading more, which will lead to improvement in their language proficiency.

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Students' Collaborative Reasoning about Natural Selection as a Complex System through the Use of NetLogo as a Digital Representation

Joseph Ferguson, Deakin University, Australia
Simon C. Lynch, Teesside University, Middlesbrough, England, United Kingdom

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Abstract
This paper investigates the potential use of NetLogo to help students develop a comprehensive understanding of the concept of natural selection. NetLogo is an agent based software environment that provides facilities allowing students to reason about natural selection as a complex system. Year 10 students from a number of Australian secondary schools participated in programs focused on evolution run at a science education centre in Melbourne, Australia. The programs were designed to enable students to investigate natural selection by considering Darwin's finches and the relationship between malaria and the HBB gene. Much of this exploration was carried out through the use of NetLogo, which enabled students to simulate natural selection in action. This paper discusses some preliminary findings, which the authors plan to further explore and elaborate in future papers, based on video data, student artifacts and classroom observations. It is suggested that by using NetLogo to explore natural selection, students can use the software as a digital representation thereby co-constructing various representations and comprehensive understandings of natural selection as a complex system.

THE IMPORTANCE OF LEARNING ABOUT NATURAL SELECTION - NATURAL SELECTION AS A THRESHOLD CONCEPT IN SCIENCE

Within the discipline of biology, and in particular within science education, there is an acknowledgement that an understanding of biology, specifically evolution, is essential when engaging with the world in a scientific way. As Theodosius Dobzhansky (1964, p. 449) stated, "nothing makes sense in biology except in the light of evolution." While this may be so, it is also the case that evolution is a particularly difficult concept to teach and to learn (Anderson, Fisher, & Norman, 2002; Centola, McKenzie, & Wilensky, 2000; Centola, Wilensky, & McKenzie, 2000; Chi, 2005; Chi, Roscoe, Slotta, Roy, & Chase, 2012; Dickes & Sengupta, 2013; Dodick & Orion, 2003; Ferrari & Chi, 1998; White, 1997; Wilensky & Reisman, 2006). Knowing that an understanding of evolution is essential for students to act and think as scientists does nothing to overcome this difficulty of teaching and learning.

This issue can perhaps best be overcome by employing the notion of a "threshold concept" (Meyer & Land, 2003, p. 3). While this notion originates in work that examines ways to improve the engagement of students studying economics at a tertiary level (Meyer & Land, 2003, 2005), it has since been extended to other learning areas, including biology (Ross et al., 2010). Meyer and Land (2003, p. 1) propose that a threshold concept functions as, "…a portal, opening up a new and previously inaccessible way of thinking about something…" It transforms the individual; the individual moves through a liminal landscape from novice to expert in their understanding of a concept.

In most cases these threshold concepts constitute what Perkins (2012, p. 36) calls "troublesome knowledge," which for myriad reasons are very difficult to understand. They might be inert knowledge (known but rarely used) or ritual knowledge (used without any meaning, i.e. regurgitation of information). Threshold concepts can also constitute foreign knowledge (in direct contrast to existing knowledge or beliefs) or may simply be conceptually difficult to understand (Perkins, 1999). The challenging nature of threshold concepts makes the transition from a novice to an expert demanding for both teacher and student.

It has been suggested that natural selection is a threshold concept (Ross et al., 2010). In this paper we extend this argument (to be further explored in a future paper) and suggest that natural selection is a threshold concept because natural selection is a complex system, and it is this that makes natural selection a threshold concept. One cannot understand natural selection unless one understands complex systems, and once one understands complex systems one's understanding of natural selection and of the world is transformed. (Blikstein & Wilensky, 2010; Goldstone, 2006; Levy & Wilensky, 2011; Wilensky & Novak, 2010; Wilensky, Wagh, & Novak, 2012).

But what exactly is a complex system? A complex system is typically a system in which the whole is more than the sum of the parts. It is emergent (outcomes at the systems level are not directly determined by that at the individual level), decentralised (there is no central control directing the system) and non-deterministic (the final outcome of the system is not predetermined) (Chi, 2005; Goldstone, 2006; C. Hmelo-Silver, 2004; C. E. Hmelo-Silver & Azevedo, 2006; Jacobson, 2001; Jacobson & Wilensky, 2006; Lesh, 2006; Penner, 2000; Resnick, 1996; Resnick & Wilensky, 1998; Sabelli, 2006; Wilensky & Resnick, 1999).

Research suggests that it is difficult to teach and learn about complex systems (Chi et al., 2012; C. Hmelo-Silver, 2004; C. E. Hmelo-Silver & Azevedo, 2006). The main issues relate to the “centralized” (Resnick, 1991, p. 207) and “deterministic" (Wilensky, 1993, p. 102) mindsets of students. Students tend to assume that systems always have central controls that predetermine the final outcomes. In this way not only is the canonical understanding of complex systems conceptually difficult to engage with, but it also constitutes foreign knowledge for students and they struggle to develop comprehensive understandings of complex systems and thus of natural selection.

THE VALUE OF REPRESENTTAIONS IN LEARNING SCIENCE

In light of this we consider the following questions:

1. How can teachers work with students to develop a comprehensive understanding of natural selection as a complex system?
2. How can teachers successfully guide students through the liminal space from novice to expert?
3. Is it possible to overcome the troublesome nature of natural selection as a complex system?

The answer may be in adopting a representation-construction approach to teaching and learning science (Tytler, Prain, Hubber, & Waldrip, 2013). This approach to science education focuses on learning as a fundamentally representational process. By interacting with existing canonical representations, as well as generating their own, students are able to co-construct understandings of scientific phenomena. Through a process of guided inquiry, involving a sequence of representational challenges, students move towards expert understandings of scientific phenomena (Hubber, Tytler, & Haslam, 2010; Prain & Tytler, 2012; Prain & Waldrip, 2006; Tytler, Haslam, Prain, & Hubber, 2009; Waldrip, Prain, & Carolan, 2006, 2010).

The value of representations, both existing canonical representations and student-generated representations, is that they productively constrain students’ learning (Gibson, 1979; Prain & Tytler, 2012). They provide multiple opportunities to engage with scientific phenomena (i.e.: to reason – see below) in a way that is not prescribed but offers loose boundaries within which students are free to conduct investigations.

The process of students generating their own representations, in addition to simply engaging with existing representations, is highly valuable because they are able to make hypotheses about scientific phenomena. The focus here is not on students being correct. Rather students are encouraged to propose their own hypotheses based on their own observations about a scientific phenomena, which can then be refined in the journey to more canonical understandings (Prain & Tytler, 2012).

A critical component of the representation-construction approach is that students create and engage with multiple representations of different modes (e.g. drawings, diagrams, role plays, simulations etc.), with a particular focus on being able to switch between different representations (Ainsworth, 1999; Prain, Tytler, & Peterson, 2009; Prain & Waldrip, 2006; Waldrip et al., 2006, 2010; Wang, Johnson, Sun, & Zhang, 2005). This requires students to re-represent their understandings; enabling teachers to accurately assess how well students are progressing towards expert understandings of scientific phenomena. It is through re-representation that students are most explicitly faced with threshold concepts and their troublesome nature.

However, in order for students to be successful in their use of representations to navigate the liminal space, they must develop their meta-representational competence. They must understand what constitutes a representation and identify the different uses of different representations (Ainsworth, Prain, & Tytler, 2011; Azevedo, 2000; diSessa, 2004; diSessa, Hammer, & Sherin, 1991; diSessa & Sherin, 2000; Sherin, 2000). Students can only productively engage with representations if they understand their structure and function.

THE VALUE OF REASONING IN LEARNING SCIENCE – REASONING AS MEANINGFUL LEARNING

The idea that meaningful learning in science can be understood as reasoning is an important component of the representation-construction approach, which considers reasoning to be an essential meaning-making process (Prain & Tytler, 2012; Prain & Waldrip, 2006; Tytler, 1993, 1998a, 1998b, 2000; Tytler & Peterson, 2003, 2004a, 2004b, 2005; Waldrip et al., 2006, 2010). Following the work of Charles Sanders Peirce, others suggest reasoning can be understood as a fundamentally semiotic (i.e. representational) process (Hoban & Nielsen, 2010; Kidman, Keast, & Cooper, 2012; Lemke, 2003, 2004; Prain & Tytler, 2012; Waldrip et al., 2010).

According to Peirce (1998), a sign consists of an object (the thing in reality), a representamen (the thing doing the representing) and an interpretant (the effect of the relationship between the object and the interpretant on those involved in the communicative act). Jappy (2013, p. 3) describes reasoning as a semiotic process (referring to "semiosis"); the result of the relationship, or flow, between the components that form the triad of the sign. In addition, as Cox (1999), Lehrer and Schauble (2006) and Zhang and Norman (1994) demonstrate, particular representations afford the opportunity to reason in particular ways about different scientific phenomena.

Hence representations and reasoning (so central to the representation-construction approach to teaching and learning science) are intimately linked. Reasoning is a representational process and representations afford reasoning. In order for students to work with their teachers to conquer the threshold concept that is natural selection they must reason through representations. The authors plan to further explore this in future papers.

The precise meaning of reasoning, however, remains unclear. There are many different interpretations. Peirce (1992a, p. 111) defines reasoning as, "to find out, from the consideration of what we already know, something else which we do not know." Yet this definition is too broad to be of use to teachers and students. So Peirce (1992b) extends this argument by proposing that reasoning can be in the form of deduction, induction or abduction.

Peirce (1992b) considers deduction to be the least productive as it is only an analytical in nature, while induction and abduction can synthesise new inference and are thus more productive. Abduction (the process through which hypotheses about reality are generated and then tested through scientific means, i.e. experimentation) is most highly valued by Peirce. While induction tends to be classificatory in nature, abduction is explanatory resulting in the production of truly new understandings for the individual. For this reason, representations that afford abduction are the most valuable for developing understanding because they lead to meaning-making.

By adopting the representation-construction approach it becomes possible for teachers to guide students to cross the liminal space from novice to expert by using representations to reason. In particular to make and test hypotheses. It is the representations and the reasoning that these representations afford which enables the students to be transformed (again something the authors plan to explore in future papers). A comprehensive understanding of complex systems and thus of natural selection then becomes possible.

NETLOGO AS A DIGITAL REPRESENTATION FOR LEARNING ABOUT COMPLEX SYSTEMS

A question that remains is which representations, if any, are going to be most useful to students for learning about natural selection as a complex system? That is: which representations are going to best assist students, working with teachers, to cross the liminal space from novice to expert (another question for future papers). Research suggests that multi-agent based computational models, in particular NetLogo, are particularly useful for exploring complex systems, including natural selection (Blikstein & Wilensky, 2010; Jacobson & Wilensky, 2006; Levy & Wilensky, 2011; Sabelli, 2006; Sengupta & Wilensky, 2011; Wilensky & Novak, 2010; Wilensky et al., 2012).

There are multiple reasons why NetLogo is such a useful tool for exploring complex systems. It is low-threshold and high-ceiling, so while it is easy to learn, the software is capable of complex simulations required for advanced investigations. In particular, NetLogo code is easier to construct than most computing code. In contrast to most programming languages, NetLogo employs an agent perspective (which provides a natural descriptive focus for describing large-scale and complex systems) and an animated environment which explicitly shows agent interactions, births and deaths.

One particularly important feature of the NetLogo environment is the controls to stop and advance time and the controls to modify the behaviour of models while they run. This, in conjunction with the viewing window that enables students to visualise emergence, assists in the creation and testing of hypotheses (i.e. abduction). Through providing these facilities, as we argue in an upcoming paper (Lynch & Ferguson, 2014), NetLogo functions as an external representation that interacts with students' internal representations, including those about complex systems (see Figure 1.).

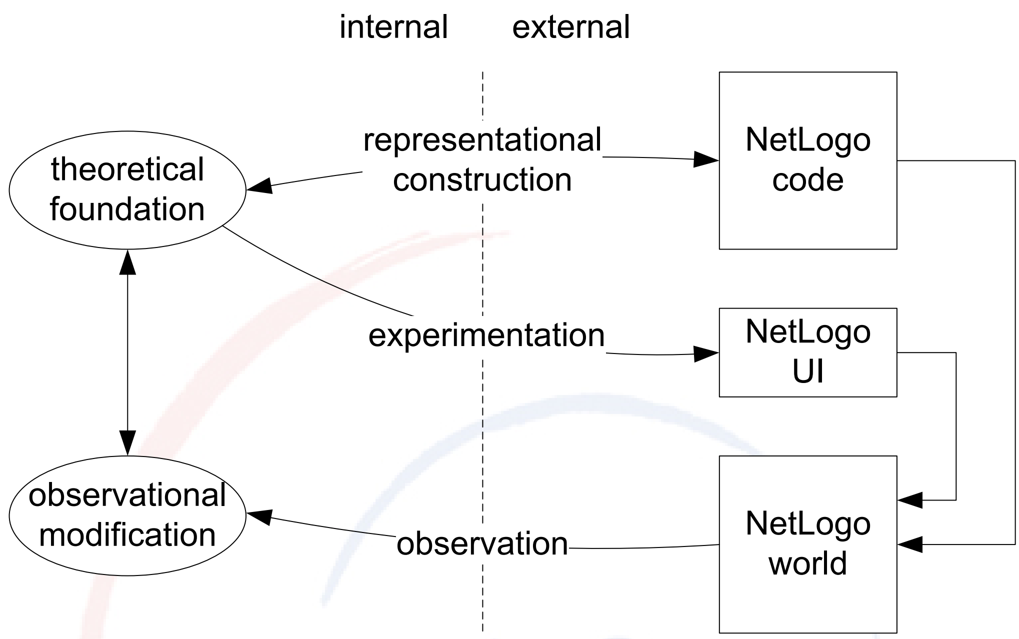


Figure 1. NetLogo as an external representation (Lynch & Ferguson, 2014)

Students are able to generate hypotheses and immediately test them using the software, allowing direct feedback to then alter their hypotheses and thereby refine their understandings. Dickes and Sengupta (2013), as well as Wilensky and Centola (2007), have made similar findings. They suggest that students can use NetLogo to bootstrap their reasoning; moving from reasoning at the individual level to reasoning at the systems level. It thus seems that NetLogo affords opportunities for students to conduct abduction about complex systems (including natural selection) and to successfully navigate towards a comprehensive understanding.

COLLABORATIVE REASONING

By proposing that reasoning is a fundamentally representational process, we also assume that reasoning necessarily takes place within the communicative act. This is sometimes an internal conversation, but more often a conversation with others. As Hogan (1999, p. 1085) suggests, there is a need for "regarding reasoning and thinking as social practices that are situated within particular contexts, and distributed across both human and material resources." It is in this way that we can talk of "collaborative scientific reasoning" (Hogan, 1999, p. 1086). As Latour (1987) and Latour and Woolgar (1986) propose, science, like all other human endeavours, is a social practice

Accordingly, if, as a part of the representation-construction approach to teaching and learning science, reasoning is recognised as crucial, then cooperation and collaboration between peers and between students and teachers must remain a focus. This collaborative reasoning encourages co-construction of knowledge through facilitating productive argumentation among students and teachers, in particular through jointly creating and engaging with representations. Reasoning as a group in many ways is more productive than reasoning by oneself (Hogan, 1999; Hogan, Nastasi, & Pressley, 1999).

Hogan goes further suggesting that there are two forms of collaborative reasoning; "surface reasoning" (1999, p. 1099) and "deep reasoning" (1999, p. 1100). Surface reasoning involves simply describing scientific phenomena, with no explaining taking place. In contrast, deep reasoning involves exploring scientific phenomena in order to generate new ideas that are then elaborated upon and interconnected. The teacher's goal should be to guide students towards deep reasoning.

Hogan et al. articulate the difference between surface reasoning and deep reasoning through their criteria for "reasoning complexity" (1999, p. 395). The criteria include:

- generativity, which relates to the generation of new ideas (i.e. hypotheses);
- elaboration, which concerns the expanding of existing ideas;
- justification, which relates to using inferences and evidence to justify ideas;
- explanation, which involves providing detailed mechanisms to account for scientific phenomena;
- logical coherence, which relates to the soundness of ideas;
- and synthesis, which involves bringing together different ideas, in particular contrasting ideas.

Any particular sequence of reasoning can involve different levels of complexity.

Hogan (1999) and Hogan et al. (1999) operationalise Peirce's notion of reasoning for use in the science classroom (a suggestion we plan to further explore in future papers). They provide an overview of the way in which surface reasoning and deep reasoning are likely to manifest in science education.

Hogan (1999) suggests that students undertaking surface reasoning do not evaluate their ideas and do not properly understand the task at hand; these students are unlikely to interact with each other in a meaningful way to generate and synthesise ideas. Their goal is to provide satisfactory answers to set questions. In contrast, students undertaking deep reasoning possess a good understanding of the task at hand; they internalise the requirements of the task; they constantly reflect on, evaluate and refine the ideas they generate and strive to question all parts of the task at hand. Perhaps the most important characteristic of the student undertaking deep reasoning is that they make hypotheses about the scientific phenomena under investigation, often as a result of debate with peers.

Hogan et al. (1999) provide further insight by proposing that it is discourse concerning knowledge construction that is a hallmark of deep reasoning. Similarly, student use of conceptual statements (i.e. statements explicitly about the concept), questions and queries (i.e. posing questions and queries) and metacognitive discourse (i.e. talk about regulating ideas as well as evaluating ideas) are all indicative of deep reasoning. In addition, while both peer-peer interactions and peer-teacher interactions must occur for deep reasoning to be a possibility, it is elaborative interactions in which there is a reciprocal back-and-forth between participants that results in an iterative discussion, which must occur for deep reasoning to be realised.

RESEARCH OVERVIEW

The study that is the focus of this paper took place in a science education centre in Melbourne, Australia. Students from across the state of Victoria visit the centre with their teachers to work with science educationalists and practicing scientists to explore bioscience. The visits to the centre are designed to add to, and extend, teaching and learning that takes place in the school science classroom.

The authors worked with staff at the science education centre to design and implement two educational programs that focused on students reasoning about natural selection as a complex system (this included programming the computer models that were used). The educational programs were based on the representation construction approach to teaching and learning science. As such there was a focus on students interacting with existing representations as well as creating their own. This paper focuses on the use of NetLogo by the students to collaboratively reason about natural selection as a complex system (a significant topic that will require further exploration in future papers). For this reason only the computer sessions (i.e. those sessions that involved the use of NetLogo) are discussed.

For the first workshop, six students and one teacher from a metropolitan, male-only government school participated, as well as eight students and one teacher from a regional, co-ed government school. These students were in either year 10 or year 11 and so were 16-17 years old. For the second workshop, 22 students and two teachers from a metropolitan, co-ed government school participated, as well as 24 students and two teachers from a metropolitan, male-only government school. These students were in year 10 and so were 16 years old.

WORKSHOPS & MODELS

The computer session that formed a part of the first workshop involved students exploring Darwin's finches as a way of investigating natural selection. They were required to answer a set of questions in a workbook through a process of guided inquiry and group work.

The students worked in pairs and as a larger group of six to explore the NetLogo model shown in Figure 2. The model showed a population of Darwin's finches changing (i.e. the relative number of birds with deep beaks and narrow beaks) under different ecological conditions (i.e. the availability of big seeds and small seeds).

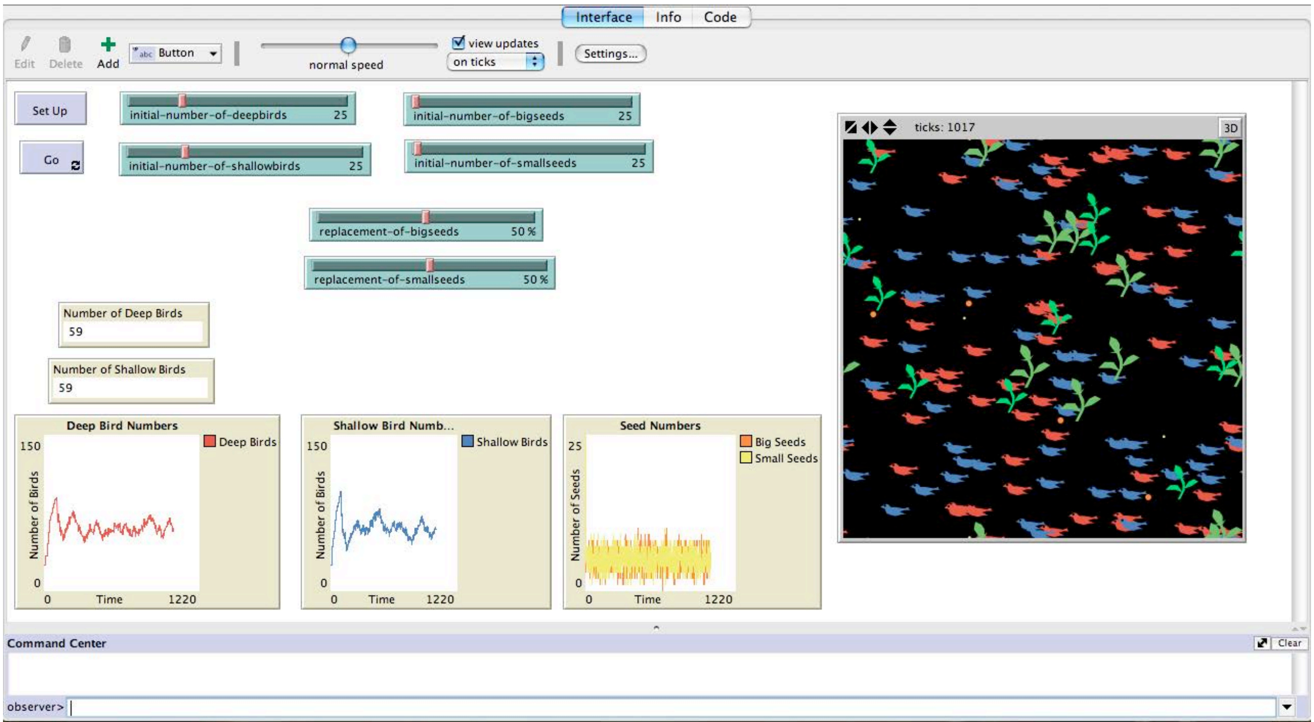


Figure 2. Darwin's finches population model (Lynch, Ferguson, & Szwed, 2014d)

The computer session that formed a part of the second workshop involved students exploring the relationship between the HBB gene and malaria as a way of investigating natural selection. They were required to use Explain Everything © (a whiteboard and screen casting application) to create, record and interact with representations through a process of guided inquiry. There were no set questions,
rather students responded to a hypothetical scenario about natural selection in the final session of the workshop. Again the students worked in pairs and as a larger group of six to explore the models shown in Figure 3., Figure 4. and Figure 5.

The first model (Figure 3.) was a fine detailed model showing the interactions between humans, mosquitos and the malaria parasite (i.e. the humans as hosts, the mosquitos as vectors and the malaria parasites as pathogens). The second model (Figure 4.) was a broader model showing interdependent populations of humans and mosquitos fluctuating under different ecological conditions (i.e. the prevalence of the malaria parasite). The third model (Figure 5.) was again a broader model this time showing the changing make up of the human population (i.e. the relative numbers of the S allele and the A allele and the various associated genotypes) under different ecological conditions (i.e. the prevalence of mosquitos and the malaria parasite).

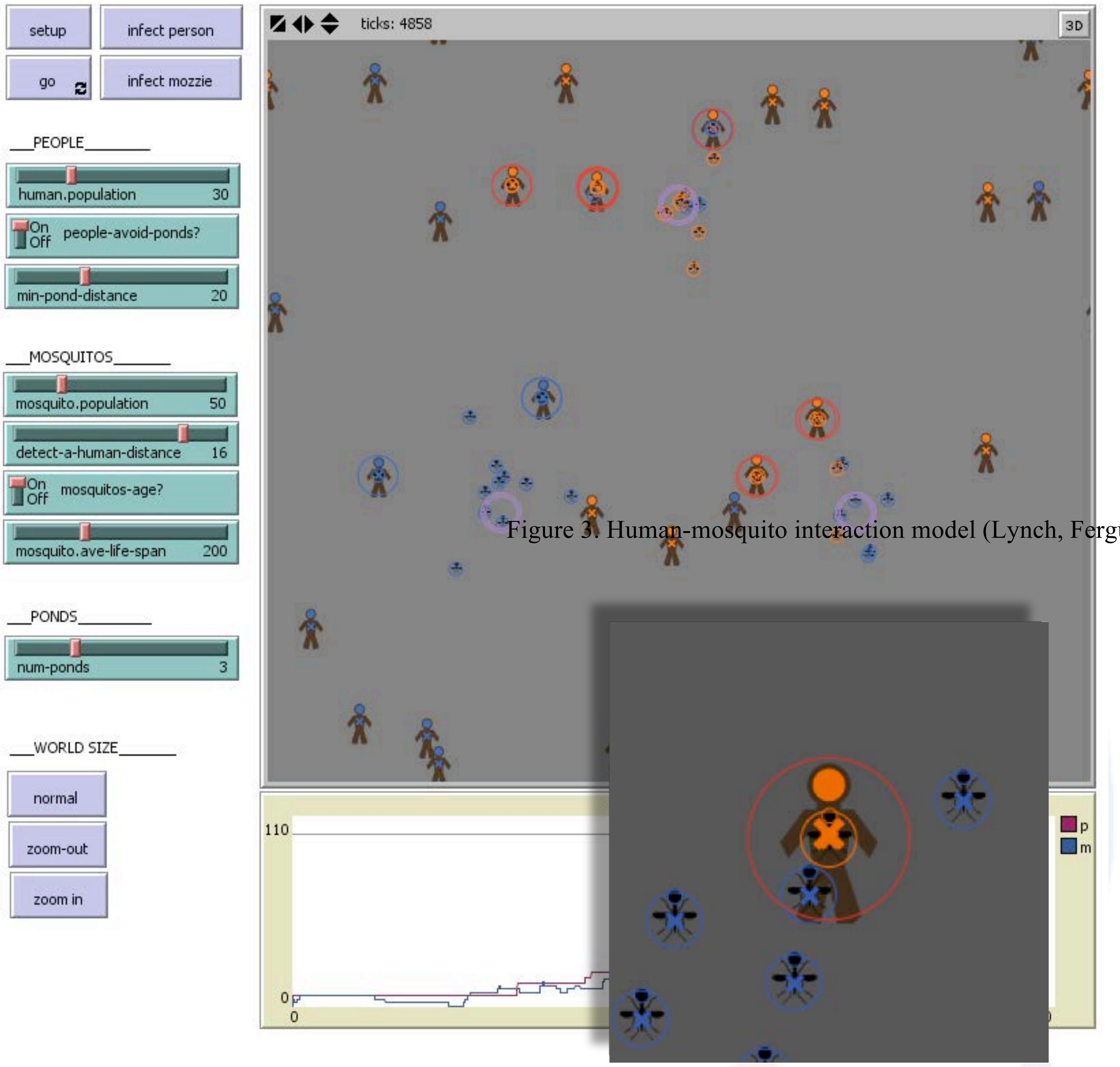


Figure 3: Human-mosquito interaction model (Lynch, Ferguson, & Szwed, 2014b

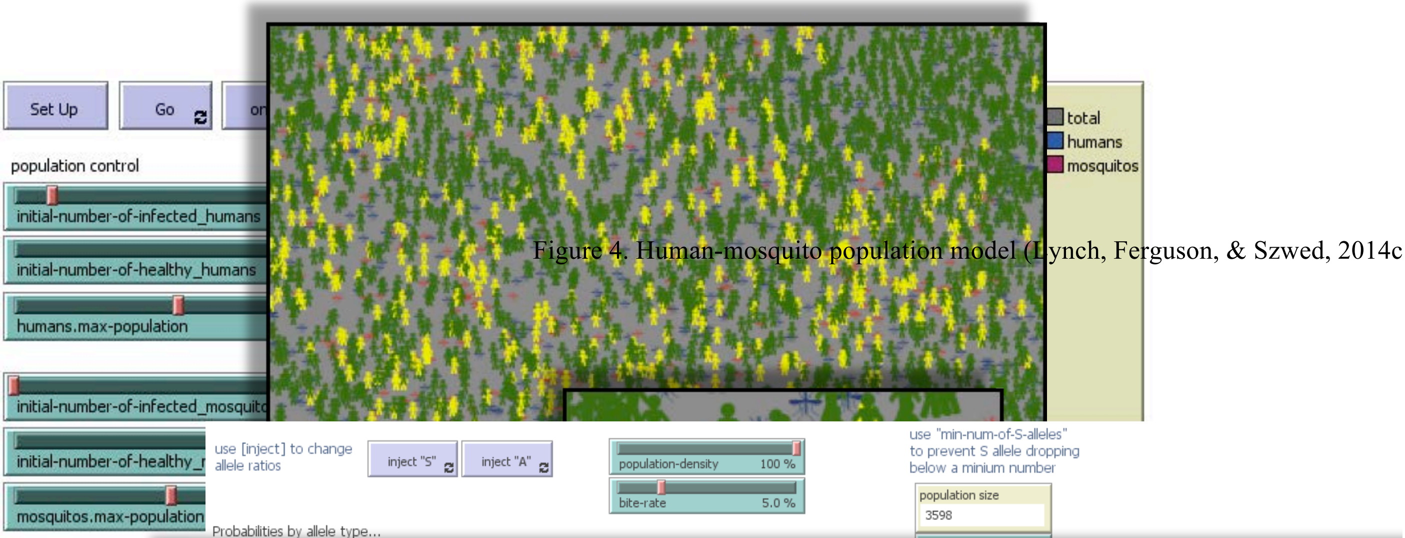


Figure 4. Human-mosquito population model (Lynch, Ferguson, & Szwed, 2014c

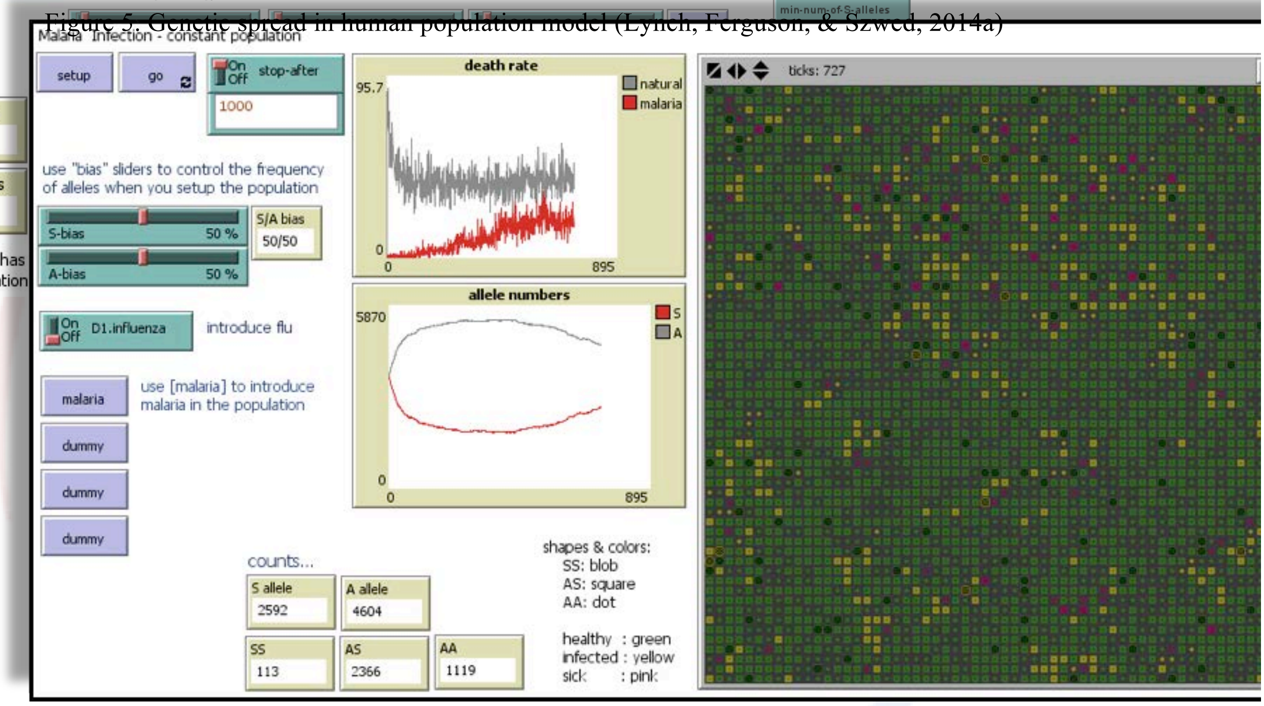


Figure 5. Genetic spread in human population model (Lynch, Ferguson, & Szwed, 2014a)

DATA COLLECTION & DATA MANAGEMENT

The student's interactions with each other and with the NetLogo software, as well as their interactions with teachers, was recorded using tripod-mounted video cameras (linked with lapel microphones) and web cameras (also containing microphones) mounted on students' computers. In addition, students' use of NetLogo (i.e. what was taking place on screen) was recorded using the screen casting software Camtasia Studio ©. The students' recordings of their experiences with representations using Explain Everything, which constituted their projects or learning journals, were exported to Dropbox to be accessed later off-site.

After collection, the video data was transferred to the video tagging software Studiocode ©. Studiocode enables the video data to be organised and coded at a broad level (potential moments of reasoning were flagged) as well as providing a means to combine the various video sources for efficient viewing. The students' projects were managed through a dedicated Dropbox folder.

DATA ANALYSIS

Since the data for this research is only recently collected, the analysis of the data is still in early stages. As a result this section provides only preliminary results and suggestions for further analysis, which will be explored in future papers.

Through the use of Camtasia Studio a coding scheme will be developed to code the video data. This will be based on the criteria outlined by Hogan (1999) and Hogan et al. (1999) for collaborative reasoning. At this stage, the video data has been viewed, not coded, in order to identify any collaborative reasoning that might be taking place. Through this coding the interaction and discourse between students and teachers can be explored. The complex interactions between different representations and changes in representations over time can also be investigated. Through this process it is suggested that reasoning in action can be explored.

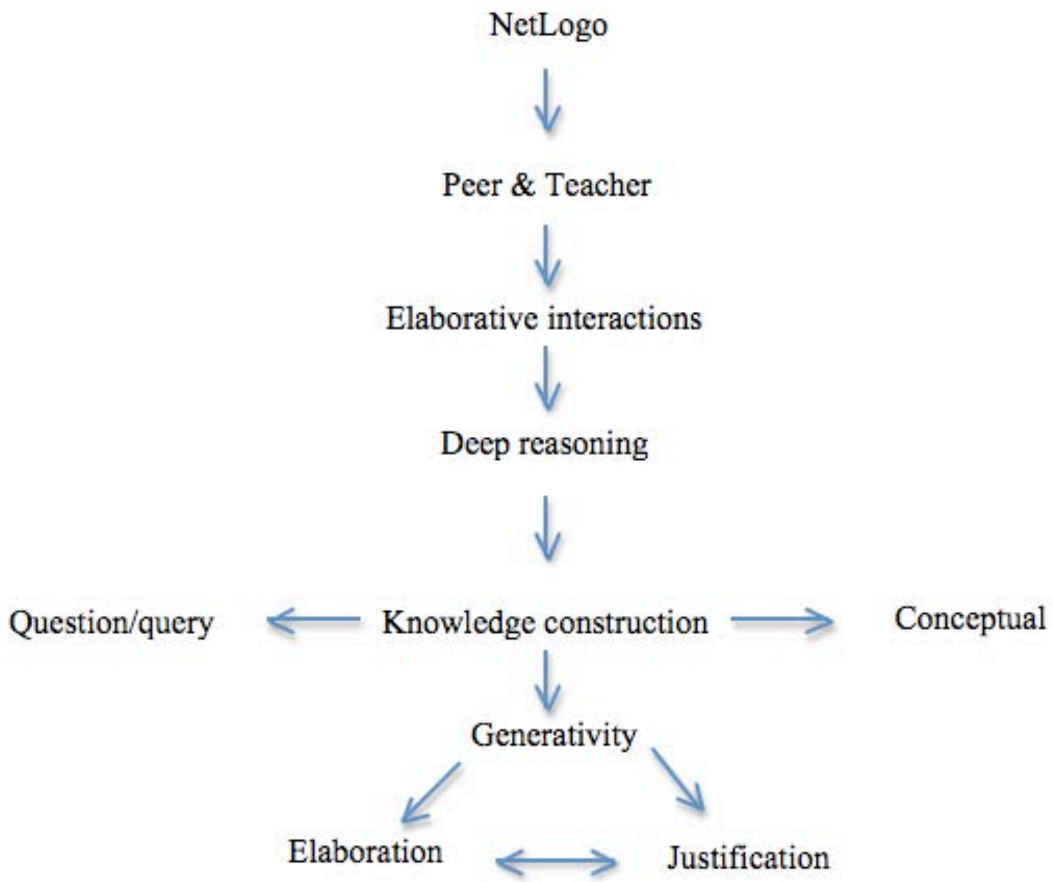
The students' projects have similarly been analysed in a preliminary fashion. Evidence of the use and creation of different representations has been identified, but not coded. Again, we expect more detailed analysis to reveal the relationship between particular representations and the collaborative reasoning that is taking place in the video data.

PRELIMINARY FINDINGS

As discussed above, the findings in this section are preliminary in nature. They are not based on a detailed analysis of the data. They are based on viewing, and not a result of data coding. Nevertheless they provide an indication of what future analysis may reveal, and provide valuable insight into the way in which NetLogo may be used by students as a digital representation to collaboratively reason about natural selection as a complex system.

The diagram below (Figure 6.) provides a schematic of the preliminary findings. It shows a proposed relationship between students using NetLogo and students collaborating in order to carry out complex forms of reasoning. Although not shown in the diagram, natural selection as a complex system is the focus of this learning.

Figure 6. Interaction with NetLogo supports deep reasoning among studen



We suggest that NetLogo promotes interactions not only between students and their teachers, but also between peers. It seems to provide a focus for interaction and productive feedback for interactions. In addition, many of these interactions appear to be elaborative in nature: students make statements about the simulations, which are not only acknowledged by peers and teachers but are also commented upon by them. These comments are then used by those involved to modify the original statements and also to modify the simulation. It is through this iterative process, which is supported by students' creation and interaction with different representations, that students produce and refine new ideas.

We further suggest that, in this context, these elaborative interactions often lead to students working with their teachers and peers to carry out deep reasoning about natural selection. Not surprisingly then, knowledge construction about natural selection appears a dominant form of discourse among students and their teachers. Logistical discourse, particularly in relation to students determining the workings of the NetLogo software itself, also seems to serve an important role. In addition, some off-task discourse is observed (particularly when students are unsure of the activity at hand). However, as the focus here is deep reasoning then discourse concerning knowledge construction is the priority.

Knowledge construction was evident in the students' conceptual statements as well as their questions and queries. The students' conceptual statements mainly concerned key concepts that form the foundation of natural selection (e.g. variation, heritability) as well as concepts more directly related to specific components of our examples of natural selection. For example: Darwin's finches (e.g. feeding habits), the HBB gene (e.g. the benefits of being homozygous in a malarial environment) and malaria as a disease (e.g. malaria lifecycle, spread of malaria among humans, the relationship between mosquitos and humans). The students' questions and queries related to similar material, but also alluded to the use of NetLogo (e.g. What were the functions of the various sliders? What was the meaning of the viewing window?).

Interestingly, the students did not appear to make conceptual statements explicitly about natural selection as a complex system. Nor explicitly pose questions or queries about natural selection as a complex system. But this finding does need to be confirmed through further, and more thorough, analysis. However, the students' conceptual statements, as well as their questions and queries, did seem to be shaped by the notion of natural selection as a complex system. This is further discussed below.

Perhaps the most important preliminary finding is that the deep reasoning students seem to be conducting is characterised by generativity. Students appear to be using NetLogo to support the creation of their own ideas (i.e. hypotheses) about natural selection (as well as more specifically about Darwin's finches, the HBB gene and malaria) and then using the software to test these ideas. The feedback from the testing is then used to modify the original hypotheses. This is abduction, and more broadly experimentation, in action.

The output from the simulations, and the associated discussions among peers and teachers, is used to both elaborate on the initial ideas and to provide justification for these ideas. All are hallmarks of the complex components of reasoning. Critically this entire process seems to be based on the students generating their own representations of the outputs of the NetLogo models and then recording these and their associated discussions in various forms. This is evident in the students' representations that form their Explain Everything projects.

Once again, however, the students do not seem to explicitly engage with natural selection as a complex system. They do not seem to generate hypotheses about natural selection as a complex system. Nor through their interactions with the software, or with teachers and peers, do they seem to elaborate on and justify their ideas about natural selection as a complex system. This is evident in the students' Explain Everything projects in which the key components of a complex system do not seem to be explicitly represented in any form. It is possible, however, that further analysis of the data will reveal that this is indeed taking place at some level.

The students do seem, however, to interact with natural selection as a complex system through their interactions with the NetLogo models. The models are designed to demonstrate the complex nature of natural selection and as such when the students interact with the models they are engaging with natural selection as a complex system. It is of note that the centralised mindset and decentralised mindset were not obviously present in the students' reasoning or representations. This is possibly a result of their interactions with the software. So it may be the case that students are subtly, but not explicitly, reasoning about natural selection as a complex system. This suggestion, however, needs to be further investigated and better articulated.

CONCLUSION

The preliminary findings of this research suggest that NetLogo seems to be functioning as a digital representation that students can use to reason (in particular via abduction) about natural selection. However, the software does not seem to be used to reason explicitly about natural selection as a complex system (but this needs further investigation). While students were engaging with natural selection as a complex system through their interactions with the NetLogo models, they did not appear to explicitly reason about natural selection as a complex system. There were signs however that students were implicitly reasoning about natural selection as a complex system, which further analysis of the data may reveal to be indicative of students directly reasoning about natural selection as a complex system.

We suggest that through participating in the workshops at the science education centre, and in particular through interacting with NetLogo as a digital representation, that students were assisted in their navigation of the liminal space between novice and expert when it comes to understanding natural selection as a complex system. So while the students left the workshops as neophytes, they, as well as their teachers, left with the resources and knowledge (in the form of the NetLogo models and the appreciation of the value of creating and interacting with various representations) to work towards overcoming the troublesome knowledge that is the complex nature of natural selection.

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A Framework for Problem-Based Learning with Cloud Technology Environment in On-line Courses

Porntida Kaewkamol, Chiang Mai University, Thailand

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Abstract
Problem-Based Learning (PBL) has been regarded as an alternative active learning method in classrooms for decades. It encourages students to develop their self-learning and problem-solving skills through an investigation of a problem from the instructor. In doing so, a group of students is generally obligated to search for related information to the given problem, analyse for solutions, and ultimately discuss it with their peers. However, problem-based learning has a limitation for on-line courses since it might be difficult for students to share ideas and information. According to this virtual communication issue, a rapid advance in technology tends to provide appropriate tools for the learners to fully achieve the benefits of problem-based learning in on-line courses. Cloud-based service is one of cost-effective technologies to facilitate teaching and learning process via the Internet. Software as a service (SaaS) is particularly the beneficial service model in cloud technology which supports on-line information sharing and integration. Students are subsequently able to use this service to experience problem-based learning in an on-line environment. This paper consequently aims to propose a framework for utilising cloud technology focusing on SaaS for problem-based learning in on-line classrooms.

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Introduction

Learning and studying in on-line courses generally emphasises on self-learning ability of students. They are supposed to learn new lessons from materials provided by the instructors to eventually achieve the objectives of a certain course. As the development in educational process, there have been an alternative teaching technique called Problem-Based Learning (PBL) which is used widely in many disciplines. PBL encourages students to practice critical-thinking and problem-solving skills to discover the answers of a given problem by themselves rather than depending mainly on the materials from teachers. Consequently, students are likely to understand the key concepts and principles by practical process. PBL also gives precedence to group working since students should share ideas and searched information with their peers to find the appropriate solution. Applying PBL in on-line courses, hence, inevitably rely on data sharing and learning collaboration even though these are in virtual communication context. Software as a Service (SaaS) is a service in cloud technology which tends to handle this difficulty. It provides solutions to facilitate the process of data sharing and collaboration among users via the Internet. With the use of SaaS, students and teachers are likely to experience PBL in an on-line circumstance.

Literature Review

Literature review of this paper includes three topics: Problem-Based Learning (PBL), online teaching, and cloud technology and Software as a Service (SaaS). Problem-Based Learning is specifically studied on its key characteristics and general processes. Online teaching is reviewed regarding its strategy and success factors. More importantly, there is a review of cloud technology and Software as a Service (SaaS) in terms of its advantages, learning processes in cloud environment and key functions that should be included for on-line education.

Problem-Based Learning (PBL)

PBL involves in learner-centred teaching. Its main characteristics include active learner engagement, collective knowledge of the group and a problem without a pre-determined solution (Tambouris et al., 2012). Students in PBL are challenged with problems which subsequently encourage their learning processes. The problem usually relates to real world situation that have several solutions. Students are obligated to find the appropriate answer to explain the given problem. During this process, students are capable to realise what they already know about the problem, new knowledge that they discover, and also additional questions that further study is required. PBL can consequently promote self-learning since students can construct their new lessons with the previous knowledge (Dolmans et al., 2005). Although PBL can be implemented by many approaches, a web-based platform is an alternative way as it can empower students to become more active, collaborative and productive in PBL (Tambouris et al., 2012).

Online teaching

Pelz (2004) proposed three factors for an effective on-line teaching strategy which are student engagement in content, student-student and student-teacher interaction, and the presence of learning environment. Savery (2005) similarly suggested the five major characteristics for a successful on-line teaching which include Visible, Organised, Compassionate, Analytical, and Leader-by-example (VOCAL). Initially, it is important that students are able to notice the visibility of a classroom by regular information update, email communication and feedback from instructions. Students should also be able to easily organise their schedule. Furthermore, instructors should be compassionate of students' feelings and needs by establishing a direct communication and a discussion forum in order to closely supervise students. In addition, assignments should be timely provided to students for the analysis of their learning outcomes. Moreover, instructors should model themselves the appropriate behaviours to assist student's performance through teacher-student interaction.

Cloud technology and Software as a Service (SaaS)

Cloud computing is the extendable technology. Cloud users can easily deploy virtualised resources without the understanding of technical mechanism behind (Hayes, 2008). Software as a Service (SaaS), in particular, is the cloud-based service which supports alternative on-line resources for education such as Youtube and iTunes. Students are consequently able to select their preferred learning content through the provided service (Little, 2008). Besides, SaaS-based system can encourage data sharing and knowledge-based service as well as decrease operational costs (Cho, 2010).

Mikroyannidis (2012) additionally proposed four main learning processes for cloud learning environment. The steps can be seen as follows

(i) Student profile is created or revised,
(ii) Student finds and chooses learning resources,
(iii) Student studies on selected learning resources,
(iv) Student reflects on strategies, achievements and usefulness

Apart from learning processes, the ability of SaaS-based service to support learning method should also be provided. Fernandez et al. (2012) introduced some key functions that should be included in SaaS-based service. They relate to five subsystems which are Application Registry Management to register the application, Application Server to store learning contents, Account and User Management to authorise users, Virtual Desktop Deployment to provide personalised desktop environment, Session Management to ensure the system is being used by an authorised user and Personalised Management to enable the selection of favourite learning contents.

Proposed Framework

According to Dolmans et al. (2005) and Mikroyannidis (2012), the framework for problem-based learning with cloud technology in on-line courses should consist of at least six main steps to cover PBL processes. The steps are:

(i) Student profile is created or revised.
(ii) Student receives a problem.
(iii) Student finds and chooses learning resources to analyse the given problem.
(iv) Student shares searched data and discuss solution with peers.
(v) Student connects new knowledge with the previous ones.
(vi) Student reflects on strategies, achievements and usefulness.

These learning steps should be processed through key characteristics in terms of Visible, Organised, Compassionate, Analytical, and Leader-by-example (VOCAL) (Savery, 2005). Furthermore, all processes should be achieved through Software as a

Service in cloud technology which promotes data sharing, student communication and collaboration (Cho, 2010). Moreover, those SaaS-based services should include key functions regarding Application Registry Management, Application Server, Account and User Management, Virtual Desktop Deployment, Session Management and Personalised Management (Fernandez et al., 2012) for a successful on-line teaching. The proposed framework can be illustrated in Figure 1.

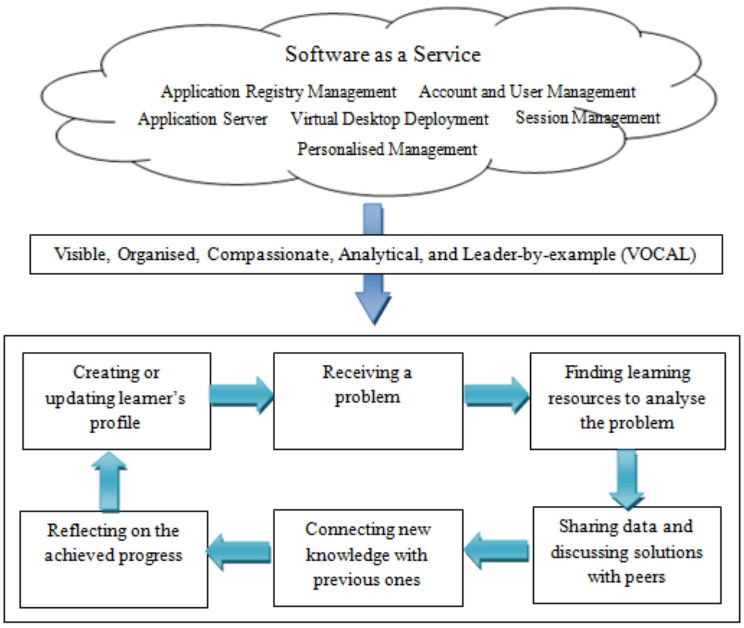

Figure 1. A proposed framework for problem-based learning with cloud technology in on-line courses.

Results and Conclusion

The overall objective of PBL in on-line course is to create a self-regulated learning environment by enabling students to manage their own learning process with the support from technology, their peers, and the instructors. Cloud-based service particularly Software as a Service is likely to encourage student self-learning process since it can provide data sharing and user collaboration functions. Cloud technology is, therefore, a suitable solution to assist students with PBL style of teaching in on-line courses to eventually achieve the learning outcomes.

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A Framework for Increasing Potential of E-Learning System by Using the Student Centered and Problem Based Learning for Sustaining Knowledge Development

Kannika Daungcharone, Chiang Mai University, Thailand

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Abstract
The teaching style and the dissemination of knowledge among educators and learners today have a wide selection. Each method focuses on the difference of elements and techniques. One way being the most popularity and widely used in educational institutions is to disseminate knowledge using electronic media and networking as a medium, known as Electronic Learning or E-Learning. This is because its ability to disseminate without any limit on locates and time to learn. This approach, the knowledge is uploaded to the E-Learning which is usually in the form of lessons or messages that the students will be able to read or download information. However, such approach is just one way communication since the students cannot ask questions or comment with the instructor in real-time. Also, the published content is only the idea of instructors. In fact, effective teaching should be aimed primarily on interests and abilities of students to enable the students can understand the content of the lesson correctly and thoroughly. Therefore, the proposed framework is to provide a guideline on the development of E-Learning system by emphasizing on the need of learners. In particular, students will be able to ask questions and give some suggestions and opinions to the instructor immediately. It also focuses on the analyzing and solving problem among instructor and students. Ultimately, this development will enable students to fully understand the lessons and can develop their own knowledge become to the ingrained and sustainable knowledge.

Keywords: E-Learning, Sustaining Knowledge Development, Student Centered, Problem Based Learning

1. INTRODUCTION

Normally teaching style of academy is only study in the classroom. Methods of teaching in the classroom, the educator are the narrator and explain their knowledge about various lessons that also includes examples of problems and how to solve the problem. On the part of the students who sitting in the class room they can listen to the lesson, take notes and ask questions to understand the problem. A commonly used tool for teaching and learning in the classroom is a whiteboard, computer and projector. Nowadays the technology is changed and has various types that support the teaching in class such as computer, the Internet, media and new equipment which make the teaching style change and have a wide selection. Therefore, the method of teaching style should be focused can focuses on the difference of elements and techniques. One way being the most popularity and widely used in educational institutions is to disseminate knowledge using electronic media and networking as a medium, known as Electronic Learning or E-Learning.

E-Learning is an approach education concept by using the Internet technology; it deliveries the digital content, provides a learner-orient environment for the lecturers and learners. For this approach, the function of teacher is providing an area on the Internet for create the E-Learning system that can share the information between teachers and students. Moreover, Lecturers have to prepare the content in digital format that can upload to the system for example text files, picture files or video clips. On the other side, the function of students needs to prepare a computer or device which can connect to the Internet and E-Learning system, and then they can study the lesson that stay in the system and also downloads it for studying in the future. In general, the E-Learning system is not the two-way communication at the same time. The learner cannot converse or ask the questions from teacher at the time when they need help. The way in which they can do is post the question then waiting for the teachers reply the answers so this is the limitation of this technique. Furthermore, the problem of the system include the quality of contents, the detail of lessons and the format of medias are not good enough.

For solving the limitation of E-Learning system mentioned above, this paper is trying to purpose a novel concept to increase the ability of the two-way communication at the same time between teachers and learners. The function of this system will help the students to understand the lessons easier or help them for asking the guideline of the solutions from the instructor immediately. It will be the useful system for students who cannot understand all lessons in their classrooms and require more studying by themselves.

2. LITERATURE REVIEW

For supporting this paper there are various theories and researches to explain and promote this concept they are briefly explained as follows.

2.1 Electronic Learning

E-Learning offers an opportunity to improve the learning experience. The advantages for teachers are to enhance the distribution of learning contents, ease for update, standardization and tracking of learner activities. The advantages for learners include ease of access, better interactivity and learning by themselves. However, it is difficult to consider the resources required to be developed and also hard to simulate some aspects of the real world. Pre-requisites for developing an E-Learning program to support prescribing needs academic expertise, institutional support, learning technology services and an effective virtual learning environment. E-Learning contents might range from complex interactive learning sessions through to static web pages with links. It is now possible to simulate and provide feedback on prescribing decisions and this will improve with advances in virtual reality (Simon, 2012).

With the growing demand for E-Learning along with striving for excellence associated with globalization, there are worldwide calls for enhancing and assuring quality in E-Learning, specifically in the context of the developing countries. Such calls for quality enhancement, accountability, added value, value for money, self-evaluation, and role players' satisfaction in higher education settings cannot go unheeded (Masoumi, 2012). The quality of E-Learning can be defined in many different ways, reflecting different stakeholder and the complexity of the systems and processes used in higher education (Marshall, 2011).

Learning designs refer to a variety of ways of designing student learning experiences that is a sequence of types of activities and interactions. It may be at the level of a subject or subject components and it also can be considered the framework that supports student learning experiences. It should focuses on learning designs implemented with the use of information and communication technologies. A learning design comprises the following key elements (Oliver, 1999):

- Tasks that learners are required to do.
- Resources that support learners to conduct the task.
- Support mechanisms that exist from a teacher implementing it.

