



Doctoral Student Consortium Proceedings of
**The 17th International Conference on
Computers in Education**

November 30 - December 4, 2009, Hong Kong



Asia-Pacific Society for
Computers in Education



Organized by **the Asia-Pacific Society for Computers in Education**
Hosted by **the Hong Kong Institute of Education, Hong Kong**

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ICCE 2009

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Edited by

Fu-Yun YU

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Sponsored by

The Hong Kong Institute of Education

Asia-Pacific Society for Computers in Education



ICCE 2009 Theme-Based Doctoral Student Consortium

November 30, 2009 (Monday) to December 4, 2009 (Friday)
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Preface

This volume contains the Doctoral Student Consortium Proceedings of the 17th International Conference on Computers in Education (ICCE, 2009). For this year, the Doctoral Student Consortium (DSC) brings together PhD students working in the broad research areas of computers in education in the following four sub-themes: Computer-supported Collaborative Learning (CSCL) and Learning Sciences, Classroom, Ubiquitous, and Mobile Technologies Enhanced Learning (CUMTEL), Digital Game and Intelligent Toy Enhanced Learning (DIGITEL) and Technology, Pedagogy and Education.

The DSC aims to provide an opportunity for a selected number of PhD students to present, discuss and receive feedbacks on their dissertation work-in-progress from a panel of established researchers with expertise in the same research areas. The DSC is meant for students to shape their research methodologies and analysis at the early stage of their PhD research with comments from invited mentors and guidance for future research directions. The DSC also hopes to nurture a supportive learning community and promote interactions among young researchers from various institutions and across different countries in the Asia-Pacific region and beyond. It also provides opportunities for theme-based forums to discuss methodological and theoretical issues of central importance. The DSC and the related social events are financially supported by the Asia-Pacific Society for Computers in Education (APSCE).

A group of senior PhD students (Coco ZHAO, Chen-Wei CHUNG, Calvin LIAO, Morris JONG and Hing Keung Vincent HUNG) who were highly recommended by the APSCE Special Interest Group Chairs (SIG) and different theme-based conference Chairs/Co-Chairs were invited to be the organizers of this prestigious event. This group of senior PhD students were guided by the DSC Chairs (Fu-Yun YU and Su Luan WONG). The DSC chairs helped oversee the whole process of organizing the DSC and provided guidance along the way. With a strong sense of responsibility and enthusiasm, this highly dynamic group has been successful in organizing the DSC. It is clear that by entrusting this group of senior PhD students with the responsibility of organizing this important event and

editing the DSC Proceedings, they were able to form a vibrant and supportive research community within a short period of time; which is one of the main goals of the APSCE.

This year we received a total of 14 submissions where 8 papers were finally selected and included in the Proceedings. Each selected paper went through a rigorous blind review by independent peer reviewers to ensure high quality work. We hope that the papers in this Proceedings on various research topics will stimulate more research ideas and discussions among the young researchers .

We would like to thank the APSCE SIG, different theme-based conference Chairs/Co-Chairs and invited mentors in making this year's DSC a highly successful event. Finally, we would like to take this opportunity to record our sincerest appreciation to Dr. Chee-Kit LOOI and Dr.Carol K.K.CHAN for their valuable suggestions at the early stages of organizing the DSC.

Editors

Fu-Yun YU

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Development of Intercultural Sensitivity through Online Interaction

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Abstract: The use of social networking technology has become embedded into the daily lives of the younger generation. In a high school intercultural exchange program where the participants are aged between 16-18 years old, the use of social networking technologies are one of the primary modes of communication. This study will investigate the online interaction of participants on a 6 month program exchange program through a mixed method analysis of interaction and artifacts gathered online in a social networking website and a custom designed learning environment to reveal how intercultural sensitivity has developed over time and how the affordances are used.

Keywords: intercultural learning, cultural competence, Web 2.0, social networking

Motivation

It has been common belief among intercultural trainers that the frequent use of online communication technology such as instant messaging and emails disrupts the adjustment process of intercultural adaptation. The reason behind this is because the participants may be in constant communication with family and friends back home and not attempting to adjust to their current environment. Although there may be valid reasons to this commonly held belief, there has been no studies to prove or disprove this claim. One of the goals of this study is to reveal to what extent and how online environments and social networking sites can affect the intercultural development of a participant on an intercultural exchange program.

While there may be reservation to limit a participant on an exchange program's use of communication technology during their time abroad, a conversation with people involved in the coordination of student exchanges of various countries reveals interest in using computer technologies for supporting participants on an intercultural exchange program. A survey on intercultural training reveals that most intercultural training still takes place in the form of workshops with minimal follow up being done after the workshops. Although intercultural trainers have acknowledged that participants require continuous support during their time abroad, there is an insufficient resource to support all the participants who are likely to face some form of mini crisis which does not require urgent attention. It seems paradoxical that the best people to support participants on the intercultural exchange program are the participants themselves as they are going or have gone through similar emotional process as their peers and can therefore better relate and empathize to the problems.

Despite the advance in the methodology in intercultural learning over the past decade, the process that leads to intercultural development during an exchange remains largely

unexplored. To analyze the learning process leading to intercultural development would mean a closer examination to the affective responses to cultural contact. This refers to feelings of well-being or satisfaction a person has when having an intercultural experience. One method to gain insight into student learning is through analysis portfolio which can be used to purposefully exhibit the participants efforts, progress and achievements (Paulson, Paulson, & Meyer, 1991). This would mean that an intervention will have to be designed to engage learners to actively express themselves by creating artifacts that can be analyzed later on to reveal learning outcomes. Within intercultural learning research, past research obtained qualitative data from journal writing via emails but produced a low response rate which was attributed to the lack of stimuli and motivation to complete the process (Hansel, 2005). The emergence of social networking technology provides another platform for people to express themselves through status updates or “shout outs” which raises the possibility of using such technology to obtain affective responses to cultural contact.

Description of Research

The main focus of this study is to determine how an online environment is use in the development of intercultural sensitivity for a participant on an intercultural exchange program. This is achieved by investigating how participants use a social networking website called Facebook during their exchange program and also an online environment called Culture Trek. Although participants are not observed directly in their interaction, this study is mainly qualitative in nature and therefore the archive of participant’s interaction within the system serves as a surrogate for the analysis of data.

This research is an exploratory study that aims to examine how participants on an intercultural exchange program achieve authentic and meaningful learning during their intercultural development process with the aid of both formal and informal computer learning technologies. The following questions will be used to guide the study and analysis of this research:

1. How are participants on an intercultural exchange program utilizing social networking technologies?
2. How are the processes in intercultural learning affected through the use of a formal online learning environment called Culture Trek?

The theoretical perspectives for this study are grounded in both constructivism and sociocultural theory. “*There is no right or wrong, but just different*” is a commonly used phrase by intercultural trainers that implies culture is a construct of society where there is no single way to do things. Constructivism is used as a theoretical perspective as this research is concerned on how learners develop and exhibit their intercultural competence through the use of technology. Through the analysis of artifacts constructed by the participants, we are not only able to gain insights into the learner’s cognition on culture but also their beliefs and conception of cultural knowledge. What this research is concerned with is not how much a student knows about culture but how their actions and behavior online will translate to cultural competence from an ethnocentric stage to a less ethnocentric or ethnorelative stage that will be measured and coded using the DMIS.

Contributions

In the education arena, there is a shift in the views on the purpose of education with a growing emphasis on not just acquiring knowledge but developing skills and resources that are critical in engaging in social and technological changes (Owen, Grant, Sayers, & Facer, 2006). The advancements in technology is now beginning to see a growth in technologies that are more community based rather than being individual focused. Within the field of intercultural training where the methods have remained largely unchanged over the past 20 years, there is a growing interest among researchers in adopting new methods from the field of education technology that will help in the development of intercultural competence (Bennett, 2009).

One of the innovations from this research is that this study will explore how the processes in intercultural learning occur within a social networking website. Social software are not thought to traditionally be an environment where learning would occur but is changing as researchers are beginning to look into this area of inquiry (e.g., McLoughlin & Lee, 2007). Learning in such socio-cultural system where the participants interact with their peers and other learners creates an environment that enables them to connect, receive support and share ideas in a fluid and unrestrictive manner.

While the use of online communication technology may seem to inhibit intercultural development as participants may frequently communicate with their family and friends back home, this study aims to uncover how the usage of two online environments affects the intercultural development process. Finally, intercultural learning is a continuous process, the use of computer technologies will provide a platform for learners to connect, communicate and reflect on their experiences even after the program has been completed.

Methodology

Although this study is mainly qualitative in nature, this research will utilize a mixed method of qualitative and quantitative research method to provide a richer insight into the collection and analysis of data. To complement the strengths of both qualitative and quantitative methods, the triangulation method with data transformation is selected for the collection and interpretation of data.

The qualitative data is obtained from three different sources namely interviews, Facebook, and Culture Trek. Although data will be analyzed from the artifacts created in Culture Trek and Facebook, an interview allows for better understanding about the experiences the participants face and also more specifically allows for the question on how they perceive the usage of technology is during their time abroad. To do so, the interviews are conducted with the participants prior to their departure abroad on exchange and immediately upon returning back to their home country. The information that is obtained from Facebook are the *status updates* and *notes*. Data from the formal learning environment called Culture Trek are derived from the artifacts created within the system. Activities that are completed in the *Passport* section of Culture Trek will be saved into the *Portfolio* section of the system.

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Development of an Inquiry-based Mobile Learning Environment for Local Culture Courses

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Abstract: This study presents a mobile exploration activity that guides elementary students to learn in social science activity with digital supports from mobile devices and wireless communications. The students are situated in both the real world and the virtual world to extend their learning experiences. The learning activities between the field and the digital system not only demonstrate the practices of mobile learning which emphasizes learning to happen close to real life but also provide learning content to facilitate students' field studies. Moreover, a comprehensive evaluation method has been used to analyze the learning effectiveness. Based on inquiry-based learning principles, students use the handheld device, PDA, to do the investigations. By constructing their own knowledge, students' learning performances are hoped to be enhanced. This research took Peace Temple in Tainan as an example and invited 33 fifth graders to participate. Through pre- and post-class questionnaires as well as observations and focus group interviews, descriptive quantitative and qualitative data were collected and analyzed. The results show significant positive results to students' learning.