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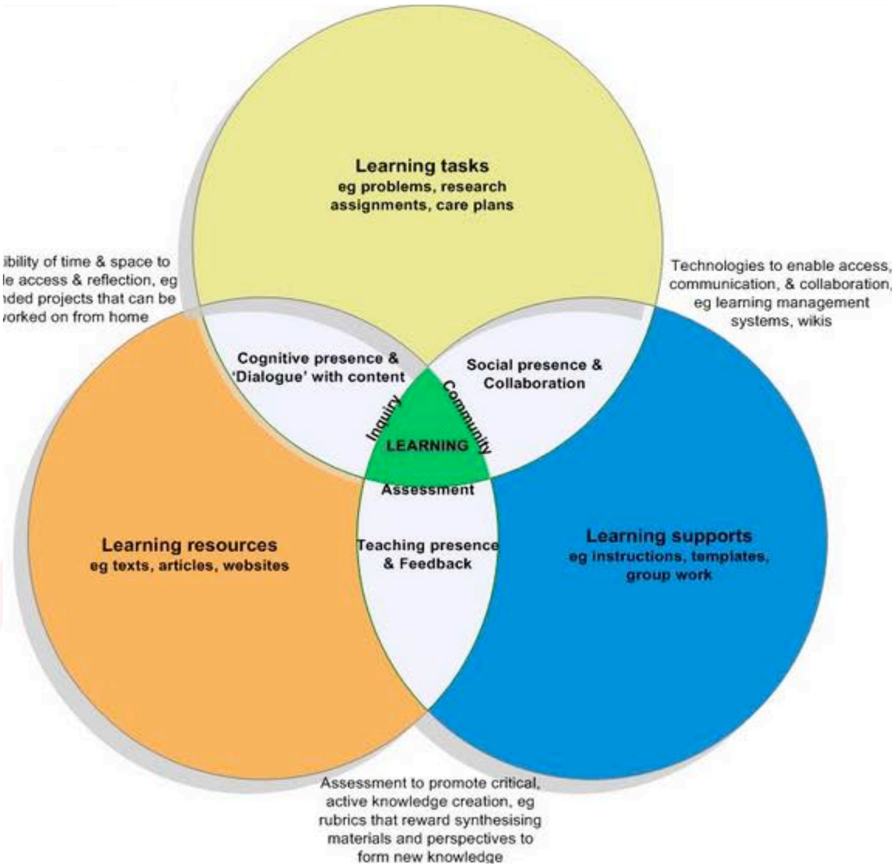

Figure 1 An E-Learning framework (Adam, 2004)

The work of communities of practice and aims at facilitating collaborative learning and knowledge sharing can view in the online knowledge network designed. It help students interact with each other and their peers, as well as share their problems, experiences and learning through the use of e-mails and chat forum services, discovery and reference materials, group work, and customized learning plans. This can also help integrate the four traditional activities in the incubator: lectures, group discussion, collaborative projects, and assessment (Teerapron, 2013).

2.2 Problem Based Learning

Problem-based Learning (PBL) is an educational approach based on the principles of constructivism, in which students learn by addressing authentic problems reflecting on their experiences. Virtual Worlds (VWs) are a promising educational medium that has the affordances to support constructivist learning and may be used to extend PBL activities in a more experiential way (Vosinakis, 2011).

2.3 Student Centered

Student-centered learning (SCL) provides an environment where students play more active role in obtaining knowledge by accessing key materials and resources in the learning process. This model suggests that students are flexible and empowered individual to access important sources of knowledge that present in Figure 2. These resources may include course instructor, course materials, library and the Internet that provide most of the materials, other students as peer in the learning process. With the availability of ICT, students have more flexible access to multiple resources including the library, the Internet, instructors, other students, lectures, and other schools (Hairulliza, 2013).

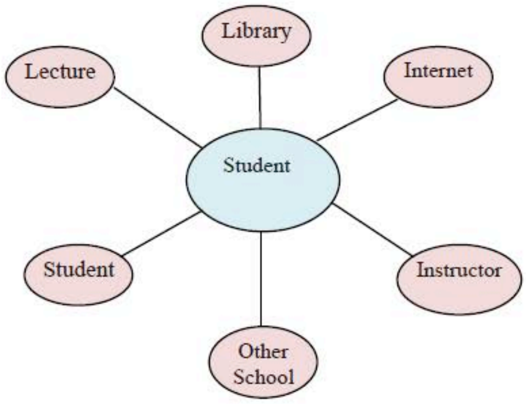

Figure 2 The relationship of Student-centered learning Model

The success of experiment group where student centered approaches was applied was significantly higher than that of the control group but they could recommend the following as to this conclusion (Yucel, 2009):

- Learning, teaching strategy, methods and techniques putting the student into the center should be paid more attention in the processes of learning and teaching.
- Learning environments should be rearranged depending on student centered applications and the needs of students.
- Teachers should be given in service training over student centered applications.

The encouraging and discouraging factors can be situated in the context of the learning environment, in students' perceptions of that context and in characteristics of the students themselves. To investigate the nature of the relationships between encouraging and discouraging factors and students' approaches to learning are concerning contextual factors, perceived contextual factors and student factors that are presented separately in Figure 3 (Marlies, 2010).

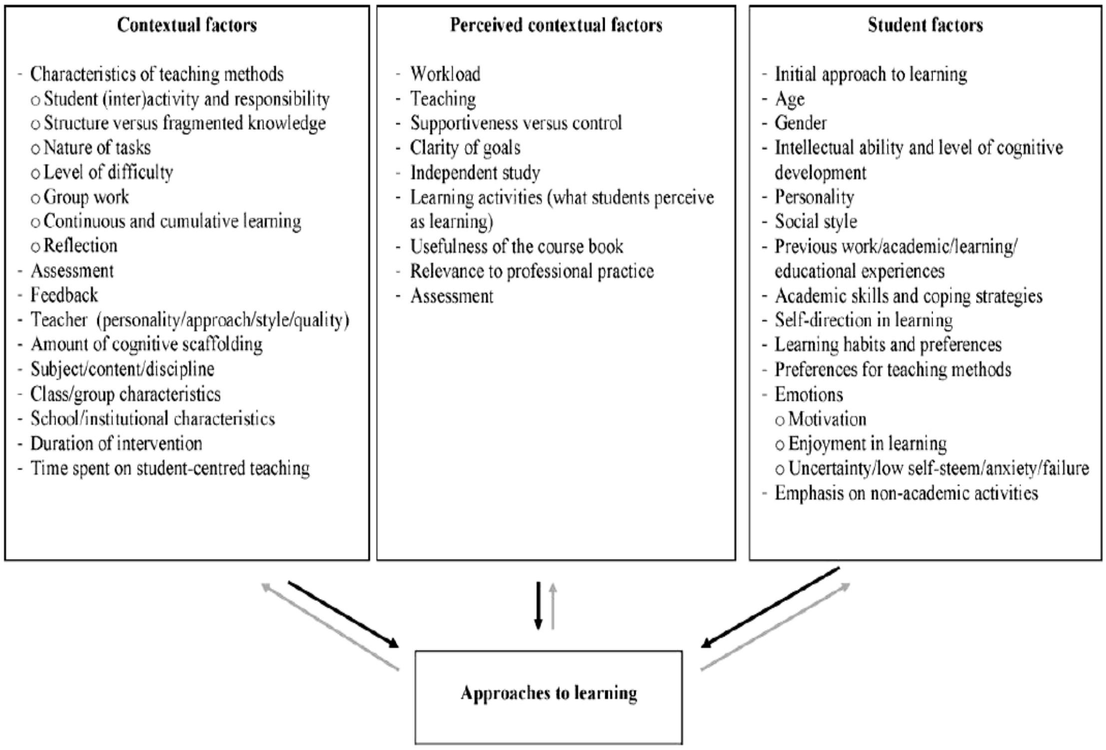

Figure 3 An overview of encouraging and discouraging factors

3. THE PERPOSED FRAMEWORK

To increase the potential of E-Learning system to the two-way communication system at the same time between the teacher and learner, it needs to consider with many factors in many aspects such as learners, lecturers, technologies and environment. All aspects are important and should be carefully consider in terms of analyzing, designing and choosing the suitable issues for creating the new system.

The conceptual framework in this paper is demonstrated in Figure 4. It is developed from three basic approaches: E-Learning system, Problem Based Learning and Student Centered. It also includes the culture and the environment of academy because all of them are related and affected to the sustaining knowledge development of learner. The main function of this research is tried to find out the major of each approach and use them for developing the E-Learning system.

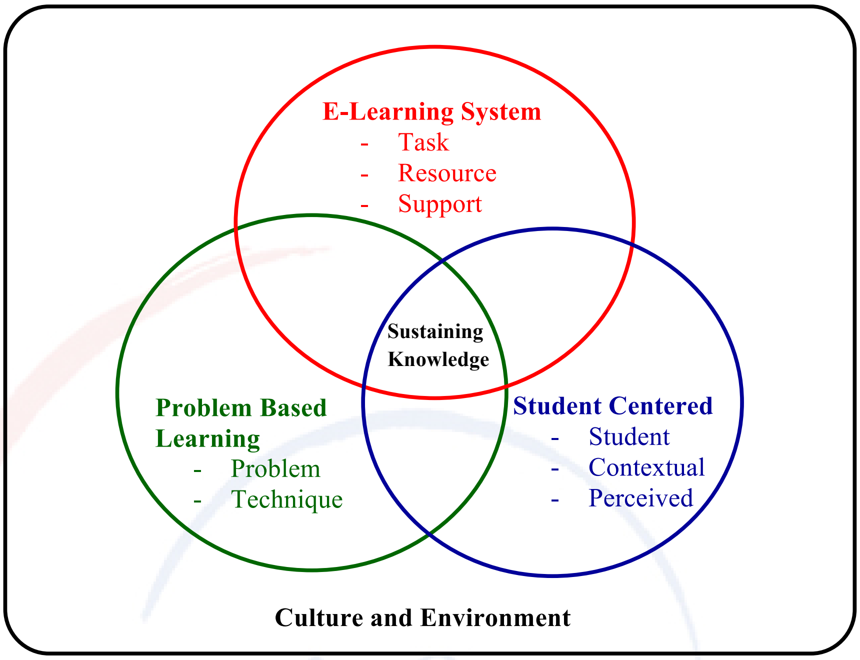

Figure 4 The proposed conceptual framework

4. CONCLUSTION

For the future result, It is strongly believed that this framework can increase the performance of E-Learning system. This is mainly because teachers and students can interact and discussion via such that is a virtual classrooms. The result of this action should also assist the students to understand the lessons and apply their knowledge to solve other problems. In addition, the system allows instructors to manage the content, lessons and media for effective and qualitative teaching.

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The Usage of Mobile Internet Device in the Action Research of Design Thinking Integrated Science Courses

Tsun-Hsin Wang, Taichung Municipal Chung-Gang Senior High School, Taiwan
Chung-Hsiang Wang, National United University, Taiwan
Wen-Sung Chou, Taichung Municipal Chung-Gang Senior High School, Taiwan
Yi-Hwan Shyr, National Taichung University of Education, Taiwan
Chin-Hui Wang, Taichung Municipal Koi-Mei Primary School, Taiwan

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Abstract
We report the studies to use the mobile internet device in the science course at the CHUNG GANG senior high school in Taichung, Taiwan. The course is designed with the design thinking method and the tablet PC are used. From the previous experience, design thinking will benefit not only the teachers and the students, but also the school authorities. However, some problems and challenges have been discovered during the execution of this program which needs further studies. On the other hand, mobile internet device (MID) becomes more and more common in the daily life with the merits of light in weight, small in size and easy operation. Here, the prospects and the potential benefits of the design thinking course with MID will also be discussed and presented here. The program is supported by Nation Science Council of Taiwan, and executed by high-school teachers and university professors.

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I. Introduction

Design thinking [1] has provided a revolution methodology in the economy knowledge era due to the integration of the following abilities: observation, analysis, empathy, definition, ideate, prototype, story-telling, and tests. For the purpose of design thinking integrated to educational scope in senior high school, the activation of humanity, active learning, multi-abilities, and vocational guidance are finally toward the ability of problem-solving. More details of the High Scope Program with design thinking can be found in our former studies.

In 2012, we demonstrated the action research of design thinking with integration to the science and technology course at a senior high-school at the 4th Asian Conference on Education [2]. We found that people were highly concerned and enthusiastically discussed on design thinking at ACE 2012. Therefore, we report the follow-up action research of design thinking integrated to the science course especially with mobile internet device (MID) this year, which has gained a substantial focus [3] since the IPAD become popular.

The MID, so-called Flyer tablet PC, is provided by Dopod Inc. which is supported by HTC company. All students of grade 10 at CHUNG-GANG senior high school are freely distributed the MID as shown in Fig. 1.

Fig. 1. The MID provided by Dopod Inc. and distributed freely to all students of grade 10 at CHUNG-GANG senior high school.

II. Study Results and Discussion

1. Training course on design thinking

Based on our former study, High Scope Program is beneficial for the integration of university, high school faulty, teachers, and students to develop their own professional enhancement. As a result, under the advice of university professors, the teachers in the high school instruct the training courses for students with the concept of design thinking demonstrated by Brown. The procedure of design thinking integrated to the science course with MID is shown in Fig. 2.

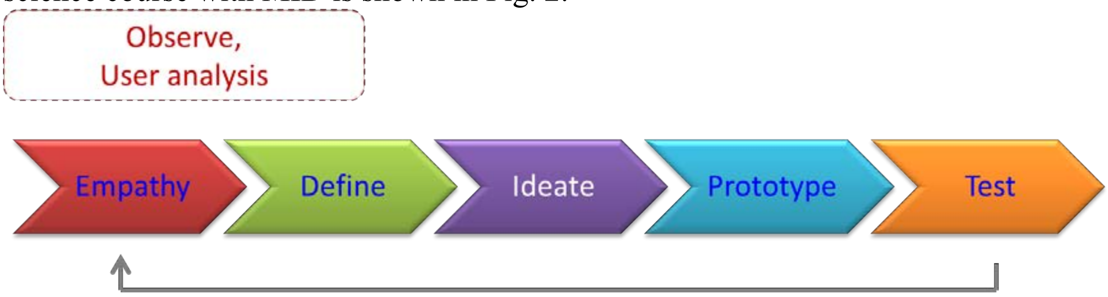

Fig. 2. The procedure of design thinking integrated to the science course with MID.

The learning cone of design thinking integrated to the science course with MID can be described, as shown in Fig. 3, as three parts: basic course, advanced course, and bright spots. The basic courses include the introduction of design thinking, the training course of mind map, and the training course of invention for International Exhibition for Young Inventors (IEYI). Moreover, the advanced courses are developed as the Redesign of Flag-raising Platform, Math Café, and Book Video. Furthermore, the bright spots of this program are set to be the active participation in international invention exhibitions such as IEYI.

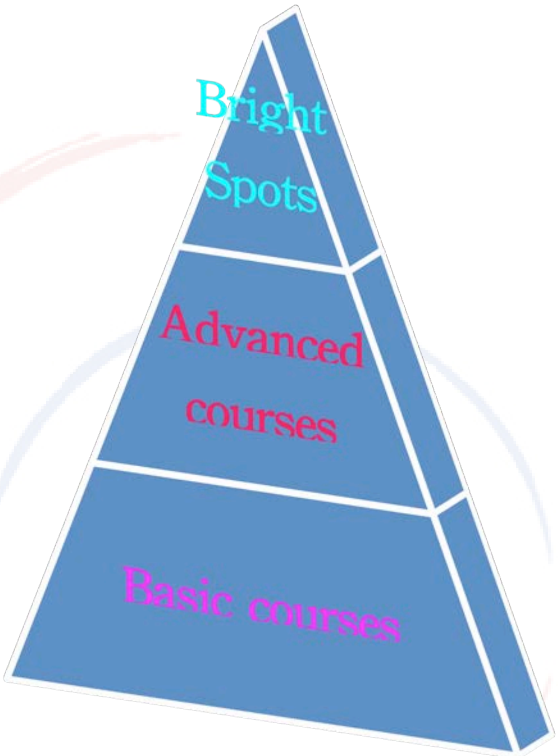

Fig. 3. The learning cone of design thinking integrated to the science course with MID.

2. MID in the classroom

The MID is introduced in the classroom for four steps. First, the science teacher upload the pdf files, named as BOOK, to the internet platform of LearnMode provided by Dopod Inc. Secondly, the science teacher instruct students to upload the video files of their preview the course. Thirdly, the procedure of discussion in the class is captured by the MID and upload to the same platform as shown in Fig. 4. Finally, the exercises are also asked to be submitted in specific period time after class.

With the integration of design thinking, the students are encouraged to share their ideas on the course which are not generally found in the classroom with traditional teaching.

Fig. 4. The application of MID which includes the platform of uploaded courses and submitted exercises, recording tools of discussion in the classroom.

III. Conclusion

In summary, on the good side, the student discussion in the classroom is highly inspired with the MID under the usage of internet platform. Effective learning and active learning are activated and observed in this study.

Contrarily, on the down side, the loading of teachers are heavier in order to prepare the course and the classroom managements are harder. With the MID, the focus of students on the course are another challenges to be solved. As a result, more investigations and experiments are suggested.

IV. Acknowledge

This work was supported in part by the National Science Council (NSC) of Taiwan under grant NSC 102-2514-S-239-001, NSC 102-2514-S-791-001, NSC 102-2514-S-142-001, and NSC 102-2511-S-142-021.

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EF Spotlight: A Case Study of Harnessing Tablet Technology to Enhance a Classroom Learning Service

Steven Crooks, EF Education First, China
Michael Thede, EF Education First, China

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Abstract

Following the mainstream debut of tablet computers in 2010, educators and organizations have sought solutions to benefit the delivery of classroom learning, evaluating of software, hardware and pedagogy.

This case study presents the experience of a private language education provider in developing, introducing, and evaluating a dedicated classroom application for provision to 200+ schools across three countries for students aged 3 – 17.

The study introduces the context of EF Kids and Teens, an English language training provider operating across China, Indonesia and Russia. Courses are provided to kindergarten, primary, junior high and senior high school students, with online self-study and a parent communication portal supporting face-to-face classroom learning using printed materials and IWB classware.

The study introduces the development of a classroom iPad application integrated with existing course materials, a back-end data management system, course management tool, and parent portal. The application's features (tabletized assessment, individual multimedia projects, and media recorder for teachers) are introduced.

The process of testing, piloting and launching the application is evaluated through quantitative product usage statistics and qualitative feedback from end-users. The positive product impact, along with learnings on training provision and local device administration, are shared along with scope for future enhancements providing additional learning content.

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Introduction

Research Purpose

Early case studies and evaluations of tablet computer implementation in educational contexts have indicated both positive potential outcomes and usages along with organizational or operational challenges involved in introducing and using the devices. Furthermore, many of these case studies primarily focus on cross-curricular tablet usage in elementary and high schools, and the impact and usage of tablet devices with a range of commercially-available free or paid applications – for example some of the largest-scale reports evaluate usage at the institutional level (Heinrich, 2012) or province level (Karsenti and Fievez, 2013). However, little or no published research currently available documents or evaluates the implementation of custom-designed applications tailored for a specific institutional or educational context.

This exploratory case study focuses on evaluating the initial implementation of tablet computers running a specific application designed to enhance the learning service provided by a large private language training organization, providing input for longitudinal studies and reference for future development and roll-out projects.

Literature Review

Tablet computers were introduced to a mainstream, mass-market audience in 2010 with the launch of the Apple iPad and Samsung Galaxy Tab. As noted in a report from Alberta Education (2012), "School jurisdictions were not immune to the iPad buzz and while there is still little scholarship on the effectiveness of iPads for learning and teaching, iPads are becoming more prevalent in classrooms and at a much faster rate than previous technology". The primary benefits of early trials and studies "have shown that integrating iPads with sound curriculum can contribute to increased student engagement, collaboration, productivity, technology competency, innovation, and critical thinking" (Chou, Block and Jesness, 2012).

Issues impacting the potential uptake and success of tablet devices in education "highlight a number of technical, pedagogical and management issues that schools will need to address" (Heinrich, 2012), including but not limited to the cost of the devices themselves along with the required infrastructure (WiFi, device management and insurance), the attitudes and device familiarity of both end-users (teachers and students) and stakeholders (such as institution management and parents), and the reliability of both the hardware and software along with provision of technical support.

Methods

Context and Setting

EF Education First is the world's largest private educational company. Founded in 1965 by entrepreneur Bertil Hult, EF is a privately-held company with 15 divisions that offer a range of educational programs from language training, educational travel, and academic degrees to cultural exchanges. With a mission to open the world through education, EF has helped people of all ages and nationalities become citizens of the world. EF operates 500 schools and offices in over 52 countries. EF's global network includes 16,000 full time office staff, 5,000 full time faculty and 16,000 part time teachers, leaders and tour directors. To date, EF has helped over 15 million people to learn a new language, discover the world, or earn an academic degree.

As a division of EF Education First, EF Kids & Teens operates over 240 schools for children and teenagers to learn English in their home country. A series of programs is offered for students aged 3 to 16 in China, Indonesia and Russia using a customized and proprietary curriculum and materials for in-class study and online homework. The classroom-based learning service provides face-to-face small-group classes using a communicative methodology with a maximum group size of 16 students, and employs a range of digital classware delivered via Internet-connected computers and interactive whiteboards (IWB’s) to supplement printed textbooks.
A data management system (known as ODIN) is used to store and synthesize information on student attendance and progress as input by the teacher, along with usage and results of the online study system, and present reports and information to stakeholders including parents (through a parent portal system known as EF Parents), teachers, school management and central management teams.

Through consultation with end-users and stakeholders and an evaluation of early research and usage of tablet computers in educational institutes, the decision was taken to develop a dedicated classroom iPad application named EF Spotlight. The app is intended to harness the possibilities offered by mobile devices to answer three operational requirements for EF Kids and Teens language centers:

1. Provide parents with more frequent opportunities to see the classroom-based learning and progress of their children.
2. Ensure that assessment is an integrated part of classroom operations and course production.
3. Provide teachers and staff with flexibility and streamlined administrative workload.

In order to meet these requirements, the app incorporates three functions:

a. Digital progress tests with automated marking and synchronization of scores with ODIN.
b. Language activities known as Digital Project Work (DPW) in which students manipulate images and make voice recordings to produce a short video of a storyboard or scene description which is automatically uploaded and can be shared with parents.
c. A photo and video recorder for the teacher in which students can be tagged and media is automatically uploaded and can be shared with parents.

The app is designed to be used by all groups at a minimum frequency of one iPad session per month, with the potential for more frequent usage by the teacher or students depending on school-level availability and scheduling.

Study Design

This exploratory case study evaluates a six-month piloting period in which the process of iPad introduction (from WiFi installation to device purchase and training) and classroom usage was piloted in four EF Kids & Teens centers. Two centers in Shanghai and two centers in Moscow were selected to participate in the piloting period, and both quantitative and qualitative measures used to evaluate usage and feedback. The focus of the study was to evaluate in-school usage of iPads and the app, and to inform future roll-out and analogous projects.

Data Collection

Quantitative measurements of application usage and progress test scores were collated through the organization's internal data management systems, along with a student survey taken online in either Chinese or Russian. The English translation of the survey can be found in Appendix 1. A total of 162 students (43 from China and 119 from Russia) responded.

Qualitative feedback from end-users was collated via a series of fifteen one-to-one interviews conducted with teachers (questions in Appendix 2) and focus groups with a total of ten parents in Chinese (English translation of questions in Appendix 3).

Results and Discussion

Usage Statistics

During the six-month piloting period in four schools, a total of 125 iPad lessons were conducted, with students completing 910 progress tests and submitting 444 digital projects. A total of 626 photographs and 80 videos were uploaded via the media recorder.

End-User Perspectives: First Impressions

Prior to the beginning of piloting, staff and teachers at all four schools participating in the project reported varying degrees of previous personal experience with mobile devices—ranging from those who had never owned or used an iPad (or similar device) to those who considered themselves to be both comfortable with and adept at the use of the technology. Despite this, one factor which remained constant was that very few (if any) teachers had any previous experience with tablet devices *in a classroom or learning environment*.

From the outset of the project, expectations were generally quite high. With few exceptions, staff and teachers anticipated students would respond enthusiastically to the use of iPads in class. That said, participants were not without their concerns and three areas in particular stood out:

1. Challenges related to the prevention of lost, stolen, or damaged equipment (especially as it pertained to personal liability).
2. The reliability of the technology (including related systems and infrastructure) which would be employed.
3. Potential classroom management issues which might arise as a result of distributing iPads to students for in-class use.

Of note here, given that app piloting included the use of a media recorder function with which photos and videos could be recorded, uploaded, and automatically shared with parents via the online parent portal, it was somewhat surprising that issues related to the screening (or lack thereof) of media prior to upload were deemed to be of little concern to staff at all levels of school administration.

End-User Perspectives: General Usage

Discussing the management and use of devices, respondents largely agreed that the introduction of iPads didn't contribute to any significant increase in overall staff workload. When it came time to deliver an iPad session, teacher further reported that they could have equipment set up and distributed and have students using the devices for lesson purposes in less than five minutes (on average). Furthermore, despite earlier concerns, students by-and-large used devices responsibly and no equipment was lost, stolen, and/or damaged during piloting.

On a whole, participants stated they felt related IT infrastructure was at least as reliable as that which had been employed as part of previous similar projects. The majority of issues which were reported during piloting were (at least perceived by staff to be) 'WiFi issues'; however, school staff also reported that in many cases they weren't capable of assessing the cause of a particular issue and that from their perspective 'things either worked or they didn't work'.

Furthermore, not only did these issues lead to a loss of class time, but they were also cited by respondents as the single biggest potential de-motivator for both staff and students when it came to the use of iPads. Groups which reported having experienced one or more IT issues during piloting also reported much lower levels of student enthusiasm. From the perspective of staff and teachers, issues contributed to higher levels of stress and frustration as they worked to resolve them.

Nevertheless, over the course of the piloting period there was a dramatic decrease in the number of issues reported by schools. Moreover, by the end of piloting, the vast majority—in excess of 95%—of issues reported could be resolved in-school by non-IT staff. Respondents further stated that both experience and additional training contributed to a large extent in improving this situation.

Other common issues stemmed largely from the fact that iPads (and related equipment) were both a shared and limited resource within each school. For example, there were instances in which teachers found that previous users hadn't logged out of the app, settings had been changed, or devices had not been properly charged. As a result, numerous respondents cited the need for a designated coordinator within each school who was responsible for managing the devices on a weekly basis.

End-User Perspectives: Progress Testing

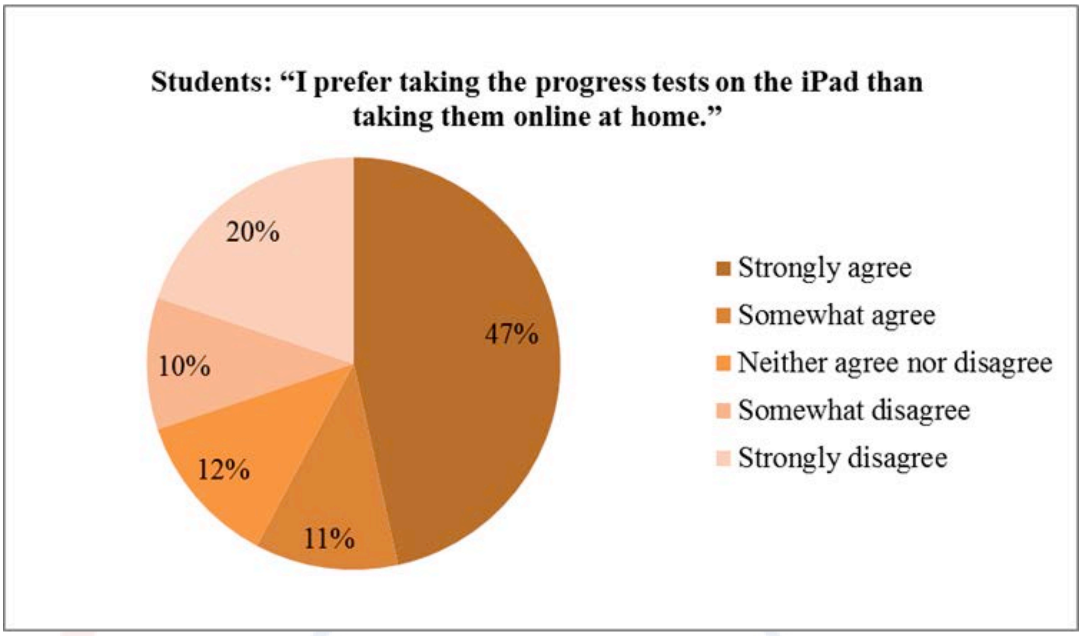
In response to piloting the progress test function of the app, teachers almost unanimously agreed that:

1. The test function was very reliable (i.e. it rarely caused the app to crash and results were accurately communicated to related systems).
2. There were very few issues related to the process of administering the test itself.

Beyond that, however, the opinions of respondents became somewhere more polarized. On one hand, there were those who viewed assessment completed on iPad as the happy medium between previous paper-based and online testing. When compared with the at-home online test, not only did iPad assessment result in higher de facto completion rates (students *had* to do the test in class), but returning assessment to the classroom setting also ensured the overall integrity of the test-taking experience for students. At schools where teachers had previously attempted to combat lower completion rates by requiring students to take the online test during class time, the use of iPads further simplified this process when compared with the prospect of relocating students to the school computer lab to complete the test.

When compared with the paper-based test, not only did automated scoring lead to higher scoring accuracy and reduced staff admin time, but the use of iPads also effectively removed teachers from the test-taking equation. For example, where teachers would have previously been required to cue audio tracks for students completing the listening portion of the test on paper, they were now free to spend more time monitoring and assisting students where needed during the test.

Figure 1: Student Survey Results



On the other hand, there were teachers who felt that while students were generally less resistant to taking tests administered on iPads (see Figure 1), that the use of tablet devices contributed to a 'game time' atmosphere in the classroom. For example, respondents stated while students appeared to be more focused insofar as they were less distracted during iPad test-taking, that some students also appeared to rush through the test and may not have been as deeply engaged with test content. Furthermore, teachers reported this may have also contributed to a drop in the scores of some students.

To follow-up on this concern, an initial comparison was conducted of student scores submitted by the iPad application versus historical scores from the online test database. No conclusive answer can be drawn here, in part due to the fact that the 6-month piloting period yielded a relatively small sample size of (only a few hundred) completed tests when compared with the number of tests that have been completed online to-date (in the tens of thousands) and that further investigation into the results of the iPad test is needed. Student scores in both cases form a diffuse distribution, with the standard deviation in scores in the range of 25% - 35% of the mean score for many levels of test. This initial comparison did however indicate no consistent or significant trend in mean scores or score distributions either increasing or decreasing when comparing the iPad data to the online data.

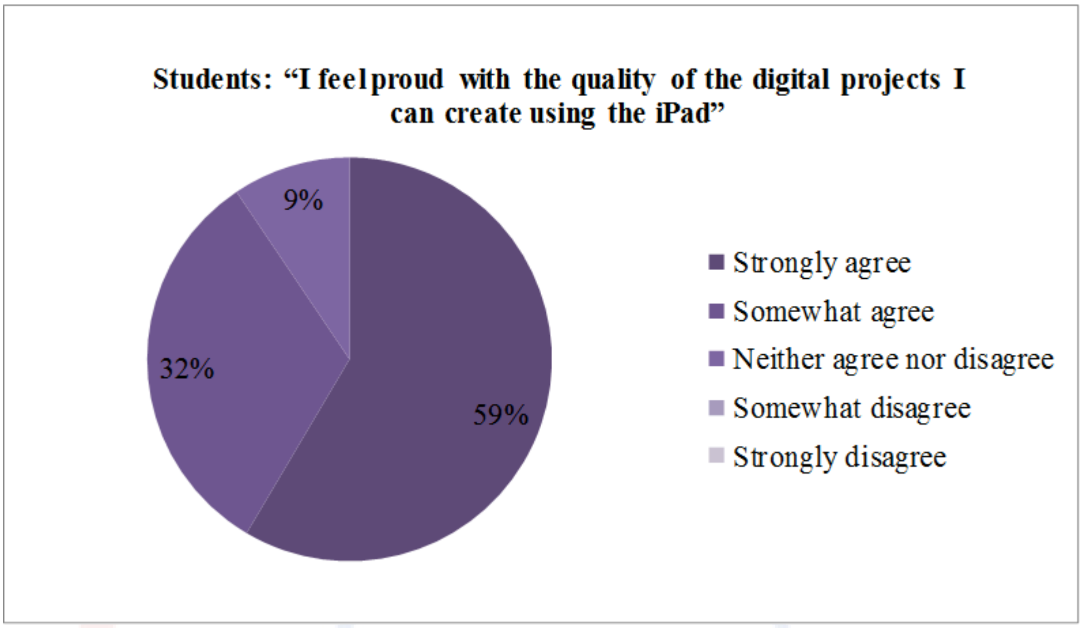
End-User Perspectives: Digital Project Work

Prior to piloting, teachers were provided with basic training, procedural notes, and additional resources (e.g. PowerPoint presentations which could be used for language introduction or review), but were largely left to their own devices and encouraged to experiment when it came to delivering digital project work sessions.

As a result, during the early stages of piloting, a number of teachers reported that while digital project work was 'fun for students', it took up time which could be used more effectively elsewhere. Others stated cited insufficient class time to review student work before being finalized and uploaded to the media management system. Despite the development of a viewing function in the media management system itself, some teachers reported they were unable to find time to review digital project work outside of class time given the need to prioritize other administrative tasks.

However, by the latter stages of the piloting period, the function experienced something of a coming of age, with both teachers and students perceiving greater value in digital project work as a record of student language ability and creativity. Furthermore, feedback indicated that teachers were now allocating more class time for modelling assigned digital project work tasks and using additional resources to introduce target language. Observations also revealed that students were spending more time planning their work out in advance and swapping iPads to watch and review each other's work.

Figure 2: Student Survey Results



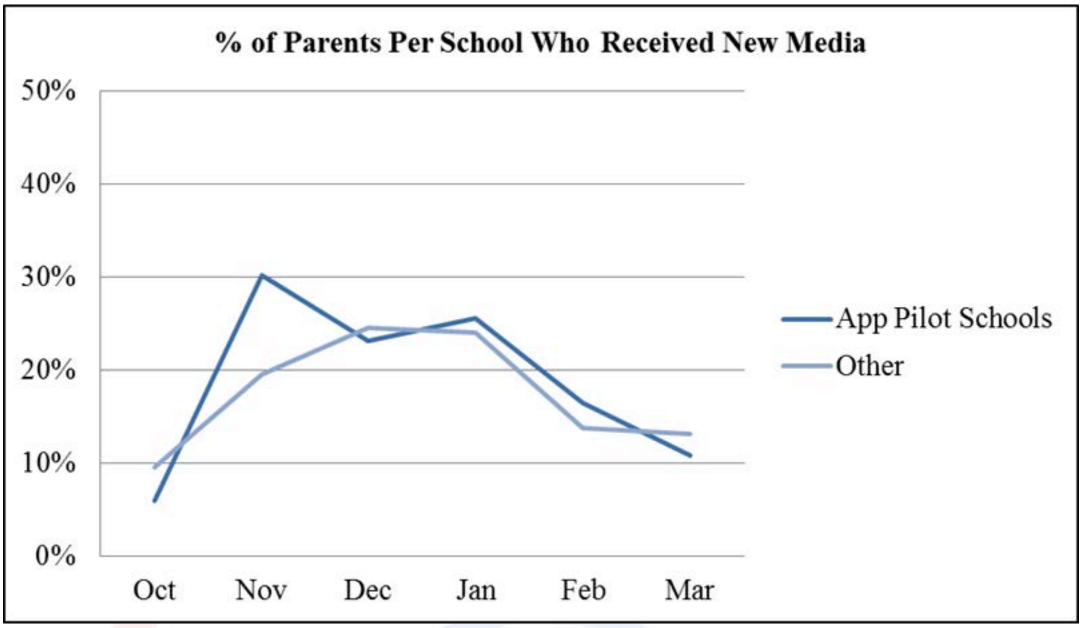
The result was that students spent on average 15 – 20 minutes of hands-on time with the iPads to create their digital project work. Although some students stated they felt the function was still somewhat limited, the vast majority of both teachers and students said they were satisfied with the quality of the digital project work which was produced (see Figure 2).

End-User Perspectives: Media Recorder

Prior to the introduction of the app media recorder, many schools were already involved in recording and sharing photos and video parents (e.g. via e-mail or CD) as part of overall parent communication. This was, however, being done on a school-by-school basis and had not previously been standardized across all schools. As a result, the objective of piloting wasn't to determine whether or not schools would be able to do something which they hadn't been able to do before, but to determine whether or not they would be able to do it better.

When it came to topic of the media recorder and sharing media with parents, the attitudes of staff and teachers were admittedly mixed. While many teachers cited the extent to which app integration with other systems greatly simplified the process of sharing media, other felt that the additional responsibility of being asked to record photos and video of class activities was difficult to manage given other classroom responsibilities.

Figure 3: Media Statistics from Parent Portal



At the same time schools involved in piloting began using the app all schools (in both China and Russia) began using the parent portal media function to share photos and videos. This lent itself to a convenient comparison between the output of schools piloting the app and those who were using other methods to record, upload, and share media with parents.

An analysis of the data from the parent portal system (see Figure 3) reveals that throughout the piloting period the media sharing behaviour of both piloting and non-piloting schools was quite similar. Moreover, in both cases, these trends correspond with operational cycle of schools as would have previously been expected.

While interesting, the above comparison is still quite limited in terms of what it really tells us since use of the app represents only one of a number of factors which might otherwise influence the volume of media shared by schools in a given month. Instead, a more valuable comparison might come from a before-and-after picture of the media sharing behaviour at current non-piloting schools as they begin to adopt the app.

Unfortunately, this data will only become available in the coming months as app roll-out is expanded to include all schools in China and Russia over mid-to-late 2014.

End-User Perspectives: Parents

Two focus groups comprising a total of ten parents in Shanghai, all of whose children had participated in iPad classes during the piloting period, were conducted. The parents not only voiced unanimous approval regarding the usage of iPads in the English language classroom, but also raised suggestions for additional activity types they would like to see in future iterations of the app. The majority of parents wished to see an additional focus on vocabulary review activities, citing a range of both freely-available and paid-for applications they encourage their children to use at home.

This unanimous support for classroom tablet usage contrasts to a previous internal company research project conducted in 2011 by one of the authors of this paper, in which 67 parents of a similar demographic were surveyed in Russia. During this survey, 16% of parents reported disapproval or strong disapproval to the notion of their children using tablet computers during class time to study English, with a further 25% neutral responses and only 49% voicing approval or strong approval. While tablet penetration and education usage have increased in the three years between these small-scale parent studies, further follow-up research investigating the impact of experience of their children using tablets on parental attitudes is a follow-up research consideration.

One further interesting outcome of parental focus groups was the small yet significant proportion (two participants per group) who reported being unaware that they could access media through the parent portal site which had been captured in the classroom. This highlights the importance of thorough end-user communication and awareness on all components of integrated systems in order to ensure optimal and successful usage of each individual component – in this case the media recorder functionality of the iPad application.

Conclusions

Main Findings

The key findings of this piloting case study indicate a successful initial adoption of the tablet technology into the organization's existing classroom learning service. Teachers, students and parents report a strongly positive attitude towards the iPads and application over the piloting period, and a substantial amount of iPad lessons were conducted successfully in all four centers.

From an operational and usage perspective, having a local on-site coordinator for both initial training and ongoing support and troubleshooting was reported as an important success factor, along with the benefits of a discovery-based "less is more" approach to instructions and interface, in contrast to overly prescriptive documentation or training sessions beyond basic features and functionality.

Policy and Practice Implications

Institutions or organizations considering introducing dedicated tablet devices and/or apps to enhance classroom-based learning services should consider implementing a controlled-scale piloting project in order to evaluate usage and troubleshoot, along with learn about end-user perspectives and best usage practices from end-users in order to enhance either the solution itself or the support and guidelines provided ahead of a larger-scale, higher-investment full roll-out.

Furthermore the value of having a motivated, capable on-site coordinator in all schools is strongly recommended, along with the importance of ensuring all inter-dependent features or platforms are not only fully integration-tested but also clearly communicated to the end-user community in order to ensure a full and valuable uptake of the new technology solution.

Strengths and Limitations of This Study

This case study provides both quantitative and qualitative input from all key end-users and stakeholders, and the access to such data was facilitated through the research evaluation being conducted internally by the organization in question.

Due to the limited time period and small scale of the piloting process, further analysis of product impact regarding statistical analysis of test scores, media upload, media access or longitudinal end-user perspectives was not possible within the scope of this study and will be considered for future research as the iPad application is launched in an increased number of schools.

Acknowledgements

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Appendices

Appendix 1: Student Survey Questions

In administering the student survey, respondents were asked to indicate whether they strongly agreed, somewhat agreed, neither agreed nor disagreed, somewhat disagreed, or strongly disagreed with each of the following statements:

1. I feel motivated when we use the iPads in class.
2. The progress test interface on the iPad is clear and user-friendly.
3. I prefer taking the progress tests on the iPad than taking them online at home.
4. The digital project work interface on the iPad is clear and user-friendly.
5. I feel proud with the quality of the digital projects I can create using the iPad.

Appendix 2: Teacher Interview Questions

The following questions and guidelines were used in conducting the teacher feedback interviews:

Engagement/Warm-up Questions

What previous experience did you have with the use of iPads or other similar mobile devices before this project? What were your initial expectations when you learned we would begin using iPads in classrooms?

Exploration Questions – Student/Teacher Response

In general, how do you feel the use of iPads has affected the learning experience for students? Are there currently any major outstanding issues or concerns you have about on-going use of iPads and/or the EF Spotlight app?

a. What is teacher's general attitude towards and/or concerns about the use of iPads?
b. How have students responded to use of iPads?

Exploration Questions – Workflow

In detail, please take me through the process of preparing for, starting, conducting, and ending a session using iPads and the EF Spotlight app.

a. How does teacher preparation (e.g. lesson plan) for a session?
b. What steps are involved for a teacher in starting/conducting/ending a session?
c. What classroom management issues has teacher encountered?
d. How could workflow be improved (additional resources, support, etc.)?

Exploration Questions – Progress Testing

Take me through the process of conducting a progress test on the iPad in class.

a. What benefits has the teacher identified to completing progress tests on the iPad vs. online or paper-based testing?

b. What difficulties has the teacher encountered in completing progress tests on the iPad?
c. What suggestions does the teacher have regarding conducting progress tests?

Exploration Questions – Digital Project Work

Take me through the process of conducting digital project work (DPW) in class. How do you see digital project work contributing to the overall learning experience of students?

a. What additional resources has the teacher made use of during the DPW portion of class?
b. How much time does teacher typically spend on the completion of DPW in class?
c. What steps does the teacher include in conducting the DPW portion of class?
d. What recommendations does the teacher have for improving the overall quality of digital project work completed by students?

Exploration Questions – Media Recorder

What role do you see the media recorder playing in the classroom and school environment? How and when do you usually make use of the media recorder?

a. What has the teacher used the media recorder for (including any novel suggestions for use)?
b. How easy is the media recorder to use?
c. What concerns or suggestions does the teacher have for further use of the media recorder function?

Exit Questions

Is there any other relevant feedback you would like to provide at this time? What do you feel is the most important point we talked about today?

Appendix 3: Parent Focus Group Questions

The following questions and guidelines were used in conducting the parent feedback focus groups:

Engagement/Warm-up Question
Who wants to share a recent achievement their child made in learning English?

Exploration Questions – Current Communication Platforms (EF)
How do you currently receive information from EF?
What is your evaluation of this communication? What do you value most, and what could be improved?

a. EF Parents (web)
b. EF Parents (app)
c. Progress Reports

d. Parent-Teacher Meetings
e. Progress Updates
f. Other

Exploration Questions – Media in EF Parents
Tell us about your experiences receiving photos and videos of your child through EF Parents.

a. Are parents aware of this feature?
b. How frequently have they received updated media?
c. What does the media show?
d. What do parents feel is the best example which they have seen of this feature?
e. What further media or content would parents like to receive at home?
f. What further media or content would parents like to discuss with school staff during consultations, parent-teacher meetings etc.?

Exploration Questions – Tablets in the Classroom
What value do you believe tablet computers can bring to your child's English studies?

a. Awareness of current EF Spotlight features
b. Experience with current EF Spotlight features
c. What benefits do tablets offer students?
d. What benefits does tablet use offer parents?
e. What features or uses would you most like to see in the future?
f. Are there any educational apps which you or your child feel are particularly strong?
What features of these apps do you most value?

Exploration Questions – Assessment
Tell us about your experience & evaluation of how your child is assessed at EF.

a. How important is assessment to parents?
b. How were students completing the online tests previously?
c. Have students shared any experiences of taking tests on iPads?
d. How would parents like to see results reported?
i. Frequency
ii. Medium
iii. Level of detail (i.e. scores vs. report vs. graded tests)

Exit Questions
Of all the topics we have discussed today, which do you feel is the most important?

Is there anything you would like to say that has not been covered in this session?

Augmented Reality Enhanced Materials Design for Language Learning

Eric Hawkinson, Seibi University, Japan

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Abstract
A look at emerging technologies using augmented reality and its use in language learning. With the advent of new technologies in augmented reality such as Google Glass there is great potential for the creation of new tools for meaningful language learning. These technologies can converge existing media like nothing before, bringing textbooks to life with video, individualizing online content into any situation, and enriching leaning experiences. But how teachers use these new tools will determine how meaningful they will be to language acquisition. This paper will introduce and compare supplementary materials using augmented reality; starting with the creation of such materials, leaning curves and production costs and a list design challenges. Ways students and teachers can use these technologies for self-study in informal learning environment will be introduced. Finally, an argument to how these technologies will become widespread in the future.

Keywords: Augmented Reality, Educational Materials Design, AR, AR Enhanced Print, Mobile Learning

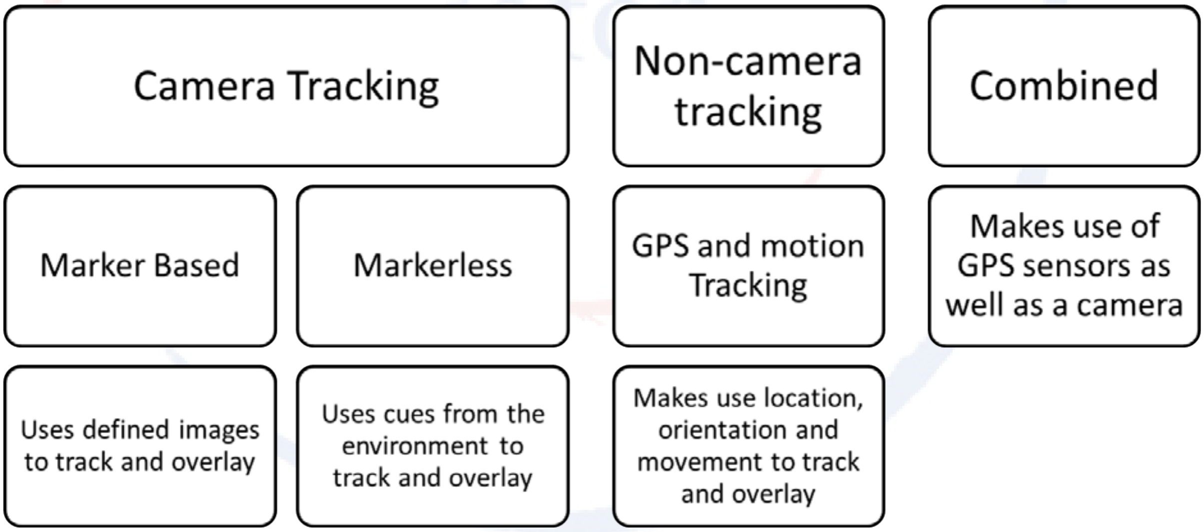
Defining Augmented Reality

Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are *augmented* (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data (Augmented Reality, 2014). In the past AR has sometimes been confused with virtual reality (VR). VR is a completely simulated environment. VR can simulate an actual or 'real' environment but the interaction with that environment ignores the current reality such as the user's location and movement. AR must somehow incorporate the physical world around the user(s). That could mean using physical objects and visuals around the user, the GPS location of the user, the movement and physical orientation of the user, or a combination of any of the above.

Types of Augmented Reality

Since AR can use the surrounding environment in many ways and can also be augmented and changed in many ways it serves a purpose to classify AR into categories so we can better match them to use and function. There are several different ways you can think of separating different types of AR but I have condensed and created my own simple classification based on what kind of data is taken from the physical world to augment.

Figure 1: Types of Augmented Reality



Fundamentally AR takes information about the user's surroundings and about the user himself. This classification table takes those two fundamental groups and categorizes AR that utilizes information taken from an optical sensor (camera) or not. Camera sensors are the main way of taking in information about the user's surroundings. There are other ways to take in that information such as temperature gauges, barometers and other equipment. Sensing equipment of that type is still not found and not practical in mobile and computing devices.

When the camera is taking in information there are different ways that information can be analyzed. Images are put through various algorithms to help track and orientate objects in relation to the camera. One early system for this was the use of markers which were square printed objects, usually with a simple black and white design on them. A square is one of the easiest objects to calculate distance and orientation using visual information. One of the first system for this was called the ARToolKit. ARToolKit was originally developed by Hirokazu Kato of Nara Institute of Science and Technology in 1999 and was released by the University of Washington HIT Lab. Currently it is maintained as an opensource project hosted on SourceForge with commercial licenses available from ARToolWorks ARToolKit is a very widely used AR tracking library with over 160,000 downloads since 2004. (ARToolKit, 2014). These markers would recognize the squire marker when placed in the field of view of a computers web camera. The computer would then overlay 3D models on top of the marker and display the model and marker on the screen. This was useful to engineers and designers that wanted to interact with virtual objects.

Since then advances in computing power and optical sensors and has helped make such markers unnecessary. The latest video game consoles like the Sony PlayStation 4 and the Microsoft Xbox One come with highly sophisticated sensing equipment and software that can track body movement down to an accuracy that can read your pulse. This makes it possible to interact with virtual objects placed in your physical surroundings and allow users to interact with those objects by simply using their bodies. Because this technology requires high amounts of processing power this type of camera tracking is not yet seen to this level in mobile devices. However camera tracking in mobile devices have evolved past marker tracking and how can track complex images and simple 3D objects with ease.

AR does not require the information from an optical sensor. A users physical GPS coordinates can be used to create an AR experience. One of the oldest and most wide spread use of this style of AR is used in the cockpits of advanced commercial and military aircraft. The heads-up-display (HUD) takes information about a plane's location, air speed, altitude and orientation and displays it directly over the pilot's field of view. The HUD uses augmented the reality to include useful information to the pilot. This same idea is now used in many augmented reality applications designed to act as some variety of navigation service. Your location and orientation data is taken and used to overlay information about the environment such as the location of local attractions or people relative to you.

The last category combines physical objects around the user with the user's location and orientation. For this multiple sensors are utilized to combine information. In this category both the user's location and surroundings are augmented in some way. To create an example of this perhaps a user had a marker that a camera sensor on mobile device used to overlay a 3D image. That image can now change depending on the user's location. Perhaps to give information relative to the user's current location.

It also might be possible to further distinguish types of AR based on real-time information or that of recordings. It also could be broken down to take into the point of view of the reality being augmented, such as from the point of view of the current user or that of another user or separate location.

Past uses of Augmented Reality in Education

As AR technologies advance so does the use of AR. Some early uses of AR in education used non-camera tracking AR applications to locate students and help guide them to physical locations in the world and then point out interesting or historical information about the area. These types of applications where also used in museums and parks and mainly served as informal learning tools. They have since evolved into game like experiences where users are given quests and must travel from location to location performing tasks and learning goals. One popular tool for this is called ARIS and serves as an open-source platform for creating GPS based AR enhanced learning games.

AR has also been used to augment items and textbooks in the classroom or study desk. A student puts printed materials in front of a computer with a web camera and augments those objects and displays them on the screen. One example of this is a AR alphabet book that was developed to help preschoolers learn the alphabet (Rambli et. al, 2013).

Augmented Reality in Print Media

As the demand for printed media wanes and digital media becoming the norm, print media companies have started turning to AR to create a bridge between print and digital media. Newspapers, magazines and billboards are loaded with marker or trigger images that mobile devices with camera tracking AR applications can augment with audio, video and other interactive content from the web. Teachers can now use this same concept for textbooks. Take an image in a textbook, perhaps an illustration of a historical figure and a student can see video and hear commentary about that figure from their mobile device.

There are now a variety of companies offering tools that teachers can use to augment existing printed materials with information from the web. Each of these companies are working a certain niche but they all can be co-opted for use in in-class or distance learning. They all essentially do the same thing and that is use camera tracking to find pre-selected images or objects (also known as triggers) and display new information above or over those images on a mobile device (also known as an overlay). A teacher tags an image and creates a trigger and then selects some media overlay to display. So when a student uses the AR application and the camera sensor detects that trigger it then displays the pre-arranged overlay. That overlay can come in many forms depending on the application being used and includes audio, video, hyperlinks, images, social media feeds and HTML5 content.

Design Challenges

Designing AR for print media can be challenging because it melds to types to media to create an experience. Graphic design principles for print media apply because it is the medium from which trigger images are taken. Those principles state that the printed material should be clear, well-spaced and easy to read as well as many other design considerations for print media. But then you must overlay digital media on top of that print media, that involves design principles more closely related to web design as you deal with different forms of media and other interactive elements. Sometimes the design principles from the two schools of thought work well together, sometimes they do not. This is the primary challenge of AR design.

One of the biggest concerns is keeping trigger images and overlay media close to the same aspect ratio. A wide image overplayed on a tall image may confuse the user. This may become an issue if you are trying to overlay media that is responsive, meaning that it resizes and re-configures for available screen area.

Another concern when creating trigger images or designing the print media to use scanned by an AR device is field of view. Make images to big and the user will have to move too far back to get the entire image into the camera's field of view. Too small and the user may have to put the camera too close to the image to get into focus.

Because you can limit the use of these materials by the physical location of the user. It is possible to force students to revisit the material for review when they are away from the school. Transversely you can only allow access to certain learning points in the text to when they are in class.

Security and privacy issues are present as with almost any use of technology that tracks user's behavior. Students may not want you to know when and where they access your materials. In addition, many of these newer print AR solutions integrate social media APIs and allow students to link their personal social media accounts to the application. This can help increase interaction between the students but may reach into their personal lives more than that is comfortable for some students.

Prototype and Initial Reactions/Acceptance

In creating an English language textbook design specifically to be enhanced with AR, I came upon the design challenges talked about in this paper. But the initial reactions of students was overwhelmingly favorable. There is a bit of novelty for first time users of this technology and it helped raise motivation and interest in the content. It also helped create a bridge between contents in the textbook and related content online and also the other students.

Although this prototype was just deployed only a couple of weeks prior to writing this paper, the initial reaction is very favorable and engagement appears to be improved. It is yet to be seen in the running for this prototype how long the novelty will last. But it is my hope that since the students have accessed supplementary materials at least once is use of the prototype, students will at least now know how to find help online should they encounter issues studying the text.

Conclusions

As mobile technology becomes more integrated into our learning and moves out of our pockets and onto our bodies in the form of wearable technologies, I believe we are going to see AR become the next mass medium. First we had print, then to radio and TV and most recently mobile technology. AR will integrate these mediums and make it more ubiquitous in our everyday lives.

In education AR can start to integrate learning into everyday situations and will make just-in-time learning more accessible and prevalent. However, the use of these technologies is not without downsides. The more we know information is readily available the less effort we make to place information into long-term memory. For language learning this could be an issue and considerations on learning method and learner retention will need to be taken when designing AR enhanced learning applications.

I've been asked many times when I demo this technology and my prototype to teachers, especially technology savvy teachers is 'Why have the book at all? Why not just have a digital copy for the mobile device?' To that I say you might not be seeing the full potential of this technology as we move to the future. We will always want and need to interact with the environment and AR is a tool to do that. The print is a part of that environment and perhaps in the future the print itself will start to disappear but the AR technology will remain and the design principles talked about in this paper will still be relevant in that case.

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Designing and Evaluating an Augmented Reality Based OpenGL Learning System

Chin-Hung Teng, Yuan Ze University, Taiwan
Jr-Yi Chen, Yuan Ze University, Taiwan
Zhi-Hong Chen, Yuan Ze University, Taiwan

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Abstract
Learning three-dimensional (3D) graphics library programming such as OpenGL is sometimes a difficult task for many undergraduate students. For novices, the difficulties arise from that they not only need to be familiar with programming language but also require imagining the placement of objects in 3D virtual space. Because of lacking visual presentation and the intrinsic fearing of programming, learning 3D graphics programming is a hard road for novices. In view of this, this paper presents a learning system focusing on helping the students to learn OpenGL programming in a visual and interactive way. We create a virtual augmented reality (AR) working space where many OpenGL commands can reveal their 3D interpretations in the virtual space. We encoded OpenGL commands into QR Codes and let the system to recognize these codes to achieve the required flexibility. In this system, users can present their QR Codes in a suitable order to create the virtual world and the corresponding programming codes are also displayed on the screen so that they can understand these codes in a more friendly approach. To evaluate the effectiveness of proposed system, two systems are compared in this study. One is the developed AR learning system and the other is the traditional integrated development programming environment. A teaching lesson is designed and then a simple task is assigned to the testers. Finally, two questionnaires are filled out by the testers. The results demonstrate that the proposed system is more effective in enjoyment and usability compared with traditional programming environment.