Keywords: mobile learning, inquiry-based learning, historic monument investigations, learning performance

1. Introduction

Mobile learning entails the kind of learning in which learners use mobile devices with digital content inside, to learn in anytime anywhere situations. Such devices include PDA, laptop computers, cellular phones with WIFI or other Internet connection capability, customized hardware. To avoid students aimlessly wandering around, instructors need to carefully arrange the learning environment and design an interactive learning model, along with prepare meaningful learning content.

This research is a mobile exploration activity to guide elementary students in Taiwan for local culture courses. This research first situates students in both the real world and the virtual world to extend students' learning experiences; second, it designs educational activities between the field and the digital system to demonstrate the practices of mobile learning which emphasizes learning to happen close to real life; third, it develops digital system with learning content to facilitate students' field studies; and forth, use a comprehensive evaluation methods to analyze the learning effectiveness.

As students are placed in the authentic learning context, students are dispersed around the environment. In situation as such, teachers have difficulties to attend to individual students.

Using digital tools such as PDAs, students can explore the environment with individual attentions. In other words, PDA substitutes teacher's role and the pre-designed digital resources in the system works as learning scaffolds to guide students.

2. Literature Review

Mobile technologies fulfill educational dreams by providing the possibility of creating innovative learning experiences that can take place in a variety of outdoor settings (for example, parks, city centers, woodlands) and indoor settings (for example, museums, learning centers, labs, home) [1]. Examples such as bird-watching [2] or museum learning [3] are informal learning situations which are sustained by the combination of powerful functions and high portability. Formal learning situations, on the other hand, are widely used in different fields around the world including natural science [4], social science [5], math [6] and languages [7], just to list a few, and have gained positive results. Among these, the Ambient Wood project led by Yvonne Rogers in England [8] and Butterfly learning with expert system on PDA led by Gwo-Jen Hwang in Taiwan [9] are eminent natural science mobile learning projects.

Colburn defined inquiry-based instruction as the creation of a classroom where students are engaged in essentially open-ended, student-centered, hands-on activities [10]. According to Collingwood, history is a kind of science which involves inquiry into the past [11]. Inquiry-based learning opens a new way for social science learning. However, unguided online historical inquiry does not guarantee meaningful learning [12]. Therefore, a similar research model is adopted in our research in consideration of appropriate tasks, sequence of hints and clues, as well as interactive dynamics during the inquiry activities. It is to ensure learning to happen accordingly.

3. Research Method

There were 32 fifth grade elementary school students participated in this research. In the beginning of the learning process, the teacher gave the orientation to the use of PDA. Then, after students filled out the pre-class questionnaire, which is for researchers to understand their initial understanding to the course materials, they started to conduct field inquiry in Peace Temple (see Figure 1).

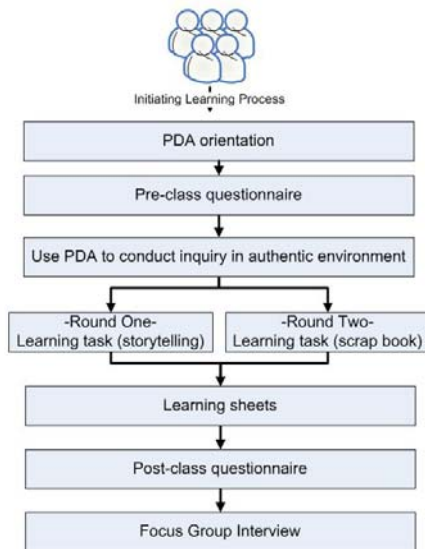


Figure 1 Research Process Diagram

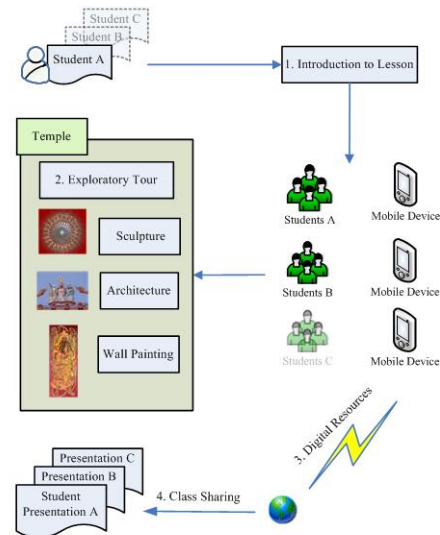


Figure 2 Concept map of instructional design

In the research, two learning tasks are designed to see if inquiry-based mobile learning can expand the width and depth of knowledge. One task is to ask students to tell an imagined story, the other is a hands-on artwork, in which we ask students to draw, cut, and paste to design a temple. We incorporate activities in historic monument investigations using handheld device, PDA. The objective of teaching is to support students' cognitive and affective learning, and increase independent learning motivation. Four steps of learning activities are designed (Figure 2).

Before the course, the teacher has to design the themes and hints for the learning activity, and the technical designers help to implement them into the system. After creating situations to stimulate students' learning motivations, the teacher introduces the historic background of the temple, local cultures and religions, and other related information so the students can have basic concepts about the trip.

For the fieldtrip, students are divided into groups; each group is assigned to one theme, such as Gods, religious world, or cultures. Students then go on fieldtrips with mobile devices in hand to explore the temple in person. Students visit spots of interests guided by the pre-designed hints in each theme in the PDA. At the same time, they gather more information with the PDA by finding out answers of the hints in each theme and taking notes when there is open-ended question. The hints require them to conduct detailed observations on the architecture and placement of gods, and interview temple keepers and people living in the neighborhood regarding their thoughts and impressions about the temple. With wireless connection, students can even link up to the Internet and search for more information about what is not taught in class.

After they come back from the fieldtrip, students synthesize and categorize their collections, and make reports to share with classmates. The discussions and feedbacks stimulate a higher level of thinking. Learning assessments are conducted from various perspectives, including teacher, peers, and themselves. At this point, multiple assessments are performed. Learning effectiveness is perceived and reviewed from their group discussions, collaboration, and communication behaviors, learning achievements with oral and artifacts reports, and feedbacks they give to others.

4. System Design

Students are given themes, hints, and selected choices for hints. Students can use those hints to collect necessary information in order to complete the tasks. The hints are organized under themes, and are prompted consecutively and progressively. In each hint, students can look up more information from either database or the Internet (see Figure 3). On the PDA, little graphics are used for the interface in order to keep the information simple and easy to read for small screen. On top of the screen, there is the dynamic menu of the themes. Then one hint is displayed at a time with necessary selected related choices. In the field, students can also conduct digital inquiry online. When the students return to the classroom, they can retrieve their observation notes on the PDA with their own account number and password. Notes are documented according to hint orders. Students can then prepare for the task reports by comparing their notes with their peers (see Figure 4).

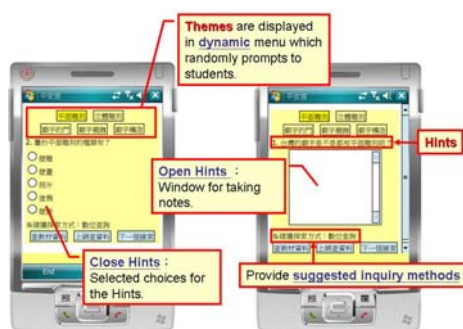


Figure 3 PDA interface for Inquiry



Figure 4 Students conduct in the inquiry learning

5. Conclusion

Inquiry-based mobile learning model can be further extended to other lessons, courses, and subjects. It is proved by this research and many others that students' learning achievements can be improved. For the future, we can conduct the research to understand other aspects of learning, such as critical thinking, creative thinking, cooperative learning, and so forth. We hope this research can provide some fundamental understanding for future researches.

Acknowledgements

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Smart Classroom 2.0: Context-aware Educational System

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Abstract: This paper presents the design and implementation of the context-aware educational system for smart classrooms. We outlined the design features for such a cost-effective system and report its deployment scenarios. The systems have three main management components that deal with various elements of this educational environment: (1) online course material and classroom hardware status management, (2) classroom booking and access control to automatically control hardware devices, (3) Context-aware event notification subsystem that informs students and teachers of various meaningful reminders of status changes.

Keywords: Smart Classroom, Content Management System, Context-aware Event Notifications, Pervasive Computing

Introduction

A smart classroom [1] in general is a classroom equipped with an instructor console and many other types of multimedia equipments, such that the teacher can give lectures in a wide variety of media modalities. Typical smart classrooms have overhead projectors, VCR/DVD players, TV sets, video/data projectors, notebook wireless connections. Therefore, the teaching materials can be of rich media format, including PowerPoint presentations, online video/audio podcast, transparencies, and whiteboard notes. To control all these elements within smart classrooms, there usually is a semi-permanent unit in the room called front-end console. This console is mainly responsible for the control and usage of all hardware and software elements.

Besides hardware support, an important feature of smart classrooms is synchronized interactions among teachers and students through digital technology, so that the learning experience of students becomes more engaging [1]. Usually these systems are called *classroom-based e-learning systems*. This requires capturing participants' attention and even predicts user's interest. Many of these solutions require deployment and integration of multiple high-end hardware equipments. However, the integration of high-end hardware equipments is through expensive proprietary and dedicated software, which is usually not open and far from a smooth and seamless integration. On the other hand, *web-based e-learning systems* have long been used for distant learning, where students rarely attend face-to-face classes, but access course materials online. Typical learning content management system (LCMS) of this category includes Moodle [7], SharePoints [8], etc.

However, there are not many works on the smooth integration between web-based e-learning and classroom-based e-learning systems. This implies not only the content management of electronic learning materials, and also the consistent status management of both software and hardware elements within a classroom setting.

Context-awareness [3] has long been identified as a key design goal for general ubiquitous computing applications, where devices or built-in software have information about current circumstances. Hence intelligent adaptations or tailored services can be provided to users without much distraction to user's attention. To design a context-aware educational system for smart classrooms, we need to free the educators from tedious technical operations, such as course homepage setup, reminder to students of certain quiz and activity. We also want to free the students from periodically rechecking course homepage for new announcements or other new course materials. To realize this kind of automation, we designed a generic context-aware event notification system that consistently monitors the status change of various software and hardware elements, and provides customized notification services for both educators and students. Therefore educators and students can focus more on the teaching or learning themselves, instead of being occupied too much by these digital technologies.

We designed and implemented the Smart Classroom 2.0 system, which is a cost-effective alternative solution to context-aware educational system. It organizes both software and hardware elements in a classroom setting. The rest of this paper is organized as follows. Section 1 presents the system design features. Section 2 gives the implementation details. Section 3 concludes this paper.