1. Introduction

As the advance of computer science, more and more technologies have been applied in the classroom to improve learning. As the authors have several years experience in teaching programming language in university, we have found that learning programming is sometimes an obstacle for freshman, especially for those who are not familiar with computer operations. Traditional programming learning is mostly based on lecture with the teacher explaining the syntax of the language, the flow of a program, and the meanings of commands provided by the language. This approach is effective for those who have basic knowledge and experience in operating computers but is sometimes difficult for the novices without strong logic thinking.

Recently, because of the advance of 3D displaying technologies, more and more 3D digital contents have appeared in many areas. The explosive applications of 3D digital content reveal that 3D programming is sometime a necessary skill for students who are majoring in digital content design. Thus, 3D programming has gradually become a major course in university. Compared with traditional programming learning, 3D programming is more difficult for novices because it requires the students having intensive 3D imagination to understand the 3D graphics commands. Obviously, a learning tool with strong visualization capability may benefit the learning of 3D programming for novices.

In view of this, this study focus on developing a good system to improve the learning of 3D programming for novices and try to evaluate its attraction to novices so as to trigger their interests. Actually, using a well-designed tool to support programming learning is not a novel idea. Many researchers have devoted themselves in this topic. For example, Alice is an educational software tool that teaches students computer programming in a 3D environment (Alice; Cooper et al., 2000). The major feature of Alice is that it allows students to learn fundamental programming concepts in the context of developing a scenario which can be an animated movie or a simple video game. By transforming traditional lecturing into this scenario based learning, students can gain experience in programming typically taught in an introductory programming course. Although Alice was designed to present the results in a 3D environment, it was primarily developed for object oriented programming languages, such as Java, C++, and C#. 3D programming learning was not the major focus of Alice.

In this research, we aim at developing a visualization system for teaching the 3D graphics library, the OpenGL (OpenGL). OpenGL is a software development kit with hundreds of functions or commands that allow a programmer to develop 3D rich interactive applications. For novices at OpenGL programming, understanding an OpenGL command sometime may not be easy because of lacking visual interpretation of the command. Therefore, the primary goal of this research is to develop a learning environment to enhance the 3D visual exhibition of OpenGL programming so as to improve learning performance.

In this research, we employ the technology of augmented reality (AR) (Carmigniani and Furht, 2011) to establish our OpenGL learning environment. AR is a technology that can be used to superimpose virtual objects into real scenes so that the user has the illusion that the virtual objects are part of the real scene. 3D visualization and interactivity are two major features of AR technologies (Azuma, 1997). These two features well fit our requirements for creating a teaching environment for OpenGL learning. 3D visualization allows the students to see the 3D interpretation of an OpenGL command and the interactive capability of AR permits the students to manipulate 3D virtual objects in the AR environment.

AR had been proposed to improve learning in some disciplines. For example, Buchau et al. (Buchau et al., 2009) devised an AR system in the context of teaching of electrodynamics. In this system, AR is used to display electromagnetic field so that students can understand the distribution of electromagnetic field in space. By AR technology, electromagnetic fields are no longer invisible but can virtually appear in the real environment. Kaufmann and Meyer developed an AR system that simulates educational physical experiments (Kaufmann and Meyer, 2008). In this system, students can build down experiments and study them in a 3D virtual world. This system demonstrates an example of how AR technologies can be used in physical education. Although these AR learning systems had proved their effectiveness in education, they were all designed for specific courses. They are inappropriate for our purpose for creating an AR-based OpenGL learning environment.

One of the major challenges of designing our AR-based OpenGL learning system is how to achieve the required flexibility. Flexibility means that the system should allow the user to present different OpenGL commands in different orders and the system must produce the 3D results accordingly, just like we are writing an OpenGL program. To achieve this goal, we use the widely used 2D barcode, the QR Code, as the medium for OpenGL command. Different OpenGL commands are translated into different QR Codes and users need only to present the codes to the system to generate the required 3D results. Because QR Codes can be shown to the system in arbitrary order, the system must function well for any combinations of OpenGL commands. Note that not all OpenGL functions are suitable for this AR presentation. Thus, currently we only focus on the most basic OpenGL commands to construct the system. However, we believe that this system can be extended to include the learning of more OpenGL commands in the future.

In this study, we also try to evaluate the effectiveness of proposed system in terms of enjoyment and usability. From a series of testing on novices, we prove that the proposed system is superior to traditional integrated programming environment in enjoyment and usability. In the following, the details of how we design and evaluate the system are presented. The remainder of this paper is organized as follows. Section 2 presents how we design the system, including system overview, system setup, QR Code design, and how to operate the system. Section 3 shows how we evaluate the system. We explain how we set up the experiments and how we design the questionnaires. Finally, we conclude in Section 4.

2. System Design

2.1 System Overview

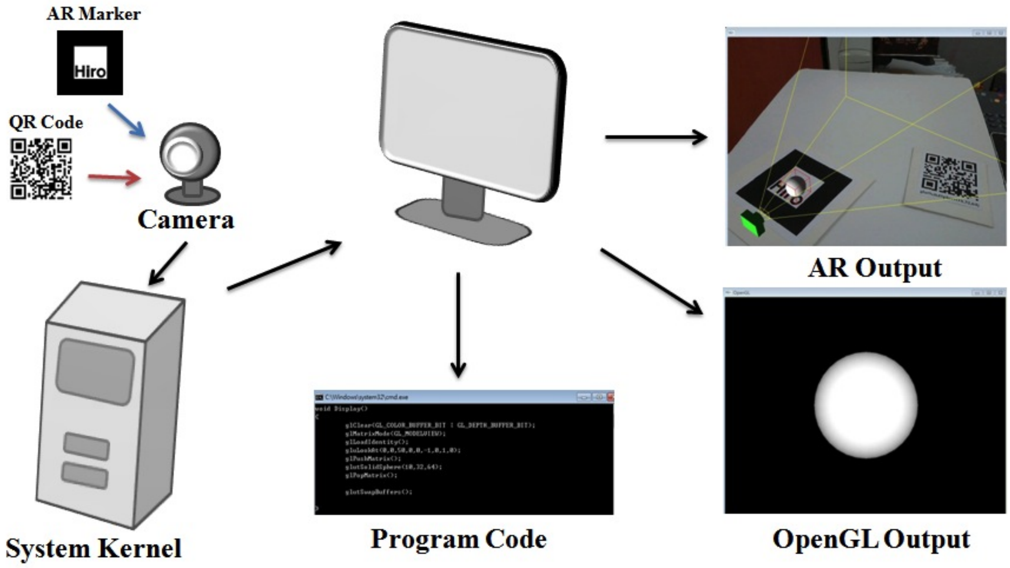

Figure 1. System Diagram.

Figure 1 shows the system diagram of proposed AR-based OpenGL learning system. As shown in Fig. 1, this system has a camera for capturing AR marker and QR Code. AR marker is used to control the position of the entire working space so that the user can see the 3D virtual world on this marker. QR Code is employed to encode OpenGL commands so that users can "program" the OpenGL environment and generated 3D virtual objects on the working space. Our system has three output windows for 3D visualization and information presentation. The first one is an AR window (AR Output in Fig. 1) which is used to display the AR content. User can see virtual objects in the real environment from different viewpoints by manipulating the AR marker. The second window is an OpenGL output window (OpenGL Output in Fig. 1) which shows the view seen by the virtual camera in the OpenGL environment. User can see the results rendered by his/her codes in this window. The final window is an information window (Program Code in Fig. 1) which reveals the corresponding OpenGL codes. User can understand OpenGL programming by verifying the OpenGL codes and the corresponding output shown in OpenGL Output window and check the relative positions of virtual objects, camera, and light sources in the AR window.

2.2 System Setup

Our AR-based OpenGL learning environment is very easy to set up. The required devices for setting up the system are a computer, a web camera, an AR marker, and a number of QR Codes. Our system is developed based on ARToolKit (ARToolKit), thus an ARToolKit marker (referred as AR marker) is required to operate the system. AR marker and QR Codes can be printed out using a typical printer, thus the cost for constructing the system is very cheap. To visualize the entire AR environment, the camera should be placed in a position so that the whole physical working space (typically, a desktop) can be captured by the camera. Because AR content is displayed on the AR marker, the marker must be captured by the camera when we operate the system. This is a limitation for operating the system. However, if AR marker is placed appropriately, the system can work very smoothly.

2.3 QR Code Design

QR Code plays a very important role in our system as it allows us to achieve the required flexibility. The users can use QR Codes to place the camera, generate the 3D objects, and move them to the desired positions in the space. Currently, we have designed four types of QR Codes as shown in Fig. 2. The first type of QR Code is used to generate 3D objects, thus we name it object code. The second type of QR Code is employed to scale and move 3D objects in the space and we called it instruction code. The final two types of codes are used to set up light source and camera and are referred to as light code and camera code, respectively. The content embedded in these four types of QR Codes is also depicted in Fig. 2 and discussed in the following subsections.

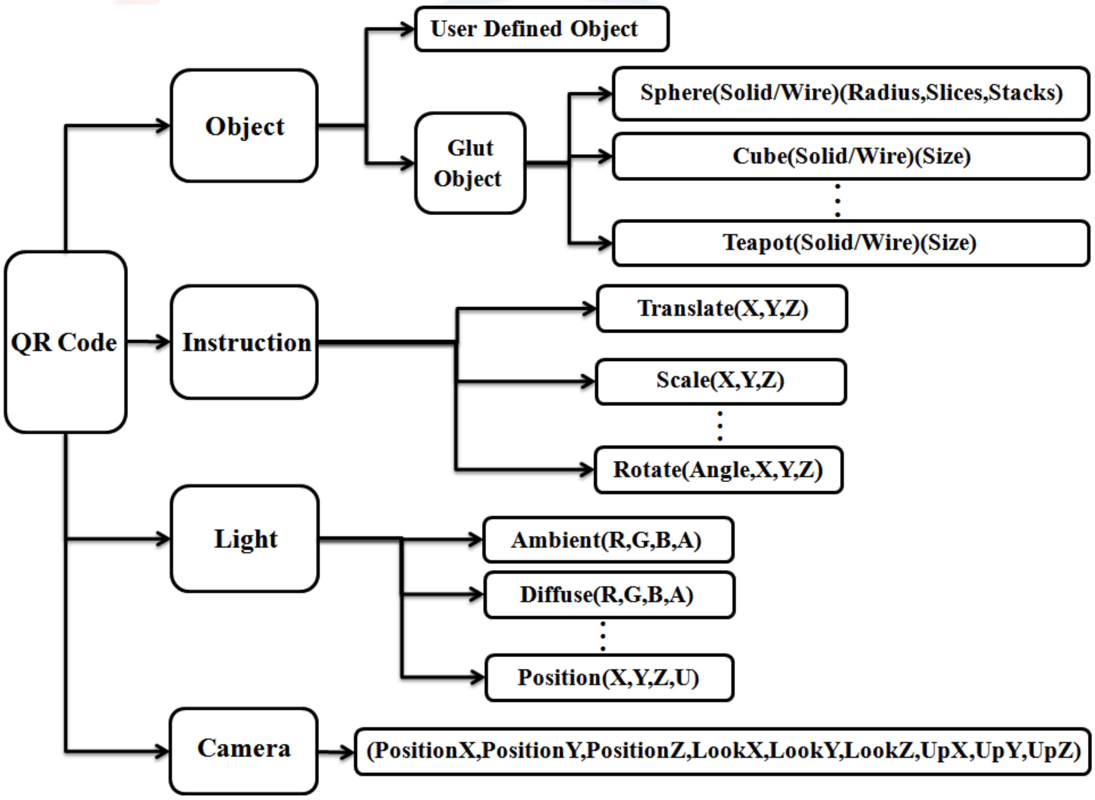

Figure 2. QR Code design.

2.3.1 Object code

The 3D objects we used can be classified into two categories: GLUT objects and user defined objects. GLUT is OpenGL utility toolkit which includes a number of functions for window creation and management and several functions for generating a set of 3D objects for program test. These 3D objects include sphere, cube, torus, cone, teapot and many others. Each GLUT object has associated properties or attributes such as radius of a sphere and size of a cube. Each object can also be rendered in a wireframe form or a solid-like object. This information and the associated properties should be encoded in QR Code so that the object can be generated with desired appearance. In our system, we have prepared a number of GLUT objects using predefined attributes for users' use. Actually, QR Code can be generated by users using any QR Code generation software of library (ZXing). There are also some websites providing the functionality of generating user defined QR Code (QR Code Generator). Thus, as long as user follows the format we encode in the QR Code, he can generate the code with preferred attributes. This is one of the reasons why we adopt QR Code as our information media. It is a universal and widely applied 2D barcode standard.

In our system, we also allow user to put his 3D object in the scene. User can generate his 3D object using any modeling software or technology as long as the file format can be accepted by our system. This is the second type of code that can be used to generate user defined 3D object. Typically, the information embedded in the second type of code is just a URL, indicating the address of a 3D model.

2.3.2 Instruction code

Instruction code is used for manipulating the 3D objects. Currently, the major instruction codes are translation, rotation, and scaling. These operations have also their associated arguments such as rotation angle and rotation axis. These arguments are also encoded in the code to indicate the quantities of translation, rotation, and scaling of the object. Similar to object code, we have prepared a number of instruction codes with different operations and arguments for users. The instruction code can also be generated by users and the arguments of these operations can be defined by the users.

Consider that we may have several objects in the scene simultaneously; another instruction code that allows the user to select the 3D object is also designed. This instruction code permits the user to traverse the 3D objects and apply the manipulations (scaling/translation/rotation) to the selected object. The selected object will be enclosed by a red bounding box to distinguish it from the other objects.

2.3.3 Light code

Light code is used to generate a light source in the space. Our system allows the user to specify some attributes of a light source such as light position and light component of ambient, diffuse, and specular via QR Codes. Each light component has four properties, indicating its red, green, blue, and opacity intensity. Moreover, because OpenGL support spot light, our system also allows user to specify the attributes of a spot light such as the spread angle of a light source and its direction. Actually, a light source is also a virtual object, thus its position can also be altered by using instruction codes. With these codes, a light source can be fully controlled by users as long as they present correct QR Codes to the system.

2.3.4 Camera code

Camera code is used to set up a camera in the space. In OpenGL, a camera has 9 parameters to define its attributes. The first 3 parameters define the position of a camera. The subsequent 3 parameters indicate the point the camera looks at. The final three parameters define the up direction of the camera. Our system can recognize these 9 parameters so that the user can set up a camera with desired position and orientation in our system.

Figure 3. The steps for creating a dumbbell shape object using proposed system.

2.4 Operating the System

Operating the system is achieved by manipulating the AR marker and a number of QR Codes. Figure 3 shows the steps for creating an object with dumbbell shape using proposed system. Each subfigure in Fig. 3 consists of three graphics, corresponding to the three output windows we described in Section 2.1. The upper left part is the AR output, the upper right part is the OpenGL output, and the lower part is the information window displaying the corresponding program codes.

First, when an AR marker appears in front of the camera, a virtual camera with default position and orientation and its associated viewing volume is displayed on the marker as shown in the upper left subfigure of Fig. 3. The viewing volume (the frustum drawn by yellow lines) is a space that the virtual camera can see. Thus, any object inside the viewing volume will be displayed on the OpenGL window. Objects outside the viewing volume will be clipped out in the final OpenGL rendering. User can move the AR marker and the corresponding AR content will also change which allows the user to view the contents from different viewpoints to enhance visibility. As shown in Fig. 3, when users show two QR Codes to the system, one is used to generate a sphere and the other is to move the camera back so that the camera can "see" the sphere, a sphere is displayed on the OpenGL output window. Meanwhile, the corresponding OpenGL codes are also shown in the program code window. Following this, two QR Codes are shown to the system to move and scale the sphere. Then, another sphere is generated and scaled to produce one side of a dumbbell by another two QR Codes. Subsequently, the third sphere is generated and scaled and finally the scaled sphere is moved to generate the dumbbell using the QR Codes. Compared to traditional OpenGL programming, our system can reveal the virtual objects in the working space so that user can "see" the meaning of each OpenGL commands and the associated arguments of OpenGL commands. Users can see the space relationship of each object so that he or she can deeply understand how to use different OpenGL commands to create the desired results. By utilizing the visualization and interactive properties of AR, we believe that our system can reduce the barrier of OpenGL learning that often produced by traditional OpenGL programming tools and therefore attract users in using this system, especially for novices. Actually, from user study we can find that our system can indeed produce more enjoyment and is friendlier in use as described in the next section.

3. Evaluation

To evaluate the effectiveness of proposed system, a user test is conducted. Two systems are compared in this test with one is the proposed AR learning system and the other is the traditional integrated development environment (IDE) for programming. Two indicators, the enjoyment and usability, that may influence the usage of systems are evaluated in this study. There are totally 34 testers involved in this study. All of them have about one semester experience in computer language programming and no experience in OpenGL programming. Before testing, a teaching lesson is designed to make them familiar with the operations of the systems. Subsequently, a simple task is assigned to them and after finishing the task, two questionnaires based on 5-point Likert scale were filled out by them. To eliminate the influence of the order of using the two systems, half of users used proposed system first and then the traditional IDE system and the other half of users reverse the order of using the systems. The enjoyment questionnaire is modified from Fua et al.'s enjoyment scale (Fua et al., 2009). Table 1 shows the means and standard deviations of this enjoyment questionnaire in terms of four aspects, *concentration*, *goal clarity*, *autonomy*, and *immersion*. A t-test showed that the aspects of concentration, autonomy, and immersion were statistically significant, whereas the aspect of goal clarity was not significant, although it also improved. This indicates that in some aspects the proposed system is superior to tradition IDE in terms of enjoyment.

The usability questionnaire is derived from John Brooke's System usability scale (Brooke, 1996). There are 10 aspects in this scale as shown in Table 2. Among the 10 aspects, 8 aspects were statistically significant, including *willing to use*, *complexity*, *easy to use*, *need technical support*, *easy to learn*, *difficulty*, *confidence*, and *need pre-learning*. Compared to tradition IDE, the proposed system is more easy to use and easy to learn. The users are also more willing to use our system. The results encourage us that the proposed system has the potential to be a good learning system in learning OpenGL.

Table 1. Results of enjoyment questionnaire

Enjoyment	Developed AR System		Traditional IDE		t
	Mean	Standard Deviation	Mean	Standard Deviation	
Concentration	4.3431	.47839	4.1304	.43573	2.766**
Goal Clarity	4.3897	.51929	4.2279	.52717	1.582
Autonomy	4.2843	.67236	3.8333	.64745	3.608**
Immersion	4.0924	.50340	3.8697	.53379	3.199**

** indicates that the number is statistically significant ($p<0.01$).

Table 2. Results of usability questionnaire

Usability	Developed AR System		Traditional IDE		t
	Mean	Standard Deviation	Mean	Standard Deviation	
Willing to use	3.2059	.68664	2.6471	.77391	4.625**
Complexity	2.6176	.77907	2.2059	.76986	3.943**
Easy to use	3.0882	.86577	2.4118	.82085	4.326**
Need technical support	1.9706	.79717	1.3529	.73371	4.055**
Integration	3.0882	.66822	3.0000	.49237	1.000
Inconsistency	2.7647	.69887	2.5588	.61255	1.646
Easy to learn	3.2059	.68664	2.5294	.78760	5.426**
Difficulty	2.9118	.62122	2.3235	.91189	4.380**
Confidence	3.0588	.77621	2.5882	.74336	3.668**
Need pre-learning	2.5000	.82572	1.6471	.94972	5.374**

** indicates that the number is statistically significant ($p<0.01$).

4. Conclusion and Future Work

How to trigger student's interest so as to improve learning is always a continuous goal of many teachers. As a teacher of 3D programming course in university, we are always consider how to employ technologies to make students understand the concepts of 3D programming in a more intuitive and friendly way. Due to this reason, in this paper we try to develop a tool that helps students in learning OpenGL. We presented an AR-based learning system to help students understand OpenGL programming. The advantage of this system is that it allows students to "visualize" and understand OpenGL commands by manipulating 3D objects in a virtual space.

Students can observe the rendered results, OpenGL codes, and the corresponding 3D objects in the virtual space to comprehend the relationship between them. To improve system flexibility, QR Code is used as a medium to communicate with the system. By presenting QR Codes to the system, user can create system provided 3D objects or user defined objects in the virtual working space. Manipulating these 3D objects is also achieved by QR Codes. The reason of using QR Code is that it is a widely accepted 2D barcode and can be generated by free software. Thus, user can produce his own codes to operate our AR-based OpenGL learning system.

In addition to develop the system, in this study we also try to evaluate the effectiveness of our system in terms of enjoyment and usability. From the results, it is encouraging that our system outperforms traditional IDE in these two aspects. This demonstrates that our system has the potential to become a good learning tool in 3D programming.

The future work of this study is to extend the functionality of proposed system. For example, in addition to using QR Code as an information medium, QR Code can also be treated as an AR marker (Kan et al., 2009). This indicates that our AR system can directly track the position of a QR Code in the 3D space and this may create more appealing applications. For example, we can directly control the position and orientation of 3D objects by moving and rotating the QR Code. This is one of our future works for improving the system. Currently, this system is just a prototype and the acceptable QR Code commands are limited. We will continuously improve the system to make it more effective, flexible, and friendly. Our ultimate goal is to let the system accommodate as many OpenGL commands as possible so that users can write an OpenGL program via a visible (visualization in 3D space) and interactive way.

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Cloud Computing: Virtual Classroom Management

Tayakorn Inudom, Chiang Mai University, Thailand
Ratapol Wudhikarn, Chiang Mai University, Thailand

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Abstract
Online instruction or "Virtual Classroom" by "Cloud Computing" is the new learning method which will reform educational system and lift it to the whole new level. It can bring about motivation in learning both in- and outside the class.

In order to improve efficiency and quality of information sharing, "Cloud Computing Technology" can come in handy. Teachers can form better and more effective teaching elements and materials. Student themselves, are able to browse all the information they need remotely. News and notices can be spread out fast and conveniently. Students will get a chance to play bigger role in instruction: They cease being just receivers and start creating their own way of studying by sharing knowledge and experiences with classmates and teachers. Debates and conferences can be held online, saving a great deal of time and traveling expense. Documents can be reached and edited wirelessly by members.

In additional, this technology consists of a lot more variety of functions. For the record, it is also capable of linking schedules and appointments directly to mobile devices.

Using "Cloud Computing" as a learning tool can lead to the formation of a huge circle of knowledge sharing as well as coordination and interaction between the school, teachers and students. This technology will standardize and eventually bring our education system to the level of global acknowledgement.

Keyword: Cloud Computing, Virtual Classroom, e-Classroom Management

Introduction

There is a great change of education system nowadays and in the past. In the former education system, students had been expected to remember things that teachers had taught by repetition. Later, the education system was developed into Child-Centered System which provides the students the possibilities to choose what they are interested to learn. At the present moments in which, there are advanced technologies and developed teaching equipment, the usage of internet system could be helpful in supporting the learning and teaching as well as being the wide learning and resource Centre. However, the internet system which is not well assorted with the education system would be neither efficient nor effective. For the best benefit of applying the internet system to the education system, it is essential to find the most suitable format for the learning management.

"Cloud Computing System" might be an optional support tool for learning management: The present education system is now regarded as the Knowledge based Society, as is evidence from the distance learning in format of e-learning system, e-book and e-classroom. Together with easier and more convenient access to the internet through computer system or mobile devices, "Cloud Computing" will be assistive in supporting the learning and varied teaching techniques can be added with the help of many applications which are developed for educational purposes e.g., Google Application in order to gain more interests from the student.

In the future, "Cloud Computing" will play a key role in the education system, as this system can be compared as a gigantic database which serves a large amount of information in various formats, e.g., search engine, mail, chat, video, as well as document management. Teachers will be able to choose their suitable service, without any necessities to create new media or teaching equipment. "Cloud Computing" is profitable even for the students themselves, e.g., the students can work together through the Google Drive application: They are able to type their work and upload the file to exchange their information, as well as easily and immediately edit their file wirelessly. The only thing they need is internet.

The ability of "Cloud Computing" can both support the education and manage the education system. The question is, how can the learning management system be improved through the "Cloud Computing" System?

2. Literature review

"Cloud computing" refers to computing resources being accessed which are typically owned and operated by a third-party provider on a consolidated basis in Data Center locations. It was developed from the idea and service of Virtualizations and Web service. Consumers of cloud computing services purchase computing capacity on-demand and are not generally concerned with the underlying technologies used to achieve the increase in server capability. There are however increasing options for developers that allow for platform services in the cloud where developers do care about the underlying technology.

2.2 Virtual Classroom

A Virtual Classroom is a learning management in the form of software with mainly purpose of supporting students to take part in learning by being able to choose the right time and the right place to learn through computer network by themselves. Things that should be taken into consideration when creating a virtual classroom are its operation system which is different from the one of normal classroom as well as the evaluation of students' educational achievement; whether the objective of learning is met. In addition, the Virtual Classroom is unable to provide the social interaction between students. That leads to the question "How can the social interaction between students be created in a Virtual Classroom"

A virtual classroom is a learning environment created in the virtual space by using abilities of computer technology in order to create the virtual experiences for students. Moreover, there are further supported facilities that help increase interactions between students and virtual classrooms. The entire process is to access in typing and reading texts or information through computer system connected with internet system which provides a great number of software and applications which help control the creation of the virtual classroom. In a virtual classroom system, students are able to connect to global information sources anywhere and anytime. These worldwide information resources provide up-to-date information which also meet students' demands. Therefore this education system can be regarded as a Just in time Education.

Learning is exchange: There is not only an expert who teach other classmates in a virtual classroom, but everybody in this open classroom including students, teachers and those who are interested will meet and share their knowledge and information since learning is exchange not only receiving things.

Environment created according to user profile: An educational environment will be adjusted according to user profile. Since the first time students logged in to the system, they will specify their scopes of interest. During the lesson the students will adjust their educational environments by choosing their lessons and their advisers by themselves. Teachers, personnel, or fellow students who have similar interests and characteristics can become consultants.

Learning Model of e-Learning

3. Methodology

In this chapter, the research methodology used in the study is described. To develop the learning management using "Cloud Computing" as supporting tool, there is a need to study the "Cloud Computing" and to plan the usage of "Cloud Computing" as following:

1. Study the basic structure of "Cloud Computing"
2. Develop the instructions based on the basic structure of "Cloud Computing"
3. Design and develop instructions based on the structure of "Cloud Computing"
4. Evaluate educational achievement

4. Conclusion

The current education system could not deny using “Cloud Computing” as a support-learning tool since there are many advantages, which help support learning and teaching as well as provide conveniently access to information. In the case that teachers or educational institutions are able to control and manage the factors e.g., the basic structure and the basic services of “Cloud Computing” as well as the quality of learning and teaching, the advancement of education can be improved in the future.

Application of the Design Thinking in the Mathematics Courses with Mobile Internet Device

Tsung-Yi Weng, Taichung Municipal Chung-Gang Senior High-school, Taiwan
Chung-Hsiang Wang, National United University, Taiwan
Wen-Sung Chou, Taichung Municipal Chung-Gang Senior High-school, Taiwan
Yi-Hwan Shyr, National Taichung University of Education, Taiwan
Tsun-Hsin Wang, Taichung Municipal Chung-Gang Senior High-school
Fu-Chien Peng, Taichung Municipal Chung-Gang Senior High-school

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Abstract
The traditional senior high school Mathematics contents are usually difficult and boring for the students, which result in the low scores. In this study, we tried to increase the student motivation and interests through different teaching styles and contents. E-learning platform and the tablet PC are used on the classroom. The contents and styles are organized and designed by the design thinking. On the class, students can access the math related teaching video shared by other high schools through the web. The video content can be a short show or drama. Teachers and students then discuss what that video will tell you about the math. Finally, they need to make their own video. In this way, a math course is the integration of math with other daily life activities. A very substantial improvement has been observed in the preliminary studies. The details of the contents and the teaching style will be included here.

I. Introduction

In the traditional senior high school mathematics educations, teachers have the pressure to include all the contents in the classroom. Typical teaching styles in the classroom in Taiwan are explanations, examples, problems and tests. For the explanations, teachers spend most of time in handwriting on blackboard with some verbal explanation. For students on the class, most of time is doing copies of what is left over on the blackboard and the problems solving practice. To make sure students with better scores, more exercises and tests are performed. Teachers then feel not enough time left and start to hurry up during the class. This is a very common scenario here and the pressure follows. The student responses to such teaching styles are mostly not very positive, which results in low motivations, boring feeling, few interactions and discussions.

To resolve the above dilemma, a small satellite project has been setup through the design thinking on the mathematics course with the procedures shown in Fig. 1.

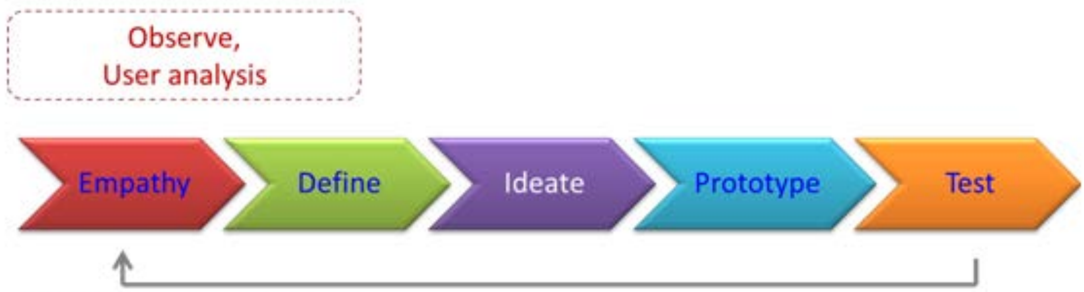

Fig.1 Flow chart for design thinking.

II. Methods for Course Design

According to the design thinking, students are the main role of our course design (not math). There are at least several steps before students can effectively absorb what teachers have taught on the classroom. The analysis flow chart is:

Students → daily living experience → high motivations → efficiency → classroom

From the above analysis, we decide to use small video and cloud environments to put our contents, which can greatly increase student interests. Several high school students use the HTC Flyers as leaning platform, including software, which work as a simple cloud based environments. The role of teachers then is the topics assignment to be discussed. The students are required to use HTC Flyer as the course blackboard as the teamwork based in the classroom. Students are grouped not according to their math capabilities, but evenly averaged out. Their teamwork discussions, homework and documents will be put on the cloud through Flyer. The video is filmed and edited by Flyer and put on Youtube. The topic reported here is the exponent and logarithm. The course design is:

1. Pre-course Stage: The team members study and discuss the subjects provided from the teachers. They need to summarize their understanding on this subject with a short video presentation

put on Youtube, which are made public on the web.

2. Teachers will explain the subject according to the materials provided with minimal lecture time
3. More time is reserved for discussions on the classroom. Un-answered or un-satisfied topics will be posted on the web for help from other school.
4. After-course Stage: The students need to put their understanding of this topics in a mind-set diagram. Also, they need to modify and polish their Pre-course video as the final homework.

Study Results and Discussion

Fig.3 Make into a video

Total 36 students are required to fill a five-level questionnaire in the end of this project, which are summarized in the followings:

- Skills: With easy-to-use tablet PC and the platform, students do not need to have strong computer skills on the class. Only 56% students are good at 3C electronic products and they perform equally well.

- General: Of all the students in the mathematics course, 75% said that this project can increase the students' concentration, 72% said this improve the learning, 61% are able to discuss the math problems on the network, and 89% are willing to spend off school time to discuss mathematical problems. Only 8 percent of the students feel bored.

- Mind Map: For the usage of mind map in the mathematics courses, 86% students conclude that this improves the understanding of the abstract concept and the complicated correlations among different subjects. There are up to 61 % of the students like to use this during the class.

III. Summary and Conclusion

Fig.4 Mind Map

As the end users of the network, students found out that the efficiency focus time period on the network is about 90 seconds. Hence, the discussions and problems solving video, which will be put on youtube, should be within 90 seconds. Results show that the teachers save more than 25% time on teaching during the class. Thus have more time for students to discuss with each other. This will also provide students opportunities to have discussions with other school students after school through the network. From this course design, which are based on the design thinking and import several disciplines with more and more diverse math curriculum, it can also effectively increase the student interests and improve their learning results. Finally, the usage of the mind map in mathematics can simplify the complicated mathematics concepts and improve the students' information acquisition and integration capabilities.

The most obstacles might come from few parents who worried that the students will have Internet addiction problems. Then cause some resistance for the after school and network discussions arrangements.

Actually, we conclude that such course design (video on cloud with discussions) can be applied to other courses besides mathematics, like literature, science.

IV. Acknowledgements

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From Real Name to Screen Nickname: Privacy, Identity, and Creativity

Hui Shin Chang, National Taichung University of Science and Technology, Taiwan
Chia Yu Chuang, Chung Chou University of Science and Technology, Taiwan
Nai Yuan Chen, National Taichung University of Science and Technology, Taiwan

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Abstract
This pilot study investigated motives and behaviors of undergraduate students when creating online screen nicknames. A paper-based questionnaire survey consisting of semi-structured questions was conducted at the Design College of the National Taichung University of Science and Technology in Taiwan. A total of 222 eligible surveys were collected and computed using the percentage-based calculation method. The findings indicate that a screen nickname typically differs from a user's real name, and plays a role in the online security, identity, and creativity of the user. These results could serve as a reference for educators in understanding the inner needs of students and values reflected by their screen nicknames.

Keywords: creativity, identity, privacy, screen nickname

In real-life situations, people form first impressions of others based on appearance, and this impression influences their subsequent perceptions and opinions of that person. In online situations, a screen nickname is similar to personal appearance, functioning as a role identifier. In addition, the creativity and meaning of a screen nickname often project the personality, characteristics, likes, and aspirations of the user. Because people can change or improve their personal online images by using multiple nicknames, screen nicknames often differ from the real names of users on social networking sites.

Young people in the Net generation commonly use information and communication technology to acquire extracurricular knowledge and skills and document their everyday lives (Becta, 2008); this is considered a basic competency. In online academic portals, students are urged to assess their learning effectiveness, upload assignments, and create resumes by using their real names. However, students typically use less-identifiable or un-identifiable screen nicknames on social networking sites (e.g., Facebook, Skype, LINE). Such students form a group of image-conscious young people who are sensitive to the opinions of their peers and address each other by nicknames; there is no difference between the online realm and the real world (Kuss, Griffiths, & Binder, 2013). Thus, they generally have at least one screen nickname created in a particular manner or for a specific purpose, and are known by this nickname online. To date, hardly any attention has been paid to the metaphor of young people's screen nicknames. To investigate the motives and behaviors of undergraduate students when creating screen nicknames online, this pilot study explored student self-reports by using a paper-based questionnaire survey comprising semi-structured questions. The findings could serve as a reference for educators in understanding the inner needs of students and the values reflected by their screen nicknames.

1. Methods

A paper-based questionnaire survey was administered to 250 full-time undergraduate students in the Design College of the National Taichung University of Science and Technology in Taiwan. A total of 222 eligible surveys were collected yielding a valid return rate of 88%. All study participants were volunteers, and their ages ranged from 18 to 23 years.

The questionnaire comprised 11 semi-structured questions. Three blank lines were provided for each question to enable participants to elucidate their responses. Anonymous random sampling was employed and data collection was conducted on the campus over a period of 2 weeks during October 2013. The participants spent an average of 5–7 minutes completing the questionnaire. We used percentage-based calculation methods to compute and analyze the data from the valid questionnaires.

2. Findings

Based on the 222 valid responses, we found that 175 participants began using the Internet during primary school, at which point, 110 participants had already created a screen nickname. The remaining participants began using the Internet and screen nicknames in junior high school, senior high school, university, or college.

Regarding daily time spent online, the results indicated that 60% of the participants spent 1–4 hours, 32% spent 5–8 hours, and 8% spent 9 hours or longer. The results also indicated that 88% of the participants had one to three screen nicknames, 9% had four to six, and 3% had seven or more. In addition, 58% of the participants stated that their screen nicknames were completely unrelated to their real names, 40% indicated that they were somewhat related, and 2% stated that it depended on the website. Concerning the primary purpose of using a screen nickname, the results were shown as Fig.1.

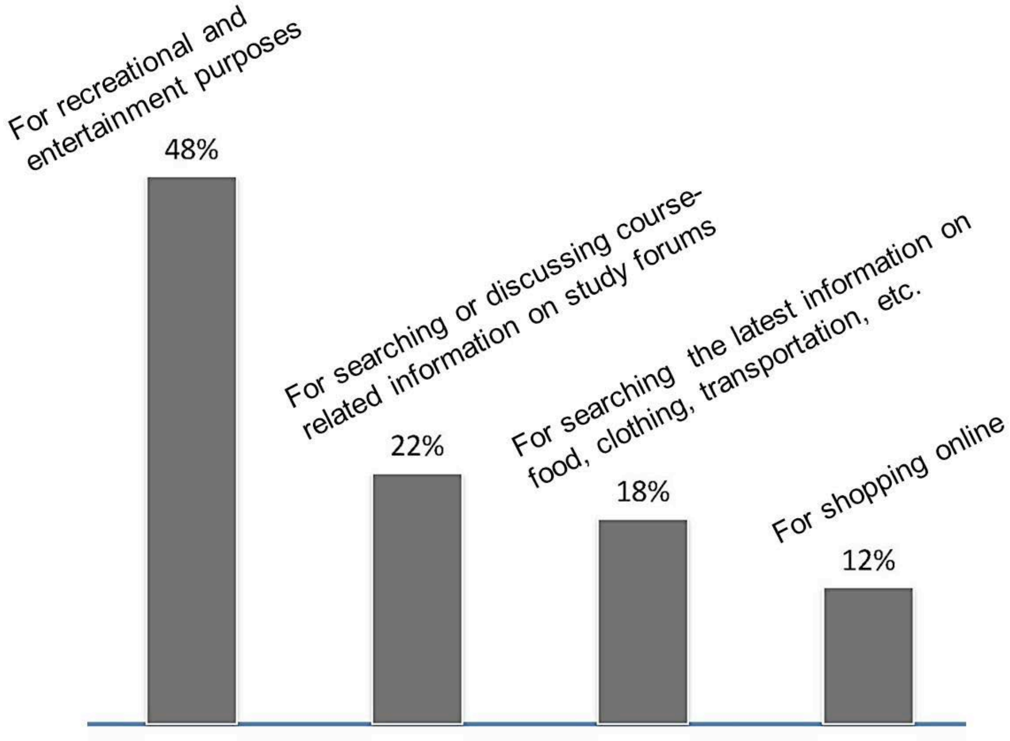

Figure 1 The primary purpose of using a screen nickname

When asked about selecting screen nicknames, 55% of the participants felt that nicknames should be creative to highlight individuality; 45% indicated that noncreative nicknames were user-friendly and easy to manage. Concerning how participants chose their screen nicknames, the results were shown as Fig. 2.

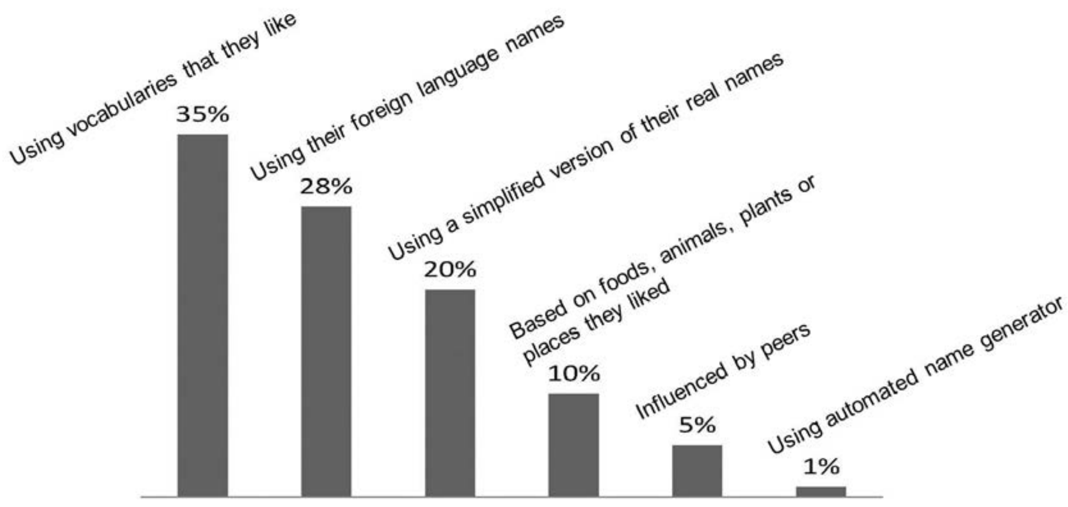

Figure 2 How participants chose their screen nicknames

When asked whether they openly disclosed their screen nicknames, 72% of the participants disclosed their nicknames to only close friends (excluding family), 17% openly disclosed their nicknames to all friends, 8% let only close family members know, and 3% kept their screen nicknames private. Regarding participants' motivation for using screen nicknames, their responses were shown as Fig. 3.

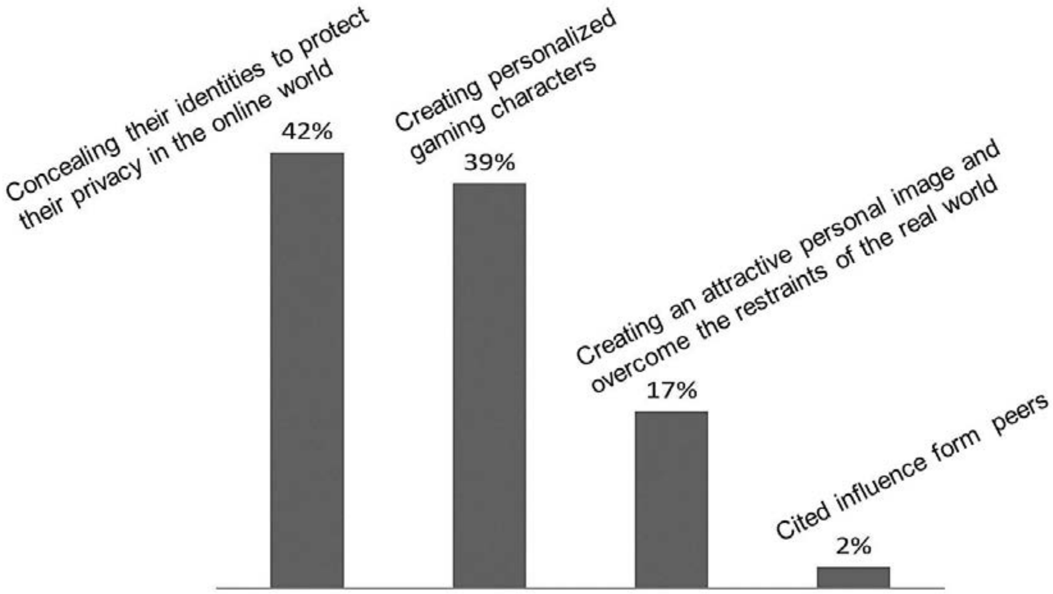

Figure 3 Participants' motivation for using screen nicknames

Only 3% of the participants felt that the long-term use of screen nicknames presented no difficulties, 49% felt that managing their online profiles was inconvenient, 44% felt that accepting their new online images was difficult for family members and friends, 4% indicated that peers often joked about their screen nicknames.

3. Discussion

The results indicated that most of the university students began using the Internet in primary school; however, the use of screen nicknames did not necessarily become common until junior high school. According to the written statements of the participants, this was because they were familiar with Internet security and had a great desire to explore their self-image during adolescence. When they reached university, most participants stated that they thought about abandoning their screen nicknames, primarily because they thought that these names might sound immature or common, or would be easy to track online. Thus, they wanted to select a suitable screen nickname to "upgrade" their online security and wisely participate in the adult Internet world. Educators at universities may help students in using screen nicknames to securely access learning and social activities and also assist them in maturing into adults through real and virtual interpersonal communication.

Eighty-eight percent of the participants had one to three screen nicknames; they felt that nicknames facilitated role playing and concealing their true identities, particularly when sharing their feelings with strangers online. This enables students to protect their privacy, find relief from academic pressure by engaging in dialogs, and expand their general knowledge. Few students have more than seven screen nicknames. Users that have multiple screen nicknames want to experience various roles; however, multiple online identities are difficult to manage and can cloud self-image. Thus, comparing the real names and screen nicknames of university students may provide insight for educators regarding student perceptions and expectations of social image. When providing guidance counseling, educators could reference student screen nicknames to clearly understand their inner needs, values, and identities.

Fifty-five percent of the participants indicated that screen nicknames should be creative and users should attempt to develop a unique moniker. They claimed that a creative screen nickname potentially arouses the curiosity, interest, and even fantasies of cyberpeers. The function of a screen nickname is similar to that of a mask; concealing the true personality, age, and online status. Thus, the participants thought that a screen nickname should not necessarily be similar to a real name; rather, it should sound unique. However, 45% of the participants stated that nicknames need not be particularly creative. As design college students, they indicated that choosing a screen nickname did not require much creative thinking, compared with professional knowledge and practice, and some even thought that an automated name generator was acceptable. Users can input their own names or other inputs, such as their favorite word, the name of a person they miss, or their favorite image, into the computer name generator, which randomly provides a screen nickname through data processing and content analysis (e.g., the meaning of the Chinese characters, and significance of the strokes). Therefore, whether a screen nickname should be creative seems to be a matter of opinion.

4. Conclusion

The findings indicate that screen nicknames typically differ from real names, facilitating the online security, identity, and creativity of the user. Of the participants, 60% spent 1–4 hours online per day, using their screen nicknames, whereas 8% spent more than 9 hours online per day; this raises concerns regarding addiction. The university students expressed a great need for and dependence on screen nicknames. From searching for information to reading and engaging in self-directed learning, the participants spent most of their Internet time engaged in recreational activities (e.g., listening to music, watching videos, chatting with friends, playing online games, and reading e-books or other electronic publications). Although the Internet can be used as a learning aid, the respondents appeared to be attracted by the entertainment value of the virtual world. Educators should consider whether this influences student academic achievements, time management, and interpersonal interactions, and provide guidance if necessary. The researchers plan to examine such topics in the future.

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The Prospects of e-Kankor Exam Prep System in Afghanistan

Hamidullah Sokout, Kobe Institute of Computing, Japan
Samiullah Paracha, Kobe Institute of Computing, Japan

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Abstract

Passing the entrance exam to a university is a major step in one's life. *Kankor* is the nationwide tertiary entrance exam in Afghanistan. Since the score on the Kankor assessment test determines the student's sequence of courses, it is highly recommended to do some test preparation so that the score and consequent placement are in the student's best interest. However, due to poverty and lack of public awareness, Afghanistan severely lacks sufficient resource for providing entrance test preparation facilities.

Keeping the aforementioned in mind, web-based test preparation systems offer greater flexibility than the conventional ways, as they can be accessed anywhere, anytime. In addition to using easily found practice materials, the online test preparation system is the most efficient, dynamic and relatively cheap method to prepare students for the qualifying test.

In this paper, we have proposed the design of a web-based test preparation environment, known as '*e-Kankor Exam Prep System*' to give students the tools to help them pass the university entrance exam on the first try.

The system is based on an instructional design methodology that features: (i) exam-focused questions and content to maximize test preparation; (ii) an interactive design that integrates content with questions to increase retention; (iii) integrated '*drill and practice*' exam prep tools to hone test-taking skills; and (iv) test preparation strategies to help ensure exam success. *E-Kankor* is a student-focused educational environment for pass rate success that will be continuously evaluated to ensure that our materials use the latest learning models.

Keywords*:* Web-based test prep systems; Interactive design; Learner-centered design; E-Learning; System architecture

Background

Nowadays Information and Communication Technologies (ICTs) have been applied in a variety of fields all over the world. As for instance in education, ICTs have opened up a vistas of opportunities for learners. They have replaced the traditional mode of paper-based learning that offers a more efficient and effective way for teaching and learning. Assessments are an integral part of an educational system particularly at higher school level that is the last door towards higher education. ICTs have been increasingly used to improve the assessment mechanisms at the high school level.

National Higher Education Entrance Examination, or commonly known as Kankor Exam, is an academic examination held annually in Afghanistan. This examination is a prerequisite for entrance into almost all public higher education institutions at the undergraduate level. It is usually taken by high school graduates and is organized by the Ministry of Higher Education of Afghanistan.

Kankor is an old university entrance examination system all over in Afghanistan. It's the first screening of high school graduates that helps educational authorities to determine whether they are capable to undertake graduate courses. Usually those students can pass Kankor Exam who work hard, and prepared well for the entrance exam. Though it is clear that all those who complete high school may not necessarily enter to higher education institutions, it is very common and normal process across the world seeing percentage of students completing higher school studies remain out of the higher education institutions. Indeed, Kankor is a very transparent process to categorize students on the basis of their talents and achievements.

The number of high school graduates has been on the rise in Afghanistan since 2001. Annually, more and more prospective students taking part in entrance examination. Last year, around two hundred thousand students have taken Kankor, but unfortunately, they did not succeed. Moreover, a large number of talented students remain out of the higher education due to lack of awareness and enough knowledge about entrance exam especially students from provinces. Last year approximately two hundreds thousands university applicants took Kankor exam, but only four thousands succeeded to enter Afghan universities. In addition, the current Kanor examination system is entirely paper-based, time-consuming, lack efficiency and transparency (MoHE, 2012).

The other major reason, is poverty which engulfs Afghanistan. Many of the talented students complete their education in misereres economic condition and due to poor economic conditions, several talented students fail to comply with Kankor's requirement. There are no cheap test preparation facilities available to the poor students to compete against the students who have rich background. These students are the only hope for their poor parents against poverty and miseries. If these students fail to get higher education, implies that the deplorable conditions of their families could not be changed. Hence, engulfed in poverty and miseries forever. There is a dire need to have and ICT-based Kankor exam preparation system fairly available to all masses.

e-Kankor Exam Prep System (e-KEPS), is a manageable and scalable web based application, which offers a secure and efficient testing solution for both examiners and administrators an easy to use with instant and credible result. This system hosted online examination software using multiple choices is the best test maker solution for training tests, self-study, and practice tests and more.

In the coming sections, we describe the system framework. We begin the paper with discussion of Intelligent Tutoring System (Section II) with its related modules. We are following the paper with related work (Section III) quoting the existing system examples. In Section IV, we describe the proposed ICT solution follow by system architecture. In particular, we emphasize the general system modules and the sub-function of each module. In Section V, we continue the paper with the theoretical foundation of system, we describe the related theory based to our system. In the last two Sections VI and VII, we will describe the system evaluation methods and conclude the paper with discussions of limitation to be addressed through future work (Section VII).

Intelligent Tutoring System

Intelligent Tutoring System (ITS), introduced an essential package of educational technology for learners in order to help them to acquire the necessary skills in their carrier and keep them up-to-date with feedback and instruction. ITS interact with cognitive psychology to provide the best test environment for various theories (Nwana, 1990). ITS provide considerable ability according to the needs of students to interact with learning materials, representing pedagogical decisions and to achieve their intelligence. It involve five major components that includes (Student model, Pedagogical model, Domain knowledge model, Communication model and Expert model) (Nwana, 1990).

Domain Module

This module is knowledge-based module which contains the learning materials and necessary information that has to teach for learners. This module keep contact with pedagogical module to play an important roles of serving the ordering mechanisms to student module.

Student Module

Student module is the main part of ITS components that establish relevant information packages for learners and provide a suitable and flexible learning environment for them. Students using the *model tracing* process to step-by-step build a solution for problems. The system that build and keep update the student is called student modelling that could be static or dynamic. Static modelling based to the initializing of model that occur only once (usually in the time of student's registration). In contrast, a dynamic modelling keeping the information up-to-date.

Pedagogical Module

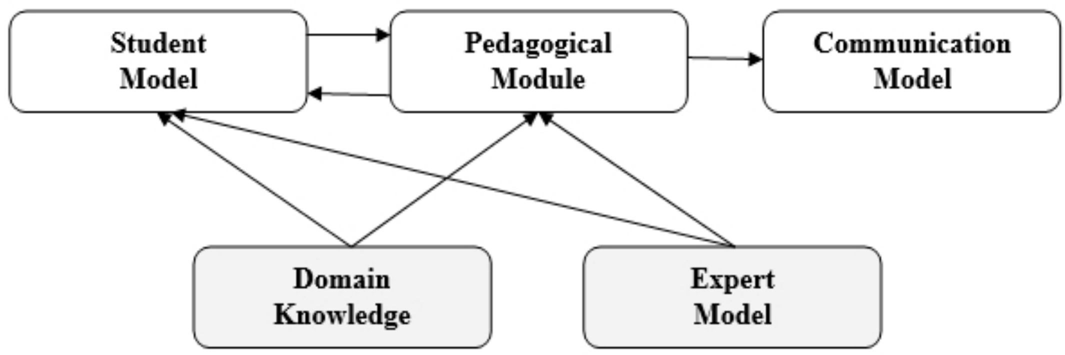
This module provide the necessary information according to the needs of students. Pedagogical module according to the received information from domain and students modules makes an efficient engineering effort to transfer the exact information to the students.

Communication Module

Communication module is an interface between system and user that control the interconnectivity of learners and offer the educational materials to them. This module provide the means of understanding in both direction for learners. For creation of session we need three types of information. First required information about the model in order to create a session and make awareness of user during the dialogue, second the required information for the contents of communication and third the necessary information which explain the purpose of communication. [Gharehchopogh Khalifelu, 2011]

Expert Module

This module responsible to provide the necessary materials according to the level and ability of learners. This concept is more similar to domain knowledge module according to the Beck et all., (1996), but expert module is more specific.



Interactions of ITS components (Beck et al., 1996)

Related Work

e-Kankor Exam Prep System provides facilities for all school graduates to take evaluate and make ready themselves for Kankor exam in order to join universities. This system exists in all over the world but not in Afghanistan, and this is because of war and conflicts that are as the result of illiteracy and unawareness of our people from such reliable system. Due to improving of science and technology in developed countries, they are easily using such system.

To promote educational services and to make it available in all over the country, creating such system is basic and fundamental requirement and vitally important and easier to manage and better serve for school students to really reach world's standards of education which creates systematic and regular preparation exam in Afghanistan.

Most educational institutions and universities use (exam management system or online examination systems) for their students at undergraduate level. These systems have become a promising alternative and replacements of traditional once, like the following we compare some of them:

According to Kandil et al., (2010), system that has developed an Arabic Web-Based Exam Management System for Mansoura University, only support Arabic and English languages, provided at undergraduate level only, and does not provide self-study, and library materials for examiners. Similarly, Hoffman et al., (1996) has proposed a non-web-based exam system, which cover a small group of students in a local area network; especially those who are related to computer science. This system support computer related subjects only.

Likewise, Alhami et al., (2011) has developed an Automatic Code Homework Grading Based on Concept Extraction, which automatically grade student's code assignments. The system proposed only for computer science students, whom related to programming field in order to evaluate and grade student's assignments and overcome the plagiarism. On the other hand, Bonham et al., (2000) proposed an education web-based assessment and testing system, which evaluate university level subjects especially physics. This system reduced grading load and help students to download their information and feedback papers immediately.

Sarrayrih et al., (2013) also proposed a web-based system for basic computer at university level, which provides security to improve on-line examination system. The system designed to identify students, using biometrics authentication which supports the security control and integrity of online exam process. According to (Rahneva, 2004), the graphic editor is designed as an extension to the dynamic test development tool in distributed e-Testing cluster. This system developed as a multilingual for creation of circuits and graphics, which have database with testing questions. The system generates tests dynamically with dynamic questions.

E-Kancor is different with other online examination systems; it will design according to the rules, policies and requirements of Ministry of Higher Education of Afghanistan. This system considered for school students to enable them to get ready, sense a positive changes to their ability and easily join the university.

The proposed ICT solution: e-Kankor Exam Prep System

eKEPS System is an web-based system, which based on multiple choices question for Afghan school students in order to make them ready to join Universities.
This system supports many kinds of questions related to Kankor general exam, ability to grade students automatically and provide various Kankor materials for students. This system will design with various open source technologies like (PHP and HTML5 for interfaces, AJAX for scripting and MYSQL for database) under the GPL license, in order to give rights to volunteers to easily bring their desired changes in system.