1. System Design Features

Our prototyped system has the following features that set it apart from existing ones:

- It is a cost-effective alternative solution to current commercial solutions: we used open standards (e.g. Wake on LAN [4], RS-232 [5]) for remote hardware control, and extended existing Web 2.0 website template for course content management, classroom booking services.
- It provides smooth software integration to control hardware, and thus facilitates various automations, such as semantic-aware course material classification for teacher, event notification (by Email or SMS messages) of changes, automatic classroom console control, and content synchronization to student clients.
- A context-aware event notification subsystem provides customized notification services to students and educator, which can be based on time, user status, notification modalities, etc. For example, it can send a SMS reminder to students shortly before the lecture starts.
- The system implementation is very flexible. We used Sparkle [2], our component-based software infrastructure in pervasive computing, to implement the classroom Front-end and Student Client in Java, more advanced hardware modalities can be easily connected to our system.

2. System Architecture and Implementation

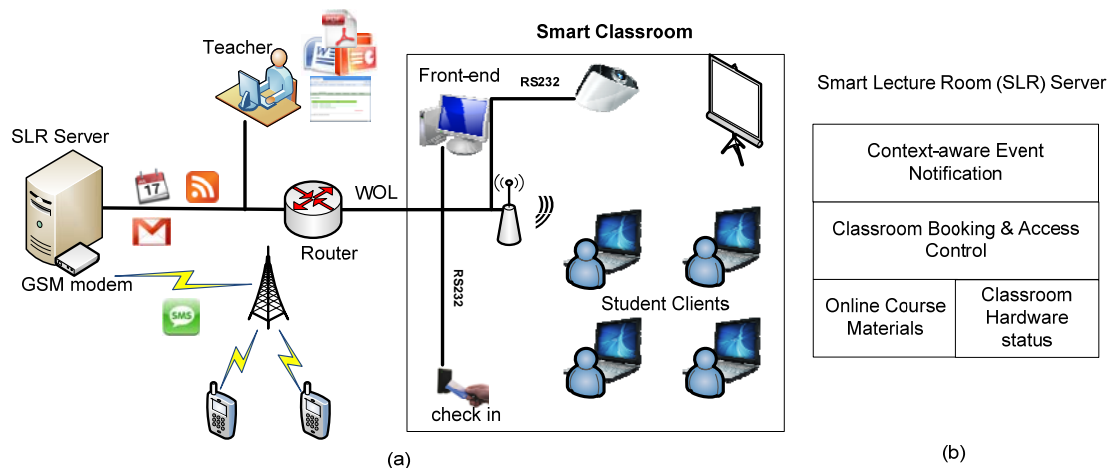


Figure 1 Overview of Smart Classroom 2.0 System

Figure 1 (a) shows the architecture of the Smart Classroom 2.0. It consists of three major components: classroom Front-end, Smart Lecture Room (SLR) Server, and Student Client software. The classroom Front-end is a software component written in java that controls the RS232-based data projector, and classroom front-end console, and the Student Clients within this classroom. The Student Client on attendee's notebook will form a Peer-to-Peer (P2P) network to get a synchronized screen view of the Front-end. The SLR Server has three main functions as shown in Figure 1 (b). (1) It hosts the online course materials, and manages status of classroom hardware, such that the coordination of different software and hardware elements are synchronized and updated consistently. For online course materials, it includes assignments, lecture/tutorial slides, announcements, quiz/exam, newsgroup questions, whiteboard notes, video/audio recordings. For classroom hardware status, it includes front-end console on/off status and its MAC address; projector status and control code, RFID reader identification. (2) It does the classroom booking and access control, which will verify a teacher's RFID card and confirm classroom reservation. (3) It has a context-aware event notification subsystem that provides customized notification to educators or students about new announcement, activities. This context-aware event notification can be personalized according to modalities (SMS or E-mail), time, or locations. For example, the notification will be automatically snoozed if the user is already taking the class by checking his student client software status.

Figure 2 shows a typical usage scenario with interactions among various components. The teacher will upload his course materials, which are being categorized differently according to a semantic-aware note classifier. This event will be consistently updated to course homepage and triggers event notifications to registered students of this course, who can receive lecture notes or quiz announcement by email or SMS messages. The systems will also automatically book classrooms based on the organized class schedule throughout a semester. Upon a teacher checks into the booked classroom by a RFID card, the SLR Server will verify the user and confirm its booking. It will send a Wake on Line signal to wake up the classroom front-end, and RS-232 signal to boot the projector. After boot up, the front-end will determine the current course code, and lecture ID, and download the lecture slide for this particular lecture. Later on if a student join this classroom, which are being detected by this classroom's Wi-Fi Access point, the Student Client will connect to the front-end and form a Peer to Peer network to get a synchronized screen cast with the front-end. The synchronized views from front-end console includes the Power point slide show, real time question and answer bulletin board. It will also remind the teacher that all devices will be turned off if this lecture is approaching to end.

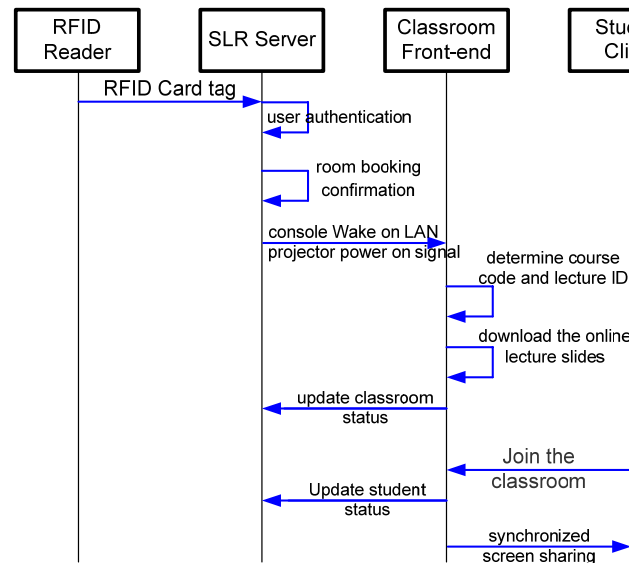


Figure 2 Sequence Flow Diagram of interactions

3. Conclusions

In this work, we reported our design and implementation of context-aware educational systems for smart classrooms. It organizes various information of course materials, hardware status. It makes use of common standards Wake on LAN (WOL) and RS-232 to provide a cost-effective alternative solution that controls the projector, classroom front-end console and student's clients. Through these support, it provides a very seamless integration between classroom-based e-learning and web-based e-learning systems, which has a context-aware event notification systems that links various communication modalities. The efficiency of education experience for both teachers and students can be greatly improved. More advanced human-computer interface and communication software can be easily added, so long as they stick to our status management and control interfaces. More information about this work can be found at [6].

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A Research of Digital Technology-assisted Reading Habit Cultivating

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Abstract: The purpose of this study pilot study was to build up and describe out the theme of how technology could be developed to enhance a reading habit cultivating activity. The conception of reading habit cultivating system is based on student-centered design. In the future work of this system and research activity will focus on develop the individualized reading model. Furthermore, the definition and measurement of the reading habits will be developed in the following research.

Keywords: student-centered, reading habit, technology-assisted, learning companion.

Introduction

Reading is an important activity in everyone's life. And reading ability is the foundation of learning. Because only one person who has reading ability, they will have the ability to learn by self. The newest brain researches find that reading ability has great association between creativity, sensibility, comprehension and memory (Yoon, 2002). There is a research find that students will have difficulties to learn if they do not have the basic reading skills before finished their third grade classes. Daniel Lerner, an educator, point out that reading is the process of construction. Further more; reading needs strategy and motivation. It is also a lifelong pursuit. Thus, how to foster reading ability and reading habits has draw attention more and more. This study will to build up and describe out the theme of how technology could be developed to enhance a reading habit cultivating activity.

1. Student-centered of reading habit cultivating

If educators can agree that a goal of education is for children to become skilled, passionate, habitual, critical readers. Then, what is the goal of reading to children? Robertson Davies answered that the goal is "to read for pleasure, but not for idleness; for pastime but not to kill time; to seek, and find, delight and enlargement of life in books"(Robertson, 1995). In *The Read-Aloud Handbook*, Jim Trelease (2001) defines the problem about children dose not like to read. "The scores tell us that many of our students know how to read, but their behavior tells us they don't like it enough to do it very often. We've taught children how to read but forgotten to teach them to want to read" (2001, p.5).

Therefore, the reading habit cultivating activities design is necessarily to consider from the student-centered. Pilgreen (2000) based her work on analysis of 32 free-reading studies

containing 41 experimental groups. In her research, she concludes eight factors to a successful reading activity program:

- 1.1 Access: Students must have access to books from a classroom library, school library, or other source, but materials must be readily at hand
- 1.2 Appeal: Reading materials should be interesting enough to make the students want to read them. Allowing students to choose their own books can take care of this.
- 1.3 Conducive environment: Students need a quiet, comfortable place to read
- 1.4 Encouragement: Students need encouragement from teachers, parent, and/or peers to stay interested in reading until it becomes reward in itself.
- 1.5 Staff training: The training of teacher is an important part of establishing a successful reading activity.
- 1.6 Nonaccountability: In order to get the most enjoyment possible from their reading, students should feel no obligation associated with it.
- 1.7 Follow-up activities: Activities to remain enthusiastic about a book without the feeling of accountability
- 1.8 Distribution reading time: Most of the successful reading activity programs offered students 15 to 30 minutes of reading time per session

Besides to create a reading environment, such as books, reading time, space. Nancy (2007) and Steve (1993) also agree that non-responsibility for self-selection of books and reading is the most effective way in promoting reading motivation. And in this mechanism teacher plays an important role to promote and encourage the student to read.