The eKEPS Architecture

The system architecture as shown in Figure 1 is intended to provide four types of subsystems/ modules to better manage and provide a leaning environment for students. Each module (see Figure 1), describes bellow:

Exam Management Module: This part of system belongs to teachers, who are responsible to do the following tasks.

a. Question Management which includes (preparation of questions, categorizing of questions, creation of courses, and arrange of question according to subject and topics).
b. Exam Management which includes (organizing of exam, preparation of exam and controlling the exam).
c. Student Management which convers (categorizing of students, organizing of students, and giving the feedback to students).
d. Subject Management which includes (categorizing of topics, preparation of topics).

Exam Engine: This part of system related to the students, who are responsible to do the following tasks:

a. Take exam
b. Manage profile
c. Post comments

Library and practice test: This part of the system also related to the students for self-study practice-test and access the library.

Maintenance: This part of the system belongs to system administrator in order to keep the system with better performance and monitor the system.
The flowing figure shows the system architecture.

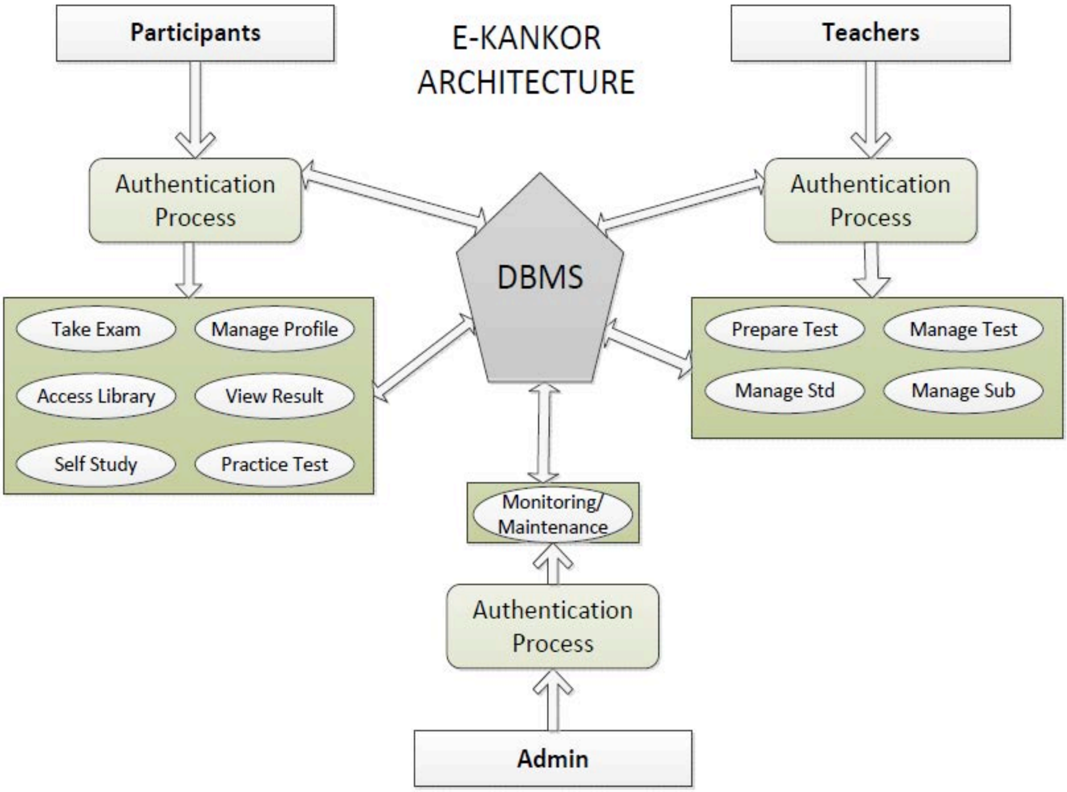


Figure 1: e-kankor system architecture

The system will provide authentication ability for different users and switch them to their own page according to their role. All users' information, questions and answers will be managed by DBMS; and the system will have the ability to auto grade the students according to the correct answer of each question.

Theoretical Foundation of System

A theoretical foundation for teaching and learning will expose and make a clear values and understanding about educational skills. It is by making precise the theoretical principles that we reveal our educational ideals which will have a profound influence on practice. When adopting and replacing the traditional teaching and learning with new, it is essential we think through our educational ideals. E-learning has become the protagonist for change in higher education and brings a revolution to education aspects, but strong needs for stimulus and a purpose (Garrison, 2011).
According to Bonk and Reynolds (1997), to promote traditional learning to more effective way, we must consider the challenging activities in which to enable the learners to recognize the new information for old one, able to gain the appropriate knowledge and construct their knowledge.
Interaction of learners with models and simulations will bring real-life models and simulations environment, which will have a positive effect and better influence in learning method (Kozma, 2001). Computers are only acts as an interface between users and instructions, which provides the processing capability and delivering of knowledge to learners (Ally, 2004).

The aim of this section is to outline the concept and principles of theoretical foundation which are stand behind of this project and making inferences and conclusion of e-Kankor.

Constructivism

Constructivism is a learning concept which based on basis of observation and study to explain how learners acquire knowledge and build their internal illustration of knowledge. The main goal behind this theory is to enable the learners to use their prior experience and practice to formulate new, more effective and adaptive concepts in related learning. Using of skills in the way of practice let learners to be more confident, or maybe changing what they believe. In any case, enable them to construct their own meaning and interact with something different perspectives and being active innovators for their own knowledge. [Coperation, 2004] & (Jonassen et al., 1999).
In this theory the role of teachers and peers become as a motivators and personal resources in which to create a link between theory and practice and adjusting practice through activity and feedback, to catch the necessary and efficient knowledge.

Experiential Learning

This theory based on experience and the impact of knowledge transforming and catching trough experiences. According to Kolb (2000) “Experiential learning theory differs from cognitive and behavioural theories in that cognitive theories emphasize the role of mental processes while behavioural theories ignore the possible role of subjective experience in the learning process.”
This theory follows the collaboration approaches, which focuses on how the experiences include cognitions, environmental factors, and emotions affect the learning process and reflect the changes [Kolb, 2000]. According to Kolb, (1984), this theory followed the four different cycles, which begins with learner’s experience, learner’s reflection, conceptualization and finally followed by experimentation phase. By practice of these phases the learners make inferences of what they have experienced and actuate them to different behaviours actions. The four cycle of experiential leaning which are proposed by Kolb describe bellow:

Concrete Experience (CE)

This cycle of learning focus to the individual involvement in everyday situation. In this stage the learners emphasize on feeling rather than on a systematic approach of problems and situations.

Reflective Observation (RO)

In this stage of learning approach, the learners have enough ideas from various points of view. There is no specific action taken by learners, the learners would emphasis on patience, objective and careful thoughts.

Abstract Conceptualization (AC)

In this stage the environment change from feeling to the more theory and logic-based environment in order to well understand the problems and situations. Learners keep focus on systematic planning and developed theories to make the hypothesis and solve the problems.

Active Experimentation (AE)

In this stage the learning become more practical and consider what really works rather than watching the situation. Learning change the situation by taking an active form-experimenting, which enable the learners to consider the way to improve and learn from previous stage (Kolb, 2000).
The diagram below outlines Kolbs' four stage learning cycle.

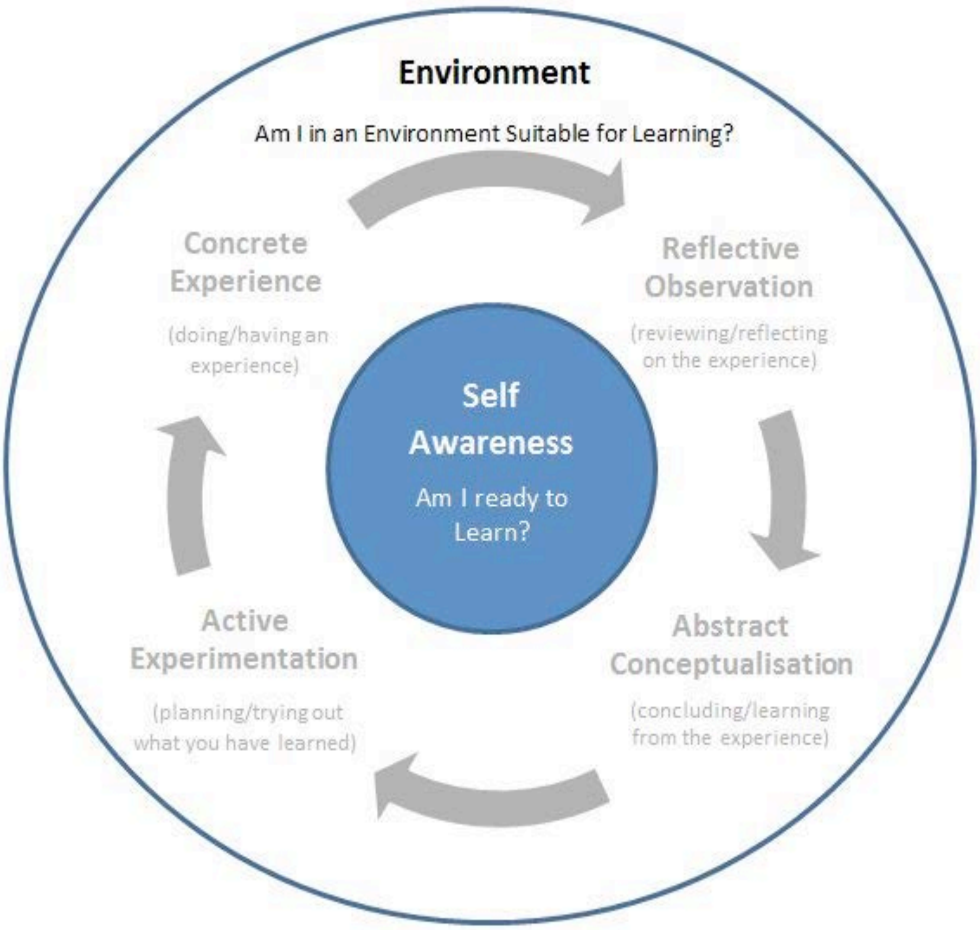


Figure 2: Kolb's experiential learning cycle (David A. Kolb, 2000)

Behaviorism

This theory measures the human behaviour including acting, thinking, and feeling, to bring the changes to the cognitive and psychological aspects of human. This theory support a number of different approaches of teaching that based on teacher-cantered instruction. This approaches include tutorials, practice, simulations and so on. All of these teaching strategies combine in an approach called "*Integrated Learning System*" (ILS).

Situated Learning

Situated learning theory is another important concept in learning environment that focus on problem solving skills and based to the interaction of learners with Computer-based learning environment. According to Lave & Wenger (1991), the concept to this theory enable the learners to become more active and operative in a community of practice. Lave and Wenger (1991), argue that learning is not one-to-one knowledge transaction, it is a social process that help learners to acquire and develop their meaning in a domain activity.

Evaluation

For collecting of data and developing of this project we are going to use two kinds of methodology (i).*Survey* (ii).*Learner cantered design*. During data collection, I preferred to use *Survey method,* which includes (Direct Observation, Interviews, and questioners) in order to study and attempts to actively solve the problem, carefully documented and bring positive changes. The survey will be conducted in Kabul and two other provinces (Herat and Balkh), due to shortage of time, we would not able to cover all schools, only 30% have been targeted both male and female and the survey sample size will be approximately (N=60); 30 Male and 30 Female. The more targeted information will be going to receive from respondents when students fill out the questionnaire and interview with right people (teachers and parents) to receive valuable feedback for the questionnaire.

During the developing of system, I will prefer to use Learner cantered design approach that totally based to education environment and focus to the interest of students. This approach also provides user involvement, which support the learners and instructors in using feedback and make deference between practice and theory. Learner centred design approach has series of intermediate deliverables. Therefor it makes sure that what is done and what the stakeholder expects.

Future work

In compliance of the current requirements and needs of Afghanistan, studying and analysing of existing web based system especially online based systems builds an image and will find out the effective solution based on regulation and rules of Afghanistan to manage better and improve educational services and standardize computerized system. For future work we are trying to overcome the limitation of system that include user interface; to make it more user-friendly and interactive to participants. Furthermore, we intend to promote the system to general entrance exam, consider new features for secondary level schools and have e-Kankor registration system inside the system as a part of our framework in the future.

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Cultural Perceptions Captured in Stop Motion Animation: Training High School Teachers in Brasilia, Brazil

Vânia Lúcia Costa Alves Souza, University of Brasilia, Brazil

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Abstract
The learning event happens in a dialogic process of cooperation between students and the teacher, and it could be mediated by technology. Schools in the digital era require teachers aware of student's attitudes, interests and ways to learn. This article describes the Culture Workshop, part of the course: "High School Teaching Practice: Pedagogical approaches for Students enrolled in DIS (Age and Grade Distortion) classes" hold in the second semester of 2012 in the neighborhood of Guará, Brasília, Brazil. The purpose of this course was to develop workshops using themes Culture, Science, Work and Technology for High School Teacher of DIS classes. The workshop Culture was developed in two parts: The first section had important exercises and discussions among teachers from different areas to construct a common definition of the culture. In the second section, High School teachers wrote a screenplay for Stop Motion animation. The final product was a story telling video describing their perception of the theme. The Culture workshop developed important approaches for teachers aligning different cultural identities, perceptions and communications toward the same objective, common definition of culture.

Keywords: animation, training teacher course, culture, stop motion

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Introduction

We are living in a time where the learning process happens in other spaces other than schools. Information mobility creates multidimensional places that encourage the learning at any time and space (SANTAELLA, 2007,p.15). Therefore, schools need to be remodeled to deal with different learning styles in classes. Technology entered in the educational environment and left the challenge to integrate it with learning. This combination could lead to new ways of education and determine new values, actions and visions of the world for each individual or social group (LEVY, 1988). Schools look for adjustments with new methodologies like the collaborative education that requires interaction, share of information, reciprocity and corporate work.

The collaborative education foresees the interdependency of group's elements. Everyone contributes and participates in the learning process. Each one receives his assignment and offers his contribution (KENSKI,2003,p.9). It is based on a new school environment with new learning objectives as described by Perrenoud (2000,p.63) . According to this author, school should have the responsibility to organize creative didactic sequences to stimulate students' participation in research projects. Also, teachers should have the responsibility to prepare dynamic classes to stimulate students to learn. Some activities, for example, can comprehend projects with final products. During the process of collaborative education, teachers are expected to develop their way of communication with their pupils, using more encouragement, mobilization and involving tasks. Tardiff (1992, p.41) pointed that all teachers actions in school are important because each activity should be determined to reach the optimum progression of students' learning.

Projects in school could be mediated by technology offering interactivity between teacher and students. Research projects may represent an interesting pedagogical work to classes of, Age and Grade Distortion,DIS, where there are older students and the ones who had failed in previous years.

Projects could be organized in three activities, to be worked in sequence (Moran, 2004):

a. Research – working and investigating the theme.
b. Communication – promoting debate and reflection about the theme
c. Production- production of multimedia, vídeo, hypertext

The objective of this article is to investigate the importance of research project mediated by technologies .The Culture Workshop was structured to analyze ways of teachers' interaction, debate and production of multimedia in the project-What is Culture?

Development

The Culture Workshop was part of the course: "High School Teaching Practice: Pedagogical approaches for Students enrolled in DIS (Age and Grade Distortion) classes" hold in the second semester of 2012 in the neighborhood of Guará, Brasília, Brazil. The purpose of this course was to develop workshops using themes such as Culture, Science, Work and Technology for High School Teacher of DIS classes.

The Culture workshop was developed in two parts: The construction of a common description of Culture and the integration of technology to communicate it. The first part stimulated the interdisciplinary work among teachers in the construction of a concept of culture through exercises and debates. The second part involved the creation of a screenplay and production of an animation.

The first section was composed by two exercises: individual and group reflection on culture.

a. The individual exercise was to answer these questions:
   - *What is culture?*

Suppose you are in this situation: You have received an excellent work proposal to be held in an island of the Pacific. This work will last two years without opportunity to return to your home country in that period of time.

What is the most important object to take with you in this trip? Justify your choice.

b. Group reflection. This activity involved a debate with a colleague. Each teacher socialized his concept of culture and the group analyzed its similarities and differences .Group promoted debate about the differences of the teacher's perception and the scientific literature. In the last task, teachers should chose one concept of culture aggregating ideas discussed.

The second section involved the creation of a screenplay and the choice of a technology that would allow the socialization of the concept built in the first part. Teachers chose the production of a stop motion animation using the open source program Universal Manipulation of Animation (MUAN) which is software for animation frame by frame, easy and simple to operate.

Results

The first part involved the conceptual construction of culture; teachers showed their individual perception of this theme. They also did a research about the scientific concept of culture to help with this construction. The group definition was investigated; summed up and organized in the form of a poem that had 13 stanzas and described teachers' definitions.

The second part consisted of the creation of a video on culture. The group separated the poem in thirteen scenes; each one was represented one stanza of the poem. They did video edition and produced a 3minutes and 30 seconds video.

One of the successful aspects of this workshop was achieved as a result of the fully participation of all teachers in the activities who were very creative in debates, reflections and video production. All teachers received one copy of their animation and they were happy with their final product as a collective work.

Conclusion

The workshop Culture represented an important group activity aggregating reflection, debate and technology. The dialogic and dynamical type of the activity stimulated teachers' interest, curiosity and participation toward a common objective: working in group that is an important asset for Age and level Distortion classes.

Research projects have stimulated the construction of theoretical perceptions of Culture with activities of reflection, discussion, interactions and research. Individual conceptions on the theme were presented in exercises and had adaptation after debates. The moment of discussion was essential for sharing and adjusting the culture concept. The debate is also essential for the understanding of students' theoretical representation and active promotion of new definition allowing the organization and transformation of new knowledge.

The video represented the group concept of Culture. The sequence used in the Culture Workshop: research – communication- production could represent a nice possibility to encourage students to cooperate, interact and learn. Students that are usually more participative in class have better grades and feel motivated to continue their studies.

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Voxopop for Out-of-Class Speaking Practice in the Japanese University EFL Context – Uses and Student Perceptions

Cathrine-Mette Mork, Tokyo Woman's Christian University, Japan

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Traditionally, problems with integrating technology into the curriculum have been a lack of technological knowledge among teachers and the costs of software, but now technology has become more advanced, reliable, and user-friendly. There are additionally increasing amounts of freely available online resources, and Internet access is continuing to become more widely available as well as more reliable. Students are also more increasingly what is known as digital natives. Add all this to the importance of taking advantage of technological tools to improve learning. It is the responsibility of teachers to employ freely available authoring tools that help them create interesting and interactive materials for use in their classes.

With the opportunity to listen to their teachers and peers in addition to record their own voices, the *Voxopop* online tool allows students to contribute to improving their listening and speaking skills. The system allows for real communicative interaction practice outside of class time, and gives teachers a good record of examples of students' speaking that teachers can listen to in order to assess any pronunciation problems and to record and assess their progress as their speaking develops.

Voxopop is completely free online digital voice tool that bears some resemblance to blogs and message boards, except posts or comments are recorded through voice instead of text, using a special interface. By definition it belongs to what is often referred to as asynchronous computer mediated communication (ACMC), offering the opportunity for deferred asynchronous exchanges over a flexible period of time, and allows teachers and students to build up threaded audio discussions online. Minimal information is required to register, and users can also create their own profile and an introductory message. Students of oral skills can interact from home, or anywhere outside the classroom where computers and Internet connectivity is possible. The system is conducive for teachers who wish students to practice conversation, make oral presentations, or work on collaborative projects. Teachers can create their own class "talkgroup" and invite students to join by email. These groups can be completely private, restricted, or open to the world.

To start adding messages to others' talkgroups, users need to join them either by invitation or simply by clicking them. Public messages and threads can be listened to without joining. Once a talkgroup member, users can be updated when new entries are added. It also produces a 'feed, ' which means that (on their computer or mp3 / iPod / phone) when new messages are added. Teachers can create talkgroups that are completely private if needed; access from Voxopop users outside the class is prohibited, meaning a certain degree of privacy and anonymity can be preserved for situations where this is a concern.

Literature Review

The Internet is replete with freely available tools for language teachers that when properly integrated, can have positive effects on improving content presented to students and increasing and bettering learner outcomes. Since language learning in particular is far from limited to classroom experience, supporting English language teaching with web technologies is essential (Cephe & Balçikanli, 2012). Teachers must have knowledge about the educational technology available to them, and moreover must know how to use these technologies in their teaching context and know how to guide students in learning with these technologies (Paulsen, 2001).

"Repetition is the mother of learning" (asynchrony allows revision and reediting) and "Listening to your own voice and the voice of the others " are principles supported by the Voxopop platform that enhance learning by improving pronunciation, intonation, vocabulary range, grammar structures, and even creativity and critical thinking (Pop, 2010). Pop, Tomuletiu and David hypothesized in 2011 that differentiation of instruction through introduction of technology-enhanced speaking tasks would address a larger range of learning styles and therefore lead toward more positive outcomes, and that engaging speaking in a safe, asynchronous environment would allow for greater exposure and production, significantly raising student interest and motivation. Their paper demonstrated empirically that "higher expectations are engendered" in students than in the *in vitro* class environment through the use of online asynchronous voice tools.

> *Factors of learners' different personalities, learning and response pace, motivation, and language proficiency that lead to individual inequality to speak up in class or in groups were bypassed in the digital environment, as students were engaged and thus apprehension of production was significantly removed. Focusing on technology during EFL speaking proved a strategy of offering students the implicit confidence they needed in order to bypass inherent apprehension of losing face during class speaking* (Pop et al. 2011).

A potential loss of face is considered a strong obstacle to language learners from the Japanese culture. Yashima, Zenuk-Nishide and Shimizu (2004) go into depth concerning Japanese students' reticence to participate in a communicative classroom, acknowledging the prevalence of teacher-centered educational models, individual cognitive abilities, personality characteristics, meta-cognitive differences, social contexts, and affective variables also as obstacles to active in-class participation by Japanese learners. The works of Horwitz *et al.* (1986) estimated that about one third of all language learners suffered from some form of Foreign Language Anxiety (FLA). An online tool such as Voxopop increase oral output and aural input quantity and deal to some extent with students' fear of a loss of face. Although in-class speaking can be easier to monitor and control, Brown's research shows discordance between the views of foreign language teachers and learners on the effectiveness of pair work and role plays in language classes:

> *This hesitancy toward group/pair work may simply reflect logistical difficulties that sometimes arise given certain interpersonal dynamics or when teachers engage students in group work within a particular physical space. However, such mismatches may reflect fundamental differences between teachers and students in perceiving the process of L2 acquisition as well as in understanding the nature of achievable goals for L2 learning. Students who value an emphasis on grammar teaching and overt error correction may feel that L2 acquisition is strictly about obtaining declarative knowledge of a language's grammar. This perspective will most likely lead to frustration when the students struggle to use the language spontaneously in either spoken or written modalities.* (Brown, 2009)

Brown's research on teacher and learner beliefs regarding effective L2 teaching also shows that speaking practice outside class is perceived by teachers as highly important (2009). Indeed speaking is likely the most highly invested skill in terms of learner expectations and motivation to take language courses. Although a high quantity and quality of language output is highly desirable, without tools such as Voxopop, language quantity and quality cannot be easily monitored or measured by teachers.

Strong benefits have been identified to developing confidence, collaborative learning, reflective practices, and also creating a sense of ownership and pride by using online audio tools. Hsu, Wang and Comac (2008) analyzed the impact of the use of voice blogging during an English as a second language (ESL) course from a student and a teacher's perspective and identified these benefits, which are strategically important in L2 learning. Sun's 2009 study also showed a perceived improvement among learners in relation to the development of fluency and language learning strategies as well when investigating the impact of audioblogging. Clearly, then, it has already been demonstrated that the use of digital voice tools such as Voxopop can be highly beneficial to foreign language acquisition.

Examples of Possible Uses for Voxopop

The uses of the platform are only limited by imagination. The following are some of the more obvious uses.

Discussion points. To put the focus off writing and onto speaking, teachers can post discussion question(s) in a Voxopop assignment, and students can record a series of contentious statements rather than assigning written homework to an opinion-based assignment. Both teachers and students can to respond to each others' recordings, producing a thread of oral comments.

Feedback. Since commenting and questioning is a main feature of Voxopop, teachers can give them oral feedback and have students participate a minimum number of times on each other's threads.

Creating narratives. Teachers can record the first sentence of a narrative and then ask students to listen to the thread and add a sentence each to the story. Students can add on to the thread.

Dictations. Teachers can record their own online dictated texts and have students to listen and write down what they hear, and then record their own version of the text for the teachers and other students to listen to.

Pronunciation drills. Teachers can record some pronunciation drills and have students listen and then record themselves repeating the words or sentences.

True/ false statements. Teachers and students can make recordings about themselves and get students to leave questions for the creator to find out which of the statements are true. Teachers could allow students a period of time to leave questions for the teacher to answer, and then in class, students could tell the teacher which statements are true or false. Students of course could then do the same.

Dialogue practice. In pairs or even small groups, students can practice role plays and task- based exercises that were previously introduced and practiced minimally in class.

Use of Voxopop at TWCU and Meiji University

Voxopop was used for two EFL courses at two universities in the 2013 academic year. The assignments were posted on the teacher's Moodle site, so students were expected to figure out exactly what they had to do by reading the instructions. At both institutions, Voxopop was not used as an assessment tool per se; students were graded simply on whether or not they were able to complete the assignment, and do so by the deadline.

At Meiji University, the platform was used weekly and sometimes bi-weekly for freshman students in a speaking course designed to increase basic oral fluency. As students finished with the textbook earlier in the fall term, the system was used less frequently, mostly as a system to record self-evaluations of presentations in oral format. Typically, students had to get into pairs and record two separate dialogues similar to role plays using language that was previously introduced and practiced in class, thereby at least tripling the amount of practice time they would get if they had only used class time to practice. Assignment example:

> *After completing the discussion activities in chapter 6, find a partner for this Voxopop assignment:*
>
> <u>*RECORDING 1 (on partner A's Voxopop account)*</u>
> *PARTNER A: You are the student. One of your family members has been sick recently and you won't be able to finish your essay on time as a result of having to take care of this person. Explain this to your teacher and ask for an extension.*
>
> *PARTNER B: You are the teacher. One of your students has come to talk with you. Because the student is telling you this BEFORE the deadline, you can accept her/his late homework.*
>
> <u>*RECORDING 2 (on partner B's Voxopop account)*</u>
> *PARTNER A: You are the teacher. One of your students has come to talk with you. Deny the student's request, reminding him/her that there are no makeups for quizzes and not to be late next time. If the student's excuse is a really good one, you can offer to give more points to the next quiz.*
>
> *PARTNER B: You are the student. You were late for this morning's class and have come to the teacher's office to apologize, explain why you were late, and see if your teacher will allow you to make up the quiz.*
>
> *Try to use all the language you have learned from this chapter when doing the recordings.*

At Tokyo Woman's Christian University (TWCU), Voxopop was used bi-weekly throughout the second semester for third year students in the school's Career English

Program (an optional, intensive program focusing on English skills), as a tool to record their opinions about each of the five units of the business and social issues text they had covered in the term. Students were also required to submit a more formal written report of their work, as this was not an exclusively speaking-focused course. Although students were instructed not to read from their written versions (indeed they were supposed to be different), it was predicted that many students would end up simply reading their written work. Students were told that it would be easy for the teacher to determine if they had done so and that they would lose marks for not speaking spontaneously when recording. Despite this, it was obvious from listening to students' work that many of then had simply read their work, and many admitted this in the survey. Assignment example:

> *Music companies want to restrict the Internet and technology more, whereas technology companies feel the legal sharing of music should not be restricted. Explain each of these positions in your own words. Which side do you agree with and why?*

Survey Results

At the end of the academic year, all of the 37 students from the two classes completed survey questions on their mobile phones via surveymonkey.com. This was a small sampling, and the goal was simply to get students perceptions on having used the platform. They were asked six questions on a five-point Likert scale, ranging from strongly disagree, disagree, neither agree nor disagree, agree, to strongly agree, and students had to explain their choices with comments for each question except for question number six. The last question had no scale to choose from; it was an open-ended question. As students completed the questionnaire in class, they were able to ask the teacher for assistance if they did not understand the questions (they were all in English). Nevertheless, some comments generated had little to do with the questions posed, and many of those comments were more appropriate in addressing other questions on the survey. A selection of comments can be viewed in Appendix A.

1. I did my Voxopop assignments on time regularly.

Just over 20% attested to having completed the work on time, and almost 19% of did not do so. Interestingly the rest of the students were neutral, likely indicating that they sometimes did and sometimes did not complete the work on time. Most students reported in the comments section that technical difficulties made it difficult for them to submit on time, that they managed the work well enough, or that they were simply too lazy.

2. I enjoyed using Voxopop.

Almost 47% of students reported enjoying the system, whereas almost 19% did not. The rest were neutral. Students reported that it was fun, that they enjoyed listening to the work of their peers, that it was something new and interesting for them, and that is was entertaining to hear their own voices. Others, however, reported that they were too embarrassed or fearful to have their recordings accessed by classmates, that the system was too difficult to be fun, and that it was embarrassing to record in a lab where others in the room could hear them recording.

3. The Voxopop platform had lots of technical requirements that were difficult to troubleshoot (solve).

49% of students perceived there to be a lot of technical issues with the platform. Indeed over 16% strongly agreed that troubleshooting was difficult. Almost 25%, however, did not feel that Voxopop was hard to figure out, and 27% of students were neutral on the issue. The issues students reported include general computing incompetence, difficulty in learning the system, computer or system freezes, limitations to on-campus computers that were upgraded to compatibility level for Voxopop, and difficulties in upgrading personal software so as to be compatible with Voxopop. Indeed, whenever students upgraded their OS system, they were also required to update their JAVA software so as to work with Voxopop, and this was not requirement that was implicitly understood. Fortunately, the teacher was able to troubleshoot this issue and alert students before it caused too much of a problem for most. Students also reported frustration at having to troubleshoot in general.

4. After I solved any technical problems (software upgrades, microphones, etc.), Voxopop was easy to use.

Even after solving any technical issues (assuming they did so), 16% of students reported that the platform was not easy to use. However, over 62% claimed that once they overcame the technical issues, Voxopop was easy to use. Almost 22% remained neutral on the issue. Many students commented that they had no issues after learning the system and getting it to work on the computers they were using. Others reported that they had to record more than once to get the system to work, and still found it difficult.

5. I feel that using Voxopop has helped to reinforce my speaking skills.

No students disagreed with this statement, although just over 24% were neutral. Almost 76% agreed that Voxopop helped reinforce their speaking ability. Several students commented that they were unsure as to whether or not Voxopop helped them improve their speaking. There were vague comments related to how it depends on the teacher, number of students, and class. It would have been useful to follow up with the students who made these comments as their intending meaning was unclear. One student commented that speaking face to face is preferable, but more said that they believed using the system was useful to their speaking skills as it gave them chances to speak that they otherwise would not have.

6. I would recommend Voxopop to other teachers and students for their classes.

Most students (almost 41%) were neutral in response to this statement, but an equal amount agreed that they would recommend the platform. Almost 19% disagreed, however. Comments solicited from this question were more appropriately placed in addressing the final question, so were moved there.

7. Broadly speaking, in what ways to you feel Voxopop was useful (or NOT useful) to your studies?

Positive feedback included increased speaking and listening time, the ability for self-assessment and comparison with peers, increased computer skills and TOEFL iBT practice, reinforcement of learned vocabulary and phrases, peer feedback, increased speaking confidence, increased motivation and self-reflection, increased flexibility in practice time, and interestingly, pronunciation practice (there was no focus on pronunciation in either class, but clearly it is a concern for several students). Several students at TWCU reported that being made to orally summarize their opinions was a valued exercise.

Negative comments were almost all related to the technical difficulties students experienced in using the system, and a few related to their own challenges. For example, a few TWCU students admitted to reading scripts and regretted the fact, and some Meiji University students claimed it was challenging to meet up with partners outside of class time.

Several unsolicited suggestions were made by students, including the addition of features allowing for the upload of audio files, and the ability to record with portable devices. They also called for improvements to university computer lab conditions. One student called for in-class discussion of Voxopop, and another even suggested the teacher or another native speaker record model sentences or structures for students to emulate.

Conclusions

The Voxopop application suffers from the restriction of the necessity install third party software such Javascript and Flash, which causes a hassle for both teachers and students in using it, especially as any update to a computer's operating system may also necessitate updating this software, which is not clearly evident to the end user of the system. Voxopop also has recording time limitations, and does not provide the user with the ability to delete recorded files saved to the system. The system is completely free, however, and as such it can hardly be expected to come without fault. Also, if teachers are able to anticipate issues, technical problems experienced by students can be reduced. The fact that the platform does not come without drawbacks could mean that students might develop troubleshooting skills. According to Sadoux, the flip side to these latter points is that for teachers to be able to anticipate problems, their workload will be increased (15, 30). Also, many students who have only rudimentary computer skills may be made to feel stupid, not empowered (8-9).

Perhaps Voxopop is not the ideal choice, then, and other solutions should be investigated. The survey did confirm, however, that students crave and appreciate extra oral practice time outside of the EFL classroom. Previous research has proven its value. Classroom interaction in the Japanese context tends to be controlled, and students have little opportunity to interact in different contexts with different people. Through Voxopop, students are not in fact limited to the privacy-protected recordings in their teacher's *talkgroup*. With their account they could venture out and explore open talk groups from structured and unstructured classrooms from all over the world. Students were not informed of this ability in the 2013 academic year, and this is a regret. According to Dieu et al, "*Letting them* [students] *interact with whoever they choose according to their interests and needs will allow them to own the words through which they express their identity and voice their thoughts, thus relating the* *language to their individual selves"* (2006).

As usual, it must be noted that a learning tool is nothing more than a tool, and it is only effective if it serves a specific pedagogical purpose in promoting language learning through conversations and networks, which is where the power of modern web tools lie. Emergent online tools are proving to be of invaluable support to traditional studies that take place in classrooms, as well as to those that take place over the web, as a way to promote optimum levels of interaction and learner production.

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Exploration of the Effects of Teacher Education Program on Building ICT Competencies of Pre-Service Teachers

Xi Bei Xiong, The Hong Kong Institute of Education, Hong Kong
Cher Ping Lim, The Hong Kong Institute of Education, Hong Kong

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Abstract
Teacher education program is vital in preparing qualifying teachers during their apprenticeship phase (Northcote & Lim, 2009). Based on the collective case study of two teacher education programs at a normal university in South China, this paper investigates the effects of teacher education program on the development of ICT in education competencies of pre-service teachers. To compare and contrast the effects of the ICT in education curriculum structure and the ICT in education course content of teacher education program on the ICT in education competencies of pre-service teachers, the study employed the sequential mixed-method approach. Data analyzed from documentation, interview and focus group interviews reveal that (1) teacher education program has a significant impact on pre-service teachers' learning outcomes from the ICT in education curriculum structure, ICT in education course objectives, content, and pedagogy perspectives; (2) sustained efforts are required to improve coherence and coordination for teacher education program; and (3) feedback and reflections of pre-service teachers' ICT learning experiences are essential to revise and refine teacher education program. In addition, the implications for teacher education program improvement are discussed.

Keywords: ICT in education competencies, TPACK, teacher education program

Introduction

Over the last two decades, studies have demonstrated that the ICT in education competencies of pre-service teachers have significantly impacts on the tomorrow's teaching and learning. It has been an important research focus in teacher education. Nevertheless, a gap still exists at teacher education program level, between what pre-service teachers are taught and how they will apply ICT in an authentic classroom (Pope, Hare, & Howard, 2002). This paper comparatively explores the ICT in education curriculum structure and course content of two teacher education programs in a Chinese normal university, as well as the feedback and reflections from pre-service teachers' ICT learning experiences, in order to understand how teacher education program builds up such ICT competencies of pre-service teachers, and further to generate implications for future research in this field.

1. Literature Review

1.1 Pre-service teachers' ICT in education competencies

When defining teachers' competencies regarding use of ICT, there are three points to be noted: first, personal ICT application does not easily or automatically translate into an integration of ICT into teaching and learning (Lim, Chai, & Churchill, 2010). Second, easier access to computer may not be synonymous with competencies (Ellilott, 2004). Third, current pre-service teachers are still weak in information literacy and critical thinking (Oblinger & Oblinger, 2005). Therefore, pre-service teachers need to be prepared with the necessary ICT and pedagogical capabilities to integrate ICT into teaching, learning and even administration (Mims, Polly, Shepherd, & Inan, 2006).

1.1.1 The UNESCO ICT competency framework

To ensure teachers to develop the appropriate ICT knowledge, and to specify a clear set of internationally recognized guidelines on appropriate ICT professional development for educators (UNESCO, 2008), the UNESCO created a set of competency standard modules for teachers first in 2008 and recently updated as the *UNESCO ICT Competency Framework for Teachers* in 2011 (UNESCO ICT-CFT). The framework defines teachers' competencies on three stages-----"Technology literacy, knowledge deepening and knowledge creation. These approaches are mapped across six dimensions of the education system: understanding ICT in education, curriculum and assessment, pedagogy, ICT, organization and administration, and teacher professional learning" (Lim, Chai, & Churchill, 2010, p.8). The UNESCO ICT competency framework is regarded as the international-recognized curriculum guidelines for teacher education and the core component of national ICT in Education Master Plan (UNESCO, 2011), however, the expectation of society and government agencies are satisfied easily. Therefore, based on the classification in UNESCO ICT Competency Framework for Teachers (2011), most countries are still likely to formulate their own national progressive standards for teachers, according to specific social, economic and educational development stage.

1.1.3 The TPACK framework

Different from the above international or national standard sets which all try to prescribe expected competency of teachers in various areas, the Technological Pedagogical Content Knowledge (TPACK) framework is rather a theoretical scheme for understanding teachers' knowledge and skills involved in using ICT for teaching and learning. Based on Shulman's (1986) pedagogical content knowledge (PCK), the technological, pedagogical and content knowledge (TPACK) framework developed by Mishra and Koehler (2006) has gained much attention recently. As an analytical framework, TPACK proposes that effective teaching with technology needs to focus on the connections and interactions among technology, pedagogy and subject content (Chai, Ho, Koh, & Tsai, 2012). TPACK is also regarded as a practical guideline to understand teachers' knowledge required for effective ICT integration (Mishra & Koehler, 2006), and how they might develop this knowledge. Therefore, the TPACK framework has been adopted in many teacher education programs globally to design, develop and evaluate curriculum in the area of ICT integration (Chai, Koh & Tsai, 2010; Jimoyiannis, 2010).

1.2 Factors that affect the ICT preparation of teacher education program

According to the TPACK framework, an effective teacher education program plays a crucial role in preparing pre-service teachers with the necessary ICT and pedagogical competencies to integrate ICT for teaching and learning during their apprenticeship phase (Mins, Polly, Shepherd, & Inan, 2006). To understand how ICT in education competencies can be effectively built up within teacher education program, there is a need to consider the essential roles of ICT in education curriculum (Schmidt, et al., 2009).

One of the key factors that had a considerable influence on the development of pre-service teachers' ICT in education competencies was the ICT in education curriculum structure. To be accordance with the TPACK framework, the ICT in education curriculum structure should be a systematic project, which needs to realize the effective integration from perspective of technology, pedagogy and subject. Technical competency is essential to the effective use of instructional technologies (Becker, 2001). However, a single course approach may be insufficient to encourage pre-service teachers to transfer ICT skills into practices during their internships (Rees, 2002), and does little to cultivate the use of ICT as higher order thinking and learning tools (Steketee, 2005). In response to the inadequacies of skills-oriented approach, ICT in education curriculum structure needs to stress the importance of understanding ICT in relation to its pedagogical use, and provide a pedagogical oriented unit to train pre-service teachers how to integrate ICT into subject teaching (e.g. Brown, 2002; Delargey, 2002; McNair & Galanouli, 2002; Willis & de Montes, 2002; Zhu & Yan, 2002). Meanwhile, subject specific integration has been recognized as an essential component of ICT in education curriculum structure (McNair & Galanouli, 2002). Many teacher education programs include training whereby ICT is embedded into specific subjects (Steketee, 2005).

Additionally, assessment seemed to be an integral part of the ICT in education curriculum development task (Lim, Chai, & Churchill, 2010). Besides from linking with the curriculum, various forms of assessment tools need to be integrated and balanced to monitor pre-service teachers' learning progress (e.g., pre-learning or post-learning questionnaire, learning portfolios, individual product rubrics, peer evaluation, reflections and blogging). The tools in authentic assessment tasks would help pre-service teachers to acquire the necessary competencies and dispositions for the integration of ICT in the real world (Lim, Chai, & Churchill, 2010).

Another important motivating factor for pre-service teachers' ICT in education competencies was the lectures, who were teaching ICT in education curriculum, and their teaching and learning strategies. Although the teaching and learning strategies are various, trends in teacher education have highlighted the value of teaching and learning with ICT rather than on ICT; that is, ICT can be learned by being used as a tool to strengthen learning of content, instead of being grasped as an isolated learning objective (Drier, 2001; Guy, Li, & Simanton, 2002).

2. Research context

Although there is a great deal of research on ICT in teacher education, there is a constant need for more research about the effects of ICT in teacher education programs in specific contexts (Zhang & Martinovic, 2008). Given the significance of educational informationization, the MOE of China issued "Educational Technology Competency Standards for Primary and Secondary Teachers (Trial)" in 2004. The structure of the Standards (2004) can be summarized into four domains of competencies which are - values of and attitudes to applying educational technologies, fundamental knowledge and skills of educational technology, application and innovation of educational technology, and social responsibility issues involved in adopting educational technology. Since then, most of the ICT competency trainings for in-service teachers are usually designed and implemented in coordinate with the Standards (2004). However, the Chinese central government has not formulated any guidelines specific for pre-service teacher education. Instead, more control and flexibilities are given to individual teacher education institution (TEI). As a result, most of TEIs have correspondingly begun to restructure their teacher education programs.

3. Research questions

Case study approach can be conducted to provide an "in-depth study of instances of a phenomenon in its natural context and from the perspective of the participants involved in the phenomenon" (Gall et al., 1996, p. 545). In accordance with the reviewed literature and the contextual background, the following two research questions guiding the current study were:

1. How does teacher education program have effects on the development of ICT in education competencies of pre-service teachers?
2. Whether the pre-service teachers' ICT in education competencies have any implications for teacher education program improvement?

4. Research methodology

The study employed mixed methods including documentation, survey, interview and focus group interviews for addressing research questions. In this study, documents analysis focused on administrative documents, syllabi for various technology courses, program sheets, or subordinate school website. The collected information was to corroborate and augment evidence obtained from other sources (Yin, 2003).

To explore information about expectations and challenges in terms of course design, the technology course coordinators were invited for a semi-structured interview. The interview consisted of questions of four aspects. The first aspect centered on the course planning; the second aspect of questions focused on the implementation and development of the course; the third aspect was mainly about the evaluation of the course; and in the last aspect, the course coordinator made comments on the expectations and challenges faced with. The 60 minutes' interview was conducted in Chinese and audio-recorded.

The pre-service teachers for focus group interviews were chosen after considering their gender, grade, major and native place etc. Totally 8 pre-service teachers from two sampled teacher education programs were organized into two focus groups respectively. Semi-structured interviews were conducted within 30 minutes for each group. These interviews were tailored to further understand the pre-service teachers' attitudes, perceptions and ICT learning experience.

5. Description of teacher education program in GXNU

Guangxi Normal University (GXNU) is a provider of vocational education, higher education and adult education in Guangxi province, southwest China. Teacher education is of the university's strength. Like many other normal universities in China, pre-service teachers are registered in different subject subordinate schools. In GXNU, teacher education program is composed of general education, specialization education, teacher education and practicum. Specifically, the ICT in education curricula include: (1) "Fundamentals of Computer", a three-credit general education course on ICT skills, is compulsory for all the students; (2) "Application of Educational Technology", a two-credit teacher education optional course on ICT for education, is organized by the School of Education; (3) "Comprehensive teaching skills of pre-service teachers", a two-credit compulsory course involving ICT as an element offered by each subordinate school; (4) besides, some subordinate schools also offer an additional optional or compulsory course on teaching subject knowledge with ICT.

6. The profiles of two cases

6.1 The ICT public courses "Fundamentals of computers"

The School of Computer and Science offers the course "Fundamentals of Computer" for all undergraduate students in the University. Students' ICT competencies vary greatly as they come from very different backgrounds across the country. Thus, starting from 2010, a pre-test on computer knowledge and skills was administered to all students to determine their level of competencies and divide them into classes of three different levels – the low level A, the intermediate level B, and the high level C. The majority of students (about 60%) fall into the intermediate level B, with the rest divided between the low level A and high level C. Different courses are offered for each level. For Level A and B students, the goal of the course is to equip them with basic competency of computer, and introduce to them the basics of computing science. While for Level C students who already have acquired basic competency of computer, more advanced content on programming and databases are covered. The course does not cover content on using computer for teaching and learning purposes. The course has its own computer-based assessment system, with a bank of exam topics to choose from.

6.2 Profile 1: The ICT in education curriculum structure for History teacher education program

· The course "Comprehensive Teaching Skills of Pre-service Teachers"

In history teacher education program, "Comprehensive Teaching Skills of Pre-service Teachers" is a two-credit compulsory course offered by the School of History and Tourism. This course mainly focuses on the theory and practices for pedagogical knowledge. The comprehensive teaching skills are organized into three sub-courses, namely, "Microteaching" (1 credit), "Calligraphy and Blackboard Design" (0.5 credit), and "Teaching Practice" (0.5 credit). The assessments for these sub-courses are arranged at Semester 5, Semester 6, and Semester 7 respectively from Year two to Year three. There is no classroom lecturing for these sub-courses, but the course assessment standards are provided for pre-service teachers in advance for preparation. And the School of History and Tourism is responsible for the assessment. Pre-service artifacts and teaching practices are adopted as the major assessment method for this course.

· The course "Application of Educational Technology"

"Application of Educational Technology" is a two-credit ICT course optional to pre-service teachers, developed and delivered by the School of Education. The goals of this course are set against the Standards (2004), mainly focusing on the two dimensions: knowledge and skills, application and innovation. This course especially aims to develop pre-service teachers' awareness of applying educational technology into teaching and learning process by constantly requiring them to reflect on their learning, and peer-review their works. Since this course is open to pre-service teachers from different study disciplines, it does not include specific subject knowledge. For this course, the integrated assessment is based on attendance (10%), reflections on personal blogs (20%) and assignments (70%). For the assignments, the online artifacts for 30%, the PPT accounts for 50%, the website design and management for 20%.

6.3 Profile 2: The ICT in education curriculum structure for Mathematics teacher education program

· The course "Computer-aided Mathematics Teaching"

"Computer-aided Mathematics Teaching" is a three-credit compulsory course for Mathematics pre-service teachers. This course especially aims to develop pre-service teachers' awareness of the integration of technology and pedagogy into subject knowledge. Specifically, it is based on the theory of pedagogy, integrated the Mathematics subject knowledge and supported by educational technologies. This course is opened at semester 5 (Year 3). The course coordinator especially involves many cases on secondary school Mathematics pedagogy to get pre-service teachers well-prepared for their practicum in secondary school teaching and graduation designing project in Year 4. The assessment is based on pre-service teachers' artifacts. This course is regarded as the major ICT in education curriculum for Mathematics pre-service teachers, and the feedbacks and responses from pre-service teachers are very positive as well.

This course provides us new thinking of teaching designs, new understanding of educational technology and new cognition of the teacher careers. As a student majored in Mathematics, the technology learned in this course (e.g. Web Quest) was very useful to illustrate the inferring process of a calculation formula or the proving process of a mathematical assumption. The technology made things easier and clearer.

· The revised course "Comprehensive Teaching Skills of Pre-service Teachers"

In Mathematics teacher education program, "Comprehensive Teaching Skills of Pre-service Teachers" consists of three sub-courses, "Internship at Middle-School and Microteaching" (1 credit), "Standard Chinese and its Oral Expressions" (0.5 credit), and "Calligraphy and Multimedia Courseware" (0.5 credit). However, considering the limited credits for ICT in education curriculum, the course coordinator involved ICT as an element in "the Calligraphy and Multimedia Courseware" with classroom lecturing. More importantly, the course content embodies the integration of technologies into teaching and learning process. Therefore, this revised course is not only the pedagogical course, but it has been developed as an integrative course to cultivate technological pedagogical knowledge. The assessments for the three sub-courses are intensively organized in Semester 6 (Year 3). Pre-service artifacts and teaching practices are the major assessment method; however, technologies have been one of the key components in the assessment standards. To be accordance with the course "Computer-aided Mathematics Teaching"**,** the course coordinator and lecturer of the two courses is the same person, who has more than five years' experience of teaching Mathematics with educational technology. When asked about why to revise this course, the course coordinate pointed out:

We recognized that it was urgent to develop our current ICT curriculum to meet the requirement for teacher education development, especially to develop students' technological competency. Based on the Standards (2004), we conducted a comprehensive instructional analysis of pre-service teachers' ICT knowledge and skills, aptitude for learning and the requirements of curriculum reform, and we revised the course into the current form in 2010.

7. Key Findings and discussion

· Perspectives on ICT in education curriculum

The comparison of the ICT in education curriculum from the two cases revealed that teacher education program seemed to have a positive impact on pre-service teachers' ICT in education competencies from the curriculum planning, implementing and evaluating perspectives. The findings from data analysis have been summarized in Table 2. It is evident that there existed differences for the ICT in education courses in terms of time arrangement, course content, pedagogy, and assessment.

History teacher education program			
Year of study	**Course**	**Course content**	**Assessment**
Year 1	"Fundamentals of Computer"	TK	Computer-based assessment system
Year 2-Year 3	"Comprehensive teaching skills of pre-service teachers"	PK	Pre-service artifacts and teaching practices
Year 3	"Application of educational technology"	TPK	Attendance, Reflections on blogs & assignments
Mathematics teacher education program			
Year of study	**Course**	**Course content**	**Assessment**
Year 1	"Fundamentals of Computer"	TK	computer-based assessment system
Year 3 (S5)	"Computer-aided mathematics teaching"	TPCK	Pre-service artifacts
Year 3 (S6)	The revised "Comprehensive teaching skills of pre-service teachers"	PK→ TPK	Pre-service artifacts and teaching practices

Table 2: The comparison of the ICT in education curriculum structure for the two cases

It should be noted that the time arrangement for ICT in education course is an important influencing factor to the learning outcomes of ICT in education competencies. For example, since the curriculum planning needs to follow up with the TPACK framework, as well as need to be structured with adequate awareness of the general scheme of progression for the pre-service teachers (Lim, Chai, & Churchill, 2010). Specifically, the preparation from PK, CK, and TK course are expected to constitute the necessary knowledge foundation for ICT integration, and then the integrative course, such as TPK course, PCK course, TCK course and the TPACK course should be offered. Importantly, the TPACK course needs to be arranged closed to the practicum, and then pre-service teachers are able to apply to the TPACK knowledge to their teaching practices more effectively. Additionally, to avoid repetition or disconnection, the ICT in education curricula should be linked with each other in a gradual progress; even the units within one curriculum should be connected with the main tasks of each session and the assignment after it.

Regarding the content of course, the data analyzed from documentation and focus group interview indicated that there is a need to improve the T-related integrative course for pre-service teachers. Especially, they need to develop their T-related integrative competencies from the TPK course before they attend the TPACK course. And the responses from interviews with course coordinators also confirmed this point. That is why the Mathematics teacher education program revised their course "Comprehensive teaching skills of pre-service teachers" from PK to TPK course.

Perspectives on the efforts for coordination of teacher education program

The ICT in education curriculum are offered by different subordinate schools. For example, "Fundamentals of Computer" is offered by the School of Computer and Science, "Application of Educational Technology" is organized by the School of Education; "Comprehensive teaching skills of pre-service teachers" is arranged by individual subordinate school, as well as the course on teaching subject knowledge with ICT. And the supporting hardware and technical matters come under the charge of the Resource and Property Management Office of the university. The current structure brings about the incoherence in the teacher education program management. Sustained efforts should be focused on the coordination and communication for the coherence of teacher education program. The broken, vacuum and overlap in the process of program planning, implementation and evaluation need to be identified for improvement and revisions, such as the overlapped course contents, gaps or omissions between courses; lack of consistent management or supervision, and no assessment or evaluation system.

Perspectives on the feedback and reflections of pre-service teachers' ICT learning experiences

All interviewed pre-service teachers shared their willingness to learn more about ICT in teaching and learning. Most participants suggested that it was imperative that each teacher education program needed to involve its own TPACK course, which was likely to improve the ICT in education competencies of pre-service teachers more effectively. Also, they believed that ICT incorporation into teacher education program should emphasis the integration between technology, pedagogy and content knowledge, as well as the connection between theory and practices. Meanwhile, the course coordinators admitted that the feedback and reflections from pre-service teachers' learning experience seemed to be the most important implications for ICT in education curriculum development. Pre-service teachers' responses tended to be a direct assessment for the effectiveness of ICT in education curriculum and could be adopted for the purpose of revising the course and even the teacher education program.

8. Implications and conclusion

As stated previously, this study has explored how teacher education program builds up the ICT in education competencies of pre-service teachers. The findings from the study have useful information for various stakeholders involved in the processes of teacher education program planning, implementation and evaluation. Such a study will inform policymakers, school administrators, and lecturers about how to effectively develop teacher education program towards pre-service teachers' ICT in education competencies. The following are the implications based on the findings of the above study.

Subordinate school level

Lecturers' recommendations, together with pre-service teachers' feedback, should be taken into serious consideration. Course coordinators or vice dean of each subordinate school will review pre-service teachers' feedback and insure the ICT in education curriculum planning to be in accordance with teacher education policies and guidelines, as well as meet the objectives of building up pre-service teachers' ICT in education competencies.

Fully recognize the limitations in terms of credit management, class hours, students' quantity, and resources; there should be a mechanism to stipulate the evaluation standards, to supervise the adaptability and flexibility of ICT in education curriculum. More importantly, there are needs to assess or evaluate the procedure and the pre-service teachers' ICT learning outcomes to accumulate practical experiences and knowledge for further development.

University level

Set a clear vision for the university. It is crucial to pull together those who have a stake in the learning outcomes of pre-service teachers' ICT in education competencies, including pre-service teachers, lecturers, head of each subordinate school, and university administrators, and allowing them to assist in the creation of the vision by contributing their knowledge and positive attitudes to build a strong acceptance, commitment and potential for teacher education program improvement. It is the essential responsibility of university to coordinate the interrelationship between the subordinate schools and foster the mutual communications.

Other normal universities level

This study may be representative for most current teacher education programs in Chinese teacher education. The presented significance, challenges, and restrictions of the effects of teacher education program on building up the ICT in education competencies of pre-service teachers may be references for the other normal universities in China or teacher education institutions in the similar context.

Conclusion

Based on this study of GXNU, it is possible to provide a deeper understanding of how teacher education program has effects on the development of ICT in education competencies of pre-service teachers, as well as the ICT learning experience of pre-service teachers tends to be important driving forces for teacher education program development. However, the pressure is still on for educators to acquire and utilize effective strategies for teaching and curriculum improvement. After all, to develop the ICT in education competencies of pre-service teachers may not be a simple task. It requires the concentrating efforts on the processes of program planning, implementation and evaluation, and the sustained efforts on coordination and communications from different stakeholders, to construct ICT in education curriculum models and approaches of ICT integration in teacher education program based on above understanding.

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Using Online Chants to Enhance Oral Reading and Sentence Writing in an English Remedial Program

Feng-cheng Chiang, University of Kang Ning, Taiwan
Tzu-ying Wu, Shiaying Junior High School, Taiwan
Ching-ya Chiu, University of Kang Ning, Taiwan

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Abstract
Proficiency in English is emphasized to be necessary to promote individual and national competitiveness in the international community. People with high English proficiency earn more opportunities and better competitiveness in the global job market. However, some junior high school students' basic communication competence has continued to be far below expectations although they have been learning English for over 4 years. On the other hand, an integration of pedagogical development with technological advancements has been advocated, and found beneficial for learning. With the rapid access to abundant online learning resources, teachers can apply technology in curriculum design, learning material, and class activities. Besides that, studies have shown that chants can enhance students' English learning. Therefore, this study attempted to explore the effects of using online chants in an English remedial program in a junior high school in Taiwan. Eight low-achieving seventh graders participated in a 16-week English remedial program. Six instruments were employed, consisting of online instructional materials, an English achievement test, four quizzes, a questionnaire of attitudes toward English learning, a questionnaire of attitudes toward the remedial program, and classroom observation. The results of the study showed that the use of online chants in an English remedial program could promote low-achievers' learning interest, improve their learning attitudes, and enhance their oral reading and sentence writing. In the conclusion, some pedagogical implications are offered for English instruction.