2. The conception of digital technology-assisted reading habit cultivating

To design a digital technology-assisted reading activity to support and guide students to improve their reading motivation and cultivate reading habits is the issue of this study. This research is based on Learning Companion theory and tries to create a mechanism supporting students to cultivate reading habit. The activities are divided into three stages and held by a well-trained researcher between the whole processes. And have chosen one third-grade class for reading activities. In the first stage, teaching and guiding the students to select books. Let them know how to choose books and their right to take non-responsibility in reading. Books will be based on the extent of third-grade divided into three categories, which are "holiday", "just" and "challenge". Provide students a reference for book selection. In the second stage, researcher guides them to read. And guide the students to record their daily reading progress and number of pages. The most important factor in this stage is that researcher will read together in order to take a role modeling fostering children's reading attitude. In the third stage a non-accountability and voluntary book talking activity will be conducted every bi-weekly. Besides, no homework will be taken in whole stages. After all, these three activity stages will be a circle in a class that will be held two times a week. (Figure 1)

Furthermore, the system design in this activity will be based on three described above divided into three parts. The first part is a database of books. Students borrowing the book and returning the books from the book case will be recorded in this database. The second part included the reading profile database and learning companion system. The reading process of every student will be recorded in reading profile database and then build up an individualized reading model with those data. While each student finished to read a book. Learning companion system will be based on the individualized reading model give each

student a personalized feedback. With those feedbacks students can get foods or gold as awards to raise and play with their visual pets. The third part is Teacher System. Teacher System will support the teacher to monitor students reading profiles and reading process. Beside, the teacher can use this system to give every student volunteer to share what they were read some additional feedback in learning companion system after every book talk activity.

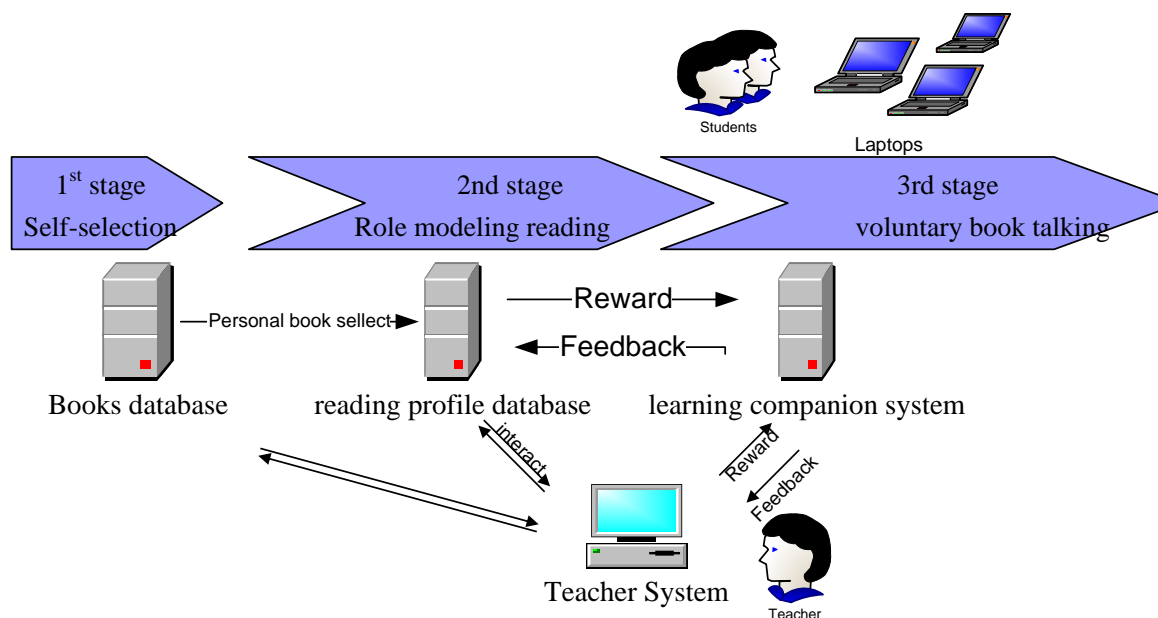


Figure 1: Three stages of the Reading Activities designed in this research.

3. Measurement

This study will take pre-test and post-test to measure the change of reading behavior and reading attitude. The reading behavior measurement will be based on the questionnaire which was modified from PIRLS 2006 student questionnaire. The other way to measure reading behavior is to observe in the experimental place and gather the data from reading profile database. The reading attitude measurement will use *Reading Attitude Scale* developed by McKenna, M. C., & Kear, D. J. (1990). Further more, qualitative interviews will be implemented after the post-test.

4. Discussion

There are two core issues that need to be resolved in this research. One is how to establish the individualized reading model with each student's reading profiles. An individualized reading model can be used to assess the progress of individual reading, reading ability and then provide appropriate feedback in order to enhance the motivation to read. For example, the book category of the "challenge" level may be easily for some students with good reading ability. But for other students, with poor reading ability, the "challenge" level is truly challenged for them. In this case, system will give additionally feedback while each poor reading ability students finished each "challenge" level books. The other one core issue is the definition of reading habits and measurement. The goal of this study is design and develops digital technology system to enhance the interest and motivation of every student in reading. Furthermore, in a large number of continuous readings, students be able to

develop a reading habit and the pleasure of reading. But how to define and measure on the reading habits will also be the problems of this study.

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The Design of a Blog-based Learning Game

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Abstract: Blogs are popular publishing tools that have flourished alongside the emergence of Web 2.0. In recent years, educators have harnessed the power of blogs for a wide variety of educational purposes. Different from the general blogger who shares personal products and gets identity from numerous audiences on the network, the sustainability problem has become one of the most common weaknesses in using blog to facilitate learning. The purpose of this study is claiming a blog-based learning game to stimulate personal product sharing and given comments. Two mechanisms come together as a blog-based learning game, a game environment with multiple motivations to maintain long-term use. This study also look forward to explore whether these game mechanisms embedded in the learning environment can enhance the amounts of the personal post and interactive comment.