Keywords: Oral reading fluency, English sentence writing, attitudes toward English learning, chant instruction, English remedial programs, online learning materials

Introduction

Due to the arrival of the era of globalization, English has become an important foreign language in Taiwan. People with high English proficiency have more opportunities and better competitiveness in the global job market (Lin, 2005). To enhance students' English proficiency and competitiveness on the international stage, the Ministry of Education (MOE) introduced a policy that English as a required subject would be taught from the third grade of elementary schools in 2004, in order to develop students' basic communication competence and to enhance their learning attitude, effective from 2005.

However, according to many research findings, junior high school students' English performance on the Basic Competence Test (BCT) does not reflect the fact that they have learned English since the fifth grade of elementary school -- at least five years (Lin, 2009). Two distinct groups of English achievement levels are evident in the distribution of students' scores, specifically a bi-nodal distribution known as the English double peaks, rather than a normal curve (Li, 2003). The two distinct groups can be described as a lower achievement group and a higher achievement one. The existence and seriousness of this phenomenon can also be found in junior high school classrooms (Chen, 2006; Tsai, 2009). Shown in some studies, academic achievements of low achievers and their attitudes toward learning are closely related to each other (Chien, 2004; Hsieh, 2007; Huang, 2010). When low achievers lack a sense of achievement in English, they usually show passive attitudes and low motivation in class. Besides that, research shows that grammar plays an important role in the BCT and it is also highly emphasized in English teaching in junior high schools (Doughty, 1991; Ellis, 2002; Hsieh, 2005). Understanding of grammar is necessary for EFL learners to achieve high English proficiency, especially in reading and writing (Leow, 2001; Norris & Ortega, 2000; Schmidt, 2001). However, for most learners, it is annoying to have to master grammatical structures, particularly low-achieving students (Hung, 2008).

Chants have been reported in numerous studies as effective and enjoyable tools to learn English (Hakke, 1990; Metin & Saricoban, 2000; Opie & Opie, 2000). They are considered rhythmic speech or music, and are the rhythmic expression of Standard American English (Graham, 1979; Kenney, 2005; Munger, 2008). Rhyme, phonemes, vocabulary, phrase, sentence patterns, and even grammatical structures could be found in them (Bradley, Bryant, Crossland, & Maclean, 1989; Sibarah, 1999). They are also one of the recommended teaching materials in the guidelines of the Grade 1-9 Curriculum (MOE, 2004). Teachers can recite with students with a particular tempo and beat in jazz. Using jazz chants in the classroom can help reduce students' anxiety, make them feel relaxed, and further help them learn unconsciously and joyfully (Cross, 1995; Eken, 1996; Krashen, 1985). Repeated chanting helps increase learners' rate of word recognition and accuracy of pronunciation (Dowhower, 1994; McCormick, 1994; Graham, 1986). Students can acquire difficult sounds, natural stress, rhyme, intonation patterns, and even grammatical structures gradually and naturally by "speaking and listening to" them rhythmically and repeatedly in an easy and relaxing atmosphere (Graham, 1986; Griffee, 1992; Iantorno & Papa, 1979; Schoepp, 2001).

By means of the features of repetition and rhythm, students may become acquainted with the language structures of everyday situations unconsciously and enjoyably. Students' academic achievements may be improved, and their attitudes toward English learning may be promoted, too. As a result, this study aimed to provide online chant instruction for low-achieving junior high school students in an English remedial program. The following research questions were used to guide the study:

1. Does the use of online chants improve the English oral reading fluency of low-achieving junior high school students?
2. Does the use of online chants improve the English sentence writing of low-achieving junior high school students?
3. How does the use of online chants in English remedial instruction affect the attitudes of low-achieving junior high school students toward English learning, including motivation and anxiety?
4. What attitudes do low-achieving junior high school students display toward this English remedial program?

Methodology

Participants

The participants involved in this study were eight low-achieving seventh graders in a junior high school in Tainan City in Taiwan. They were assessed as low achievers according to their average scores on three monthly exams, ranked in the last 25%, in the first semester of the seventh grade. In addition, according to their English teachers, they had much trouble learning English; they could not pronounce the words they had learned or make simple sentences with taught sentence patterns. "I can't do that." is what they often said. Also, they showed low motivation and passive attitudes toward English learning. Table 1 and Table 2 showed the detailed information of the participants.

Table 1
Mean Scores of the Eight Participants and All Seventh Graders

	ASG	S1	S2	S3	S4	S5	S6	S7	S8
Mean Scores on the Three Monthly Exams	62	28	23	18	22	23	21	19	21

Note. ASG = All Seventh Graders, S1 = Student 1, S2 = Student 2, etc.

Table 2
The Participants' Learning Behaviors in Class

Participants	Gender	Behaviors
Student 1	Female	Talkative and passive in learning
Student 2	Female	Talkative and distracted easily
Student 3	Female	Shy and slow in understanding
Student 4	Female	Shy, with low motivation to learn English
Student 5	Male	Talkative and distracted easily
Student 6	Male	Shy, with low motivation to learn English
Student 7	Male	Passive, with low motivation to learn English
Student 8	Male	Talkative, passive and distracted easily

Instruments

Instructional materials. The instructional materials consisted of eight English chants which focused on four grammatical structures, including Yes/No Questions, Wh-Questions, the Command Forms, and the Present Continuous Forms. The eight chants had been selected and revised, based on the participants' English proficiency, from a series of Jazz Chants reference books written by Carolyn Graham and published by Oxford University Press: Jazz Chants, Jazz Chants for Children, Grammar chants and Holiday Jazz Chants. The audio of these chants were also downloaded from YouTube to assist the teacher to use in class.

English Achievement Test (EAT). The EAT was designed to examine whether these students' oral reading fluency and sentence writing proficiency were improved after this remedial program. This test consists of two categories, oral reading and writing. The vocabulary and sentence patterns in the EAT were all selected according to the competence indicators of the English learning area in the Grade 1-9 Curriculum announced by the MOE in 2009. Two experienced English teachers were invited to evaluate the eight participants' oral performances, based on the criteria of accuracy, speed, and prosody (Chiu, Chiang, & Chen, 2012; Zutell & Rasinski, 1991). Accuracy was assessed by counting the percentage of words that students read correctly on the oral part of the EAT. Speed was evaluated by measuring the average number of words students read correctly per minute. Prosody was judged by evaluating the appropriateness of the stress, intonation and expression in students' reading, using an index ranging from "very good = 5," "good = 4," "fair = 3," "poor = 2," to "very poor = 1."

Questionnaire of Attitudes toward English Learning (QAEL). Based on the adaption from Horwitz, Horwitz, and Cope's (1986) Foreign Language Classroom Anxiety Scale, Li's (2005) Questionnaire of Attitudes toward English Learning, and from Tsai's (2010) Questionnaire of Attitudes toward English Listening, the two-category QAEL was employed to investigate students' motivation toward English learning and the anxiety they experience. A four-point Likert scale rating from "strongly agree = 4," "agree = 3," "disagree = 2," to "strongly disagree = 1 was used. In addition, three open-ended questions were included in the QAEL. Two professors had been invited to evaluate the questionnaire to achieve expert validity. In addition, 60 seven-grade students took part in a pilot study to test its reliability (see Appendix A), reaching an overall Cronbach's Alpha .85; one partial Cronbach's Alpha .92 and the other .91, showing that the questionnaire has high reliability.

Questionnaire of Attitudes toward the Remedial Program (QARP). The purpose of the QARP was to explore students' reflections and responses to the instructional materials and this English remedial program. It was developed based on Tsai's (2010) Questionnaire of Attitudes toward Listening Materials, and was inspected by two professors. Questions 1-14 in the first section used a four-point Likert scale rating from "strongly agree = 4," "agree = 3," "disagree = 2," to "strongly disagree = 1," and the three open-ended questions (15-17) in the second section were designed to obtain more detailed information about students' responses to this remedial program (see Appendix B).

Classroom observation. Classroom observation was employed in this study is to collect data about students' participation in class, interaction with others, and performance during the remedial program. All of the participants' behaviors in class were audio and video recorded, and a reflective teaching journal was kept by the researcher in the process of conducting the remedial program.

Four quizzes. They have been designed, based on the four grammatical structures targeted in the adopted chants, to test the participants' sentence writing after instruction in each grammatical structure.

Data Collection and Data Analysis

The remedial program was conducted by the researcher over a period of 16 weeks, and eight seventh graders took part in it. At the beginning, the participants took an English achievement pretest, and completed a questionnaire about their attitudes toward English learning (QAEL). In the process of the program, they used the instructional materials, took two 45-minute classes per week, and had a quiz after the teaching of each grammatical structure. At the end of the remedial program, the participants completed an English achievement posttest and two questionnaires, the QAEL and QARP. Both quantitative and qualitative approaches were employed to analyze all of the collected data. First of all, the SPSS was employed to investigate the quantitative data collected from the participants' English achievement pre- and posttests, responses to the QAEL and QARP, and four quizzes during the instruction. The significance level was set at α=.05. Then, the qualitative data was coded and analyzed to explore relevant research questions.

Results and Discussion

Results and Discussion of Research Question One

Significant improvements were found in the results of participants' English oral achievements on the EAT in accuracy, speed, and prosody. All participants made a significant improvement in their oral reading accuracy (t = -18.10, p =.000) after the English remedial program (see Table 3). The average percentage of their improvement was 21%. Also, all participants showed a significant improvement in their reading speed (t = -10.17, p = .000) after the remedial program (see Table 4). Their reading speed increased on average by about 12 words read correctly per minute. In addition, as shown in Table 5, most of the students achieved a significant improvement in their reading prosody after the English remedial program (t = -4.97, p =.002). They improved an average of 1.13 rating units, a 22.5% improvement.

Table 3
Paired Samples Test for the Percentage of Participants' Accuracy on the EAT

	Mean (%)	*SD*	*t*	*p*
Pretest	7.18	6.37	-18.10	.000***
Posttest	28.25	8.14		

Note. $N = 8$. The percentage came from the words participants read correctly divided by the total words 143. *** $p < .001$.

Table 4
Paired Samples Test for Participants' Speed on the EAT

	Mean	*SD*	*t*	*p*
Pretest	3.69	2.71	-10.17	.000***
Posttest	15.33	5.55		

Note. $N = 8$. *** $p < .001$

Table 5
Paired Samples Test for Participants' Prosody on the EAT

	Mean	*MD*	*t*	*p*
Pretest	1	0.00	-4.97	.002**
Posttest	2.13	0.64		

Note. $N = 8$. Ranging from 1 point (very poor) to 5 points (very good). ** $p < .01$.

Moreover, in their responses on the QARP, participants all showed a positive attitude toward the effects of chants on their oral fluency. They all stated that the rhythm and melody of the chants were helpful to their pronunciation and speaking, and also reported that they all found it easier to memorize vocabulary after repeating the chants. Some extracts were translated as follows.

> *... I was glad I could know how to pronounce these words correctly…* (Student 4)
>
> *…We chanted and practiced many times in class; that left a deep impression of vocabulary and sentences on me...* (Student1)
>
> *...I could read the chant out alone after frequently repeating it with the teacher and other classmates…* (Student 5)

Also, based on the observation field notes, all participants displayed a lot of changes in their attitudes toward oral learning. At the beginning of the treatment, most of them kept silent when they were asked to repeat. However, gradually they started to read along loudly and rhythmically, and were willing to ask questions actively in and after class. Some extracts were selected as follows.

> *...Student 4 stayed after class with Student 3 to ask some questions about the pronunciation of vocabulary.…* (week 4)
>
> *...Student 5 raised his hand to ask how to pronounce "listen"…* (week 7)
>
> *...Student 8 repeated happily with his hands beating the tempo…* (week 8)

The results of the treatment indicated the remedial instruction significantly improved the English oral reading fluency of low-achieving junior high school students. All participants showed a significant improvement in their oral achievements in terms of the accuracy, speed and prosody after the English remedial program. The possible explanation is that the repeated practice in chants can help students improve their oral reading ability. Chants provide authentic language and comprehensible resources, like different pronunciation of words, for students to train their ears and practice their pronunciation. Chant instruction may stimulate students to listen and speak English in class. Through repeated aural and oral practices, students will probably become very familiar with the sounds of the words, and then step by step they may be able to read or chant more clearly and smoothly one day. These findings are in accord with the results of the previous studies that chants can help to develop students' abilities in listening and speaking (Hakke, 1990; Metin & Saricoban, 2000).

In terms of accuracy, the use of chants will provide numerous opportunities for students to practice and correct their pronunciation. Chant instruction may stimulate students to hear the sounds of the words clearly, offer them abundant oral practice to chant over and over again, and help to increase the correctness of their pronunciation from the feedback of themselves or others. Therefore, students' pronunciation will probably be enhanced positively. These results are entirely consistent with the findings of Dowhower (1994) and McCormick (1994), who found that students' accuracy of pronunciation increased through plenty of oral practice of chants. In terms of fluency, lots of oral practice of chants may help students not only to correct their pronunciation, but also to become more and more familiar with the chants and to enhance their speed of oral reading. The use of chants gives students opportunities to repeat the language elements many times, and possibly aids the fluency of their oral performance consequently. These results are supported by the findings of previous studies that students' oral fluency was improved after using chants to learn English (Tseng, 2008; Ward, 1980). As for prosody, the results are consistent with the findings of Graham (1986) that students can acquire sounds, stress, and intonation of natural language in the chants naturally and gradually through speaking and listening to them joyfully and repeatedly. However, compared with accuracy and speed, all participants made less improvement in prosody. It is likely that as Flynn (2004) reported, to low achievers, prosody is an advanced oral skill, and it may require more time and more practice for them to achieve mastery.

Results and Discussion of Question Two

Based on the results (Table 6), all participants made a significant improvement in their sentence writing after the English remedial program (t = -9.55, p = .000), and the average percentage of their improvement was up to 19.25%.

Table 6

Paired Samples Test for Participants' Sentence Writing Performances on the EAT

	Mean	*SD*	*t*	*p*
Pretest	11	6.41	-9.55	.000***
Posttest	30.25	11.15		

Note. N = 8. Total scores of the EAT were 100.
*** p< .001.

As supporting evidence, participants' writing performances on four quizzes during the remedial program are displayed in Figure 1. According to the results, all of the participants improved continuously in their sentence writing on the four quizzes during the English remedial program.

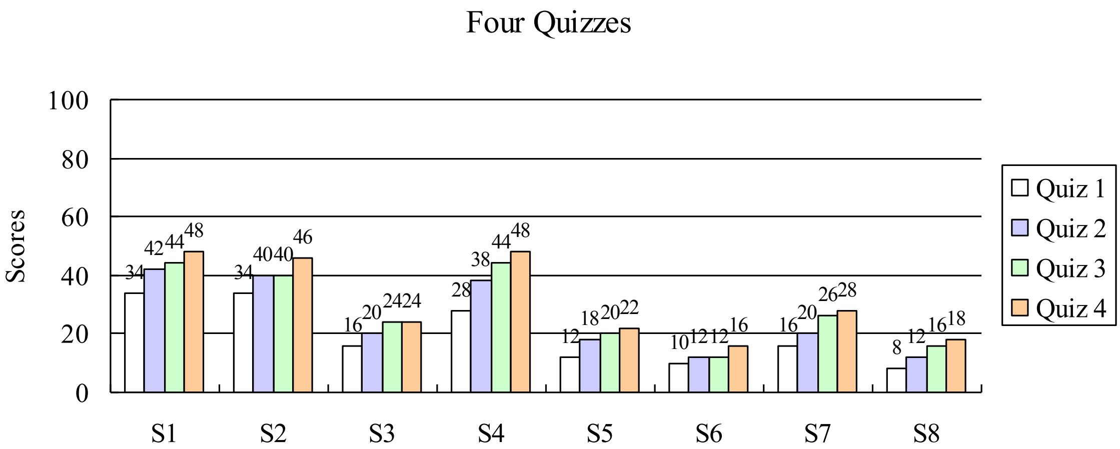

Figure 1. The participants' sentence writing performances on the four quizzes.

In addition, based on their questionnaire responses, all participants showed a positive attitude toward the effects of chants on their English sentence writing. They all indicated that the use of chants helped them to memorize vocabulary, and they could write more words and phrases after chant instruction. Besides that, they could also learn the sentence patterns of the chants at the same time. Some comments from open-ended questions were translated as follows.

> *…I can write more words now…* (Student 7)
>
> *…I became more familiar with the vocabulary and sentence patterns after numerous practices, and that did help me recall them when making a sentence...* (Student 2)
>
> *…The contents of the chants were easier to remember than those of the textbook. I could chant them out…* (Student 1)

Furthermore, based on the notes of classroom observation, some improvements were revealed among the participants. At the beginning of the instruction, most participants did not think they could spell or write any words and refused flatly to do that when asked by the teacher. However, after they were familiar with the chants, many of them even liked to help others to do the spelling. Some of them could write complete short sentences of the chants willingly on the board by the final classes. Some extracts from field notes were selected as follows.

> *…Student 2 was active to write a new word on the board to get points…* (week 9)
>
> *…Student 5 wrote down the whole sentence "I love the sun" slowly but correctly on the board…* (week 13)
>
> *…Student 1 made a sentence totally correctly on Quiz 4…* (week 15)

The results of the treatment indicated the remedial instruction significantly improved the English sentence writing achievement of low-achieving junior high school students. All participants showed a significant improvement after the English remedial program on their sentence writing in terms of grammar multiple-choice questions, reordering sentences, and translating sentences. It is likely that the repetitive presentation and repeated practice of the language elements in the chants can improve students' sentence writing ability. Learners may enlarge their vocabulary bank and reinforce their grammar concepts through chant instruction.

They may acquire a lot of related words and phrases from the chants, and also learn the basic grammatical structures and sentence patterns presented in the chants at the same time. By using the chants, students probably will joyfully and unconsciously improve their sentence writing step by step in class.

In terms of grammar multiple-choice questions and reordering sentences, students made significant progress in their grammar ability after the remedial program. Participants were likely to acquire the grammatical structures and sentence patterns of the chants through frequent immersion in the authentic content and the oral reading environment. Chant instruction may make the grammar rules easier to understand, and the abundant input of oral reading may make the sentence patterns of the chants easier to keep in mind. In this English remedial program, four grammatical structures were introduced and presented clearly and appropriately in eight chants. The chants may not only have helped the participants to be familiar with the pronunciation of the vocabulary, but also have helped them to strengthen their memorization of the language elements by means of repeated presentation and practice of the basic sentence patterns. When the input is enough, the output will come out (Krashen, 1985). When students are quite familiar with the grammatical structures of the chants, they possibly can judge and answer the grammar multiple-choice questions and reorder sentences more confidently and correctly.

In addition, with regard to translating sentences, the participants also made a significant improvement in this part. They may have learned the vocabulary and phrases of the chants through abundant oral practice of chant instruction. Integrating the learned vocabulary with familiar sentence patterns, students possessed more ability to translate Chinese sentences into English ones. The results of this research question are consistent with earlier findings that students' vocabulary ability was improved after chant instruction (Trelease, 2006; Wei, 2004; Wu, 2009). However, few studies have investigated or proved the progress of participants' English sentence writing. This study enhances the previous studies' findings by providing a much more detailed investigation on participants' improvement in their English sentence writing.

Results and Discussion of Question Three

Based on the participants' responses on the items of the QAEL, there was a significant improvement in their learning attitudes after the English remedial program (t = -5.71, p = .001), displayed in Table 7. In other words, students' motivation was significantly enhanced by chant instruction, (t = -5.36, p = .000), and their anxiety was significantly decreased (t = 6.48, p = .000).

Table 7
Paired Samples Test for Participants' Attitudes on the QAEL

	Mean	*SD*	*t*	*p*
Pretest	2.50	0.35	-5.71	.000***
Posttest	2.93	0.34		

Note. N = 31. Rating from 4 points (strongly agree) to 1 point (strongly disagree).
*** p< .001.

The participants' responses to the open-ended questions on the QAEL were collected as qualitative data to investigate the effects of chant instruction on the participants' attitudes towards English learning. Based on their responses, all participants agreed that the use of chants had influenced their learning attitudes, including motivation and anxiety. They reported English was not as difficult as they thought before, they would not feel so nervous about tests as long as they had enough practice, and chant instruction had made it much easier to perform in front of other students. Some extracts were translated as follows.

…I liked to chant. It was fun… (Student 1)

…When I read in front of others, I did not feel as nervous as before… (Student 6)

…I thought I could perform better on tests as long as I practiced more… (Student 4)

…English seemed not so terrible… The lessons were much easier to understand and acquire than those in the textbook… (Student 2)

In addition, based on the researcher's classroom observation, all participants became more positive and happier about learning English during the remedial program. They followed the teacher's progress, asked for help when meeting problems, prepared for the tests after class, and even started to care about their own performances in English. Some extracts from fieldnotes were selected as follows.

…Student 1 volunteered to be the English assistant again… (week 13)

…Student 2 asked the teacher some English questions in the textbook… (week 11)

…Student 4 came to the teacher for a review of the chants because the next day Quiz 3 would be held… (week 11)

…Student 6 smiled when the teacher praised his performance on Quiz 4… (week 15)

The results of the treatment indicated the attitudes of low-achieving junior high school students toward English learning, including motivation and anxiety, may have been significantly affected by the remedial instruction. All participants' motivation was promoted and their anxiety was reduced. There are three possible explanations for it. First, using chants to learn English is fun. Because chants combine music with language, students may feel interested in the active tempo, diverse lyrics and varied practices integrated with various activities. The interesting learning materials may attract students' attention and at the same time promote their learning motivation. As the notes in the teaching journal revealed, the participants of this study enjoyed having remedial classes very much. They liked to play the rhythm, chant by turns, and take part in the interesting games designed for the chants. All of these activities may inspire the participants' enthusiasm for English learning. The results of this research question support the findings of previous research that the use of chants can interest and motivate the learners, and further offer them a happier and more comfortable environment for English learning (Lee, 2007; Cross, 1995; Schoepp, 2001; Wu, 2009).

Second, the use of chants can probably reduce learners' anxiety because chants are easy to learn. The results of this research question are consistent with previous findings that students' anxiety was lowered and their learning was improved consequently and unconsciously after chant instruction (Lee, 2005; Huang, 2008).

Chants provide a natural context for the most common grammatical structures. The repetitive presentation of the language elements in the chants may make the grammatical structures easier to understand and memorize. The easy and comprehensible chants will probably ease learners' tension and make them feel relaxed to listen and speak without pressure. Under the relaxing atmosphere, students' learning anxiety may be reduced, and their learning achievements may be enhanced.

Moreover, it is also possible that the use of chants will enhance learners' confidence in English learning, which makes students' learning attitudes more positive. When students' learning motivation is promoted and anxiety is reduced, their learning achievement will be enhanced at the same time, and so will their learning confidence. Therefore, a cycle of success is created. During the English remedial program, the participants became more and more active to chant loudly and answer questions under the easy atmosphere through the use of chants. Gradually they not only concentrated in class but also stayed after class for more help and directions from the teacher. Their improvement enhanced their confidence and aided their willingness to learn further in English. The results of this research question are in agreement with the findings of Liao (2009), in that the achievements of the six low-achieving fourth graders were improved, and their interest and confidence were also enhanced after eight weeks of chant instruction.

Results and Discussion of Question Four

According to their responses on the QARP, all of the participants displayed positive attitudes toward the English remedial program. They all agreed that chant instruction had improved their English learning. Also, many of the items on the QARP were approved by the participants. Nine-fourteenths of them even earned overall support, shown Appendix 3.

As for the participants' responses to the open-ended questions on the QARP, they were collected as qualitative data to investigate the attitudes low achievers displayed toward this remedial program. Based on the responses, all participants revealed that the remedial program contributed positively to their English learning, and they all enjoyed using chants to learn English. Some extracts were translated as follows.

> *…I liked the chants. They helped me to learn happily…* (Student 1)
> *…The chants were full of vocabulary and grammatical structures… They helped me to learn more efficiently…* (Student 4)
> *…Chanting with knocking the desk usually excited me…* (Student 8)
> *…I wished my English teacher could also have this kind of lessons in my original English classes…* (Student 7)

Based on the field notes of classroom observation, participants all enjoyed themselves and made efforts during the process of the remedial program. All of them also improved themselves after the remedial instruction. Moreover, some of them even asked whether the remedial program could be kept on in the future very often. Some extracts were selected as follows.

> *…Student 1 stayed and asked for more explanations of the grammatical structures of the present progressive tense…* (week 12)
> *…Student 3 became happier and chanted louder when boys helped play the*

> *rhythm by knocking and stamping…* (week 6)
> *…Student 4 asked again "Can we continue the class?"…* (week 16)
> *…Student 5 repeated after the teacher loudly though his pronunciation was not so correct and expression was not so appropriate…* (week 3)
> *…Student 6 looked happy and excited when playing the game…* (week 9)
> *…Student 7 continued chanting "stop the noise" excitedly with Student 8 when they left the classroom after class…* (week 10)

All participants showed satisfaction with the use of chants in the remedial program. They agreed that chant instruction had given them an interesting and effective English learning experience. The chants may not only provide active paces and moods to motivate the participants but also help them to acquire new vocabulary and phrases. Chant instruction may have built students' learning energy and confidence. Moreover, using chants offered opportunities of repeated oral readings which probably built participants' oral accuracy, fluency and prosody, and provided sentence patterns which possibly made their learning and writing easier. Besides that, all participants displayed positive attitudes toward this English remedial program. It was likely that the program allowed them to have their own learning progress based on the individual learning ability, and students could put emphasis on the language elements or skills that they wanted to acquire. Furthermore, the remedial instruction may have allowed them to proceed with the next learning objective when they had mastered the preceding objective by means of the frequent repetitive practice and instant corrective feedback about their performances. All of the participants affirmed the effects of using chants in the English remedial program.

Although the participants all held positive attitudes toward chant instruction and the remedial program, there were some diverse opinions that need to be noted. Two out of eight students still lacked confidence to face future English lessons in regular curriculum, and three out of eight students thought the instructional materials of this remedial program were a little too difficult for them. It is likely that these students need more time to practice and to sufficiently familiarize themselves with the materials. The chants adopted in the program are more easily understood than the contents of the textbooks. For other than these participants, the chants were suitable; however, those who had lower academic achievements and weaker learning ability probably needed a longer period of time to master the chants. Therefore, it is suggested that chant instruction can be integrated into the regular curriculum to assist students in easing their anxiety and the materials while learning.

Conclusion and Pedagogical Implications

This study investigated the effects of using chants in a junior high school English remedial program. It was found that each participant's oral reading fluency and sentence writing improved after the English remedial program. All participants' attitudes were affected positively by the use of chants, including motivation and anxiety. And after the treatment, all participants held positive attitudes toward chant instruction and the English remedial program. Based on the results of this study, two pedagogical implications of chant instruction and the English remedial program for educators and curriculum designers are proposed.

First, the repeating strategy in chant instruction may be effectively used to assist students to acquire the required language abilities in English. When students meet difficulty in some sections of lessons, teachers can design or choose a chant and put the targeted learning objective into the chant for students to practice repeatedly. After students master the learning objective and achieve the expected academic standards, teachers can diagnose their problems and needs again, and develop another new chant for them. A lot of online resources or printed materials on chants can be found and adopted by educators. These available chants are usually grouped according to their different topics, emphasizing elements such as grammar, or different specific holidays.

Second, chant instruction can be integrated into the regular curriculum based on its possible effectiveness in the English remedial program. The combination of the chants and the lessons in the textbooks can be used to warm up students when new vocabulary and grammatical structures are introduced, and to review the learned lessons. The chants may attract students' attention, arouse their motivation, and lower their anxiety toward English learning. Setting an easy and relaxing learning environment will be likely to help students reduce their fear and rejection of English, and learn more joyfully and interestingly in class. Moreover, students can create their own chants by means of learned vocabulary and sentence patterns to increase the fun and effectiveness of English learning.

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Appendix A

Questionnaire of Attitudes toward English Learning

I. Basic information

1. Gender: Male□ Female□
2. How much time do you spend on studying English per week except for writing English homework?
□ Less than 30 minutes □ Between 31 to 60 minutes □ Between 1 to 1.5 hours
□ Between 1.5 to 2 hours □ More than 2 hours

II. Multiple Choice

(SA=strongly agree; A=agree; D=disagree; SD=strongly disagree)

		SA	A	D	SD
1	I enjoy learning anything about English.				
2	I enjoy English classes.				
3	I enjoy watching English films, such as movies, cartoons, or TV programs.				
4	I am interested in listening to English songs.				
5	According to my experience, learning English is interesting.				
6	I envy others who have good English proficiency.				
7	I desire to learn English well.				
8	I think English is very hard to learn, but I am willing to spend more time learning it.				
9	I think English is very important.				
10	I think English is helpful to my future.				
11	I will have a great sense of achievement when my English grades are better than others'.				
12	I consider learning English is a good way to keep up with world trends.				
13	I can make foreign friends more easily if my English is good.				
14	I consider people with better English proficiency will have better achievement in the future.				
15	Parents' expectations will enhance my motivation to learn English.				
16	Teachers' encouragement will reinforce my determination to learn English well.				
17	I am afraid of having English classes.				

		SA	A	D	SD
18	I feel relaxed in English class.				
19	I become nervous when I hear somebody speaking English.				
20	I am always worried about whether I can follow what the teacher teaches in English class.				
21	I worry that I cannot learn English well.				
22	I get nervous when I hear we are to have an English test.				
23	I am afraid of asking questions when meeting problems in English class.				
24	I still worry about how I perform on English tests even if I have prepared well.				
25	I will feel quite nervous if the teacher asks me to answer English questions in class.				
26	I feel embarrassed when the teacher corrects my English answers.				
27	I feel uncomfortable when speaking English before classmates.				
28	I get nervous when I cannot understand what the English teacher says in class.				
29	I am afraid my pronunciation will be laughed at by my classmates when I speak English.				
30	I feel anxious when I finish reading the content but cannot get the idea.				
31	I worry about making English sentences with wrong sentence patterns.				

III. Open-ended Questions

32. 32-1. In your opinion, is it necessary for students to learn English?

32-2. Why? Or why not?

32-3. What are the benefits to you if you have good English proficiency?

33. Do you feel anxious when learning English in class? Please explain your feelings and situations according to the following four sections.

33-1. On「listening」:

33-2. On「speaking」:

33-3. On「reading」:

33-4. On「writing」:

34. Do you think the English remedial program has reduced your anxiety when learning English? Please explain your feelings and situations according to the following four sections.

34-1. On「listening」:

34-2. On「speaking」:

34-3. On「reading」:

34-4. On「writing」:

Appendix B

Questionnaire of Attitudes toward the Remedial Program

I. Basic information

1. Gender: Male□ Female□
2. How much time do you spend on studying English per week except for writing English homework?
□ Less than 30 minutes □ Between 31 to 60 minutes □ Between 1 to 1.5 hours
□ Between 1.5 to 2 hours □ More than 2 hours

II. Multiple Choice

(SA=strongly agree; A=agree; D=disagree; SD=strongly disagree)

		SA	A	D	SD
1	I enjoy using chants to learn English.				
2	I hope I can keep on using chants to learn English in the future.				
3	Using chants to learn English can help me to memorize grammatical structures.				
4	In this English remedial program, the four grammatical structures are introduced clearly and appropriately in the eight chants.				
5	In this English remedial program, using chants helps me concentrate on learning.				
6	I feel relaxed when using chants to learn English.				
7	Using chants to learn English helps me to be familiar with the pronunciation of the vocabulary.				
8	When using chants to learn English, the repetition of phrases and sentence patterns helps my learning.				
9	After the English remedial program, I am more willing to sing or chant what I learn in class.				
10	After the English remedial program, I have more confidence in learning English.				
11	Using chants to learn English can help reduce my anxiety when learning English.				
12	Using chants to learn English helps me remember the sentence patterns I need to make English sentences.				
13	The pace of using chants to learn English is too fast for me to follow.				
14	The instructional materials of this remedial program are too difficult for me.				

III. Open-ended Questions

15. 15-1. In the remedial program, which part (chant, practice, or activity) did you like most?

15-2. What is the reason?

15-3. What benefits did you receive from it?

16. Does using chants to learn English contribute to your learning? Please explain your feelings and situations according to the following four sections.

16-1. On「listening」:

16-2. On「speaking」:

16-3. On「reading」:

16-4. On「writing」:

17. In this English remedial program, which part do you think needs to be improved? Besides, what else could be added to help you learn English?

17-1. The part that needs to be improved:

17-2. The things you would like to have added

Appendix C

The Percentage Distribution of Participants' Responses on the QARP

Items	Average Rating	Response Frequency (%)	
		SA & A	D & SD
1. I enjoy using chants to learn English.	3.25	100	0
2. I hope I can keep on using chants to learn English in the future.	3.38	100	0
3. Using chants to learn English can help me to memorize grammatical structures.	3.50	100	0
4. In this English remedial program, the four grammatical structures are introduced clearly and appropriately in the eight chants.	3.13	100	0
5. In this English remedial program, using chants helps me concentrate on learning.	3.13	87.5	12.5
6. I feel relaxed when using chants to learn English.	3.50	100	0
7. Using chants to learn English helps me to be familiar with the pronunciation of the vocabulary.	4.00	100	0
8. When using chants to learn English, the repetition of phrases and sentence patterns helps my learning.	4.00	100	0
9. After the English remedial program, I am more willing to sing or chant what I learn in class.	3.25	100	0
10. After the English remedial program, I have more confidence in learning English.	3.25	75	25
11. Using chants to learn English can help reduce my anxiety when learning English.	3.00	87.5	12.5
12. Using chants to learn English helps me remember the sentence patterns I need to make English sentences.	3.75	100	0
13. The pace of using chants to learn English is too fast for me to follow.	2.13	12.5	87.5
14. The instructional materials of this remedial program are too difficult for me.	2.38	37.5	62.5

Note. SA= strongly agree; A= agree; D= disagree; SD= strongly disagree. Rating from 4 points (strongly agree) to 1 point (strongly disagree).

An Analysis of the Effect of ICT Integration in Primary and Secondary Education

Toshiro Takahara, Kobe Institute of Computing, Japan
Samiullah Paracha, Kobe Institute of Computing, Japan

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Abstract
E-learning is still in its infancy across developing world towards the end of the first phase of Millennium Development Goals (MDG). To achieve "universal primary education" Information Communication Technologies (ICT) is the key missing link that requires comprehensive strategy, method, content and a consistent implementation approach. It is, therefore, imperative to integrate ICT in the primary and secondary education sectors of the developing countries to maximize opportunities for learning and development. In this vein, One Laptop Per Child (OLPC) is a widely-promoted e-learning global initiative that aims to change the world, through cutting-edge technology, by connecting its poorest corners. Despite criticism, OLPC is still a good idea that has facilitated donations of about 2.5 million laptops to elementary school children. OLPC, therefore, holds some valuable insights and lessons: (i) the project has succeeded in highlighting the topic of ICT in education and the needs of developing countries; (ii) integrating ICT in primary and secondary education requires efficient implementation approach; (iii) defining ICT goals in relation to the conditions of elementary and secondary education and workforce requirements in the developing world is crucial; and (iv) selecting appropriate technologies (software & hardware) to support these objectives is also equally important, so that the potential of ICT in education can be realized effectively. This paper provides an in-depth analysis of the OLPC experiments focusing on ICT integration in elementary and secondary education; hardware and software alternatives; top down and bottom up approaches etc. Finally, we conclude after examining the challenges and possible solutions.

Keywords: ICT in Basic Education; e-Learning, Technology in the Classroom; Individual; Connecting; Learning & Growing

1. Introduction

Education in developing countries faces 2 different issues, access and quality. With MDGs, they are reaching the first goal, the universal access to primary education. But until now, there are no notable effort for improving the quality of education. In fact, improving access is not the most difficult part of this challenge. Improving quality is the most important and difficult part to achieve.
To improve the quality of education in developing countries, we must consider carefully the environmental and social context of the children in order to choose the appropriate approach and contents.
Especially in basic education, children must acquire the learning skills, how to think, how to acquire knowledge, and how to build a meaningful hypothesis from fragmented information.
Learning is an experience to connect the internal knowledge to real world phenomenon. Learning skills are the tools how to connect inner-world to outer-world. Connectivity is especially important in early stage of education. And ICT is a great tool to help children to develop this ability.

2. Literature Review

In 1995, the founder of MIT Media Lab, Nicholas Negroponte said in his book *Being Digital*, "there is little fundamental difference between the way we teach today and the way we did one hundred and fifty years ago. The use of technology is almost at the same level." Though there are a lot of great researches conducted in the field of education. One of them is Constructionism, inspired by mathematician Seymour Papert. He emphasized the importance of thinking and making rather than classical teaching and instructing, using computer programming.
According to Allen (2013), "the importance of ICT to education as a sector is far greater than the consideration of ICT as a discrete knowledge based subject, and it should be seen as such." (Education Business)
At the same time, the development gap between developed countries and developing countries became a serious issue. And education is set as one of the most important sectors.
According to Hepp (2004) "*….there is a more urgent need to improve the quality and equity of education to bridge the gap between developed and developing nations, and ICT are perceived as necessary tools for this purpose*."

In 2005, a flagship project to introduce ICT in developing countries' schools started. One Laptop Per Child (OLPC).

In this context, UNESCO has published a guide to measure ICT in Education to set a standard indicator of education statistics in 2009.

World Bank mentioned about the advantage of ICT in School Education in 2010, "*a carefully thought-out, integrated approach to introducing computers and the Internet into learning environments in developing countries can have a significant impact on teaching and learning. In countries where learning resources are limited and teachers never dream of having a fully stocked library, let alone the Internet, teachers and students have been introduced to a new world of learning. As a result, those with* *access to ICTs have been greatly empowered, and now believe they can compete in a global knowledge-based economy because they know that their knowledge, ideas, culture, and passions are as valuable as any in the world.*"

Meanwhile, African scholars started to advocate ICT in their education system. Oyenike (2010) has emphasized the importance of ICT training for teachers, with the strong political will of government in "*Quality Basic Education Development in Nigeria: Imperative for Use of ICT*", and recently in Nigerian newspaper "Daily Newswatch", Okebukola (2013) sited ICT in education as "*catalyst for national development*".

According to Purington (2010), OLPC initiative is a misdirection of humanitarian effort, and the project is unsustainable and too expensive to implement. But, I think ICT project in developing countries is not a "*humanitarian effort*" or "*charity*". And leaving these countries under-educated and poor will cost more for the developed countries, and it will compromise the sustainable development of the whole world.

3. Theoretical foundation of ICT in Education

3.1. Anthropological Approach

According to Levi-Strauss, every culture which seems to be "*primitive*" to the eyes of outsiders, actually has very sophisticated and elaborated rules. Only we don't know about it. Many cultures in developing countries are seen as primitive and inferior. These are the pure prejudices, and in most cases, wrong. In schools, the appropriate type and level of advocacy on local culture is necessary.
Every child is born with abilities and potential to develop their knowledge. This development depends on educational opportunities and environment.

3.2. Universal Grammar

Universal grammar is a linguistic theory developed by Noam Chomsky that suggests that some grammatical rules of the human languages are naturally incorporated biologically in the brain and the human has ability to use it without being taught. ICT in education uses broadly this theory as its starting point. If we provide the children of developing countries the opportunity to interact with ICT devices, they will be able to use ICT devices without being taught.

3.3. Bilingualism and the Second Language Acquisition Theory

Many children in developing countries are in the situation that they are forced to learn several languages at the same time. For example, local language at home or in the community, and official language in schools. And some of the local languages are not very well structured, nor are they written languages. Multilingualism theory indicates that the exposure to the second language under 5 years old makes simultaneous bilinguals. But when the acquisition of the first language is not completed, both of the first and second language will not be fully acquired. It is called semi-lingualism and many children in developing countries seem to be in this state.
In the classrooms, the teachers have to manage many "*code switching*". This situation makes it difficult for the teachers to concentrate on teaching subject.

Bilingualism is considered as an advantage to develop cognitive skills, it is preferable to teach the second language in early stage of education. English is *Lingua Franca* and English proficiency makes better business chance. It is an important factor for the education in developing countries.

3.4. Constructivism and Constructionism

Constructivism is a psychological theory developed by Jean Piaget which is focused on "*La conservation et la reorganisation des acquis*" = "*the way of keeping and making the order of the acquired knowledge*".
Constructionism is a sociological and educational theory developed by mathematician Seymour Papert which is focused on "*La decouvert des nouveautés*"= "*Discovery of new things*".
These are the learning theories which emphasize the ability of children to build the knowledge without instructions from teachers. These theories are used to introduce learner centred approach and to practice the "*build and scrap*" method. Constructionism is widely used on the e-learning platform, especially to practice the computer programming skill, such as LOGO, Turtle art activity on Sugar, and CODE.org.

3.5. Sociology in Schools: Assimilation Theory

Since school assembles important number of children and adults in a single institution, there's a sociological dynamics working in its environment. Robert E. Park's assimilation theory can be used to understand the sociology in school, and to define the appropriate use of ICT in classroom.
Assimilation theory is usually used to illustrate the social integration process of immigrants in the host country. The children adapt themselves into school life through the assimilation process. ICT can help children to accelerate this process for a quick adaptation into the school environment.

3.6. Semiotic Approach

Semiotic is a study of symbols, and symbols are everywhere including school. In primary level, children must learn many symbols such as alphabets, mathematical symbols, scientific symbols and social symbols which surround us in everyday life. Semiotic approach is not only the connection of symbols and their semantic meanings, but also the logical connection and rules of a set of symbols (Code). If the teachers can teach these connections, it will be easier for the children to understand the deeper meanings of symbols. In ICT, these logical connection of symbols are shown clearly, because it's necessary for the usability of interface. As a result, using ICT expose the children effectively to the use of semiotic codes.

4. Case Study: OLPC Initiative

4.1. Overview of the OLPC Initiative

One Laptop per Child (OLPC) is an initiative to empower the children of developing countries by providing a decent laptop computer to every school-age child. To accomplish this goal, the OLPC initiative;

- Develops the hardware and software suitable for the environment of developing countries' children.
- Provides the laptops to the government of developing countries with affordable price.

Although Negroponte says OLPC is not a device developing project and it's an educational project, the development of XO-Laptop and Sugar OS took a big part of the project. The educational part of the project is frequently underestimated. In fact, the educational part of OLPC is incorporated in software bundled in XO-Laptops; Sugar environment.

Based upon 40+ years of educational research at Harvard and MIT, Sugar promotes "studio thinking" through demonstrations, projects, and critiques, as well as "studio habits of mind", by developing craft, engagement, persistence, expression, observation, reflection, and exploration. In the context of Sugar, studio thinking is applied not just to the arts, but to all disciplines. (Source: OLPC Website)

OLPC's approach is based on the constructionism, it means, in interacting with the device, the children will find out automatically how to use it in order to build their own knowledge.

What children lack is not capability, it is opportunity and resources. The tool with which to unlock their potential is the XO. (Source: OLPC Website)

OLPC project deployed more than 2.5 million XO-Laptops in 42 countries through governmental command and give 1 get 1 program.
The particularity of this distribution program is, the child received the device own the device. So he/she can take it home and live with the device. In other ICT in education project, they usually place the devices in classrooms and the children can use them only during the lessons.

4.2. Analysis

The study on impact of OLPC project seems to be difficult. Sometimes, the baseline survey before the implementation was not done, and there are no common indicators. And the implementation style is different in each country.
From the country report of OLPC initiative and Australian Council for Educational Research's "Evaluation of OLPC programs globally: a literature review" (2010), the advantages and disadvantages of OLPC project are the following.
Advantages:

- Increased students interaction (Nepal)
- Reduced absenteeism (Peru)
- Behavioral change, Positive attitude (Peru)
- Slight increase of scores (Ethiopia)
- Students' attention (Haiti)

- Positive impact on cognitive skills (Peru)

Disadvantages:

- Insufficient Teacher training (Haiti, Rwanda)
- Lack of spare parts (Rwanda)
- Only 10% of teachers have tech support, 7% have pedagogical support (Peru)
- Teachers lose control of class (Ethiopia)
- Time shortage (Ethiopia, Brazil)
- Outdated school infrastructure (Brazil)

Since the children own the XO-Laptop and take it home, it's not only for the child, but for the other members of the family and the community. We can't ignore this social impact, but its assessment is quite difficult.
XO Laptop was a unique, innovative laptop computer in 2005, but it is outdated now. There are a lot of affordable netbooks and Android tablets. For the computer lab, there's also single board computer like Raspberry Pi. We can provide continuous e-learning environment using various hardware/software solution.

5. Challenges in Using ICT in the Classroom

5.1. Complexity of ICT in education

Introducing ICT in classroom needs consideration of many factors. For example, in OLPC's case, there were;

- Technical aspect to develop an appropriate hardware/software solution
- Political aspect of deciding its introduction
- Pedagogical aspect, teacher's training
- Production aspect to manage the device production and decide the price
- Logistic aspect to deliver the device to target country/school
- Administrative aspect

As it clearly shows, the technical aspect is only a part of the ICT in education project.
In this context, the semantic value of technology is very important. Some ICT project fail because the technology itself becomes the objective. But technology is always a tool to achieve higher level objective even in ICT project. We must define the meaning and the importance of the technology before starting the project.

5.2. Limitation of Technology Centered Approach

There's another factor for the failure of technology centered project. Technology is essentially used to make the double=copy. We must employ the technology in the right place in a right way, for not to make a fake copy. Technology is very efficient to make the standard copy. This power helps teachers to transfer the basic knowledge at the same time, but the acquisition at student's side is another story. Technology centered approach tries to transplant the classical education style, approach and contents on ICT based. ICT in education project must have more than increasing the effectiveness of the educational opportunities. It must include the new informational and communicational approach and method of education.

5.3. Understanding the Country's Specific Context

Another important factor for the failure of ICT in education project is the ignorance of the specific context of the target country. There are physical and technological contexts like power supply, network availability, temperature, humidity, school building conditions etc. They are easy to detect and to avoid. There are other contexts more difficult to detect and to avoid, like social context, cultural context and biological incidents. These kind of contexts include the perception of technology in their society and culture.

5.4. Broadband Affordability

According to the Oxford Internet Institute, Broadband Internet subscription is very expensive in developing countries, and in some countries, it is more than average yearly income. The cost of Internet connection depends on the geographical position, so Sub-Saharan Africa is the most expensive part in the world, then Oceania, Latin America and Caribbean, and Asia. Europe, North Africa and North America are the cheapest zone. But the price is dropping very quickly, especially in Sub-Saharan Africa. ICT in education needs broadband connection.

5.5. Rigidity of Education and the Need for the New Model

Despite of all the technological innovation, the basic design of education and its classroom composition are the same as of 50 years ago (Negroponte, 1995).
Education has this extreme rigidity based on an industrialized model of human resource. This can be a factor of failure for the introduction of ICT in education. The common misconception of ICT is, ICT will replace the teacher. But it's not true. ICT in education needs teachers. ICT will optimize the communication between teachers and students. In this context, the basic design of education will evolve towards a new model.

Sir Ken Robinson talked on TED about the needs to change the model of education, from an industrial model to an agricultural model. Industrial model education produces standardized human resources. Agricultural model education will grow the natural ability of each children. ICT facilitate the agricultural model of education, because it can provide a personalized contents and speed of learning.

6. Building Solutions

6.1. Technologies

Knowing all the challenges mentioned above, ICT solutions can build a future vision of education in developing countries.

- Using distance learning, we can overcome the shortage of teachers, the poor quality of teaching skills.
- Using web based learning tools, we can reduce the cost of developing contents.
- Using ICT, we can provide attractive learning methods and contents.(experiment in science class, demonstration in art class, etc.)
- ICT provides an open window to huge amount of information
- ICT devices became more affordable.

6.2. Educational Approaches

These technological assets must be combined with educational approaches for the contents development:

- Storytelling: Many countries in developing world have “oral culture”, and the children are used to listen to the stories. In this context, it will be easier for the children to learn subjects as story based form.
- Open ended approach: Open ended approach is a problem solving which has several possibilities. Students can analyze the situation and discuss what are the possibilities. Students acquire the way to critically think and to test the several solutions.
- Problem solving: There are many social issues in the developing countries. It is useful for the students to perform the root-cause analysis to find out the possibilities to solve the problems.
- Computational Thinking: The term Computational Thinking was first used by Seymour Papert in 1996. It’s a thinking skill to simplify a very complex problem into several manageable components and solve gradually the problem. This problem solving method is developed by Center for Computational thinking at Carnegie Mellon University.
- Instructional scaffolding: is a learning process designed to promote a deeper level of learning. Scaffolding is the support given during the learning process which is tailored to the needs of the student with the intention of helping the student achieve his/her learning goals (Sawyer, 2006).

- Instructional Design Models: This is a tool to design the instructions for the classroom. Instruction design is used to make the acquisition of knowledge and skill more efficient and effective. There are several models of instructional design.

6.3. Online Resources for Education

There are many resources on the Internet to help teachers to use efficiently the ICT in classrooms.

- Open library / Project Guttenberg: Free Online Library
- Openstax CNX (Rice University) MOOC for teacher training
- Open Access (Open library of academic papers)
- UNESCO OER (Open Educational Resources), OER commons
- Commonwealth Of Learning: Resources for learning)
- LAMS: Tool to create online course
- WikiTeach: Free library of lesson plans
- CK12 Foundation: Open resources for STEM field
- Khan Academy: STEM field online courseware

Using above technologies and resources with educational approaches, a new flexible, creative and efficient educational contents will be generated. ICT integration will be on higher level and it will help teachers to manage better the classroom, it will help students to learn more.

7. Future Work

After the analysis, my next objective is to make a framework for the integration of ICT in education in developing countries. This framework is inspired by modern OS architecture; robust core system, modular structure and ability of adaptation to many environment. The framework is composed of 4 principal tools;

- Assessment tool
- Service mobilization planning tool
- Integration process management tool
- Monitoring tool

This framework will guide the developing countries to plan the ICT integration in schools, to make the policy, to help choosing hardware and software, to develop the contents, and to monitor the whole process.

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A Game-Based Learning Environment for Programming Strategies

Po-Yao Chao, Yuan Zu University, Taiwan

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Abstract

Computational thinking is an essential skill for the 21 century. The algorithmic problem solving employs the features, components, and knowledge for computational thinking. Therefore, many researchers suggest that programming is beneficial to the development and demonstration of computational thinking. However, traditional teaching methods and tools for programming accentuate the difficulties of programming, which lead to many students' efforts concentrated on language syntax rather than on the active construction of programming strategies required to solve a computational problem, causing the ineffectiveness of developing computational thinking through computational problem solving. With advance of computer games and simulation environments, game-based problem solving has potential in improving the competence of programming strategies and computational thinking. Therefore, the purpose of this paper is to incorporate features of programming strategies and game-based learning to develop a a game-based learning environment for programming strategies. Learners develop and demonstrate their computational thinking through solving a game problem. The influences of the game-based learning on learner behavior, strategies, motivation, and performance are also explored in the paper. With the development and promotion of this programming strategy oriented game environment, there is a hope that students can develop programming knowledge and strategies targeting on computational problem solving and can foster their computational thinking.

Introduction

Computational thinking is an essential skill for the 21 century. The algorithmic problem solving employs the features, components, and knowledge for computational thinking. In addition, the demand for programmers has grown rapidly in recent years and introductory courses for programming skills have become increasingly popular (Robins, Rountree, & Rountree, 2003). Many researchers suggest that programming is beneficial to the development and demonstration of computational thinking. However, after an introductory programming course, most novice programmers do not have the ability of solving computational problems (de Raadt, 2007; Robins et al., 2003). Traditional teaching methods and tools for programming accentuate the difficulties of programming, which leads to many students' efforts concentrated on language syntax rather than on the active construction of programming strategies required to solve a computational problem, causing the ineffectiveness of developing computational thinking through computational problem solving.

With advance of computer games and simulation environments, game-based problem solving has potential in improving the competence of programming strategies and computational thinking. A simulation environment for learning programming often provides novices with program or manipulation visualization to help them understand underlying programming concepts or algorithms. Program visualization is a method of illustrating the program behavior in different states during the execution (Kaila, Rajala, Laakso, & Salakoski, 2010). Research shows that program visualization in a simulation-based system is helpful in introducing algorithms involving data structures, understanding programming concepts, and enhancing debugging skills (Myers, 1990). Moreover, Chang, Chen, Lin and Sung (2008) stated that students who are better at higher abstract reasoning benefit more from simulation-based learning. Liu, Cheng and Huang (2011) discovered that simulation games constitute an effective approach to helping novices learn computation problem solving skills. Therefore, the purpose of this paper is to incorporate features of programming strategies and game-based learning to develop a game-based learning environment for programming strategies.

System description

The proposed game-based learning environment is shown in Figure1. To the right of the Figure 1 is a map captured in the game-based learning environment. The map consists of a robot, farmer, and various objects such as flower, grass, stone, and bomb. The robot works in the farm with missions collecting followers using minimal instructions of actions. The robot can detect objects, move forward, and pick followers. He also has an instruction card, a bag, light, and two counters. To complete his mission, the robot executes instructions given in the instruction card by picking up followers and putting them into the bag. To the left of the Figure 1 is the instructions stored in each instruction cards. By editing instructions, programming novices can instruct the robot how to complete the missions.

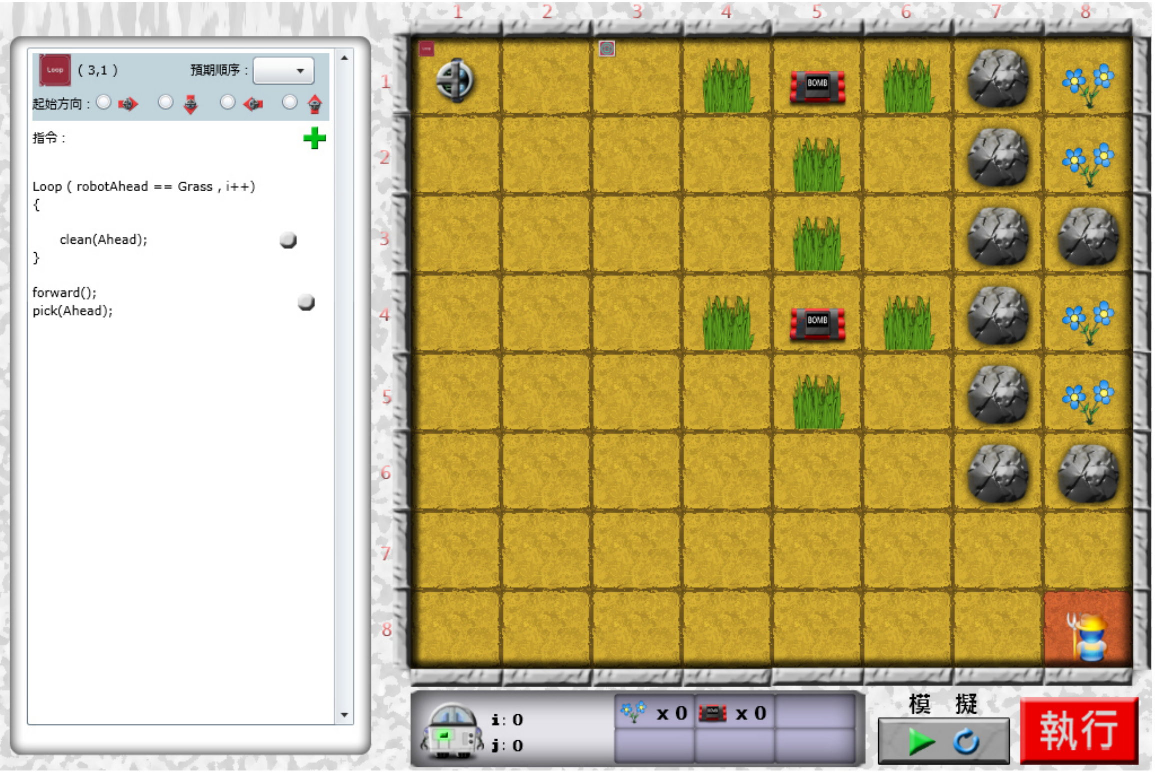

Figure 1. The game-based learning environment

Pilot study

A pilot study was conducted to explore the influences of the game-based learning on programming strategies and performance. 183 college freshmen enrolling computer programming course participated the study. They were asked to complete five missions in the game-based learning environment. Following that students were asked to fill questionnaires aiming to explore their self-efficacy.

To evaluate students' programming strategies, six patterns of programming strategies are recognized as shown in Figure 2. The complexity ranges from (a) simple sequence strategies to (b) most complex nested loop strategies.

```
…
forward();
pick();
forward();
pick();
…
```
(a)

```
…
forward();
if(…)
    pick();
…
…
```
(b)

```
…
for(…) {
    forward();
}
…
…
```
(c)

```
…
…
for(…){
    forward();
    if(…)
        pick();
}
…
```
(d)

```
…
…
for(…) {
    for(…) {
        forward();
    }
}
…
```
(e)

```
…
for(…) {
    for(…) {
        forward();
        if(…)
            pick();
    }
}
```
(f)

Figure 2. Six recognized programming strategies

As shown in Table 1, the use programming strategies was compared between high and low achievement students. Low achievement students used more pattern a strategies (t = 2.791, p = .03) than the high achievement students. However, low achievement students used less pattern d (t = -1.991, p = .049) and e strategies (t = -4.162, p < .001) than the high achievement students. There was no statistical difference between two groups in the pattern b, c, and f. The findings suggest that high achievement students tended to use high complexity programming strategies in the game-based learning environment whereas low achievement students tended to use low complexity programming strategies. Both two groups knew and would use pattern c strategies because it is the basic form of looping strategy. Both two groups seldom used highest nested looping strategies.

Pattern	Achievement				t	p	Comparison
	Low		High				
	M	SD	M	SD			
pattern_a	11.6	3.70726	10.0656	4.15078	2.191	.030	Low > High
pattern_d	.6970	1.69133	1.5410	2.88429	-1.991	.049	High > Low
pattern_e	.6364	1.11819	2.0164	2.35579	-4.162	.000	High > Low

n=127

Table 1. Difference between high and low achievement students

Data collected from the questionnaires were analyzed by means of calculating Person production correlation among variables. We found students' self-efficacy is positively correlated with pattern d (r = .203), e (r = .191), and f (r = .271) but negatively correlated with pattern a (r = -.197). This means the use of high complexity programming strategies may tended to had high self-efficacy whereas the use of low complexity programming strategies may tended to had low self-efficacy.

Conclusion

Based on students' deficiency of programming strategies and the potential of simulation game features, the goal of this paper is to incorporate features of programming strategies and game-based learning to develop a game-based learning environment for programming strategies. Students improve their programming strategies by giving instructions to a robot in the environment and evaluation the consequence regarding the given instructions.

The results of the pilot study shows that high achievement students tended to apply higher complexity programming strategies and to gain higher self-efficacy when they solving computational problems in the game-based learning environment. On the contrary, low achievement tended to apply lower complexity programming and to gain lower self-efficacy. The environment has potential in incorporating various important programming strategies in practical instruction by assigning missions with different required programming strategies. The students will learn to apply increasing complex strategies in the game-based environment.

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Integrating Technology into EFL Writing Courses: Reflections on Blog-based Peer Feedback

Louise Ohashi, Tokyo Woman's Christian University, Japan

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Abstract
As digital technology advances, educators and students have an ever-growing supply of learning aids at their disposal. In the spring semester of 2013, two online tools were used in two English as a Foreign Language writing courses at a women's university in Japan. The first tool was a blog, which was used to facilitate peer feedback on the students' writing assignments. The second tool was an online student response system, which was used to record and share brainstorming notes and give quizzes that related to course content. After using the blog and the online student response system, 50 students completed questionnaires that were designed to ascertain their perceptions of each tool. The findings were presented at IAFOR's Fourth Asian Conference on Technology in the Classroom. This article focuses on one of the tools, the blog, which was found to be a valuable addition to the courses.

Keywords: EFL writing; blog; peer feedback

Introduction

In recent years technological advances have brought the Internet into people's lives in numerous ways. For many, the Internet is used in their studies, as the use of online tools in education is becoming increasingly common. While some warn that an overload of technology can be detrimental to teachers (Allan, 2009) and students (Chen, Pedersen, & Murphy, 2012), the potential benefits online tools offer to learners are too numerous to ignore. This article examines some of those benefits, showing how technology was used to enhance two semester-long English as a Foreign Language (EFL) writing courses at a women's university in Japan. Two forms of technology were introduced in these courses: a blog and an online student response system. An overview of how these tools were used and how students perceived them was given at IAFOR's Fourth Asian Conference on Technology in the Classroom in April 2014. This article presents data pertaining to one of the tools, the blog, which was used to facilitate peer feedback.

Background

Blogs

A blog is an online tool that allows the account holder to upload text, pictures, videos, and audio material to a private homepage that can be viewed by others. This tool was originally used as an alternative to paper-based journal writing, and is still used by many people in this way today. While only the account holder can upload blog posts, it is possible for others to add comments, generally in a section below each post. This means that account holders not only have a way to share what they have written, they also have the opportunity to interact with others. This interaction is generally asynchronous and can be done at a time and place that is convenient for account holders and commenters. Furthermore, as there is no face-to-face contact, it can be done anonymously if desired. These features have made blogs a popular tool in educational settings, and led to one being used for peer feedback in this research project.

Peer Feedback

Peer feedback (also known as peer review and peer response) generally refers to the comments that people who have a relatively equal relationship make on each other's work. In a classroom context, it refers to student-to-student feedback. This form of feedback was initially used in L1 (mother tongue) process writing but has since become widely used in L2 (second/foreign language) writing courses. In the L2 writing context, the term peer feedback generally refers to feedback L2 students provide on each other's texts. While it can be used to refer to any comments made by a peer, the goal of peer feedback is to help the writer improve their work so it often takes the form of praise, constructive criticism and advice. Feedback can be collected from either individuals or groups. It can be oral or written, with a combination of these mediums also possible. Research has been conducted face-to-face (de Guerrero & Villamil, 2000), which precludes anonymity, and through written feedback (Dippold, 2009; Gedera, 2012), which allows participants to withhold their identity if desired. If written, there are paper-based and online options.

In L2 writing contexts, peer feedback offers numerous benefits to both the writer and reviewer. As has been noted in my previous work (Ohashi, 2009), benefits for L2 writers include acquiring a sense of audience (Mangelsdorf, 1992; Tsui & Ng, 2000; Villamil & de Guerrero, 1998), feedback from a range of perspectives (Fujita, 2002), and, a shift towards self-regulation and self-revision (Villamil & de Guerrero, 1998). In addition, Tsui and Ng (2000) found that it can raise students' awareness of their strengths and weaknesses, facilitate collaborative learning, and foster text ownership. While many consider the benefits from the writer's perspective, taking on the role of reviewer is also important as it can expose students to model texts and heighten their awareness of textual strengths and weaknesses. Lundstrom and Baker (2009) found that students who reviewed others' work for a semester made significant gains in their own writing. In fact, the gains made by the group who only reviewed texts outweighed those in the group that only received feedback. A potential reason for this is alluded to by Nicol and Macfarlane-Dick (2006), who argued that providing feedback may allow students to "develop detachment of judgement (about work in relation to standards), which is transferred to the assessment of their own work" (p. 211). Whether students give or receive feedback, or do both, the examples above show that there are many benefits.

Despite these benefits, care must be taken when incorporating peer feedback into courses. As summarized in my earlier work (Ohashi, 2009) studies show that many students feel peer feedback cannot replace teacher feedback (Sengupta, 1998), so a two-fold approach is generally recommended (Fujita, 2002; Nelson & Carson, 1998; Tsui & Ng, 2000; Villamil & de Guerrero, 1998). It is not only important to have a two-fold approach, but also to consider the timing of teacher and peer feedback. As writers may value their teachers' comments over their peers' (Sengupta, 1998), Paulus (1999) advocates students and teachers commenting on different drafts. His recommendation comes after finding that both peers' and the teacher's advice were acted upon when the first draft was commented on by peers and the second was commented on by the teacher. The order seems to be important to the reviewer too, as Dippold (2009) found that the quality of peer feedback was lower when the teacher gave feedback first. In addition to the considerations above, there have been strong calls for student training. Berg (1999) has offered eleven guidelines for those wishing to implement peer feedback training. These guidelines proved useful in a paper-based peer feedback program that I implemented in an EFL course at a Japanese university (Ohashi, 2009). More recently, Lam (2010) reported on a three-step training program that was used with 30 students enrolled in an EFL writing course in Hong Kong. Before integrating peer feedback, it is recommended that educators refer to articles such as those outlined above to familiarize themselves with potential problems and consider the guidance available.

Using Blogs for Peer Feedback

Studies in which blogs have been used for peer feedback reflect many of the advantages outlined above and offer additional ones. In a study by Gedera (2012) at a Malaysian university, students indicated that they were motivated by the online medium and benefited from the presence of an audience, not only in terms of receiving feedback, but also because others were expecting them to share their contributions. As one student in Gedera's (2012) study noted, "When my friends start posting their essays it reminds me that I haven't done mine and I do it because if not they will know that I haven't done yet" (p. 27). Furthermore, a study in Turkey found that blog-based peer feedback had a positive effect on EFL students' writing skills (Ciftci & Kocoglu, 2012). In that study, one group of students gave peer feedback orally, and the other group used blogs. The students in the latter group improved their drafts more and made greater gains in their writing skills over the period of the study. All of these benefits make sharing peer feedback online an attractive option.

Research Question

In the sections above the benefits of peer feedback have been outlined. In this project's research context, the English department of a women's university in Japan, teachers have long been aware of these benefits so peer feedback has been an integral component of the department's writing courses for many years. However, prior to this project, students in most writing courses did peer feedback on paper, through face-to-face discussions, or a combination of these methods. As the research outlined above suggests that sharing peer feedback online can offer additional advantages, the aim of this project was to ascertain whether using an online tool for peer feedback would be beneficial in this specific teaching context. As such, the overarching research question is as follows:

Is using a blog for peer feedback beneficial to students in writing courses in the Japanese EFL context?

This question could, and perhaps should, be narrowed further to focus on writing courses at the research site. However, as this project provides an example of a case study that has been conducted with students undertaking EFL writing courses in Japan, the question has been left somewhat open. It is phrased this way in the hope that other researchers in Japan will address the same question so that over time the results can be analyzed together to create a deeper understanding of the merits and demerits of using blogs for peer feedback in the Japanese EFL writing context.

Methods

Participants

This case study was conducted with students who were enrolled in two different EFL writing courses at a university in Japan. Fifty of the 52 students enrolled in these courses provided data for this study. The number of participants from each year-level was 26 (first year) and 24 (second year). As the study was conducted at a women's university, all participants were female and the vast majority of students were Japanese, with only one non-Japanese participant. In terms of age, most students were 18 to 21 years old, with only two who were older than this and none who were younger. Given the small sample and the largely homogeneous nature of the group, no effort was made to investigate differences by nationality, age or gender.

Procedures

The blog was introduced to students partway through their semester-long EFL writing courses, when they were beginning their second major writing task. Prior to this, they were required to read a classmate's paragraph (first year) or essay (second year) and write feedback using paper-based peer feedback sheets. Both courses' textbooks had a unit on peer feedback, and training was primarily based on these units, with some extra practice using the feedback sheets on anonymous texts. When students had finished writing the first draft of their second assignment, the blog was introduced. They were told that it was a communal blog that would be used by students enrolled in the two courses in this study and a third-year EFL writing course, and that a password had been added to protect their privacy. Before adding their essays and feedback to the blog, students were told that they could use a pseudonym if they wanted to remain anonymous. Of the 52 students in the two courses, four chose names that did not easily identify them and a further six chose to use pseudonyms that thinly veiled their identity (their initials or a word that included part of their name).

Training on how to use the blog was given in two ways. First, students were shown how to upload assignments and add comments during an introductory session (one per course). These sessions were done in a computer room that had a shared monitor, so students could see my screen and follow along from their own computers. In addition, they had access to a step-by-step guide that included screen shots, which was available through their course website. This was created to help them use the blog outside of class, and also to assist students who missed the introductory session. Each student was required to upload the first draft of a writing assignment during the introductory sessions, and provide feedback on at least one classmate's assignment for homework. They were encouraged to read and comment on more drafts but were not given grade-based incentives for doing so. After they had written peer feedback homework, some examples were selected for in-class discussions. Students who had not produced enough in terms of quality or quantity were encouraged to add to their comments, and many did. Writers were required to read the feedback then redraft their assignment, acting upon the feedback when appropriate. They submitted paper copies of their second draft and received teacher-feedback on it. This was used to create a third draft, which was submitted and graded. Before and after drafting their assignments, participants were encouraged to return to the blog to read more texts from their own class, the other class in this project and a third-year writing class that was not involved in this study. When doing so, they were advised to take note of the problems they noticed in weaker texts and the strengths of texts that they viewed as models.

Data Collection Instrument

At the end of the semester, students were invited to complete a short questionnaire (see appendix) about the blog. They were asked 10 questions that aimed to gather both quantitative and qualitative data. Quantitative data were predominantly collected by asking participants to indicate their level of agreement with statements. A four-point Likert scale (strongly agree, agree, disagree, strongly disagree) was used for this. Qualitative data were collected through open-ended questions. These questions were mainly employed to ascertain participants' reasons for their answers to quantitative questions.

Data Analysis Methods

As noted above, both quantitative and qualitative data were collected through a questionnaire, which was completed by 50 students. Quantitative data were converted to percentages and tabulated. Qualitative responses were read and analyzed for key themes. In qualitative research, one way that themes are established is through constant comparative analysis of data. This method, which was developed by Glaser and Strauss (1967) and has since been used extensively in quantitative and mixed methods studies, is a valuable data analysis tool because it allows the participants' themes to emerge from the data rather than pushing the data into pre-existing categories. To find themes in this study, words or ideas that appeared in more than one participants' answer were colour-coded. In some cases more than one theme was found in the same response, meaning two or more colours were used, but most responses were short and focused on only one idea. The data were read several times after coding began, with some changes as new categories emerged. When all of the answers had been coded they were set aside for a few days and checked again to ensure intra-rater reliability, then the number of responses per theme was counted in order to draw out the most notable themes. Representative quotes were selected to give examples of raw data that the themes were drawn from.

Results

The vast majority of the data collected from the fifty participants in this study highlighted positive aspects of using a blog for peer feedback. As shown in Table 1, 80% of participants found the blog easy to use and almost all participants (92%) felt it helped them with their English studies. In terms of particular tasks, 96% agreed it was a good way to give feedback to classmates and 94% believed it was a good way for writers to get feedback.

Table 1
Students Views on Using a Blog for Peer Feedback

	SA	A	D	SD
The class blog is easy to use	18%	62%	18%	2%
The class blog helps me with my English studies	28%	64%	8%	0%
The class blog is a good way to give peer feedback	24%	72%	4%	0%
The class blog is a good way to get peer feedback	26%	68%	6%	0%

Note. SA = strongly agree A = agree D = disagree SD = strongly disagree

Participants were asked about four benefits that it was felt the blog would facilitate. As Table 2 shows, most participants felt that the blog fostered these benefits. First, all participants agreed it was a good tool for sharing written work with classmates, with 56% strongly agreeing. In addition, 94% agreed it was a good tool for getting ideas about what to write. While the method for doing so was unspecified, it is expected this was done through peer feedback or by reading other students' assignments. Ninety-six percent of participants felt that the blog was a good tool for reading model paragraphs and essays, and 98% believed that it was a good tool for helping students to identify their own strengths and weaknesses as a writer.

Table 2
Students Views on the Benefits of Using a Blog for Peer Feedback

	SA	A	D	SD
The class blog is a good tool for:				
・sharing written work with classmates	56%	44%	0%	0%
・getting ideas about what to write	26%	68%	6%	0%

・reading model paragraphs/essays	36%	60%	4%	0%
・learning about your strengths and weaknesses as a writer	38%	60%	2%	0%

Note. SA = strongly agree A = agree D = disagree SD = strongly disagree

Open-ended questions were asked to elicit free responses from participants about their views on the blog. The responses were analyzed and representative quotes, which are shown here unedited, were selected. When asked what they liked about the blog, the strongest theme that emerged was an appreciation of the student-to-student interaction it facilitated. This was expressed through comments such as "We can share each other's idea" and "There are comments by my classmates so I can know how I improve my essays." The second theme that emerged was that students liked the convenience of the online system. References to convenience included being able to "check details whenever we like", with many participants using words such as "anywhere", "instant" and "whenever" to point towards advantages that the Internet can offer in terms of time and space. While no other major themes emerged, being able to do the task paper-free and anonymously were mentioned by several students.

When asked what they did not like about the blog, the main theme that emerged was that participants faced operational challenges. The words "difficult", "trouble" or "troublesome" appeared in approximately a third of the comments, with some referring to initial difficulties and others referring to unresolved problems. Resolved problems were mentioned in comments like "At first it is difficult to use for me, but I came to use it easy now." On-going difficulties were expressed in statements such as "I usually don't know how to use the blog well." In addition, while only noted by 12% of participants, there was a level of discomfort in sharing work. This is evidenced in comments such as "I do not want show my terrible English essays that are not checked by teachers" and "I don't like the system that I have to show my unfinished essay". The size of the potential audience may have enlarged this problem for such students, as it did for the one who wrote "I didn't want many people to see my essay."

In addition to asking about aspects that students liked and disliked about the blog, the questionnaire also asked them to consider whether or not it was a good tool for giving and receiving feedback. Comments were mainly positive, noting advantages such as "others can see my comments at the moment I send them" and "if I forgot to mention some points, I can comment again". The online medium was seen as convenient because it was "easy to access and check peer feedback" and "I do not have to printout my feedback." However, several students found this feedback medium problematic, noting disadvantages such as "we can't write between the lines of the essay, it is little difficult to give feedback in detail" and "It is hard to read on the screen."

At the end of the questionnaire, participants were asked if they would like to continue using the blog in the following semester. Results were encouraging, with 82% indicating that they would like to do so. Of the 18% who did not want to continue using the blog, 14% had found it difficult to use. The other 4% believed pen and paper feedback was better because it "can be better quality than writing on the web" and it is "hard to read them on the screen."

Discussion

The research question that guided this study asked whether using a blog for peer feedback could be beneficial to students in writing classes in the Japanese EFL context. Preliminary findings suggest that for most students who participated in this study, the answer was yes. An overwhelming majority of participants agreed that it helped them with their English studies and was a good way to both give and receive peer feedback. They all agreed the blog was a good tool for sharing written work and most of them felt it was good for getting ideas, reading model texts and learning about their own strengths and weakness as writers. Many participants were pleased with the convenience this online option offered, praising it for being accessible whenever and wherever they were, and commenting positively on it being paper-free.

However, the drawbacks of conducting peer feedback online cannot be overlooked. The blog proved to be a complex tool for some participants, with 20% indicating that it was difficult to use. Students were shown how to use the blog in class and provided with a step-by-step user guide, so it was expected that they had received sufficient support, but with a fifth of participants facing difficulties, it is clear that more training and guided practice opportunities were needed. Fourteen percent of participants did not want to continue using the blog because of the operational problems they faced. This creates a dilemma as it would be unfair to continue requiring these students to use this tool without providing additional training, but as there is already a large amount of work to cover in these courses, only a limited amount of time can be allocated. As most students uploaded their assignments in class, it is likely that those who had difficulty using the blog were either absent from the introductory session or had trouble when adding feedback. Absentees were sent an email about what they had missed, and were advised to use the guide and ask classmates for support. In terms of difficulties adding feedback, a possible solution is to get students to work in pairs for one assignment, as this would allow those who do not understand to get further instructions from a classmate. They could then be allocated another assignment to review individually. A final drawback, which was mentioned by fewer students but is still important to address, was that some participants felt uncomfortable with classmates viewing their work. While these participants may have felt the same way about paper-based or oral peer feedback, these feelings were likely enhanced by the fact that more people could view what they wrote. It is unclear whether these students posted under a pseudonym or not. Knowing this would be useful when planning the next step for such students. While no participants listed their discomfort as a reason for not wanting to continue with the online peer feedback program, educators should keep this issue in mind, as forcing students to participate against their will can be counter-productive.

Conclusion

This article outlined why and how a blog was integrated into two EFL writing courses at a university in Japan, evaluating it from the viewpoint of students who used it as a peer feedback tool. As it was a small study the results cannot be generalized. However, the fact that almost all of the participants who used the blog found it beneficial to their English studies and wanted to use it again suggests that it is a tool worth considering. Students showed a very positive response to aspects of the peer feedback program that could have been achieved through paper-based or face-to-face modes, such as learning about their strengths and weaknesses as a writer, but they also identified benefits that directly related to the blog's online medium. The convenience this tool offered was seen as a major advantage, with students appreciating being able to exchange feedback "instantly", at a time and place that was convenient. Despite these positive findings, not all students were comfortable with this medium, mainly due to the operational difficulties they faced. Although all students were able to post their assignments and peer feedback, which indicated that they could use the platform, a substantial proportion were reluctant to continue using the blog because of difficulties they had faced. Therefore, educators who are considering using blogs for peer feedback are advised to take appropriate measures to ensure that students can use the blogs with relative ease.

This project focused on just one online tool, which was selected from the plethora available. As technology develops, the range of tools that educators and learners have access to will continue to grow. Decisions must be made as to which tools will be used and how, with on-going evaluation needed to ensure that the tools are meeting expectations. This project provides a small building block in the knowledge that is available on the use of online tools in EFL writing courses. Research from other EFL and foreign language educators is encouraged in order to further evaluate the educational value of online tools to language learners, and more research on the use of blogs in peer feedback programs, particularly in the Japanese EFL research context, would be most welcome. By working together and sharing findings, there is hope that in time it will be possible to establish reliable best practice models for integrating technology into language learning.

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Appendix

Participants were asked to complete the following questionnaire via an online data collection tool. Please note that strongly agree, agree, disagree and strongly disagree have been abbreviated here, but were written in full in the online version.

1. The class blog is easy to use. SA / A / D / SD

2. The class blog is a good tool for:

sharing your written work with classmates. SA / A / D / SD

getting ideas about what to write. SA / A / D / SD

reading model paragraphs/essays. SA / A / D / SD

learning about your strengths and weaknesses as a writer. SA / A / D / SD

3. The class blog helps me with my English studies. SA / A / D / SD

4. What do you like most about the class blog? Please write your answer in as much detail as you can.

5. What don't you like about the class blog? Please write your answer in as much detail as you can.

6. The class blog has been used for peer feedback. This is a good way to give peer feedback to classmates. SA / A / D / SD

7. Please explain why the class blog is/isn't a good way to give peer feedback to classmates.

8. The class blog has been used for peer feedback. This is a good way for the writer to get peer feedback. SA / A / D / SD

9. Please explain why the class blog is/isn't a good way for the writer to get peer feedback.

10. Would you like to use the class blog again next semester? Why/why not?

Interactive Design of New-Media for Learning for Children in Preoperational Stage

Voravika Wattanasoontorn, Prince of Songkla University, Thailand

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Official Conference Proceedings 2014
0234

Abstract

Today's world of teaching and learning is facilitated by the new media, digital media where content is created and distributed via digital techniques, computerized systems or data networks. The new media is mostly dynamic, interactive, connected and changes the way we learn, communicate, affiliate and play. To integrate the content with emerging technologies and creative disciplines, we need to take into account an interactivity between user and application. Interactive design is defined as a user-oriented field of study that focuses on meaningful communication of media between people and technology. In case that users are children in the preoperational stage who have egocentric concept, which means that they are only able to consider things from their own point of view, the study of children–computer interaction is required. In this paper, we present an interactive design procedure of our tactile-based mobile application for learning for children in preoperational stage (2-7 years) as a case study. The observation of 35 participants while they are using our application with respect to pre-defined parameters such as manipulation, accessibility, control and time usage will be presented and discussed.

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1. Introduction

When it comes to daily use of technology, the number of users are also rising as we can see more and more screens at home. Mobile devices are being a part of consumer culture including children. BBC Business News reports that 26% of children between the ages of twelve and fifteen now own a tablet, increasing from 7% in 2012 [1]. In 2013, the percent of U.S. children who use mobile devices on a daily basis has more than doubled, from 8% to 17% [2]. Furthermore, Gutnick et al. reported that children of age 8 to 10 years spend about 5.5 hours each day using media, but they are actually exposed to almost 8 hours of media, because they use multiple media simultaneously [3]. There is a great focus on the kid-apps market, which now has numerous inspiring – educational, creative and/or playful – applications for children of all ages. Mobile applications for children are categorized individually. In App Store (iOS), applications for kids are divided into 3 categories by age; five years and under, six to eight, and nine to elven years. Children of every age from toddler to preschool spend many hours a day with different kinds of mobile devices, e.g. mobile phones or computer-tablets. The problem is that mobile applications are generally not designed only for the children or with serious use of an empirical research along with the design process. Ergonomic design for children is particularly challenging in order to accommodate their size and capabilities, as well as to anticipate how these will change in the future. The primary focus of this paper, therefore, is to apply our proposed interactive design procedure with WaWa, our tactile-based mobile application for learning for children in preoperational stage (2-7 years) as a case study.

2. Background

New media is defined as the dynamic, digital and connected media that changes the way we learn, communicate, affiliate and play [4]. As presented in a statistic report, research by Pew research center, entitled "How Americans got news" that collected data between 1991-2012, the trend of traditional media; television, video, and newspaper, has been decreased. In contrary, the trend of new media; online and any digital news, are continuously increasing [5]. Ellen W. and Nancy J. defined new media as the future of children since computer technology has ushered in a new era of mass media, bringing with it promise and great concerns about the effect on children's development and wellbeing [6].

The cognitive development in babies and children was developed by Piaget, a major theorist and psychologist [7]. There are four major stages of cognitive development in children: sensory motor period (0 - 24 months); the preoperational stage (two to seven years); concrete operations (seven to 12 years); and formal operations (more than 12 years). In this paper we focus on children in the preoperational stage that is a period during which a child learns to use a language. During this stage, children do not yet understand concrete logic, cannot mentally manipulate information and are unable to take the point of view of other people. So interactive design for children in this stage is challenging.

3. Interactive Design for new media

Figure 1 shows our proposed interactive design procedure that is composed of 6 steps. The first step is the specification of the properties of the application e.g. platform, interactive tool, target user and the number of users (single or multi user). Second, all actions that are required by the game have to be explored and listed. The outcome of these two steps will be used to create the design questions in step three. The design questions are created with regard to the objectives of the application. Answers of these questions will lead to the proper interactive gestures in step four. In step five, the user interface (UI) elements (widgets) e.g. selection, navigation, container, and data input/output are designed according to the chosen gestures. Finally, all reactions e.g. on click, on release, on press, and animation should determined.

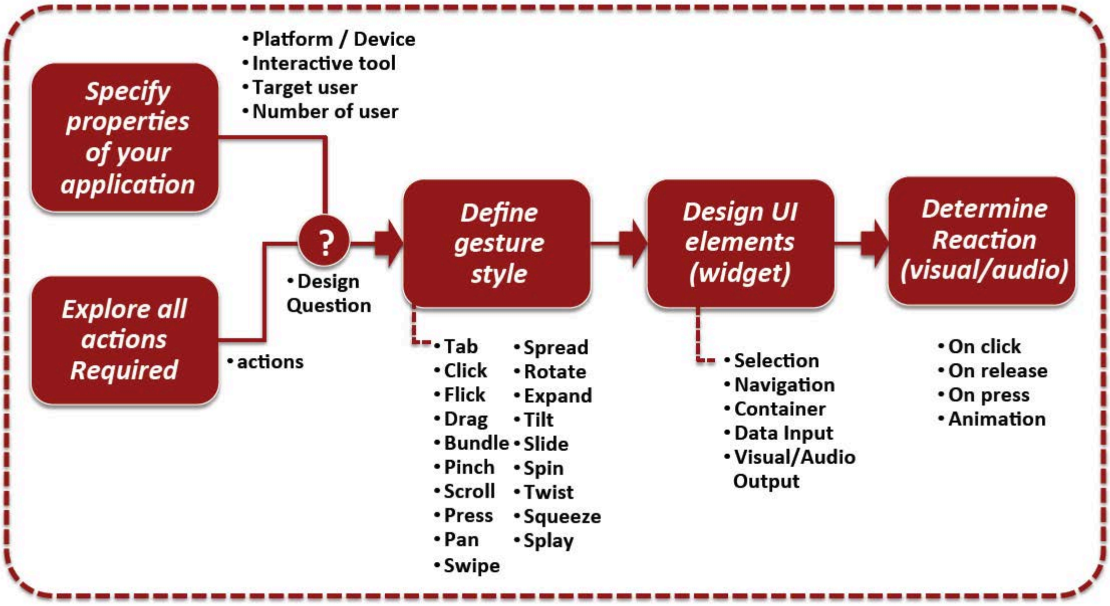

Figure 1: Interactive design procedure

The next section presents how we applied the proposed interactive design procedure to our tactile-based mobile application for learning for children in preoperational stage (2-7 years) as a case study.

4. Our study

Interactive storytelling on handheld device about the journey of WaWa, a caterpillar to a butterfly, was created based on the proposed interactive design procedure. First, we specify the application properties as an application for children in preoperational stage (age 2-7 years) that is working on Android and iOS computer tablet. The story is about how a butterfly is born from an egg. The application have around 10 pages (scenes) of book pages that the user can read and play with. Each page shows a situation that WaWa, the main actor meets after he got out of an egg. In the second step we have listed all the actions in our application. The main actions are to navigate WaWa to the destination and to activate the animation of objects in the scenes. However, since the main users of our application are the children in preoperational stage, one of the main objectives, in addition to entertainment, is an ergonomic design in order to ensure that the target users' capabilities and limitations are taken into account in the design process of an item and that the final product fits them.

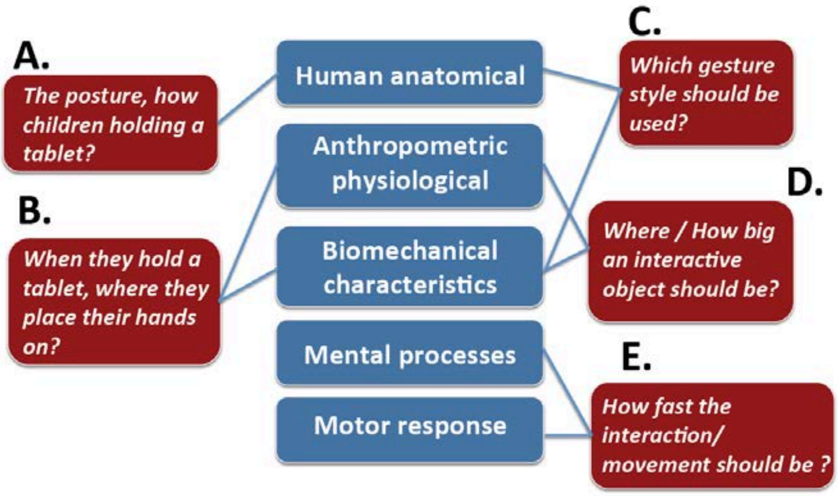

Figure 2: Design questions, for WaWa, with regard to factors influencing Ergonomic Interactive design

Third, we have defined the design questions with regard to an ergonomic design framework provided by International Ergonomics Association (IEA) [8] as presented in Figure 2. Five design questions are created which are: question A, the posture, how children hold a tablet?; question B, when they are holding a tablet, where do they place their hands on?; question C, which gesture style should be used?; question D, where / how big an interactive object should be?; question E, how fast the interaction/movement should be?. In the following we present the answers and the experimental result for design questions A to C. The experiments were performed with 35 children of age between 2-7 years by using Samsung Galaxy Tab 3 8.0 with Android platform [9].

Question A. *The posture, how children hold a tablet?*
In order to answer this question, we investigate the participants how they hold a tablet after we gave them the tablet and said that there is a very interesting game on it. Then we allow them to go and use the tablet anywhere in the common room of a school.
Figure 3 presents the distribution of posture how children hold a tablet separated to using one hand, both hands, or not hold.

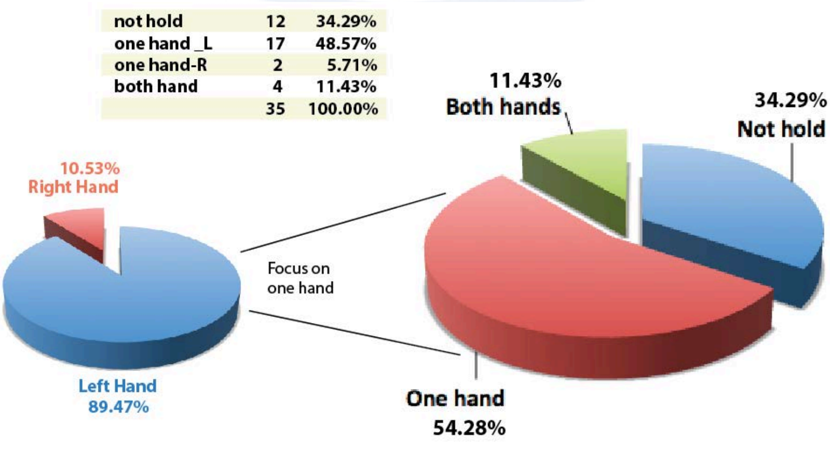

Figure 3: Distribution of posture how children hold a tablet; one hand, both hands, or not hold.

According to our results, 54.28% hold the tablet with one hand, 34.29% do not hold the tablet by hand but they lay it on the floor or lean with objects such as pillow and 11.43% hold the tablet with both hands. Focusing on participants that hold the tablet with one hand, we have seen that most of them hold it with the left hand (89.47%) and use the right hand to interact with the application.

Question B. When they hold a tablet, where do they place their hands on?
In order to answer this question, we observe the participants when they hold the tablet, whether they use one hand or both hands. The first position that their hands were placed on were recorded. The collected data are interpreted in according to the positions that we plan to place the interactive object on (A, B or C), see Figure 4.

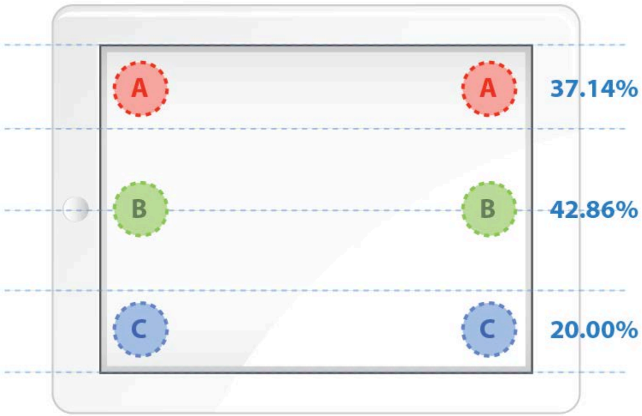

Figure 4: Distribution of the positions (A, B or C) where the interactive object should be placed

We found that participants place their hands on the position that is proper to put the object in the middle of the screen height (B, 42.86%), followed by putting the object on the top (A, 37.14%) and bottom of the screen height (20%).

Question C. Which gesture style should be used?
There are three main interactions in our application including: interaction with object in the scene, navigate the caterpillar, and change page/scene. We choose the gesture based on what we found in the answer of question A, i.e. participants are most likely to hold a tablet with one hand. In addition, tapping is simple and it is the easiest gesture that very young children can use. Table 1 presents the possible and chosen gestures that are related to the main interactions of WaWa.

Table 1: The main interaction of WaWa and the related gestures

Interaction	Possible gesture	Chosen gesture
Interaction with object in the scene	Tab, Drag, Flick, Hold, Pinch and Spread, Double tab, Rotate, Scroll, etc.	Tab on object
Navigate the caterpillar	Tab, Drag	Tab the destination

Change page/scene	Tab, Flick	Tab on button

Next step is to design the UI elements and determine the reaction of each widgets which are presented in the next section.

5. Result

Following our proposed interactive design procedure as presented in Figure 1, we have gotten the results, the user interfaces of WaWa, which are presented in Figure 5. Tapping is the only gesture that we choose with respect to the experiment results as presented in the previous section.

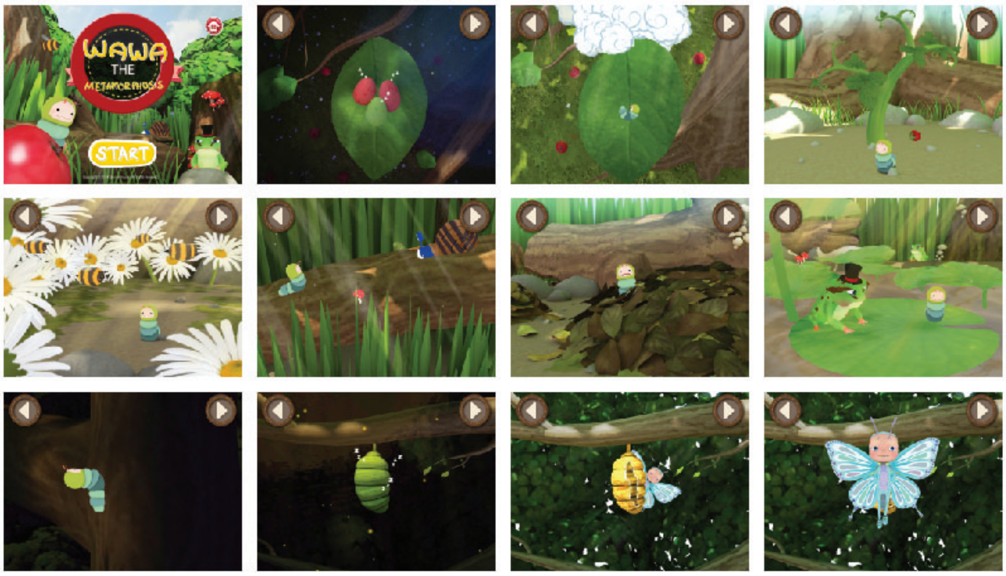

Figure 5: User interfaces of WaWa [10]

6. Conclusion

In this paper we have proposed an interactive design procedure for new media and applied it to an interactive storytelling application on handheld device, WaWa, the metamorphosis. Ergonomic interactive design of new media for children in preoperational stage, 2-7 years old, have special considerations according to their motor and cognitive specification. These factors include human anatomy, anthropometric physiology, biomechanical characteristics, mental processes and motor response. Three of five issues with regard to design questions were examined as examples. These are 1) posture, how children hold a tablet; 2) hands position; and 3) gesture style. Ergonomic design is further complicated because children of the same age may differ vastly from each other in size, strength, cognitive development and emotional maturity. As a future work, we plan to study the design with respect to the range of abilities and sizes of children.

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Vocabulary Foundation Project: Vocabulary Improvement Through Specific Recycling Methods

Çağlar Kök, Middle East Technical University, Turkey

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Vocabulary is a very important knowledge area in language learning, and particularly the students who are at beginner and elementary levels need continual recycling in order to improve their vocabulary. Yet, many of our students do not know how to recycle vocabulary and idiomatic language that they have practiced before and/or they do not spend the necessary amount of time for recycling them. They do not revise them at certain intervals; therefore they have difficulty in transferring them into their active vocabulary "bags" in their mind. A contextualized vocabulary quiz that was administered to 38 students (App. 1) revealed that the students had problems in remembering the active vocabulary items that they had already practiced. The aim of this paper is to review an action plan devised to improve their vocabulary knowledge by focusing on the recycling procedures that were followed (App. 6) and the quantitative and qualitative analysis of the results of the action plan (App. 7).

The review of the implemented action plan can be detailed as follows: The teacher administered a vocabulary quiz (App. 1) in which she tested the vocabulary knowledge of *Offline Readings 0.5* Texts 12, 13, 14 and 15. After testing the students' knowledge of the target vocabulary items, as her first action she prepared interactive online vocabulary flashcards on a website called Quizlet (www.quizlet.com); and she assigned the students to study the vocabulary items of the aforementioned texts by using the vocabulary flashcards on Quizlet (App.2) for a week. As a second action, she recorded an audio-book in which she read out the words, the definitions, the collocations, example sentences and the part of speech of the target vocabulary items (the vocabulary of Text 12,13,14 and 15). In the audio-book she also had the students drill the words and the collocations (App.3); and she assigned the students to listen to the audio-book for a week. At the end of one week, the teacher administered another vocabulary quiz (App. 4), which revealed that having the students study the vocabulary flashcards on Quizlet and having them listen to the audio "vocabulary journal" led to an improvement in their knowledge of the target vocabulary. The average success rate of the students in the first vocabulary quiz was 65,98% whereas the average success rate of the students in the second quiz was 81.32%. In addition to administering the second quiz, the teacher also received written feedback from 21 of the 38 students who took the quiz. The feedback of the students was completely positive (App. 5), except one student who said that he hadn't tried the audiobook component yet (see App. 7 for detailed analysis of the research results). Yet, in order to enhance the vocabulary knowledge of the students further, the teacher suggests some other ideas (App. 8) for the future.

In brief, the review of the action plan reveals that enhancing the vocabulary knowledge of our students is possible by having the students recycle vocabulary by listening to audio materials in which they hear the words, definitions, collocations and example sentences and by encouraging them to study vocabulary on the interactive and "usefun" vocabulary flashcards website called Quizlet. The teacher is going to encourage the students to study vocabulary on the Quizlet website regularly. Also, she is going to work on her future action plans (App. 8) in order to help her students recycle the active vocabulary items of other course books as well.

App. 1

Vocabulary quiz 1:

Complete the blanks in the paragraph with the words below. There are extra words that you do not need.

really	**neighbourhood**	**spend**
unfortunately	**far**	**called**
attic	**view**	**opposite**
share	**love**	**so**
comfortable	**street market**	**healthy**
same	**rich**	**hard**
dinner		

I used to live in a flat downtown on a busy street. It was always noisy **1......................** it was difficult for me to study. Finally I decided to move to a house in a suburban area. After some research, finally I found a small but cute house. In my new house, there are two bedrooms, a small but cute kitchen, a big and **2......................**living room, a bathroom and an **3. ....**upstairs. My new house is in a nice **4.......................**There is no noise in the street, and there are parks and green fields around. The **5.................** from my living room windows is beautiful! This place is **6. ....**from the noise and the traffic of the city centre! The district is **7.................** **"**Peace Hills". It is really quiet and peaceful! In addition, my neighbours are very nice people. They grow fruits in their garden, and they sell some of their fruits in the **8................................**on Sundays; and they give some to me! Behind my house I have a small garden, and I've started to grow some vegetables there and now I give some to my neighbours. That means we **9...........................**the vegetables and the fruits, and I like it a lot. Sometimes they invite me to **10.......................**and they serve delicious meals to me. There is a small primary school **11........................**my house, so I can see children coming out of school across the street and walking and talking happily in the afternoon. I make some coffee, I put on some music and I **12................**some time watching the children in the street. This is such a beautiful place. I **13.................**my new house!

App. 2

See www.quizlet.com website for the interactive vocabulary flashcards
Username: vocabularyworld
Password: dbevocabularyword

App. 3

See the CD attached for the *OLR 0.5* vocabulary journal audio book records.

App. 4

Vocabulary quiz 2:

Complete the blanks in the paragraphs with the words below. There are extra words that you do not need.

really	**neighbourhood**	**spend**
unfortunately	**far**	**called**
attic	**view**	**opposite**
share	**love**	**so**
comfortable	**street market**	**healthy**
same	**rich**	**hard**
dinner		

Nancy is a waitress in a restaurant. The restaurant is a small one, but it is cute and very popular! It is **1..............................** "Yummy Yummy". It is in a narrow street in a nice **2............................:** there are small offices and shops around the restaurant and a lot of trees and green areas on both sides of the road. **3........................** the restaurant there is a nice park, and on Sundays there is the **4..................................**so it becomes a very busy street on Sundays!
Nancy walks up and down the restaurant all day and she gets very tired, but she always says "I **5..................**my job very much", so she is happy that she has this job. In the evenings she welcomes the same guests; they come to the restaurant and they have **6. ....** in the evening. They say that the restaurant is very comfortable and cosy. The **7........................** from the windows of the restaurant is beautiful and heart-warming, indeed. Also they think that the meals are delicious! On Saturday nights, the restaurant is open till midnight. Nancy works overtime on those days. She says "I **8.......................**those evenings getting the orders, running around and carrying plates!" Nancy's home is **9. ....**from the restaurant. There are no buses late at night and she does not like taking a taxi, **10..................** she does not go home on Saturday nights. She stays upstairs in the **11............................**of the restaurant with the other waitress of the restaurant, Julie. Unfortunately, the room is not very **12..........................** because it is too small for two people. Also, there is only one bed, one closet and one dresser there, so Nancy and Julie **13......................**everything!

App. 5

FEEDBACK FORM

Please give feedback on the vocabulary work you have done this week. Answer the questions and write your comments in the relevant box.
Component 1: The vocabulary cards on the Quizlet website Do you think it is easier to learn vocabulary on Quizlet? Do you think it is more fun to learn vocabulary on Quizlet? Any other comments:
Component 2: The vocabulary audio book Do you think it is useful to listen to the audio tapes and repeat the words and collocations? Any other comments:

App. 6
Implemented Action Plan

Step 1: Choosing a problem area

The teacher administered a vocabulary quiz in which she tested the active vocabulary items of Text 12,13,1,4 and 15 of *Offline Readings 0.5* book (App. 1)

Step 2: Developing and implementing new strategies

Action 1: The teacher prepared online vocabulary flashcards (vocabulary items of OLR 0.5 book Text 12,13,14 and 15) on the Quizlet website (App. 2).

Action 2: The teacher recorded an audio-book in which she introduced the definitions and the parts of speech of the target vocabulary items and introduced and drilled the target vocabulary items, collocations and example sentences (App. 3). She set the two components as homework, thus she had the students study these for a week.

Step 3: Analyzing the research findings

The teacher administered the second vocabulary quiz in which she tested the same vocabulary items in a different context (App. 4).
In addition, the teacher received written feedback from the students (App. 5)

App. 7

Statistical analysis of the action research results

In the light of the research results, it may be asserted that the actions taken in the action research has been successful to a great extent. The analyses of the four action steps are as follows:

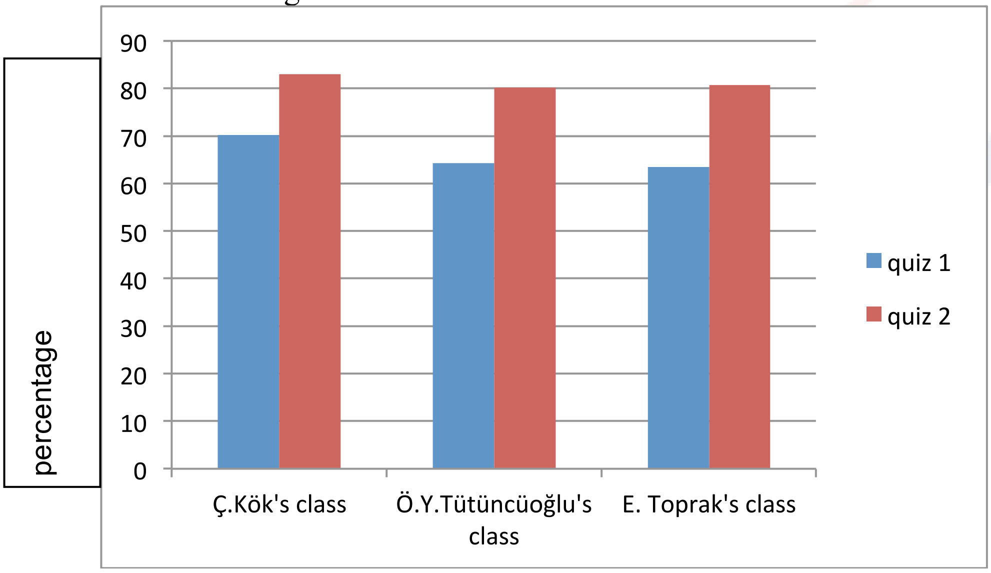
To begin with, the two actions that were taken yielded positive results. The students, who listened to the audio-book (audio "vocabulary journal") and studied the online vocabulary flashcards on Quizlet website performed better in the second vocabulary quiz (App. 4).

The averages of the three groups of students from three different classes are as follows (Table 1 and Figure 1):

Table 1:

	Quiz 1 average success rate	**Quiz 2** average success rate
Çağlar Kök's class: 15 students	70.2%	83.07%
Özge Yakut Tütüncüoğlu's class: 19 students	64.3%	80.15%
Esma Toprak's class: 4 students	63,46%	80,76%

Figure-1

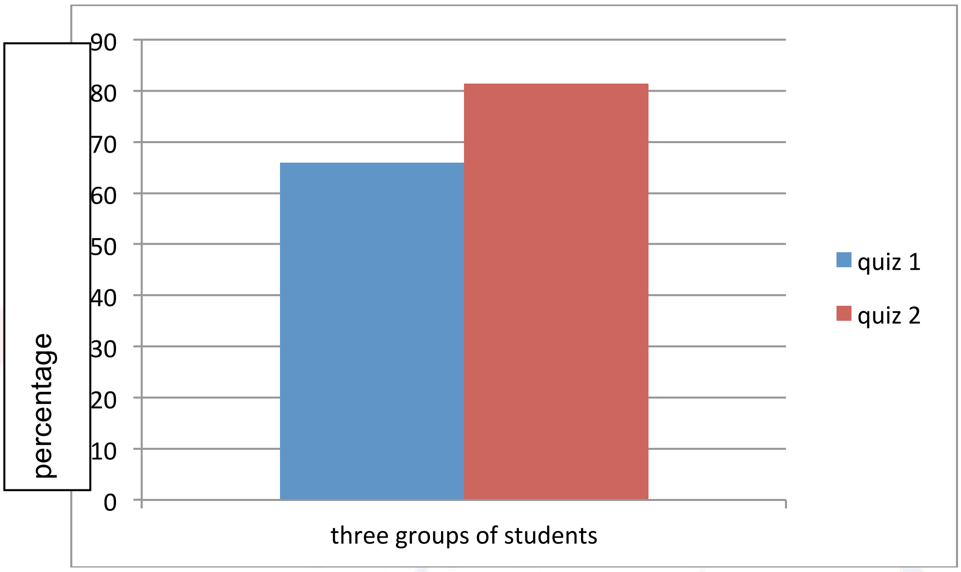


The average of the three groups of students are as follows (Table 2 and Figure 2):

Table 2:

The average of the three groups of students-the success rate in Quiz 1	65,98%
The average of the three groups of students-the success rate in Quiz 2	81.32%

Figure-2



In addition to the higher success rate in the second quiz, the written feedback received from the students displays the positive effects of the action steps taken. In the light of their written feedback, it can be concluded that the students were enthusiastic about using the Quizlet website and the audio component and clearly expressed positive opinions about both of them.

Attached are the copies of the authentic feedback forms.

App. 8

Future Action Plan

The research findings show that the action research has been mostly successful. Yet, the research covers only the vocabulary of *Offline Readings 0.5* book. In order to further improve the students' vocabulary knowledge, the teacher offers a project that is much wider in scope. The project is based on the belief that listening to audiobooks and drilling vocabulary items and idiomatic language and studying vocabulary by using interactive flashcards enhance vocabulary and idiomatic language knowledge of students. The project in question has the following components:

Vocabulary Foundation Project:

• *Offline Readings* 0.5 and *Offline Readings 1* books active vocabulary items on online flashcards in Quizlet website
• *Offline Readings* 0.5 and *Offline Readings 1* vocabulary journals in an audio-book format
• *Top-Notch Fundamentals* book vocabulary- vocabulary flashcards-hardcopies
• *Top-Notch Fundamentals* book active vocabulary items and Conversation Models in an audio-book [1]
• *Language Leader Pre-intermediate* book active vocabulary items on online vocabulary flashcards on Quizlet website
• *Language Leader Pre-intermediate* book active vocabulary items in an audio-book
• "Vocabulary practice" book Contents: a. Vocabulary puzzles b. Vocabulary in context: Students fill in the blanks in a paragraph with the words provided c.Word form practice: Students fill in the blanks in a paragraph with the correct word form of the words provided.

TOP-NOTCH FUNDAMENTALS VOCABULARY AND CONVERSATION MODELS AUDIOBOOK- Sample Tapescript:

Welcome unit:

Introducing yourself
Listen to the conversation.
A:Hi, I'm Emily.
B:Hi, Emily. I'm Susan.
A: Nice to meet you, Susan.
B: Nice to meet you, too.
Emily and Susan are introducing themselves.
In this audio book, repeat after the speaker when the speaker pauses. Listen and repeat:
A: Hi, I'm Emily
(Pause)
B: Hi, Emily. I'm Susan.
(Pause)
A: Nice to meet you, Susan
(Pause)
B: Nice to meet you, too
(Pause)
You are Susan. Now speak with Emily. Introduce yourself:
A: Hi, I'm Emily.
(Pause)
B:Hi, Emily. I'm Susan

[1] See the CD attached for sample recordings. Below are the tapescripts of those recordings.

A: Nice to meet you, Susan.
(Pause)
B:Nice to meet you, too.
Other ways of greeting people:
Listen and repeat:
Hello
(Pause)
Listen and repeat: Hello, I'm Lisa
(pause)
Hello, I'm Lisa.
(pause)
Lisa is introducing herself. You answer: Nice to meet you. You can also say: Glad to meet you
Listen and repeat: Glad to meet you
(Pause)
It's a pleasure to meet you
(Pause)
Greeting people:
Listen to this conversation:
A: Hi, Susan. How are you?
B: Fine, thanks. And you?
A:I'm fine.
These two people are greeting each other. Now, listen and repeat:
A: Hi, Susan. How are you?
(pause)
B: Fine, thanks. And you?
(pause)
A:I'm fine.
(pause)
Now you are Susan. Lisa is asking "How are you?" Answer her:
A: Hi, Susan. How are you?
(pause)
B: Fine, thanks. And you?
A:I'm fine.
More greetings:
You say "hi" or "hello" to greet people. You can also say "Good morning" in the morning
Listen and repeat: Good morning
(pause)
You can say "Good afternoon" in the afternoon
Listen and repeat: Good afternoon
(pause)
You can say "Good evening" in the evening
Listen and repeat: Good evening
(pause)
Listen and repeat: How are you?
You can also say: How's everything? Listen and repeat: How's everything?
You can also say: How's it going? Listen and repeat: How's it going?
(pause)
Now answer: Fine

(pause)
I'm fine
(pause)
Not bad
(pause)
So-so
(pause)
If you feel very good, you can say "Great". Listen and repeat: Great
(pause)
Saying goodbye
Listen to the conversation:
A: Good-bye, Susan
B: Good-bye, Charlotte
A See you tomorrow.
B: OK, see you!
Charlotte and Susan are saying goodbye to each other. Listen and repeat:
A: Good-bye, Susan
(pause)
B: Good-bye, Charlotte
(pause)
A See you tomorrow
(pause)
B: OK, see you!
(pause)
You say "good-bye". You can also say "Bye". Listen and repeat: Bye
See you later
(pause)
Take care
(pause)

Unit 1-Lesson 1
Vocabulary-Occupations
In this lesson you will revise occupations. Listen and repeat:
A teacher 2x
A student 2x
An architect 2x
An actor 2x
An athlete 2x
A musician 2x
An artist 2x
A banker 2x
A singer 2x
A flight attendant 2x
An accountant 2x
A bank teller 2x
A dentist 2x
An electrician 2x
A florist 2x
A gardener 2x
A grocery clerk 2x

A hairdresser 2x
A mechanic 2x
A pharmacist 2x
A professor 2x
A reporter 2x
A salesperson 2x
A travel agent 2x
A secretary 2x
A waiter 2x
A nurse 2x
A lawyer 2x
Telling your occupation-Conversation Model:
Listen to the conversation:
A: What do you do?
B: I'm an architect. And you?
A: I'm a banker.
Speaker A and Speaker B tell their occupations. Listen and repeat:
A: What do you do?
(pause)
B: I'm an architect. And you?
(pause)
A: I'm a banker.
(pause)
You are speaker B. You are an architect. Answer Speaker A's question:
A: What do you do?
(pause)
B:I'm an architect. And you?
A:I'm a banker.

<u>Unit 1 Lesson 2:</u>
Vocabulary-more occupations
Listen to the statements and repeat:
She's a chef. 2x
He's a writer 2x
She's a manager 2x
She's a scientist 2x
He's a doctor 2x
She's an engineer 2x
He's a photographer 2x
He's a pilot. 2x
Identifying who people are-Conversation model
Listen to the conversation:
A:Excuse me, are you Marie?
B: No, I'm not. I'm Laura. That's Marie.
A: Where?
B:Right over there.
A:Thank you.
B: You'are welcome.

Speaker A wants to talk to Marie. He sees a woman and starts to speak. You can start a conversation like this: Excuse me. Listen and repeat:
A:Excuse me
(pause)
A:Are you Marie?
(pause)
B:No, I'm not
(pause)
B:I'm Laura
(pause)
B:That's Marie.
(pause)
A:Where?
(pause)
B:Right over there
(pause)
A:Thank you
(pause)
B:You're welcome
(pause)
What do you say when someone says "Thank you"?
(pause)
You're welcome

Unit 1 Lesson 3
Vocabulary-The alphabet
In this lesson you will revise the letters in the alphabet. Listen and repeat
A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
Listen and repeat the spelling of the words:
Chef
How do you spell chef?
(pause)
c-h-e-f
teacher
How do you spell teacher?
(pause)
t-e-a-c-h-e-r
Spelling names-Conversation model:
Listen to the conversation:
A: Hello, I'm Josephine Bello.
B: Excuse me?
A:Josephine Bello
B: How do you spell that?
A: B-E-L-L-O
B: Thanks!
Speaker A introduces herself. Listen and repeat:
A: Hello, I'm Josephine Bello.
(pause)
Speaker B does not understand. She says "Excuse me?" Listen and repeat.
B:Excuse me?

(Pause)
Speaker A says
A:“Josephine Bello”
Speaker B wants to learn the spelling. She says “How do you spell that?” Listen and repeat:
B:How do you spell that?
(pause)
Speaker A spells his last name: B-E-L-L-O. Listen and repeat:
A:B-E-L-L-O
(pause)
Speaker B thanks Speaker A: Listen and repeat:
B:Thanks
(pause)
Now you are Josephine Bello. Greet the woman and say your name:
(pause)
A:Hello. I’m Josephine Bello.
B:Excuse me?
Say your name again
(pause)
A:Josephine Bello
B: How do you spell that?
(pause)
A:B-E-L-L-O
B: Thanks. What do you do, Ms. Bello?
Now, say your occupation. For example: I’m an architect.
(pause)

Unit 13-Lesson 1
Vocabulary-Abilities
Listen and repeat:
Sing 2x
Dance 2x
Play the guitar 2x
Play the violin 2x
Swim 2x
Ski 2x
Cook 2x
Sew 2x
Knit 2x
Draw 2x
Paint 2x
Drive 2x
Fix things 2x
Vocabulary-more musical instruments
A cello 2x
A piano 2x
A tuba 2x
A trumpet 2x
A trombone 2x
A flute 2x

A clarinet 2x
A recorder 2x
A saxophone 2x
A xylophone 2x
An accordion 2x
Drums 2x

Expressing a wish-Conversation model
Listen to the conversation
A: I wish I could draw. Can you?
B: Yes, I can.
A:Really?
B:I draw a lot. But not very well.
The two people are speaking about an ability:drawing. Speaker A can't draw, but she would like to draw. Listen and repeat:
A: I wish I could draw.
(pause)
Speaker A asks B if she can draw or not. Listen and repeat:
B: Can you?
Speaker A answers positively. Listen and repeat:
B: Yes, I can
Speaker A shows interest. Listen and repeat:
A:Really?
Speaker B says that she draws a lot. Listen and repeat
B: I draw a lot.
Speaker B can draw but she can't draw very well. Listen and repeat:
B: But not very well.
B: I draw a lot. But not very well.
Now you are speaker B. You can draw. Speak with A:
A: I wish I could draw. Can you?
(pause)
B Yes, I can.
A: Really?
(pause)
B: I draw a lot. But not very well.
Speaker A wants to learn what you draw. She asks:
A: What do you draw?
(pause)
I draw people.

<u>Unit 13-Lesson 2</u>
Vocabulary-Reasons for not doing something.
We sometimes decline an invitation. We have a reason to do so. For example: I can't talk now. I'm busy. I'm busy is the reason for not talking. In this lesson you will revise some reasons for declining an invitation. Listen and repeat:
She's busy 2x
They're not hungry 2x
She's full 2x
He's tired 2x
It's early 2x

It's late 2x

Politely declining an invitation-Conversation model

Listen to the conversation
A: Let's go to a movie.
B: I'm really sorry, but I'm too busy.
A: That's too bad. Maybe some other time.
Speaker A invites B to a movie. Listen and repeat:
A: Let's go to a movie
(pause)
Speaker B declines the invitation. Listen and repeat:
B: I'm really sorry
(pause)
B:...,but I'm too busy
(pause)
B:I'm really sorry, but I'm too busy
(pause)
Speaker A answers. Listen and repeat.
A: That's too bad
(pause)
A: Maybe some other time.
(pause)
Speaker A can try to arrange another time by saying "How about next weekend?"
Speaker B responds positively. She says: Sounds Great! Listen and repeat:
B:Sounds great!
Now you are Speaker B. Speaker A invites you to the park. Tell her that you are too busy
A: Let's go to the park.
(pause)
B: I'm really sorry, but I'm too busy.
A:That's too bad. Maybe some other time.

<u>Unit 13-Lesson 3</u>

Vocabulary-Favors

Listen and repeat:
open
open the window
Could you please open the window?
open the refrigerator
Close
Close the door
Could you please close the door?
Close the window
Close the microwave door
Turn on
Turn on the light
Could you please turn on the light?
Turn on the stove
Turn on the computer
Turn off
Turn off the TV

Could you please turn off the TV?
Turn off the microwave
Turn off the light
Hand
Hand me
Hand me my glasses
Could you please hand me my glasses?
Hand me my sweater
Hand me my book
Help
Help me
Could you please help me?
Give me hand

Asking for and agreeing to do a favor-Conversation model

Listen to the conversation
A: Could you do me a favor?
B: Of course
A:Could you please close the window?
B: Sure. No problem.
Speaker A asks for a favor. Listen and repeat:
A: Could you do me a favor?
B agrees to do the favor. Listen and repeat:
B: Of course.
(pause)
Speaker A asks B to close the window. Listen and repeat:
A:Could you please close the window?
(pause)
Speaker A can give the reason here: for example: It's too cold
(pause)
A:Could you please close the window? It's too cold
(pause)
Speaker B says:
B: Sure. No problem.
(pause)
Speaker B says "Sure, no problem." Some other ways of agreeing to a request are as such. Listen and repeat:
Of course
(pause)
My pleasure
(pause)
OK.
(pause)
Now you are Speaker B. Speaker A asks for a favor. Answer her.
A: Could you do me a favor?
(pause)
B: Of course
A:Could you please open the window? It's too hot.
(pause)
B: Sure. No problem.

Unit 14-Lesson 1
Vocabulary-life events:
Listen and repeat:
Be born 2x
Grow up 2x
Go to school 2x
Move 2x
Study 2x
Graduate 2x
Vocabulary-academic subjects:
Listen and repeat:
Architecture 2x
Medicine 2x
Psychology 2x
Business 2x
Education 2x
Mathematics 2x
Maths 2x
Information technology 2x
Nursing 2x
Engineering 2x
Law 2x
Biology 2x
Chemistry 2x
History 2x
Fine art 2x
Drama 2x
Science 2x
Getting to know someone's life story-Conversation model
Listen to the conversation:
A: Where were you born?
B: Here. In New York.
A: And did you grow up here?
B: Yes, I did. And you?
A: I was born in Brasilia.
B: Did you grow up there?
A: Actually, no. I grew up in Toronto.
Speaker A and B are talking about where they were born and where they grew up.
Speaker A wants to learn Speaker B's place of birth. She asks "Where were you born?" Listen and repeat:
A:Where were you born?
(pause)
Speaker B was born in New York. Listen and repeat:
B:Here, in New York
(pause)
Speaker A asks: And did you grow up here? Listen and repeat:
A:And, did you grow up here?
(pause)
B gives a positive answer. Listen and repeat:
B:Yes, I did. And you?

(pause)
A was born in Brasilia. Listen and repeat:
A:I was born in Brasilia
(pause)
B asks:
B:Did you grow up there?
(pause)
A gives a negative answer.
A:Actually, no.
(pause)
A: I grew up in Toronto.
(pause)
Now you are Speaker B. You were born in New York and you grew up in New York.
Speak with A:
A: Where were you born?
(pause)
B:Here. In New York.
A: And did you grow up here?
(pause)
B:Yes I did.
Now, ask A: And you?
(pause)
A: I was born in Brasilia.
Now ask A: Did you grow up there?
(pause)
A:Actually no. I grew up in Toronto.
Now ask A his occupation
(pause)
B:What do you do?
A: I'm a student.
Now ask A: What are you studying?
(pause)
B:What are you studying?
A: I'm studying engineering.

Unit 14 - Lesson 2
Vocabulary-More leisure activities
Listen and repeat:
Travel
Go camping
Go fishing
Relax
Hang out with friends
Do nothing
Discussing plans-Conversation model
Listen to the conversation:
A: Any plans for the weekend?
B: Not really. I'm just going to hang out with friends. And you?
A: Actually, I'm going to go camping
Speaker A and B are talking about their plans for the weekend.

Speaker A asks B about her weekend plans. Listen and repeat:
A: Any plans for the weekend?
(pause)
Speaker B doesn't have a specific plan. Listen and repeat.
B:Not really.
(pause)
with friends
(pause)
hang out with fiends
(pause)
I'm just going to hang out with friends
(pause)
Speaker B asks A's plans. Listen and repeat:
B:And you?
(pause)
Speaker A is going to go camping. Listen and repeat:
A:go camping
(pause)
A:Going to go camping
(pause)
A:I'm going to go camping
(pause)
A:Actually
(pause)
A:Actually, I'm going to go camping

<u>Unit 14-Lesson 3:</u>
Vocabulary-life cycle events:
Listen and repeat:
Get married
Have children
Retire
Change careers
Expressing wishes for the future-Conversation model:
Listen to the conversation.
A: What's next for you, Susan?
B: What do you mean?
A: Well, would you like to get married or have children?
B: Actually, yes. I'd like to get married and have children. What about you?
A: Me? Actually I'd like to study art.
Speaker A and B are talking about their wishes for the future.
Speaker A asks B's plans or wishes for the future. Listen and repeat:
A:What's next for you Susan?
(pause)
Speaker B doesn't understand what A means. Listen and repeat:
B: What do you mean?
(pause)
Speaker A explains. Listen and repeat:
A: Well, would you like to get married?
(pause)

A:or have children?
(pause)
A: Would you like to get married or have children?
(pause)
Speaker B gives a positive answer. Listen and repeat:
B: Actually, yes.
(pause)
B: I'd like to get married
(pause)
B: and have children
(pause)
Speaker B asks A's plans or wishes. Listen and repeat:
B: What about you?
(pause)
A: Me?
(pause)
Actually
(pause)
I'd like to study art
(pause)
Actually, I'd like to study art
(pause)
Speaker A has some other wishes. She says "and I'd like to move to New York."
Listen and repeat:
B: New York
(pause)
B:Move to New York
(pause)
B:I'd like to move to New York
(pause)
B: ...and I'd like to move to New York.
(pause)

Influence of Pivotal Changes in Russian Society on Technical Manpower Training: Creation of new IT-based Learning and Motivating Strategies

Natalia Goncharova, Ural Federal University, Russia
Alena Nevolina, Ural Federal University, Russia
Konstantin Aksenov, Ural Federal University, Russia

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Abstract:
A personnel problem being of increasing relevance can be successfully solved only on fulfillment of the next conditions: constructive cooperation between universities and enterprises, providing supportive social environment for graduates at enterprises, organizing system-based continuing education and creating the “Lifelong Learning” educational pathways for individual development. For the improvement of a learning process the authors propose to apply modern information technologies that allow forming open education. The development of e-Learning as a tool for increasing the competitiveness of educational programs due to their variability and customization makes the educational product more accessible and creates new interaction mechanisms on a base of virtual academic mobility with the option of special courses for students.

Key words: *Lifelong Education, educational trajectories, professional competence, information technologies, educational process, in-class activities, computer testing, e-learning, e-courses, informatization.*

Every school leaver thinking about his/her future profession is mostly oriented by the vision evolved in recent years: Get more with less effort. As a rule, studying at a technical university is more difficult than at a humanitarian, and working conditions at industrial enterprises are more dangerous and more harmful to health than in an office, and economists' and lawyers' pay is much higher than what engineers can earn. Therefore the number of those wishing to be enrolled in technical universities is falling dramatically, and as a result there is shortage of specialists in the field of design and construction.

Let us try to analyze the reasons for this negative trend and give some proposals on the example of training non-ferrous metallurgy engineers.

Ural Federal University has a large experience in training engineers and scientists.

Training specialists in non-ferrous metallurgy has been conducted at the University for more than 80 years.

This branch of metallurgy remains one of the most important industries in all developed countries, but most Russian metallurgical enterprises are characterized by their bulkiness, rather high rate of toxic emissions, low level of mechanization, and "moderate" salary.

After disintegration of the USSR, capacities of existing plants significantly decreased, which led to reduction in personnel.

And as a consequence, universities cut down specialized departments, narrowed the enrollment to this speciality, young teachers and scientists went into private business.

Nowadays there is deficit of specialists at metallurgical plants, and competence of graduates ceased to meet the needs of the employers. This launched a new challenge of developing and implementing methods for training personnel of new formation.

Unfortunately, higher technical education in Russia often manifests elements of rigidity, excessive regulation of educational standards and slow reaction to changing needs of industry.

Transition to a market economy in Russia has led to the acceleration of scientific and technical progress, based on implementation of flexible automated systems, microprocessors and device management software, robots. All this has set up an important task for modern universities - to bring up and prepare graduates that will be able to engage themselves actively in the new stage of modern society development.

Today, employers are waiting for professionals who are able to work with modern equipment in a competitive environment.

Besides, modern university graduates, in addition to professional competence, must be able to plan and organize work, forecast the results of their activity, have management skills and actively use information technologies.

Business representatives today admit that it is difficult to find an engineer who is able to work with unique technologies. Therefore, the universities need to address a serious issue of bringing educational standards to the needs of innovative production.

In recent years this problem is successfully solved with the help of development and introduction in educational process of various information technologies.

Let’s name different ways of improvement of educational process in universities:

1. Inviting foreign highly-qualified specialists to deliver lectures
2. Intensifying interaction between the university and enterprises
3. Deepening the study of foreign languages
4. Introducing students to certification and international standards
5. Organizing the training of process planners for metallurgical departments on the basis of computer modeling and application packages.
6. Providing a big variety of IT-based in-class activities
7. Better applying open information systems designed for the use of the information, currently available to society in a certain sphere.
8. Creation and wide usage of computer testing, diagnostic methods of control and evaluation of the trainees’ knowledge level.
9. Using ideas of open education, new approaches, and innovative educational technologies. A special place in this system takes remote, "virtual" learning, independent and individual work of students.

In the framework of implementing the above mentioned ways of educational process improvement, Ural Federal University has a lot of work in this direction.

In July 2013 a corporate institute of professional development in the areas of engineering training and business education was created to train students on the basis of higher, secondary and primary professional education.

A project for training highly qualified technical specialists is being implemented in collaboration with the regional government.

The University has been collaborating effectively for over 10 years with UMMC, one of the leaders in metallurgical industry of the Ural region, which comprises more than 40 enterprises operating in various regions of Russia, including a number of mechanical engineering enterprises.

Since 2011 over 300 experts and scientists from Europe and Asia have been invited to the University to deliver lectures and seminars.

Ural Federal University is actively introducing new modern technologies of training students with the use of IT-technologies.

Enrollment of 500 students for e-learning during 2014-2015 has been planned.

The University, in total, designed and developed over 95 e-courses and 27 electronic multimedia educational resources supporting some courses of certain educational programs.

Unique opportunities of information technologies enable to intensify educational process.

The formation of new learning strategies and motivation with the application of IT technologies in higher education signifies implementing a complex of measures aimed at raising the professional level of specialists by means of expanding the sphere of using computers and computer technologies in teaching and research work and in educational administration.

Informatization creates additional opportunities for stimulating students' creative thinking, reinforces the importance of their work, simplifying control and self-control of independent work.

Despite the huge efforts of universities to improve the teaching process, fixing personnel problems, the relevance of which grows, can be successfully performed only when the following conditions are fulfilled:

- creative interaction between universities and enterprises
- creation of social conditions for graduates at enterprises;
- organization of system personnel retraining;
- creation of educational trajectories for individual development “Lifelong Education”.

Joint efforts of the state, higher school, and employers on improvement of education with use of information technology would allow training highly professional technical specialists of a new kind – those who are ready to solve wide-ranging challenges of Russian economy development.

At One with ASEAN: Connecting Students Through a Collaborative Media-Based Project

Alexander Nanni, Mahidol University International College, Thailand
Rahul Sangar, Mahidol University International College, Thailand

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Abstract

All too often, EFL programs focus on developing students' language ability without concern for providing meaningful content. This presentation demonstrates a technology-based approach to addressing this shortcoming, a semester-long project that fosters collaborative learning and integration with the wider community. Media and technology are a part of students' everyday lives, and students have significant tech skills; however, these skills are often left untapped. This project, which was developed in the context of an EFL program at a Thai university, places students in the role of news reporters covering events relevant to them as members of the ASEAN community. Students use their language and technology skills to collaboratively create content that is relevant to their experience. Through participation in this activity, students do much more than improve their language skills: they connect with classmates and with the wider community, they learn teamwork and independent study skills, and they grow both as individuals and as citizens of ASEAN. In this paper, two teachers involved in designing this project will provide and discuss the results achieved through the enactment of this project.

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As Dewey (1907) observed in *The School and Society*, "There is all the difference in the world between having something to say, and having to say something" (p. 67). Dewey's statement, written over a century ago, remains valid today. The observation applies in a wide range of educational contexts, but it seems particularly applicable to the teaching of language. The development of communicative competence and language skills are, rightfully, the focus of language programs worldwide; however, many of these programs attempt to foster this development through the use of materials that the learners find neither engaging nor cognitively challenging. This paper presents one possible solution to this problem in the form of a semester-long project centered on current events in member states of the Association of Southeast Asian Nations (ASEAN). In addition to providing an opportunity for students to enhance their language skills, this project helps students to forge bonds with their classmates and become more engaged with the wider community. The project also leverages students' existing technology skills, resulting in a polished and attractive final product. After introducing the context in which the project was piloted, this paper will review relevant literature on the topics of project-based learning and the use of media projects in liberal arts programs. It will then describe the project in detail before outlining and discussing the outcomes associated with the first iteration of the project.

Context

This project was developed at the Preparation Center for Languages and Mathematics at Mahidol University International College. This center provides intensive language courses to students preparing to enter the English-medium liberal arts program at Mahidol. The university website states, "A distinctive feature of the MUIC curriculum is its strong focus on liberal arts and the promotion of a learning culture that prepares its students to meet the challenges of living and working in the 21st century" ("A liberal arts education in an Asian setting," 2012, para. 1). Accordingly, in addition to developing students' language skills, the Preparation Center for Languages and Mathematics must strive to prepare the students for the rigors of a modern liberal arts education.

Most students entering the Preparation Center for Languages and Mathematics are products of the Thai educational system and have thus been exposed to years of the "pedagogy of the worksheet" (Pennington, 1999, p. 2). Efforts to modernize and reform the Thai educational system began as early as 1996 (Jungck & Kajornsin, 2003; Terwiel, 2011); however, the changes effected by these reforms are largely short-lived and superficial, and the Thai educational system remains largely teacher-centered (Hallinger & Lee, 2011; Hallinger, 2010). Much of the learning that students do relies on rote memorization. As a result, students' critical thinking and analysis skills are underdeveloped. This is problematic for students entering a liberal arts program, as learning in such a system requires "an attitude of intellectual openness, especially to inquiry, discovery, new ideas and perspectives .... [and] the eagerness to grapple with difficult questions, to develop and act on provisional answers to these questions, and to continue to re-evaluate these provisional answers" (Blaich, Bost, Chan, & Lynch, 2004, p. 13). Many students entering the Preparation Center for Languages and Mathematics lack such a spirit of inquiry. For this reason, developing engaging teaching approaches is a priority.

Students at Mahidol University are highly conscious of the upcoming integration of the ASEAN Economic Community (AEC), which is scheduled to take place in 2015. The official ASEAN website describes the key characteristics of the AEC: "(a) a single market and production base, (b) a highly competitive economic region, (c) a region of equitable economic development, and (d) a region fully integrated into the global economy" (ASEAN Secretariat, 2012, p. 6). The integration of the AEC will have several impacts on Thailand, including increasing the importance of English and heightening economic competition. English is the working language of ASEAN (ASEAN Secretariat, 2008), and English will become increasingly important in Thailand as interaction with other member states of ASEAN increases. The ASEAN Secretariat (2009) indicates that it will "promote education networking in various levels of educational institutions and continue university networking and enhance and support student and staff exchanges and professional interactions including creating research clusters among ASEAN institutions of higher learning" (p. 68). Thus, English skills will be critical for students who wish to study abroad within ASEAN or to pursue a career in academia. As for economic competition, member states of the AEC will lower trade barriers, which will allow greater mobility of labor (ASEAN Secretariat, 2012). Thai students graduating after 2015 will probably face greater competition in the job market as well as increased interaction with citizens of other ASEAN nations. In short, significant change is on the horizon.

Despite being acutely aware of the imminent changes that the integration of the AEC will bring, many students remain ignorant of current events outside of Thailand. Accordingly, a major objective of this project is to promote students' awareness of relevant current events. This project responds directly to needs dictated by the students' context at several levels: as language learners at the Preparation Center for Languages and Mathematics, as individuals about to begin a liberal arts education, and as citizens of ASEAN.

Literature Review

While acknowledging that there is no universally accepted model of Problem Based Learning, Thomas (2000) provides five key criteria that may be used to identify this type of work: "centrality, driving question, constructive investigations, autonomy, and realism" (p. 3). The criterion of centrality means that in PBL the projects are essential parts of the curriculum. The criterion of driving question means that projects must be centered on "questions or problems that 'drive' students" (Thomas, 2000, p.3). The central question of the project should be cognitively challenging (Blumenfeld et al., 1991). The criterion of constructive investigations means that "in order to be considered as a PBL project, the central activities of the project must involve the transformation and construction of knowledge" (Thomas, 2000, p.3). A project that does not require the development of new skills and the search for new knowledge is not PBL. The criterion of autonomy means that PBL projects are fundamentally student-driven. Students must take responsibility for their work, and they must complete a significant portion of their work without direct supervision (Thomas, 2000). Finally, the criterion of realism dictates that PBL projects "embody characteristics that give them a feeling of authenticity to students" (Thomas, 2000, p. 3). These projects are not work for work's sake; rather, they respond to a real problem or situation in an authentic way.

Project Based Learning improves student engagement. A well-designed project focuses students' attention on issues that are relevant to them. This is consistent with a student-centered approach to teaching and learning, and it helps students to strengthen skills that are relevant to the globalized world: "PBL refocuses education on the student, not the curriculum—a shift mandated by the global world, which rewards intangible assets such as drive, passion, creativity, empathy, and resiliency" (Markham, 2011, p. 38). Students are motivated to participate in PBL for several reasons, including the focus on real-world problems and the presentation of the final product to an authentic audience (Berger, 2003). These projects have the potential to be much more meaningful than other types of activities. Berger (n.d.) asks, "Is there a more profound lesson than taking pride in creating work of importance and beauty for a real audience?" (p. 2). Such deep lessons are critical to increasing students' intrinsic motivation.

Technology plays multiple roles in this type of learning. The connection between Problem Based Learning and technology is clear: "Technology enables PBL" (Solomon, 2003, para. 9). PBL requires students to conduct independent research, a process that is greatly simplified through the use of the Internet. Technology also facilitates communication among students, between the teacher and students, and between students and the community. Finally, technology allows students to "take advantage of digital tools to produce high quality, collaborative products" (Markham, 2011, p. 38). The creation of such high-quality products further boosts students' motivation to participate in PBL.

Pilot Project

The Preparation Center for Languages and Mathematics at Mahidol University International College aims to provide a foundation for those students who need to improve their English skills to a level that will allow them to study in an English-medium degree program. The course currently provides four levels of instruction: PC1 (elementary), PC2 (pre-intermediate), PC3 (intermediate), PC4 (upper-intermediate). The project was designed for the PC2 students incorporating several aspects of social media, the idea being the students would be enthusiastic to participate in such a project while at the same time developing their English skills as well as gaining general knowledge of their region.

The media is no longer just the domain of journalists. Citizen journalism, through the use of social media, is now an everyday occurrence. Whether used to investigate and report on a serious story or used in a social way, its primary purpose is still the same: to inform. The importance of the media in the lives of the youth is quite clear: "The fact is this: young people today receive nearly all their information through popular culture—mass communication" (Worsnop, 2004, p.1). This is particularly true in Thailand, where there are over 8.4 million users of Facebook (Yung-Hui, 2012). Facebook, Instagram, and Wechat are social media tools which many students use daily to socialize. The project aims to use these skills—taking videos, editing them, and making comments on the pictures that are posted on the various social media platforms—and apply them in an educational context. Since students are already using these skills in their day-to-day lives, they should also be harnessed in the learning environment (Ito. et al., 2008).

The first incarnation of this project ran over a 10-week term. Students were divided into groups and assigned an ASEAN country to report on. Each story was about 3 minutes long, covering topics that were currently making the news, and each group was responsible for producing two stories. Story topics were on the following: education, tourism, trade, rule of law, politics, sport, etc. Each classroom of approximately 18-19 students was divided into groups of 2-3 and each student was assigned one of three roles: presenter, producer, or camera/editor. The division of tasks was aimed to make sure that all skills were being tested, not just speaking, writing, reading and listening skills, but also group skills and delegation skills.

Each role had specific responsibilities. The producer created the story, researched the information and provided the story for the presenter. The producer's research and writing skills were developed as they had to get a story that was relevant and which the presenter was also happy to do. The presenter took the information and presented it in a coherent form, i.e., summarizing the information into easy-to-understand pieces of information. In other words, he or she put into his or her own words what the producer had written and passed on. The camera person shot the pictures and put the package together. Here, the student developed his or her technical skills in terms of putting the story together in a logical to make it easy to view and listen to.

The stories must contain the following three parts: a presenter speaking to the camera, an opinion from someone on campus, and a discussion with an expert in the area that the students have chosen. Students were also encouraged to source information from experts at university, friends, or family members as well as from newspapers, television stations, radio stations, and online web television stations. Teachers provided a list of recommended sources, which included BBC, CNN, the Australian Broadcasting Corporation, Al Jazeera, and other major news outlets.

The course runs for 10 weeks, and students have 8 weeks to complete the project, the students being informed about their term project on their first day of class. Each group is assigned a faculty advisor, with whom they meet thrice over the course of the term. The first advisory takes place in the second week, where students are divided into groups and are assigned an ASEAN country they will report on. The second advisory meeting takes place in the third week of the term. At this point, the students provide a compare and contrast essay based on their assigned country. The essay compares and contrasts the current situation in their assigned country with the current situation in Thailand. By the fourth week, the students have completed their first video. During the sixth week, they have their third advisory, where they get feedback on their first story and advice on how to improve their second story. In the eighth week, the students hand in their final story. Finally, the stories are screened in the ninth week, at which point both the teacher and the students' peers assess the stories and provide feedback. The stories are graded on sound quality, picture quality, writing quality, and relevance. The feedback on the project, especially on the group skills, gives insight into how to develop the project further in the coming years.

Outcomes

The outcomes in terms of the actual projects were positive. Students grasped the concept behind the project, i.e., to inform the viewer about a topic relevant to their particular ASEAN country and compare it to the situation here in Thailand. The quality of the projects from a technical perspective suggests there is room for improvement; however, considering the technology used—mobile phone and simple editing software—and the short time students had to understand the basic techniques of filming for a news story, the end products were more than satisfactory. This being said, basic skills like framing the subject, reducing extraneous sounds, and improving the lighting of interviewer and interviewee are areas that could be improved in the future. The students did not feel overwhelmed by the technological aspects of the project. In fact, the graphics used in many of the projects reflected a high level of sophistication in terms of understanding and using the technology.

The different techniques used to transition from story to story showed ambition and creativity. Some of the graphics that were used could have been used on a professional television broadcast. The style of interviewing, although amateur, showed the students understood the basic constructs of a news report. They presented a background, an interview with expert opinion, and a conclusion, in other words an informative piece of news.

Students concentrated on the background section of the project, comparing and contrasting their nominated country with Thailand. Many students provided highly informative pieces, displaying their speaking skills, as well as showing their research skills through the information they presented. The interviews were sometimes hit and miss. At times they could not get an expert on their topic; however, they were creative enough to find an alternative solution, by perhaps interviewing students at the university who lived in the country that they had to research or by organizing a group of students to give their opinion, in broadcasting terms a *vox pop* .

Most groups were proud of the final product, and were eager to screen their videos in class at the end of the term, where they were assessed and where they received peer assessment and feedback. Feedback from the students was positive; they felt the project was engaging, informative, and collaborative.

Discussion

This project seemed to meet many, but not all, of the five key criteria of PBL described by Thomas (2000). The project satisfies three of the five criteria: constructive investigations, autonomy, and realism. The criterion of driving question is partially satisfied, and criterion of centrality is not met.

Students both constructed knowledge and transformed knowledge over the course of the project, thus meeting the criterion of constructive investigations. At the beginning of the term, they were assigned a country about which they had little knowledge. The students researched the country and developed an understanding of the general situation in the country, based on which they selected current events of interest to them. They then read several news stories related to these events and synthesized their own account of the events, which they related to the situation in Thailand. The students further expanded their understanding through an interview with someone from the community. Knowledge construction and transformation were central to the project.

The project entailed significant student autonomy. Although students met with their faculty advisor three times over the course of the term, these meetings served mostly to establish expectations and to troubleshoot problems rather than to instruct or to discipline students. Groups of students coordinated amongst themselves without oversight from the faculty advisor. Furthermore, the students took the initiative to organize interviews. The vast majority of the students' work on the project was done independently.

Realism was another strength of the project. In order to research the current events that they chose to cover, students engaged with authentic texts from major news organizations. These texts had not been adapted to suit English language learners, nor had the content been checked for relevance. Students made sense of the language of authentic texts and determined which articles were relevant to their projects. The interviews added a further element of realism. Students found and interviewed an English speaker who was otherwise unrelated to their studies at the Preparation Center for Languages and Mathematics. They made sense of the authentic language produced by the interviewee and assessed the content. As was true of the news articles, the content provided by the interviewees was of variable quality. Negotiating with other group members in order to assess the texts and interviews added an element of realism to the project.

To a lesser extent, this project also met the criterion of driving questions. According to Thomas (2000), PBL projects should be based around questions that are intrinsically motivating to students. Students at the Preparation Center for Languages and Mathematics are well aware that the ASEAN Economic Community will have been integrated by the time they graduate from Mahidol University International College and that this integration will have a significant impact on several aspects of their lives. That being said, some groups seemed less enthusiastic than others.

The only criterion of PBL that is not met is centrality. Although the project is a significant element of the curriculum, it is not essential. The majority of the curriculum is still centered around other approaches to teaching and learning, approaches which involve more traditional modes of interaction between teachers and students. Although this criterion is not met at this time, the overall success of the project shows that further PBL projects could be integrated into the curriculum in the future.

Conclusion

Overall, the first iteration of this project was a success. The way the students went about researching and gathering information and the way they presented this information, both written and oral, showed that certain aspects of the Project Based Learning model were achieved. The areas of constructive investigations, autonomy and realism were achieved by the students undertaking this project. The project highlights how technology, which is pervasive in our society, can be utilized to achieve educational outcomes that are fulfilling for students and teachers alike.

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MMTT System: A Potential for Improved Teaching and Learning

Abdul Rashid Ahmadi, Kobe Institute of Computing, Japan
Samiullah Paracha, Kobe Insitute of Computing, Japan
Hamidullah Sokout, Kobe Institute of Computing, Japan

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Abstract
Conventional educational practices, do not offer all the required skills for teachers to successfully survive in today's workplace. Due to poor professional training, a big gap exists across the curriculum plan and the teacher practices in the classroom. As such, raising the quality of teaching through ICT-rich training and professional development of teachers should be an urgent priority.

'Mobile Learning', in that vein, is an increasingly growing field of educational research and practice across schools and work places. In this paper, we propose a novel Mobile Mediated Teacher Training (MMTT) system that will equip classroom teachers with resources and skills to effectively teach the subject matter content according to the standards of the new curriculum.

MMTT is basically a mobile app that resembles a web forum; however, it is potentially capable of storing data both in the local content provider and the central database as national resource for future usage. The MMTT system is comprised of: (i) an interface for the school teacher; (ii) a local content provider; (iii) an interface for the board of education to address teacher's queries; (iv) a central data repository; and (v) a public interface.

To establish that MMTT will display neither functional nor performance failure, the evaluation strategy is based on formal observation of users interacting with MMTT system followed by questionnaires and structured interviews. We hope that this novel mobile learning approach will help elementary and secondary school teachers, to align their skills with the new curriculum demands and the students' needs.

Keywords: Mobile Mediated Teacher Training; Classroom Teacher; Information Communication Technology; Mobile app;

1. Background

Educational system in Afghanistan dramatically improved after collapse of "Taliban" regime, particularly with in school enrolment and the availability of educational facilities; however the quality and the facilities inequitably distributed across the country. Even with the growing number of schools, there are still not enough qualified and motivated teachers to teach and deliver the education.

Education is fundamental for development, peace, stability and good governance. Updating curriculums, teacher training, libraries, preparing laboratories, experiment tools and equipping classrooms with new and innovative technology are the most crucial and essential part of modern schools and informational society.

The curriculum need to be updated and revise regularly to address the emerging of education needs. Curriculums development or revise, even a part of it needs a national teacher training program because, school teachers are not expert or specialist of teaching a subject. Most of the teacher in rural are not qualified and classes being taught by teacher with minimal professional teaching qualification and their educational attainment below grade 12. There for, Curriculums development or revise, even updating part of it needs a national teacher training program. Conducting a national teacher training for each change in curriculums need too much budget and take time to complete. Especially the rural areas which the program will taken after finishing the urban areas, the gaps between releasing new curriculums and completion of teacher training program will badly affect the student knowledge and may have undesirable impact on student results.

Ministry of education of Afghanistan has planned to achieve the gender equality by 2015, with a focus on full and equal access of girls in basic education of good quality. Today, 40 percent of total student (or 9.7) are girls (MoE Afghanistan, 2013). The percentage of girls enrolment show of improvement in gender equality because, in 2001, girls were not allowed to go to formal schools, but still need to accelerate this procedure. The shortage of female teachers is one of the main obstacles to increasing girls' enrolment, because Afghan parents indicate that qualified female teachers are a pre-condition for enrolment and progression of their girls through the education system. Although, the number of teacher increased from 20,700 to over 207 thousands, but still only 34% are female (MoE Afghanistan, 2013). Therefore, for providing primary education for girls in Afghanistan it's urgent to train and hire new female teachers. Female teacher will play a great and encouraging role for girl's enrolment. For developing existing teacher's teaching skill there are barriers to avoid the training programs especially for women. Teacher Training Colleges are not exist everywhere to serve the local teachers, so it's need to travel them to other places to participate in training sessions. For women leaving their family and going alone to other places is not easy in Afghanistan, due to cultural background.

Textbooks were designed, developed and printed in good quality and expected to be reused by three generations of students before being replaced. But the current experience proves the opposite of prospection. Partly as a result many students, particularly in remote rural areas, do not have access to a full set of textbooks on time. There are several challenges that stand in the way of providing all students with full sets of textbooks and additional reading material. These include insufficient financial budget allocations for printing and distributing textbooks, limited logistical capacity to distribute textbooks on time, and security problem do deliver the educational materials on time.

Government of Afghanistan develops National Educational Strategic Plan (NESP) to overcome the problem by targets both equitable access to education and quality of education delivered and received. NESP give the second priority to upgrade teacher's skill and qualifications to improve their teaching skill. The plan is to establish a system to improve the capacity of teacher trainers and administrative staff of Teacher Training Colleges and thereby increase students' learning achievements. By increasing the capacity of schools Afghan government have planned to achieve the Millennium Development Goal by 2020(MoE Afghanistan, 2010).

2. Related Work

This section briefly surveys three type of mobile learning service: (i) mobile for curriculums delivery; (ii) mentoring through mobile or mobile peer learning; and (iii) collaborative learning. For each category we review the major similarity and difference of MMTT system and exiting initiatives. From existing systems we are going to do comparative analysis of Radical Learning (Graham, 2012) and MXit platform in South Africa, Road to Reading program in Mali(M. Davis, 2012) as initiatives for curriculums delivery, Teaching Biology project (2011) in South Africa and SMS Education Management Application in Kenya as peer, collaborative and management mobile application in education.

In this part we compare our proposed system with Radical for Learning and Road to Reading systems for curriculums delivery functionality. The major difference between MMTT system and Radical for Learning is that whilst it has the strength of providing daily lesson plans for teachers, as well as keeping parent up to date from their child schoolwork by providing weekly schedule, but still it's limited from Grade R to Grade 3. Road to Reading aims to improve teacher quality of instruction by providing access to lesson plans through smart phone. The lesson in reading and science was designed and posted on the web in student-centred approach. Teachers and directors are trained to use GPRS enabled phones to download lesson and feedback forms on a one-to-one basis in formal classroom setting and informally outside of school hours. The teachers were able to submit the feedback through SMS. The Road to Reading was a good enthusiasm and pedagogical success, but, it was limited to support the primary school teachers. The program focused on empowering teachers to teach literacy. For accessing Radical for Learning and Road to Reading user need to use web browsers.

The second and most important part of the MMTT system is a specific function for peer learning between teacher and dedicated team of tutor in Ministry of Education and collaborative learning among teacher. Collaborative function is communication among teachers to solve the problem in collaboration and for information sharing for management purpose. In this manner we can compare it with Teaching Biology Project in South Africa and SMS Education Management Application (SEMA) in Kenya.

Teaching Biology Project (TBP) has the functionality of collaborative through the making network of teachers in range of school, but this collaboration was in blended learning not totally online learning. TBP use SMS to send the administrative and content specific message for teachers. For online chatting among teacher used MXit, but problem encountered because, MXit does not compatible with all type of phones (Teaching Biology Project, 2011).

SMS Education Management Application (SEMA) is same as MMTT system in information sharing, communication between teachers and Ministry of Education officials. But, the system was mostly used for collecting information from schools for ministry. And another limitation was using SMS which is limit to 160 characters (UNESCO, 2012).

3. Theoretical Foundation

Mobile learning with the unique and distinctive feature of portability function, offer the ability to create and do the activities and situation in different places, outside the classroom and not only in front of the computer. Mobile learning technology provide rich digital tools with connectivity for sharing, creating and using artefacts and visualization that can be use outside and inside different learning environment. These are idea for changing from machine-centred automation to user-centred services. People are interacting with other people and to machine. With this idea we can make changes on existing idea of ICT in Education (Shneiderman, 2002).

3.1 Collaboration and Learning

The study of collaboration has to be realized way back to diverse theories of cognition and psychological development. These theories explore how different types of interaction between peers and experts are integral to learning and cognation. Two type of peer learning, which are peer-to-peer interactions between "equals", and peer-to-mentor interaction. The Piagetian school support peer-to-peer interaction which result in cognitive restructuring, while Vygotskian theories can seen to support a peer-to-mentor interaction, because the mentor is more able partner, and can facilitate the development for knowledge and skill by scaffolding activities (Price et al., 2003). Both schools support social interaction as a key role in learning, while Vygotsky's work introduced a wider theoretical development of cognitive science with combination of psychology and anthropology to form the basis of situated learning (Lave & Wenger, 1991). "*Situated learning is a general theory of knowledge acquisition based on the notion that learning (stable, persisting changes in knowledge, skills and behavior) occurs in the context of authentic activities*" (Lave & Wenger, 1991).

In this paper I have focused on the constructivist and constructionims view of learning by supporting and enhancing collaboration among group of teacher with the use of technology.

3.2 Constructivism

Constructivism argued that people are not just passive receptacle of information, but they can construct their own knowledge base on their past experiences and reflection of those experiences. For Jean Piaget (1932), knowledge is "*to understand is to invent"* meaning that knowledge is not a segment of information to be retrieved, memorized and later applied. But, it is achievable via interaction with environment and conversation with people. Learning can be a social process of collaborative between people and support of technologies. Brown and Duguid (2000) have argued the idea of shifting view of technology from cognitive delivery system to being considered as a tool to support collaborative conversations, about specific topic. The constructivism considered as a process of learning which learner actively construct or build a new idea or concept instead rather than completely relying on knowledge of cognitive delivery.

3.3 Constructionism

Constructionism is a success factor of constructivism (BinSubaih, 2007). Although inspired by the constructivist theory that individual learners construct mental models to understand the world around them. The constructionist postulate that learning can happen most effectively when people are also active in making tangible objects in the real world. Therefore, constructionism is connected with experiential learning, and builds theory of constructivism. The important factor in constructionim is that learners reinforced learning when they have to explain their tangible object to others and that force to think hard about the content and think about the best ways to teach it others.

3.4 **Experiential Learning**

Another widely used theory in education is experiential learning which implies learning by doing (BinSubaih, 2007). Kolb describe experiential learning as where learners "*must be able to involve themselves fully, openly, and without bias in new experiences; they must be able to observe and reflect on these experiences from many perspectives; they must be able to create concepts that integrate their observations in to logically sound theories; and they must be able to use these theories to make decisions and solve problems*" (Feinstein et al., 2002). Experiential learning is a cycle based on four elements: (i) concrete experience; (ii) reflective observation; (iii) abstract conceptualization; and (iv) active experimentation.

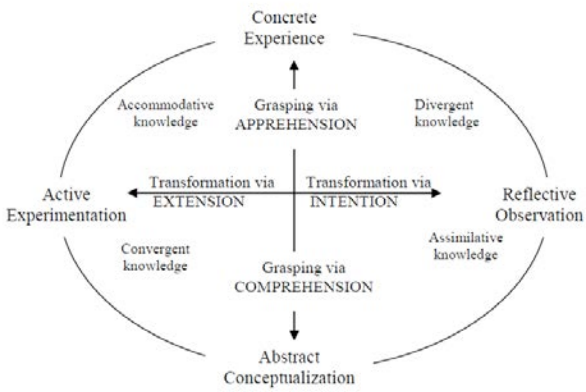

Figure 3.1: Kolb's experiential learning cycle (Chee, 2002)

According to Figure 3.1, this cycle begins with leaner's experience which is followed by a reflection phase. The learners make inference of what they have experienced, leading to future actions in which the students experiment with different behaviours.

This starts a new cycle as students gain new experiences based on their experimentation. Although this continuum is presented as a cycle, the steps may occur in nearly any order. This learning cycle involves both concrete components (steps “i” and “iv”) and conceptual features (steps “ii” and “iii”), which involve a variety of cognitive and effective behaviours.

4. MMTT System

Mobile Mediated Teacher Training (MMTT) system is a mobile learning system. Mobile leaning is the use of mobile or portable devices for learning purpose anytime anywhere. Mobile learning or M-learning is new area in education and it’s a type of e-learning or ICT in education.

4.1 Why Mobile Learning

Due to, problems in field of education in Afghanistan, we are proposing a mobile learning system. For developing countries ICTs have the potential for increasing access to and improving the relevance and quality of education. ICT is a great tool for acquisition and absorption of knowledge, offering developing countries creative opportunities to enhance education systems, and widen the range of opportunities for business and the poor (World Bank, 1998).

One defining feature of ICTs is their ability to transcend time and space. Pea and Maldonado (2006) summarized seven features of handheld devices useful for formal and informal education: “portability, small screen size, computing power (immediate staring up), diverse communication networks, a broad range of applications, data synchronization across computer, and stylus input device”. The most important feature of mobile learning with is very effect and useful for learning is portability and computing power, which this features distinguish the handheld devices from other emerging technology.

The access level of Information and Communication Technology (ICTs) is different from developing countries to developed countries. People in the rich countries have the luxury of both wired and wireless technology, of both personal computers (PCs) and smart phones. Developing countries tend to rely mainly on mobile networks, and even the numbers of phones are already increased than PCs. Afghanistan as a developing country mobile usage and service are more popular than PC or other technologies. Nowadays, the 89 % of population in Afghanistan covered by mobile services and mobile penetration is 80 % of total population (MCIT Afghanistan, 2014).

The wide range usage of mobile in Afghanistan, portability of mobile devices, and computing of power of mobile devices are enabler technologies for mobile learning in Afghanistan.

4.2 MMTT System Functionalities

MMTT system is an ICT based learning system which consists of individual mobile learning, collaborative and peer learning system. MMTT system impact is Improving quality of educational system through improving teachers teaching skills as specified in "program 2" of National Educational Strategic Plan (NESP) for Afghanistan; free from challenges of ethnic, location and gender (NESP, 2010).

Individual learning or curriculum delivery will enable teachers to no longer have relied solely on printed textbooks and other physical material available in limited quantity in libraries for the educational needs. With the MMTT system teacher can access the learning materials in almost every subject anytime anywhere. Unlimited number of teacher have access the system at same time. Many schools in developing countries and even some in developed countries that have limited and outdated library resources. Afghanistan is unable to provide on time and update textbook for teacher and for libraries due to security and financial problem. Hence, providing updated textbook for all over Afghanistan in the same time via mobile technology is a solution to overcome the problems.

Collaborative and peer learning the second and most important functionality of MMTT system. Mobile technology offers new dimensions to support and promote useful learning activities that include features such connectivity, context sensitivity and interactivity (Klopfer et al., 2002, Sharples et al., 2008). Mobility can offer opportunities to promote and enhance collaboration by enabling learners to involve in activities from different locations. These different settings provide innovative way for teachers to interactively learn from mobile devices independent of location and PC screen. The important key factor of the collaborative learning systems are the creation, action and experience sharing of learners (Spikol, 2008).

After releasing new curriculums by Ministry of education, most of the private school hired a tutor for each subject to teach and advice their teachers. Hiring tutors are very expensive for Ministry of Education, because public schools in Afghanistan are financially depending on Ministry of education. Tutoring via mobile is financially a best solution. Teacher training by tutor is one of the best training opportunities for learners and especially for in-service teachers. MMTT system is supporting tutoring from a central place to support all teachers in all over Afghanistan. Teacher can pose the question on forum. the tutor are responsible for answering the question and giving additional advice for teachers. The system is intelligent to send question of the right tutor. The tutors are categorized according to teaching subject and educational levels.

Collaboration can enhance the learning environment. Collaboration in MMTT system used for two purpose: (i)for learning purpose; and (ii) management purpose. Expert teachers can help others by sharing their experience. Teacher can share their problem with their colleges without need to be inside the wall of schools. In second part teacher and management can share information about schedule changes, meeting and other managerial process.

5. The Architecture

MMTT system is a mobile application using client-server architecture. It has been developed using Web Services. Thus, the system is both platform and language independent. As shown in Figure 5.1, the system has a two major component: (i) client side application; and (ii) server side application. The client side application is a mobile application used to developed HTML5 and JavaScript.

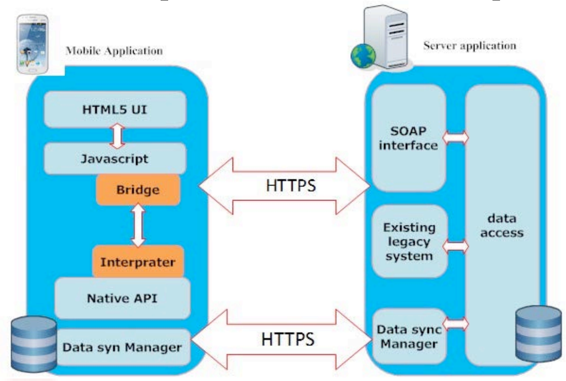

Figure 5.1: MMTT system client server architecture

Basically it contains a GUI to facilitate teachers to select the subject, chapter, text area to type the question and this application facilitate teachers to download the teaching materials and share information to each other between school teachers. Client application is equipped with local database to store the exchanged data. Local database will help to save data if the user is out of network coverage area.

Server side application has been written in JSP and contains a database and SOAP interface. Sever application is access able through different operating system due to use the SOAP interface. Database in server side application have store the exchange data between teacher and their tutors and teaching materials. Communication between client and server applications is performed by using Web Services. Web services can be seen as an application programming interfaces (API) exported across Internet. It lets clients to execute code on the servers, no matter how is developed each part (client or server).

MMTT system is mobile Intelligent Tutoring System (ITS). ITS are computer based instructional systems with educational content models. They specify teaching strategies and specify what to teach and how to teach (S. Ohesson, 1989). MMTT system determines learner's level in according to characteristic like teaching level, skills.

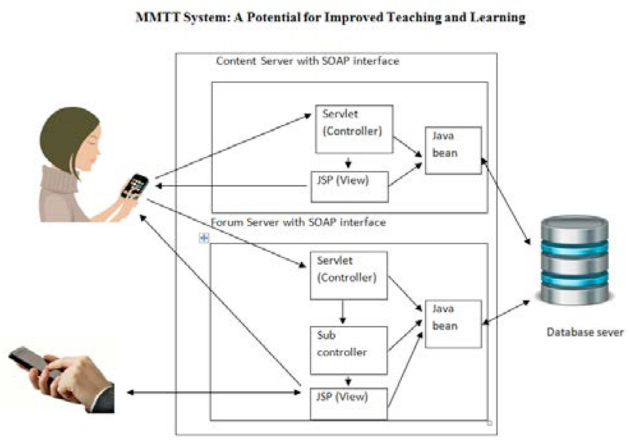

Figure 5.2: The architecture of propose system (MMTT system)

Tutors teach educational content corresponding to teaching levels and skills in proper method for teachers. MMTT system will divide the tutors according to their expertise. Teachers are also dividing according to subject they are teaching. The system will made decision to send the question for tutor to receive a proper answer and support. There are no need to teacher remember about the tutors and their channels of communication. Level of learner may be changed while getting promotion or and according to feedback from learner during training.

The system will recommend some reading and educational content according to the level of learners. The tutors help teacher to learn by the best way in MMTT system. In collaborative manner system is also intelligent enough. Collaboration in proposed system is basically one-to-many communications. The sender of information has control to choose the destination of messaged according to their category. Teachers are categorized according to their level of education attainment, subject of teaching, teaching skill and some other characteristics.

6. Evaluation Strategy

The investigation will use a combination of qualitative and quantitative research methods however; our proposed evaluation strategy can be best described as a qualitative framework with quantitative components. For testing the hypothesis we are looking for the cause, effect and prediction-making to analyse user-system modes of interaction. The type of data collection will be qualitative including interviews, participant observations, questionnaires etc. Around 40-50 in-service teachers (male and females in equal proportion) from different parts (urban and rural) of Afghanistan will participate in the evaluation of the MMTT prototype. The minimum age limit will be 20 years old and the evaluation will be carried out in four public schools in Kabul and Ghazni provinces.
Together with participants' observation and questionnaires, informal semi-structured interviews will be used to capture participants' beliefs, feelings, perceptions, motivations and behaviours in relation to MMTT. An iterative prototyping approach will be used with usability evaluation occurring as part of that iteration. Our evaluation strategy will be based on formal observation of the user interaction and the framework's conformity with *Nielson's Set of Usability Heuristics* (Nielson 1993; 1994; 2000 and 2002).

7. Future Work

The purpose of MMTT system is to train and support in service teachers through mobile devices which are widely used in Afghanistan. M-learning or mobile service experience is continually demanding by learners. Due to, future improvement of ICT and educational theorise, MMTT system in this stage will not properly answer all demand of learners. The past evolution of ICT in education can prove my claim. Now MMTT system provides teaching material for teachers and it's also source of tutoring and coaching for in-service teachers. This system also provides a way of learning from each other in collaborative manner.

One another learning method is learning through experience or experiential learning. This method is most effective for teachers. Now, most of Afghani's public schools are facing lake of labs and lab materials. As mentioned, most of the classes are being taught by unprofessional teachers and their educational background is below grad 12th. It means the teachers themselves didn't have the experience of lab and experiment of textbooks. They are unable to teach class exercises effectively for student. Due to, expensive lab and lab mistrials, it seems they would not equipped in near future. Therefore, in next version of MMTT system, we want to add the virtual lab functionality. Virtual lab in mobile format is a cost effective and easy to deliver for teachers and students. System update and upgrade is easy. With this functionally we want to teach the teachers through experiential learning. Teacher are fully and openly involve in experiences, they observing and reflecting their experience in many perspectives; after that teachers will create new concept from their observation and then teach for their students.

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The Barriers of Implementing M-Learning

Hamadah Alsadoon, Al Baha University, Saudi Arabia
Elham Alsadoon, King Saud University, Saudi Arabia

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Abstract

The purpose of this study was to investigate the obstacles that from the students' point of view might prevent implementing mobile phones in learning and teaching. A web-based survey was used to collect data from 237 students at King Saud University in the first semester of 2012. The findings indicate that the most important concerns were that students could find a way to cheat using the mobile devices and these devices could distract students.

Introduction

Mobile devices have penetrated our lives and have become the devices most used during the day. "Mobile devices have surpassed the adoption of new technologies" (Al Hosni, Ali & Ashrafi, 2010, p. 787). Many activities can now be done using them -- users can make and receive calls, navigate the internet, take pictures, record or play videos and audios, translate a word, locate a place, check a price, play a game, or fly in a virtual world.

Our students grow up surrounded by mobile devices which go with them everywhere. These students are characterized as being "digitally literate, 'always on', mobile, experimental and community oriented" (Cobcrof et al., 2006, p. 3). This phenomenon drew the attention of educators wanting to revise their services and respond to the current trend toward mobile learning (Keskin & Metcalf, 2011). Mobile learning is "[l]earning that happens across locations, or that takes advantage of learning opportunities offered by portable technologies" (Chuang, 2009, p. 51).

Statement of the Problem

According to Al Hosni et al. (2010), "Middle East is considered as the second fastest growing region after the US and Canada in mobile and telecommunication adoption. The two countries which are considered as the biggest mobile markets within the region are, Saudi Arabia and Iran" (p. 787). Students in Saudi Arabia, no matter their age, socioeconomic status or gender, carry their mobile phones with them everywhere (Al- Fahad, 2009). A few studies have been conducted on the use of mobile phones in Saudi education and revealed promising expectations of such use. However, the use of mobile phones in Saudi universities is still in its early stage; thus, there is a need to examine the obstacles of implementing such devices in higher education.

Research Questions

This paper tried to determine the obstacles, from the students' point of view, of implementing mobile learning in Saudi universities, using the following research question: What are the students' perceptions of the barriers to use of mobile phones in Saudi universities?

Significance of the Study

The results of this paper should guide faculty and curriculum designers in incorporating mobile phones in education. Since mobile learning is in the trial stage in Saudi education, revealing any potential barriers will help in smoothing the actual use of mobile phones and will save effort, time, and money spent to overcome such barriers.

Obstacles to Using Mobile Phones in Education

Smith and Cap (2007) stated that the use of mobile phones in education involves mixing elements of finance, design, development, training, hardware and software. Each element carries its own challenges. These challenges can be divided into three categories: machine issues, educational issues, and personal issues.

Machine issues

Small screen. One of the main drawbacks to using mobile phones in learning is the small screen (Khaddage, & Knezek, 2011; Corlett, Sharples, Bull & Chan, 2005; McGreen & Arnedillo Sanchez, 2005 a; Roschelle, 2003; Keegan, 2002). This problem affects the content developer and the students (Popat & Stead, 2005).

The content developer must design the learning in small chunks or pieces and the students will have to scroll up and down to see the content, which could be bothersome.

Limited input options. Another problem of using mobile phones in education is the limited input options (Khaddage, & Knezek, 2011; Roschelle, 2003). Entering text using the mobile phone keypad can be difficult and slow so it might limit the type of learning activities used with such a device (Corlett et al., 2005; McGreen & Arnedillo Sanchez, 2005, a).

Limited memory capacity. The limited memory available on mobile phones could be a problem when using them in education (Khaddage, & Knezek, 2011; Keegan, 2002; Al-Khamaysah, Zmijewska, Lawrence & Culjak 2007). Because students download materials on their mobile phones without removing what they already have they run out of space to save additional learning contents.

The quality of video and audio. The low resolution of video or audio playing on a mobile phone (Keegan, 2002) could limit its use for learning activities.

Educational issues

Lack of interaction between teachers and students. Some research has found that students don't like using mobile phone in learning because of "the lack of face-to-face interaction with the instructor and other students, difficult to contact the instructor about questions, and the problem of concentrating on coursework when not physically in a classroom" (Polat & Lee, 2006, p. 18).

Distraction. When students bring their mobile phones inside the classroom, they lack focus (Pietrzyk et al., 2011). Several studies found that students use their mobile phones for non-academic purposes. For example, they chat with friends, browse the internet, or play games (Hammer, Ronen, Sharon, Lankry, Huberman, and Zamtsov, 2010).

Cheating. The use of mobile phones inside the classroom raised the concern of cheating (Pietrzyk et al., 2011, Polat & Lee, 2006). "[S]tudents have stopped hiding crib sheets and whispering to their neighbors – and started swapping test answers by cellphone, camera phone and PDA" (Etter, 2004, p. 17).

Classroom management. When implementing mobile phones for learning, teachers might have to spend a significant amount of time managing the use of these technologies and fixing technical problems rather than working on learning activities.

Privacy. The use of mobile phones with cameras in the classroom raised the concern of privacy. Students might misuse their phones camera by taking photos without permission or taking unfavorable photos. Dunphy, Prendergast and Scolai (2003) stated that there are two important features about the digital photos taken by mobile phones. First, sharing them is easy, fast and cost free. Second, they don't disappear over time.

Methodology

A Web-based questionnaire was developed by the researcher to collect data about the students' perceptions of the barriers that prevent using mobile phones in education It included 12 closed-ended items examining the barriers (Appendix A). Cronbach's Alpha Coefficient for internal consistency was .8. Other demographic data, such as gender, age, and ownership of smartphones, were collected. A random sample was selected from the College of Education at King Saud University. There were 237 participants, 87 males and 150 females, with ages ranging from 18 to 30. All participants owned mobile phones and almost all of which (98%) were smartphones. Descriptive analysis was used to analyze the data. Also T-test for independent groups was used to examine whether there was a significant difference between males and females in their perception of the obstacles and the result indicated no difference.

Findings

Machine issues. Although some studies found the small screen size to be problematic when used in education (Khaddage, & Knezek, 2011; Corlett, Sharples, Bull & Chan, 2005; McGreen & Arnedillo Sanchez, 2005 a; Roschelle, 2003; Keegan, 2002), this study did not reveal such findings. Technological development solved this problem. Smart phones now have screens large enough to read comfortably and moving fingers on the touch screen can enlarge it. Entering the text from the phone keypad was not perceived as an obstacle by the participants in this study while other studies revealed it as an obstacle Corlett et al. (2005), Houser et al. (2002), McGreen and Arnedillo Sanchez (2005 a) and Roschelle (2003). The touching keyboard could overcome such difficulty. Another obstacle found in the literature but not confirmed in this study is the quality of a media playing on a phone. Keegan (2002) and Houser et al. (2002) found poor quality to be a limitation of using the mobile phone in education. Some studies found the mobile phone to be an unreliable device in terms of saving data Corlett et al. (2005) and Wentzel, Lammeren, Molendijk, Bruin & Wagtendonk (2006) This study also found that unreliability to be an obstacle for using mobile phones in education.

Educational issues. The interaction between instructors and students in this study was found to be an important obstacle to using mobile phones in education, which is consistent with what Polat and Lee (2006) and Roschelle (2003) found. The possibility of using mobile phones for cheating also was found to be an important barrier to using them in education. This result also was consistent with other studies (Polat & Lee, 2006; Campbell, 2006). The technical problems that occur when using mobile phones in the classroom were found to be another challenge to implementing them in learning, which is consistent with another study (Peng et al. and Hammer et al., 2010). Distraction from mobile phones being used for purposes other than learning was considered an obstacle in this study as it was in other studies (McGreen & Arnedillo Sanchez, 2005b; Burns & Lohenry, 2010; Hammer, et al., 2010; Campbell, 2006). As McGreen and Arnedillo Sanchez (2005) believed, this study found that privacy is another challenge must be considered when using mobile phones in education.

Conclusion

The findings of this study suggested that development of mobile phones has overcome the technical problems that could have prevented using them in education. The Smart phones that are now in most students' hands solved the technical issues that concern educators, but some educational issues remain unsolved. Their potential to distract students and to facilitate cheating were the most important concerns that might prevent using them in education. Compromising privacy was another unsolved concern.

Recommendations

It is recommended that researchers consider the educational concerns of using mobile phones in education such as their potential to distract students, to facilitate cheating and to comprise privacy and examine solutions to overcome such challenges. Another recommendation is to repeat the study with faculty and compare the results to see whether the faculty perceptions about the use of mobile phones in education differ from those of the students.

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Appendix A

Close-ended Items of the Survey

1- I believe that I can easily read text from my cell phone.

2- I believe that information saved on my cell can be easily lost.

3- I believe that I can save large files on my cell phone.

4- I believe that typing text on my cell phone keypad is difficult.

5- I believe that the quality of the video played on my cell phone is good

6- I believe that the quality of the audio played on my cell phone is good.

7-I believe that the use of cell phones in learning makes interacting with instructors difficult.

8-I believe students can use their cell phones for cheating

9-I believe that instructors will face some technical problems when using cell phones in their teaching.

10- I believe that using cell phones in classrooms will distract students.

11- I believe that the use of the camera in cell phones in classrooms affects the privacy of students.

12- Overall, there are barriers that prevent the use of cell phones in education.

Group Texting in Higher Education, or Not? An Experiment

Meng-Fen Grace Lin, University of Hawaii at Manoa, USA

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Abstract
This research examined issues of using group SMS (short message service) as part of a formal graduate class. Data were gathered through assignments, SMS messages, and focus groups from 15 graduate students enrolled in a seminar class during Fall 2013. Results indicated that SMS might be ideal for reminder purposes but was not appropriate for in-depth discussions. Issues surfaced around interactions such as following conversations, responding to specific comments, and personal boundaries.

Introduction

Just look around; you see people using cell phones while walking, eating, and even driving. By January 2014, 55% of American adults had smartphones. Of those, 29% say it is "something they can't imagine living without." (Mobile Technology Fact Sheet, 2013). Nearly 80% of American adults use phones to text. American young adults "are the heaviest users of text messaging, [averaging] 87.7 text messages on a normal day" (Heimlich, 2011). That proportion reached 97% in 2012 (Heimlich, 2012). How cool would it be if educators could design learning activities utilizing something as simple as texting, something a large number of Americans do daily?

Not everyone is thrilled about this. Many worry that texting is killing the English language. Purcell and colleagues (2013) detailed how digital tools (including texting) have negatively impacted student writing. Yet, Powell and Dixon (2011) argued that text messaging exposure actually has a positive effect on adults' spelling. Does texting have its place in education? What are pedagogical strategies when using texting in formal education? This research set out to answer these questions.

Context of the Research

During Fall 2013, the author taught a graduate seminar on Mobile Learning, including a unit titled "Texting in education, or Not?" At the beginning of the semester, a free texting service called Celly was incorporated into the unit, and a class "cell" was created. Students created accounts, joined the class cell, and optionally linked their cell phone with the service. Users of Celly can text message from a laptop's browser, from a Celly smartphone app, or through their cell phone's own texting service. The class cell was created for group texting allowing members to send texts to the entire group.

The three-week "texting" unit included readings, discussion, and a focus group session on the affordances and challenges after using group texting during this unit. One assignment asked students to discuss a reading using Celly exclusively. Participants included15 graduate students enrolled in the class, one teaching assistant and the instructor.

Over 300 messages were exchanged on Celly between August 27 and December 9, 2013. Nine were excluded due to enrollment or technology issues, leaving 300 messages for final content analysis. Based on a grounded theory framework (Glaser & Strauss, 1967), messages were coded, allowing relevant categories to emerge.

Findings

Three categories of messages were posted: assignment-related (213 or 71%), social-related (59 or 20%), and thank-you notes (28 or 9%). Social-related messages were voluntary texts unrelated to class activities or assignments. For example, a text asking, "who can come early and help arrange tables…?" elicited the response, "Already here." In another example, a travelling student texted, "Testing to see if I can Celly from Japan!" and received peer responses. Thank-you notes were texts sent by students after guest speaker presentations.

1. Confined to class requirements. Assignment-related messages accounted for most of the texts. Of those texts, 6% (14) were help-seeking or assisting, such as "Where is the shared Dropbox folder again?" or "How did I lose two para I was typing?" Administrative tasks (announcements or reminders) accounted for 10% (21) in this category. The instructor twice used Celly as a student response system to obtain immediate student feedback. There were 15% (31) texts in this category. Most texts (146 or 69%) were sent as partial fulfilment of assignments. More than 70% of the semester's Celly texts (210) were sent while the texting learning unit was in progress. Although students were free to use texting as they wished, most did not outside of required class activities.

2. Group texting not appropriate for discussion purpose. During the semester, two people (including the instructor) sent more than 40 text messages. Three people (including the teaching assistant) sent more than 30, five people sent more than 20, while 7 people sent 10 or fewer messages. While many may use one-on-one texting, group texting may be a new experience. Focus group data revealed that most (80%) students felt that "large group communication is not well supported." Similarly, 80% of students felt that group texting made it "hard to join the conversation once [they] miss it," as messages appeared in linear form, and also that it was difficult to "direct responses to specific comments" (90%). While everyone appreciated the short reminders and announcements, students struggled to participate in discussions in a time efficient manner.

3. Issues on personal boundaries. The days when the most messages were exchanged were Tuesday October 1 (45 texts), Sunday September 22 (32 texts), and Saturday September 21 (28 texts). The class met on Tuesdays and students were required to complete assignments before class time at 4:30pm. This also brought up issues about boundaries. One student lamented on Saturday, September 21, "Is there a way to turn this off temporarily? … I'm out, and you guys are killing my battery." Another said texts, "... can be annoying…when I don't expect or want them. … encroachment of educational usage on non-educational time."

Recommendations

The data showed a lack of reciprocal conversations among students. While texting provided a platform for information exchange, this study revealed issues when implementing group text messaging in formal education. We recommend the following strategies when implementing group texting.

1. Discuss and set up rules with students regarding personal boundaries and expectations. Discussions could include topics such as personal versus education time and the use of device, appropriate etiquettes regarding time of day, day of the week, and expectations on messages response time.

2. Scaffold the use of group texting. In the linear environment of group texting, engaging conversations can still happen when multiple people participate. Discuss strategies to keep on track, and encourage jumping in, to respond to an on-going group chat.

3. Divide into smaller groups. Divide the class further into smaller discussion groups to allow more fluid, spontaneous, and conversational interactions.

Future research

We expect to follow the above three recommendation and collect more data in fall 2014 to further expand the research and continue the theory-building process.

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Optical Mark Reading: Using QR Code for Automatic Data Entry in Questionnaire

Kanjana Boonim, Institute of Physical Education Bangkok Campus, Thailand
Parinya Sanguansat, Panyapiwat Institute of Management, Thailand

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Abstract
The automatic data entry systems for task analysis of closed ended questionnaire are processed by digital image processing. The knowledge and technique of digital image process are used in system development. And applying office supplies is the scanner for data entry which is received from survey questionnaire, and then the conclusions can be used for task statistical analysis in further procedure. The advantage of this system is reduction time, simplicity for result, convenience and rapidity. In limitation, the original system is the error from data entry by people. Therefore, we proposed our framework which consisting of 4 steps: 1) Take the QR code which is a 2D bar codes for detect position of questionnaire pattern and alignment 2) Improve the image input by morphological 3) Check the answer position by the black bar and 4) Calculate pixel density of answer position in questionnaire. The experimental results obtained from three sample data are about 300 data. Most of the samples are the students at Institute of Physical Education Bangkok Campus. By using questionnaires to assess the students' satisfaction with the learning systems, the results of the experiments by checking the accuracy of the data are 80 percent. Therefore, this system development is reliable and can make the users convenient. For limitation in this study, the questionnaire is a document that must have explicit QR code. The respondents had to paint all fields of the query.

Keywords: Optical Mask Reading; QR Code; Automatic Data Entry; Questionnaire

1. Introduction

A traditional data input technique and an important human computer interaction technique is
Optical Mark Reading (OMR) which is widely used in education testing. OMR also called “mark sensing” is a technique to sense the presence or absence of marks by recognizing their depth on sheet [1, 2]. The punched card technology are developed OMR. Previous work, OMR, which uses the light for detecting the position of graphite on the answer sheet, is very big and inconvenient to use. For desktop size OMR is available around in 1970 [3]. For software type of OMR, which based on image processing techniques, is introduced in 1999 [4]. The feature of this system is the histogram of the number of pixels in horizontal and vertical directions of the binary image. This feature is used to train the system for recognizing the mark. After that the OMR software was developed in Delphi [5] and the rotation invariant OMR was proposed in [6] by placing L-sharp symbol on the answer sheet for alignment. However, the problems about the interference and the parameter adjusting make these previous works are not robust to noise and other changes.

The important one task of the research is to collect data that obtain from survey after that data are used for data analysis. Typically, data collection requires people to data entry conclusions. However, these work usually error occur many time. The error of original system caused data entry which impact incorrect summarizes. Majority, OMR used only multiple-choice test and the sheets of OMR are printed by special printing machine on the special paper. That makes the users cannot modify the answer sheet by themselves and have the extra cost.

In this paper, our questionnaire template can design and modify by user, thus it are comfortable and rapidly. Our method is simplicity and cheap cost of hardware and materials by applying used office supplies. Therefore, normal scanner and camera are used to data entry that make data collection are accuracy more than human are data entry. Our algorithm used QR code for alignment image input which receives from normal scanner or camera. The scanned of these questionnaire sheets were input to the system by the scanner. After that, the questionnaire scanned to improve by the morphological and detect the answer position of questionnaire by the black bar. Final results, counting the questionnaire answer are calculated pixel density then exported in MS-Excel file.

The rest of this paper is structured as follows: the next section gives an overview of our system. Proposed method is described in Section 3. In section 4, we present experimental results and conclusion is shown in Section 5.

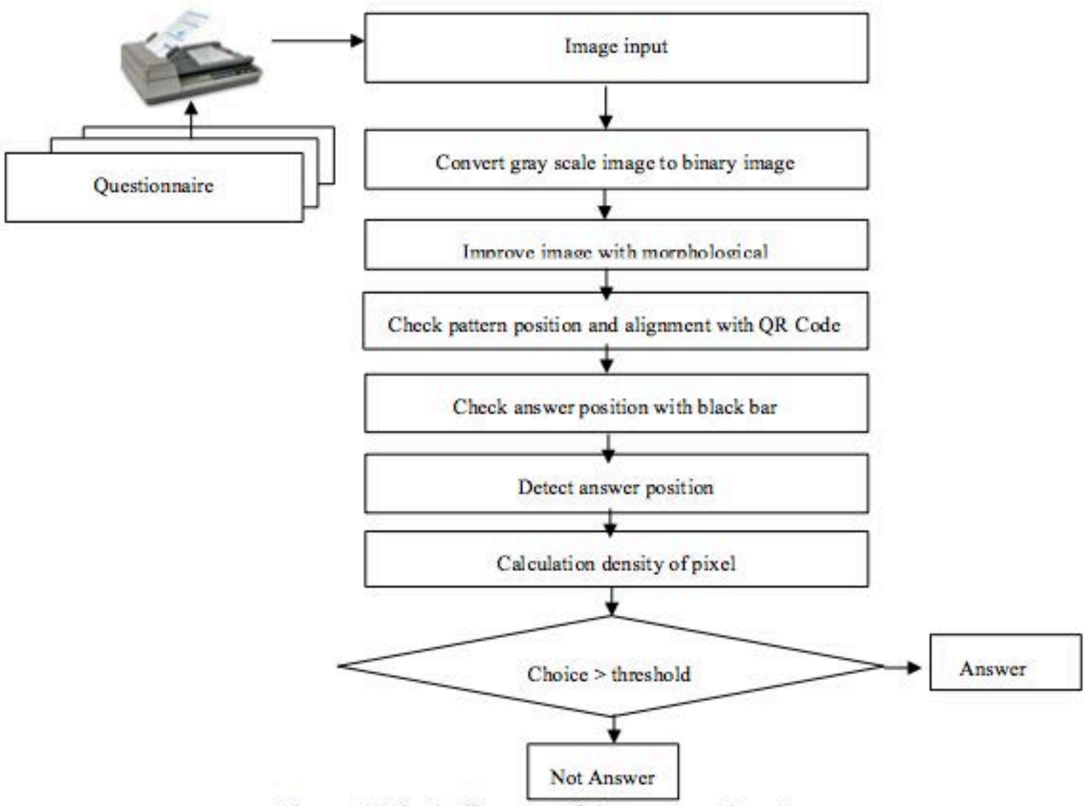


Figure 1 Block diagram of the proposed system

2. System Description

The optical mark reading (OMR) using QR code for automatic data entry in questionnaire is based on simplicity system. The block diagram of proposed system is shown in Fig. 1. In our system, we input questionnaires sheets to scanner after that, image data are sent to next step. The scanned images which are gray scale image are converted to binary image then it is improved by morphological. The scanned images are detected pattern position and alignment by QR Code. The answer position are detected by the black bar after that, the questionnaire answer are counted by calculation pixel density.

3. Using QR Code for Automatic Data Entry in Questionnaire

In this paper, we present an effective OMR using QR code for automatic data entry in questionnaire based on simplicity. Our algorithm consist 3 phases as input, processing and output unit. Input unit is first phases, we have used scanner or multifunction printer for automatic data entry of the proposed questionnaire design as shown in Fig. 2. Processing unit have used morphological for improving input image then QR code are used for alignment template questionnaire design as shown in Fig. 3 and black bar have used for checking answer position by intersection of vertical and horizontal black bars as shown in Fig. 4. And final phases are output unit which the final result as shown in Fig.5 and it can report export in MS-excel file. Therefore, it is simple for data analysis of the research.

3.1 The proposed questionnaire design

In order to, the questionnaire design occur robustness and flexible, therefore, this paper proposed the questionnaire design as shown in Fig. 2 and bring digital image processing for development our system. Beside, our questionnaire design is based on low cost and simple methodology.

Figure 2 Our questionnaire template design

3.2 Check pattern position and alignment with QR Code

For limitation of human in input data is output of processing that are error and low accuracy. Therefore, the normal scanner or camera is applied for input device. However, the image are scanned not be aligned and clean. In Fig. 3(a), our system can be modifying questionnaire by them. Thus, our system brings QR code as shown in Fig. 3(b) for checking patterns and alignment by use for means of [7]. It is detected by three position detection patterns. In Fig.3(c), detection is simplicity by checking the ratio as B:W:B:B:B:W:B or 1:1:3:1:1, where W is the number of white of white pixels and B is the number of black pixel.

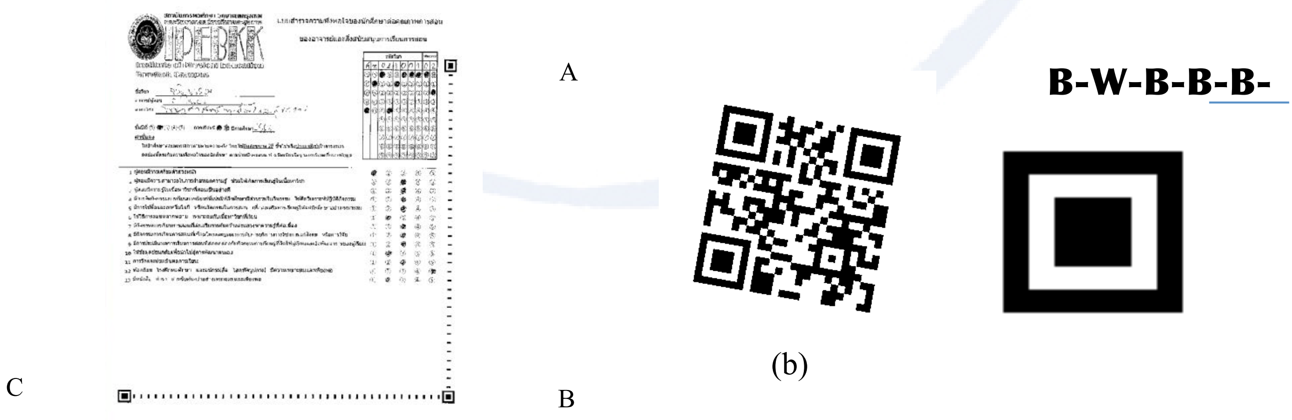


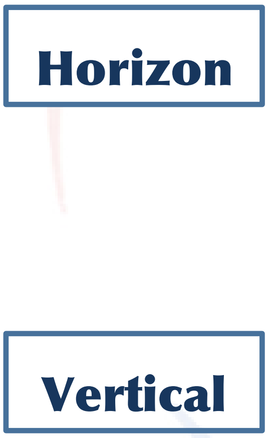
Figure 3 Detect patterns and alignment with QR Code (a) QR code position in our questionnaire template (b) The sample of QR Code (c) Detect position by ratio as B-W-B-B-B-W-B

The algorithm for detecting pattern position and alignment algorithm used the black bar and calculate by the affine transform [7]. In Fig. 3(a), three position detection patterns which are A, B and C was located, the questionnaire sheets need to be aligned for the template in Fig. 2. Because of the distances between A, B and C position detection patterns are different, the template can match the exact positions of these patterns. By calculating all distances between these 3 points, the first point (x_1, y_1) as A is defined that is the most far away from others. The second point $(\square_2, y_2)$ as B is defined that is the nearest to the others. And the remainder is defined the third point (x_3, y_3) as C. Three coordinate pairs of template (x_1', y_1') and the scanned image (x, y) are calculated by the affine transformation.

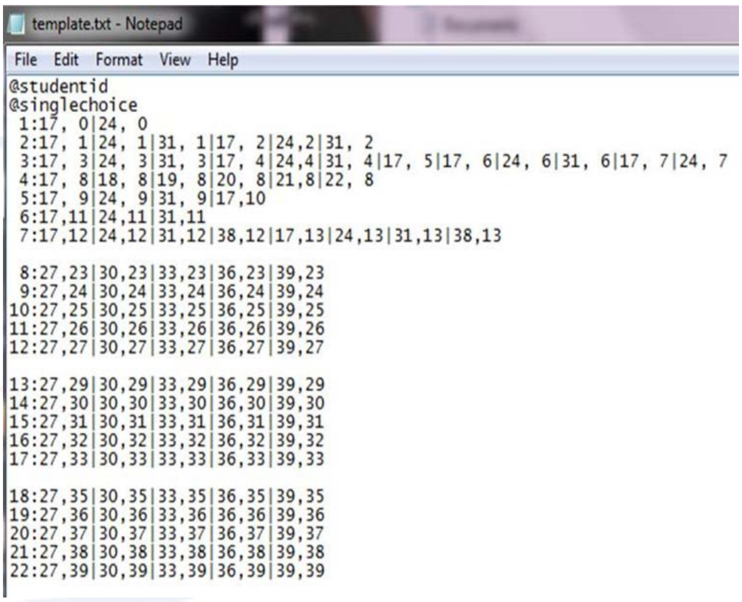
3.3 Detect answer position with black bar

Detection locations of questionnaire answer find black bar position from pattern position of QR code. By this way, it must determine the amount of black bar and need to check black bar with template of questionnaire. If the amount of black bar are not match with template, that is the error. Therefore, it will are not detected.

The location of black bar is the positions that have changed from white to black or black to white by consideration the center position. Therefore, detection the black bar position is similarly detection of QR code by draw a line the straight through the changing position of black bar.



(a)



```
template.txt - Notepad
File Edit Format View Help
@studentid
@singlechoice
 1:17, 0|24, 0
 2:17, 1|24, 1|31, 1|17, 2|24,2|31, 2
 3:17, 3|24, 3|31, 3|17, 4|24,4|31, 4|17, 5|17, 6|24, 6|31, 6|17, 7|24, 7
 4:17, 8|18, 8|19, 8|20, 8|21,8|22, 8
 5:17, 9|24, 9|31, 9|17,10
 6:17,11|24,11|31,11
 7:17,12|24,12|31,12|38,12|17,13|24,13|31,13|38,13

 8:27,23|30,23|33,23|36,23|39,23
 9:27,24|30,24|33,24|36,24|39,24
10:27,25|30,25|33,25|36,25|39,25
11:27,26|30,26|33,26|36,26|39,26
12:27,27|30,27|33,27|36,27|39,27

13:27,29|30,29|33,29|36,29|39,29
14:27,30|30,30|33,30|36,30|39,30
15:27,31|30,31|33,31|36,31|39,31
16:27,32|30,32|33,32|36,32|39,32
17:27,33|30,33|33,33|36,33|39,33

18:27,35|30,35|33,35|36,35|39,35
19:27,36|30,36|33,36|36,36|39,36
20:27,37|30,37|33,37|36,37|39,37
21:27,38|30,38|33,38|36,38|39,38
22:27,39|30,39|33,39|36,39|39,39
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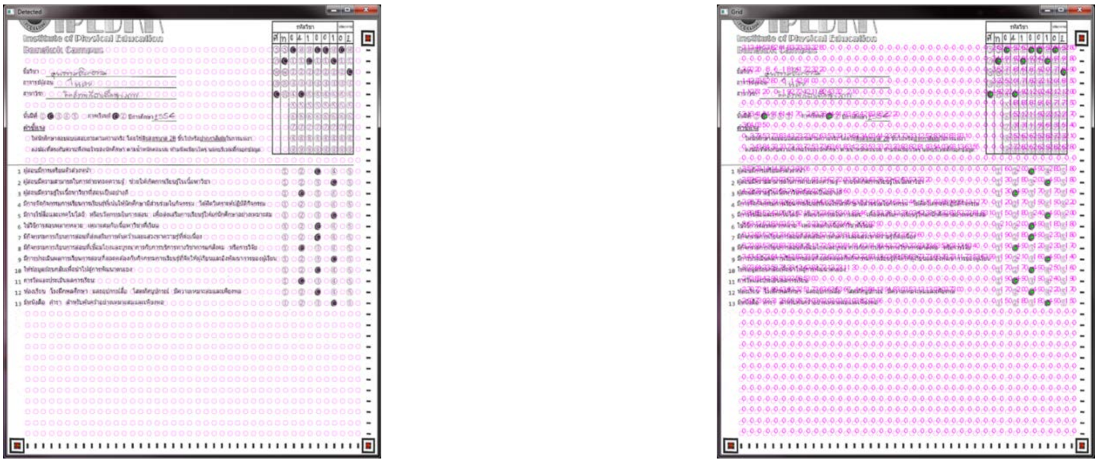
Figure 4 (a) The both of horizontal and vertical black bar for detect answer position (b) Scrip pattern (.txt)

3.4 To Detect answer position

The black bar location both of horizontal and vertical line in Fig. 4(a) are used for construction table as shown in Fig. 5(a) and then counting amount of pixel in channel of table. When receive amount of pixel each channel of all channel in table, then are checked with choices in scrip pattern (.txt) as shown in Fig. 4(b) that our system defined. By each question are defined where choice position, thus only one position have the most amount of pixel that is the answer.



(a) (b)

Figure 5 (a) Our questionnaire is aligned (b) Final result for detect answer position

3.5 Calculation density of pixel

The next task of our system when the answer positions are founded is checking the choice that is marked or not. Consider the answers are marked and unmarked which we can confidently make that the blackest one must be the marked choice. Generally, the fixed threshold is used for manipulating this computation but it is not robust for the variety of shading. Therefore, the adaptive threshold is proposed to improve the robustness. Therefore, the number of black pixels of the blackest one is previously determined as the upper bound. The threshold will be set at the 90% of this upper bound. Finally, the result of checking is presented in Fig. 5 (b).

4. Experimental Results

The optical mark reading using QR code for automatic data entry in questionnaire has been successfully tested in different sampling three group data. The software was developed by OpenCV library [8] in C++ for Microsoft Windows 7. The accuracy of the proposed for this data set is perfect. In experimental results of our proposed in three sampling data set which all of sampling is student at Institute of Physical of Education Bangkok Campus. To realize proposed our system, questionnaires are scan with scanner. To show the results, accuracies of simulations are shown in Table 1. From Table 1, it can be observed that the accuracies of sampling set 2 are higher than another set. In sampling set 3 is less than another because the answer of questionnaire of sampling set are error which occur some answer does not drain the answers. However, our proposed can provide accuracy of 80 % on average.

	Amount of questionnaires	Real Detection	False Detection	Accuracy
Sampling Set 1	162	118	44	80%
Sampling Set 2	103	95	8	92.23 %
Sampling Set 3	35	27	8	77.14%
Total	300	240	60	
Average			20%	80%

Table 1 Result optical mark reading using QR Code for automatic data entry in questionnaire

5. Conclusion

This paper proposed optical mark reading using QR code for automatic data entry in questionnaire based on simplicity system and lower cost. Our questionnaire template can design and modify by user, thus it are comfortable and rapidly. Our method is simplicity and cheap cost of hardware and materials by applying used office supplies. The Digital image processing are used the development our system and OMR pattern are used for summarize of the questionnaire score. QR code used for checking pattern position and alignment the questionnaire. The black bar used for checking answer position which are calculated by coordinate of black bar. Beside, our questionnaire design occur robustness and flexible. On the experimental results exhibit that the proposed with 80% accuracy will be more attractive for automatic data entry in questionnaire. The error of our system will occur, when means of the image are copy printed or scanned which QR code is not clear and not covered the entire areas questionnaire pattern.

6. Acknowledgments

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7. References

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Word Choice, Semantic Prosody, and Collocation Behavior: A Corpus Based Analysis of the Phraseologies of Clever and Smart

Omar Abouelazm, Zewail University of Science and Technology, Egypt

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INTRODUCTION

Vocabulary is undoubtedly an important part of any English language-learning curriculum designed for ESL learners. However, before vocabulary instruction can be considered meaningful, the factors underlying what is means to have knowledge of a word must be understood. Zhang (2009) proposed that successful knowledge of a lexical item entails that users fully understand its syntactic, semantic, and pragmatic environments. The pragmatic behavior of lexemes is defined by the term semantic prosody (SP), which describes the hidden inkling of certain words to convey positive, negative or neutral connotations. This aspect of lexeme knowledge is particularly important when English teachers are faced with problems in vocabulary t stemming from the use of near synonyms, or semantically related words. The problems faced by ESL learners when dealing with near synonyms were highlighted by Martin (1984). His investigation was one of the earliest to report that students tend to use near synonyms interchangeably in incorrect environments. Although he mentioned that language transfer, specifically semantic transfer, explained many of the erroneous uses of vocabulary items, word choice errors related to near synonyms add another dimension to the problem. What made this an even more pressing issue was that this was a problem plaguing advanced learners as well as less proficient ones. Furthermore, while dictionaries can provide using syntactic and semantic information about lexemes, they lack vital information concerning SP (Atkins & Levin, 1995).

Due to this shortcoming, researchers began to investigate SP and other factors that hinder vocabulary learning by students. The advent of this newfound interest in SP resulted in the increase use of corpus analysis to investigate native speaker language and find patterns and rules for authentic language use. This technique provided researchers with a salient way to investigate lexeme phraseologies in order to arrive at conclusions about lexical units semantic, grammatical, and pragmatic relationship with other items they frequently co-occurred with. Using a dedicated website to receive ESL teachers' questions about teaching in Hong Kong, Tsui (2005) found that most questions were asked about giving explanations for near synonyms. One such question asked about the difference of big and large, two semantically related adjectives. Except for large being classified as more formal, the dictionary defined the words exactly the same. However corpus analysis revealed that large most frequently collocated with measurement words while big favored abstract nouns. The misleading dictionary definition reinforces the use of corpus in combating such issues in ESL teaching. Furthermore, the study highlights the lack of awareness teachers have about lexeme phraseology. Zhang (2009) echoed this issue by stating teachers need to be aware of issues related to vocabulary pedagogy. He specifically proposed that teacher have SP awareness since the majority of word choice errors committed by students are related to SP. Ahmadian, Yazdani, and Darabi (2011) supported this claim with the results of their research related to students' awareness of SP. Using a corpus driven SP test, the researcher concluded that ESL student have a lack of SP awareness. Furthermore, they stressed that the learning of a word means nothing with understanding is collocation preferences and functions.

1.1 Research Problem

It can be said that ESL learners rely on native speaker intuition for semantic and pragmatic use of language. However, McGee (2009) highlighted that native speaker intuition is weak as far as collocation behavior and SP are concerned. Furthermore McGee (2012) redefined the concept of SP with the idea of hidden meanings. This concept stated that not every lexical unit possessed SP, only those with no inherent connotations. That is, the word danger cannot be said to have negative SP due to the nature of the semantic meaning to be negative. Although this notion is clear for native speakers, learners of English may face problems due to cross-cultural linguistic differences.

Xiao and McEnery (2006) emphasized the importance of exploring SP and CB on near synonyms in languages other than English in order to gain insights on similarities and differences in comparison to English. Using a corpus analysis of English and Chinese, the researchers investigated the CB and SP of near synonyms cause and consequence. Results of the subsequent contrastive analysis revealed Chinese exhibited CB and SP as much as English did. Additionally, the researchers discovered neither of the near synonyms in English or Chinese behaved similarly or were interchangeably. The pedagogical implications of these findings provide strong support for the teaching of SP and CB for near synonyms in ESL classrooms.

Given the contextual background and pedagogical implications of SP, CB, and factors have on vocabulary instruction, the present study aims to investigate the use of the semantically related lexemes smart and clever through a corpus-based analysis. These words are of interests due to the overwhelming observed use of clever by ESL Egyptian learners to compliment someone on their intelligence. The researcher, a native speaker of English, proposes that clever has a negative SP whereas smart shows inclination towards the positive end of the spectrum. The following research question is put forth by the present study: What are the Collocation behaviors and semantic prosodies of the semantically related adjectival lexemes clever and smart?

2. REVIEW OF LITERATURE

2.1 Semantic Transfer

An underlying issue in in vocabulary acquisition is semantic transfer, or use of directly translated lexical items to the L2. In a study by Woodin (2010), membership categorization was used to highlight the issues related to problems with direct translation from L1 to L2. The conversations of tandem language learners participating in an English/Spanish language exchange were recorded and analyzed specifically for discussions surrounding certain nouns. Among other interesting findings, results showed that even though some nouns in English had Spanish equivalents (and vice versa), their connotations and representations differed due to the way each language learner perceived them culturally. Furthermore, only the learners that had been exposed to the target language culture were able to personally relate to the noun in question. These findings suggest that cultural linguistic knowledge is essential for vocabulary understanding. Thus, a working pragmatic knowledge of the target language and its lexical components are important to avoid erroneous use.

A study conducted by Zughoul (1991) demonstrated the problematic semantic transfer in the choice of lexical items by Arabic speakers. Using the compositions of Jordanian EFL learners, the research constructed a learners' corpus and analyzed the errors related to lexical choice. Findings showed that semantic transfer occurred and often times resulted in awkward sentences. An example given was with the use of Waraqa a'nab (grape leaves) in its direct translation of grape papers. A similar study was conducted but used the context of beginning Spanish-speaking learners of English in Spain (Llach, 2007). Using a similar methodology of gathering student-writing samples, the researcher conducted error analysis to investigate errors related to lexical choice. Although spelling errors were the most frequent, the findings produced evidence of transfer from L1. An example was the Spanish equivalent of the word plate used to describe one's favorite food as in the sentence my favorite plate is chicken. In this instance, the correct word is dish. This example is particularly of interest to the present study be dish and plate are near synonyms but are not interchangeable in the previous context.

Finally, Jiang (2002, 2009) made the claim that L1 semantic transfer accounts for a large part of erroneous lexical choice when communicating in the L2. This conclusion was drawn after he conducted two separate but identical studies save for the participants' L1 background. Using Chinese L1 and Korean L1 English bilinguals as participants for each respective study, the researcher designed a study that asked participants to provide rating on the semantic relatedness of near synonym pairs in English. The pairs were classified into two categories, same translation pairs and different translation pairs. Same translation pair constituted English words that were near synonyms but had only one equivalent in the foreign language (Chinese or Korean). Results shows that pairs in the same translation group were given high ratings of semantic relatedness since they essentially had one meaning in the minds of the participants. These finding led to a model of vocabulary lexical mapping in which Jiang (2002, 2009) argued L1 lexical information was mapped on the L2 equivalents and thus used interchangeably and incorrectly with near synonyms in the target language.

2.2 Semantic Prosody and Collocation Behavior: Corpus-Based Studies

Corpus analysis has allowed researchers to examine large amounts of native speaker data in order to draw conclusions about language behavior. Atkins and Levin (1995) pointed out a flaw in dictionary definitions by conducting a corpus analysis of the shake verbs. The shake verbs included semantically related lexemes, all with similar semantic meaning to shake. Examples of these in the study were quake, tremble, shiver, and quiver. The Longman Dictionary of Contemporary English (LDCE) defined each of the verbs with one or more of its near synonyms, suggesting that they are all interchangeable. However, corpus analysis revealed that the shake verbs were found in vastly different phraseologies and displayed different CB. A similar study conducted by Butler (2008) examined the phraseologies of the semantically related nouns concept, idea, and notion along with their Spanish counterparts. Unlike the analysis conducted by Atkins and Levin (1995) the SP, in addition to the CB and idiomatic uses of the nouns were investigated. After getting similar results from the definitions of the nouns in the LDCE, the researcher investigated the British National Corpus (BNC) to determine the frequencies, adjectival collocates, and SP of each of them. The researcher specifically chose to focus on adjectival collocates in order to determine types of lexemes that modified each of the nouns under scrutiny. With respect to CB, the researcher gathered information regarding collocate frequency, collocate similarity, and grammatical structures each noun was used in. This information was then used to make any inferences to the SP of the nouns. The close corpus analysis revealed that idea, notion, and concept shared similar syntactic environments based on their adjectival collocates, which made them interchangeably is many cases (Butler, 2008). However, Butler concluded that overwhelmingly, the corpus evidence suggested English conceptualizes each noun in a different sense. These differences centered on the ways speakers evaluated ideas, concepts or notions.

Idea was most used to exemplify mental constructs of everyday life and was evaluated positively or negatively. On the other had, notion was typically evaluated negatively and concept denoted mental constructs belonging to a specialized field.

A further study aimed to explore the use of English words own and possess to investigate similarities and differences in their use (Nordlund). After highlighting the problems related to the similar dictionary definitions of the words, the BNC was used to search the terms in order to develop an understanding of their uses in context. The search was limited to the simple verbs of own and possess, excluding any other inflectional forms. Being verbs, the researcher examined the subjects and objects of each term, generalizing rules of use. The results revealed own and possess occurred mostly with human subjects and inanimate objects. However, own was used to reflect legal ownership and control whereas possess was used to show that someone had a certain quality.

Chief, principal, primary, major and main came under scrutiny in another study investigating the differences possessed by near synonyms (Liu, 2010). As a preliminary point of departure, the definitions of the adjectives were probed for observable commonalities between the uses of each word. Definitions revealed that the five adjectives were similar in that they added a send of value and importance to the word they modified. Using the Corpus of Contemporary American English (COCA), the frequencies and collocates of each adjective were analyze resulting in the construction of a behavior profile for each. Since the words in adjectives, the analysis focused on the nouns being modified by each term and was able to pinpoint differences in usage. Noun categories were used to determine which of the adjectives preferred certain nouns (abstract, position titles, etc). This analysis led to conclusions about the semantics of each adjective as preferring specific environments.

Corpus based analysis was also the driving force for a study investigating the use of the verbs provide, supply, and present (Clerck & Delorge &Simon-Vandenbergen, 2011). Taking a different approach than previous research, the researchers decided to investigate the most frequent structural use of the verbs in order to make claims about their semantic inclinations. Preliminary analysis resulted in the common use of the three verbs with the prepositions with, to, and for. Unlike the findings of Butler (2008), who concluded that notion, idea, and concept were interchangeably in certain situation, Clerck et al (2011) proposed that neither of the terms examined in their study was interchangeably semantically. These findings validate the notion that some near synonyms are not interchangeably under given circumstances.

3. Methodology and Analysis

Using Butler's (2008) methodological approach as a model, the research searched (COCA) for instances of smart and clever. These search terms were manipulated in order to examine their frequencies and collocates. Since both lexemes are adjectival, the researcher decided to explore the CB of each items in terms of noun and intensifier collocates. This decision was taken in order to determine how the adjectives under scrutiny modify and are modified by words they collocate with. Finally, based on the findings, inferences to each adjectives SP will be made based on the preliminary corpus analysis.

4. Results

To put the results in perspective, clever and smart where first are searcher in the Longman Online Dictionary of Contemporary English. The purpose of this step is two fold. First, the results of the study will compare findings to the information reported in the dictionary definitions. Second, the dictionary some what illustrates what a learner of English might encounter when using the tool for vocabulary learning.

Clever: able to learn and understand things quickly [= intelligent; = smart AmE]
Smart: intelligent or sensible [= clever; ≠ stupid] Disrespectful: trying to seem clever in a disrespectful way

First, it can be seen that the words intelligent, clever, and smart are used as part of both definitions. Additionally, the definition for smart attempts to expand from providing the typical semantic information to adding a negative usage of smart as trying to seem clever in a disrespectful way. However, judgments about the SP of smart according to this usage cannot be made until a preliminary understanding of the SP of clever is made.

Frequency

Search terms smart and clever were queried in COCA in order to examine their frequencies across the five sub corpora of COCA. The results for this search are displayed in table 1 below.

Table 1: Frequencies in COCA

Lemma	All	Spoken	Fiction	Magazine	Newspaper	Academic
Smart	21674	5096	4765	6256	4193	1364
Clever	5565	739	1933	1468	873	552

No other grammatical variations of the words were searched because the research was interested in investigating their adjectival use. It is clearly evident from table 1 that smart is used more frequently that clever across all of the sub corpora. Additionally, it is used most frequently in the magazine sub corpus of COCA. On the other hand, clever is most frequent in the fiction sub corpus. In fact, although more hits for smart occur in fiction, clever has a greater percentage of use at 34.7% to smart's 21.9%. Although these preliminary findings are interesting, no strong claims can be made towards their CB or proposed SB. However, if it is assumed that fiction as a genre invites more creative use of the language, clever may have inclinations towards being more descriptive, especially for characters in a story.

Collocation Behavior

The search terms smart and clever were queried in COCA with the intention of investigate their collocates. The researcher specified that the program output included words to the first left and first right of the search terms. Since the lexical items under scrutiny are adjectives, running such a search revealed important information about the intensifiers and nouns that collocated with them. This was important because how adjectives are modified in addition to what they modify provided vital information to their semantic constructs. Furthermore, such information may also provide enough insight the use of the lexical items so that strong claim can be made about its SP. Table 2 below displays a representation of the most frequent collocates as evidenced by COCA. These words are a representation of the collocates that were intensifiers or nouns in the first 30 hits.

Table 2: Representation of Most Frequent Collocates

Clever		Smart	
Noun Collocates	Intensifier Collocates	Noun Collocates	Intensifier Collocates
Way, Ways, Idea, Girl, Marketing, Ideas Boy, Design, Strategy, Twist Fellow, Scheme Politician, Tricks Advertising Devilishly	How, Too, Pretty, Quite, Extremely, bit, Diabolically, Particularly, Fiendishly, Fairly	Guy, Move, Growth Thing, Card Money, Phones Cards, Phone Bombs, Grid Girl, Ed, Ones Choice	Enough, Very, Too Really, Pretty

It can be seen that although smart and clever share a significant number of intensifiers, their commonalties with respect to noun collocation is limited. The only noun the two adjectives modify is girl. However, it is noteworthy to point out that this similarity only surfaces in the construction adjective + noun. Furthermore, in the previously mentioned constructions, both adjectives show a strong preference to be collocated with non-human nouns. Between the adjectives, the only human nouns that occurred in the top 30 hits were girl, boy, guy, and politician.

Upon scrutiny of the intensifiers that collocate with clever, diabolically, fiendishly, and devilishly seem to carry strong weight. All three intensifiers conjure up images of things relate to demonic entities or evilness, which are obviously negative connotations. Even some of its noun collocates, tricks and schemes, have insinuate negative intentions. On a cultural not, politicians, another of clever's noun collocates, is synonymous with liars and manipulators.

Investigating further into CB, figure 1 below displays 10 concordances lines (five with the clever and five with smart), of the ways each adjective interacts with enough. These lines were selected randomly from the first 100 concordance lines in COCA. The grammatical structure of the examples are quite similar, following a be + smart/clever + to + infinitive pattern. This finding helps illustrate the confusion of near synonyms for English teacher and English learners (regardless of level of proficiency).

An interesting point to delve into however is the pervading negative sense both adjectives emanate when coupled with enough. Example one uses smart sarcastically to mock the person who decided to drive through Death Valley (the hottest place in America) without air conditioning. In concordance, example eight uses clever in relation to a person using intelligence to commit a untraceable murder. Moreover, scheme, one of the frequent collocates of clever, is associated with smart in example five. As mentioned earlier, scheme has a negative connotation as a plan devised to deliberately deceive someone.

Figure 1:Concordance Lines of Collocations with Enough

1.One person was smart enough to drive through Death Valley in August with no air conditioning in the car
2. They are waiting for other countries to buy their debt because even Americans are smart enough to know they are not going to pay off.

3. I don't mean' cause of all those loving cups he won for his golf and tennis or even him being smart enough to get a scholarship to Princeton College. 4. He'd been smart enough or conservative enough to anticipate that - so, no tribal tats stamped up the neck, no facial designs or piercings, no four-letter words across his knuckles. 5. Somebody in the scheme was smart enough to take the battery out of the cell phone. 6. It's 10 inches across and seven inches tall, not including its pop-up plunger that I wish I'd been clever enough to figure out on my own how to lock down. 7. But he adds, that " I think the Palestinian people are clever enough to know which way is the better way without knocking on a sensitive issue. 8. But prosecutor Laura Gunn suspects Cynthia Sommer was clever enough to plan a murder without leaving any direct evidence of her using arsenic to kill her Marine sergeant husband. 9. She also found an expert who followed him for a day and determined that he was clever enough to communicate his needs differently to different people. 10. I told him my true intention, not being clever enough to lie.

However, preference for negativity shown by both adjective in the above example does not hold true for other intensifiers. Upon scrutiny of the collocate very, the corpus revealed that smart was used more neutrally (both positive and negatively) while clever continued to be negative. Some examples of these are shown below.

But when placed into a corner people become very clever with the stories that they can concoct to protect themselves. ell, the defense has been very clever in massaging the evidence to fit their theories

These example show that clever remains to be associated with the negativity of manipulating the truth for benefit. Smart was also used in this way but only if collocated with a word with negative connotations such as in the example The victim's daughter is a very smart, manipulative fourteen-year-old.

The noun collocates of the adjectives were also examined. Since the problem observed by Egyptian students related to the adjective choice with people, the common noun collocate girl was examined in the corpus. Randomly selected lines are displayed in figure 2. From the concordance lines, only example five is overtly negative with the use of tricked, implying a manipulative action was taken. Other than that, the only distinguishing factor is seen in examples one and three, in which smart is followed by more positive adjectives used to describe girl and nice, ambitious, and hard working.

Figure 2

1.She's a smart girl. And a nice girl. 2.You are a very smart girl. 3.She is a smart girl, she is ambitious and she is hard working. 4.AYou're a clever girl. Your father will be proud-or would have been 5.she's a very clever girl. I guess I can believe that she tricked you 6.the story of a clever girl who by her skillful telling of stories averts an evil threatening her

Although the inanimate noun collocates were not the focus of the analysis, they still provide important information about the adjectives under scrutiny. For instance, clever collocated with idea, ways, scheme, and trick. All these nouns have the fact that they require human cognition in common. One the other hand, smart was collocated with nouns that related to modern technology such as bombs and phones. Move and investment were also collocates of smart and it could be argued that these nouns require human cognition as well, as in some on making a smart move/investment.

Finally, the corpus was used to understand the ways in which the adjectives were used in the construction noun + be + smart/clever. This search term was used to try and mimic what a student would say in the classroom. An example of this structure would be Egyptians are smart/clever. For clever, only 112 hits were returned and the majority of them were in the fiction sub corpus. Smart occurred a little over double the figure for clever with 257 instances. Table 3 displays the most frequent collocates for the search term used. Using this construction, smart tends to me used more with human nouns. This is similar to clever, although some inanimate objects occurred (idea, book, management).

Table 3: Frequent Collocates for Construction Noun + be + Smart/Clever

CLEVER	SMART
People are clever	People are smart
Mother was clever	Kids are smart
Father was clever	Guy is smart
Management is clever	Guys are smart
Idea is clever	Child is smart
Book is clever	Women are smart
Photographers were clever	Consumers are smart
Peter was clever	Fish are smart

After examining the concordance lines, the present researcher selected a few for further scrutiny based on their novelty. One such case was the use of the phrase father was clever.

Republican would be president-a man who, though a fiscal conservative, was unabashedly pro-choice and pro-women's rights, which put him at odds with many Republicans and the religious right. Never mind. His mandate had come from young // people, Hispanics and African Americans who, finally deciding it was time for their voices to be heard, turned out in record numbers to vote for Edward Carson. Not only did they fi nd him irresistibly charismatic, but they also liked what he said, and how he said it. She had to admit her father was clever as well as smart. Still, he was of a species-the po liti cal animal-that she despised.

The above line is from the greater context of a fiction book which used both adjectives to describe father. Characterizing a human as both smart and clever seems to mean that there is a difference in both qualities. The greater contexts shows that the father was a republican that went against his party's platform to appeal to minority groups. It appears her did so not because he cared about their strife, but because he wanted to win votes for the presidential election. Doing this made him clever and smart. If the proximity rule is applied, since clever is mentioned before smart, it most closely modifies the father's character of going against his party for his own gain while seeming appealing to a group of people. Again, the theme of manipulative appears with the word clever.

With vast number of possibilities with the two adjectives, it is difficult to present all the instances in this section justly. More is discussed in the next section.

5. DISCUSSION AND CONCLUSION

The research question put forth by the present study asked, what are CB and SP of the semantically related adjective clever and smart? To answer this question, CB of the lexical items appearing at the first left and first right of the adjectives will be discussed first. As previously mentioned, clever and smart shared a significant number of intensifiers as collocates. Corpus revealed that the syntactic structure used for each of these was the same in most cases (enough). This finding is typical of studies that scrutinized semantically related lexical items in corpora (Butler, 2008; Clerck et al, 2011). Furthermore, closely looking at the way the adjectives collocated with enough revealed they both were expressed somewhat negatively. Thus, given this observation, it is possible that clever and smart are interchangeable in the environment be + smart/clever + enough + to + infinitive. Although interchangeability was common in some findings (Butler 2008; Liu, 2010) this notion was rejected in others (Danielsson, 2011).

Concerning the noun collocates, results showed that both adjectives preferred inanimate objects. However, in the construct noun +be + Smart/Crazy, the noun tended to be human. The in animate nouns modified by clever were nouns that seemed to have the common theme of human cognitive interference. For example, ideas are thought up by humans. Humans find clever ways of doing something. Also, humans devise clever schemes and tricks. The latter two items have a negative connotation, which provides some evidence of clever's seemingly negative SP. Interestingly enough, the following example from COCA uses a negative intensifier alongside a negative noun to truly exemplify clever: labyrinthine machinations and open mob warfare, as Tom sets thug against thug in a diabolically clever scheme to set things straight.

Smart, however, was used both negatively and positively. Usually, it was used just to state a fact of something or someone having intelligence. Figure 2 revealed that other positive adjectives followed smart in some cases. These adjectives did not particularly pertain to intelligence, but there were good characteristics to have. Looking back at the definition, the word sensible was used to define smart. The extra adjectives that followed smart in figure 2 could be classified as sensible characteristics to have.

Based on the very surface lever corpus analysis, there is some evidence to support the claim that clever has negative SP. However, if SP is represented as a continuum, it should not appear at the extreme negative end. Smart, on the other hand can be said to have a neutral SP, as the concordance lines reveal it to be seen used negatively and positively often. Thus, from the preliminary findings, the research proposes the following definitions for EFL language books:

Clever: Able to think quickly and intelligently; using knowledge and intelligence to manipulate situations for ones benefit Smart: having or characterized by intelligence.

Thus, the researcher concludes that introducing SP to language learners is important, especially for near synonyms so students can avoid pragmatic failure in the long run. The next section provides activities that can be used in the classroom based on the corpus findings.

5.1 Pedagogy

Teaching vocabulary is important for any ESL classroom. Based on the corpus analysis of clever and smart, the researcher has designed two activities for classroom use. Activity 1 (Appendix A) is designed for beginning learners that have not reached full autonomy and who may find the concordance lines difficult. Activity 1 is inspired by the corpus analysis although it does not use concordance lines or even modified versions of them. Activity 2 (Appendix B) is designed for advanced learners. The activity uses a data driven learning approach to familiarize student with how to use the corpus.

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APPENDIX A

Are you clever or smart?

Brainstorming: Think of movies or stories that have animals in them.
Directions: Look at the list of animals below. What kind of adjective describe the animals?
Fox:
Dog:
Cat:

Turtle:
Ant:
Reading
Directions: Read the passages. Use clues from the stories to define the BOLDED words
The Ant and the Grasshopper
In a field one summer's day a Grasshopper was hopping about, chirping and singing to its heart's content. An Ant passed by, bearing along with great toil an ear of corn he was taking to the nest.

"Why not come and chat with me," said the Grasshopper, "instead of toiling and moiling in that way?"

"I am helping to lay up food for the winter," said the Ant, "and recommend you to do the same."

"Why bother about winter?" said the Grasshopper; "We have got plenty of food at present." But the Smart Ant went on its way and continued its toil.

When the winter came the Grasshopper had no food and found itself dying of hunger - while it saw the ants distributing every day corn and grain from the stores they had collected in the summer. Then the Grasshopper knew: It is best to prepare for days of need.

The Tortoise and the Hare
There was once a hare that laughed at a tortoise daily. “You move so slowly!” he chuckled. “How long it must take you to get from place to place.”

“I move just as fast as I need to,” replied the tortoise, sick of the teasing. “I bet I could win in a race against you, if I truly wanted.”

The hare laughed again. “You, Tortoise, think you could beat me? We’ll just see about that!”

The tortoise and the hare looked for an official to watch and score the race. They found the wise old owl and asked him to watch their race.

“We shall be racing from the top of the big hill to the bottom,” said the hare.

“First to the bottom wins!” said the tortoise.

“And shall this be a running race?” asked the owl.

Again, the hare laughed. “No need to put limits on this race,” he said. “Regardless of what way Tortoise here uses to get to the bottom of the hill, he still won’t be able to beat me.”

The owl nodded and looked at the tortoise, who was trying to hide a smile.

The next day, the tortoise and the hare met at the top of the hill. All the animals gathered to watch. It wasn’t everyday that they could watch a race between a tortoise and a hare. The owl sat on a branch above the starting line.

“On the count of three, you will begin the race,” he said. “One. Two. Three. Go!”

The hare skipped lazily down the hill. There is no way this tortoise can beat me. No need to get all tired and sweaty, he thought.

However, much to the hare's misfortune, there was a boy who lived near this hill who left his skateboard on the top of the hill everyday before he went to school. The clever tortoise climbed slowly onto the skateboard, and with one gentle push, he began his descent down the hill. The further down the hill he went, the more speed he picked up. By the time the hare noticed the tortoise on the skateboard, it was too late. The tortoise zoomed past the skipping hare to the bottom of the hill.

"Tortoise wins!" shouted the owl as the animal spectators cheered.

"But that's not fair," the hare protested. "He used a skateboard!"

"Did you not say that you could beat Tortoise regardless of the method he used in the race?" the owl reminded him.

Defeated, the hare hopped away angrily. The animals continued to cheer on the clever tortoise as he began his slow climb up the hill, pushing the skateboard back to its spot on the top of the hill.

APPENDIX 2

Is he clever, or is he smart?
Directions: In groups, search for the terms clever and smart in the corpus.
Write down some sentences you see

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____

What are nouns each word modifies

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Do you see any patterns

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Based on your group discussions and searches, write a definition for each word. When everyone has finished, exchange your definition with a different group and compare answers.

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