Keywords: Blog, game-based learning, blog-based learning game, reflection, active open learner model, pet-nurturing game

Introduction

A blog is a publishing tool that facilitates composition and frequent updating. The term weblog, a portmanteau of *web* and *log*, first appeared in 1997; the word weblog was soon shortened to blog. Blogs have since grown in popularity for their powerful ability to organize user-created data. In the past decade, realizing the potentials of blogs to promote more interactive conversation, teachers have used blogs with many different educational purposes. It should be noted that though there are many benefits from learning with blogs, many learners lack sufficient motivation to engage in learning activities even when blogs are available. Blogs support conversational interaction, but don't inevitably lead to active interaction. In order to make up for some of observed weaknesses of blogs in education, passive sharing and shallow interaction, the purpose of this study is claiming a blog-based learning game to stimulate personal product sharing and interactive comment. Two mechanisms come together as a blog-based learning game, a game environment with multiple motivations to maintain long-term use. This study also look forward to explore whether these game mechanisms embedded in the game environment can enhance the amounts of the personal post and interactive comment.

1. Literature Review

1.1 The Potential affordances of the Blog for Education

A blog is a publishing tool that facilitates composition and frequent updating. Blogs have since grown in popularity for their powerful ability to organize user-created data. All writing and editing of blogs can be managed through a web browser, which makes reflective practices in e-learning accessible to a much larger, less technical population, (Chuang, 2008). On the public internet and on private networks, users use blogs to exchange their

opinions and experiences, and to present current events. Although blogs are often interactive in nature, the private space of a personal blog is also a protected space over which the owner feels the power of control (Herring et al. 2004). Additionally, Thorpe (2004) posits that the private nature of keeping journals about learning allows learners to feel less inhibition, lets them gain insight into their true feelings and also into the nature of what they are learning. In this respect, blogs can be used as personal learning tools with affordances for organized thoughts.

Blogs are also a type of social software, one that both represents the real existence of an author and fosters a high level of interpersonal relationships (Herring et al, 2004). The posts that are published on a blog reveal core relationships between the wider audience and the author. Blogs often have “comment” mechanisms that allow opinions and feedback from others to be shared. Langellierc and Peterson (2004) defined the feedback mechanism of a blog as a modulating action between the author and the viewers in which each seeks to define their own position among the others. They observed that an author modify his or her own representation according to the reflections of the viewers. In addition, a blog may be regarded as a tool that encourages individual reflection (Park, 2003). Learners consider and learn from other more expert bloggers through observing their opinions (Efimova, 2004). Moreover, the asynchronous nature of blogs allows users a time for reflection that avoids many of the mistakes that are made in face-to-face interactions. An author can think and rethink carefully, and edit blog articles accordingly (Walther, 1996). A blog can thus provide a steady place that facilitates interaction and reflection through asynchronous interaction.

1.2 The Driving Force of the Educational Blogs

In the past decade, realizing the potentials of blogs to promote more interactive conversation, teachers have used blogs with many different educational purposes. The sustainability problem has become one of the most common weaknesses in using blog to facilitate learning. Because using blog is intrinsically a spontaneous activity. On the internet, bloggers use blog to share their personal products and get identity from numerous audiences. The driving force to keep writing and reading with blog is often from the strong self-motivation. Different from the general blog, the blog with educational purpose have to be taken account of more motivation elements for keeping using, especially the target users are children. Many students lack the self-motivation to maintain their learning behavior with blog. Blogs provide adequate support for conversational interactions, but the use does not inevitably lead to active interaction.

Motivation is a significant aspect to influence a student’s learning. Recently, digital game-based learning attracts increasingly attention due to its positive influences on learning. Digital games often own multiple motivational factors, and are helpful to motivate people to learn (Crawford, 1982). In other words, game-based learning is a potential way to provide learners with a great deal of learning opportunities to improve their learning. Therefore, Gee (2003) suggested that human’s learning should adopt good learning principles built in the game design. The game mechanism pays a key role to motive and regulate the children’s learning behaviors.

The purpose of this study is claiming a blog-based learning game to stimulate personal product sharing and interactive comment, and exploring whether these game mechanisms embedded in the game can enhance the amounts of the personal post and interactive comment. In order to make up for some of observed weaknesses of blogs in education, e.g.

passive sharing and shallow interaction, we propose two mechanism of game approach to motive network interaction with educational blog. These mechanisms come together as a blog-based learning game, a game environment with multiple motivations to maintain long-term use.

2. Game Environment Design

In this game environment, as shown in Fig. 1, children have their own publishing tools for composition. These tools are similar in function to those of a blog website. The unique feature of this blog-based game is the obvious game interface on the head of the webpage. Child can take care of the pet and go outside from one virtual space to another place, maybe buy some food for the pet or interact with other people in this real-time environment interface. Two main mechanisms were designed to encourage students to write their own views and give comments. In the next section, two mechanisms of game would be explained in detail.



Figure 1. The user interface of the game environment



Figure 2. The skill tree of the blog-based game

2.1 Coaching Skills for the Pets

Related investigations have noted that pet keeping is naturally attractive to humans, especially to children, and that children are naturally attracted to pets because they all share the same attributes, such as cute, simple and straightforward behaviors (Melson, 2001). The activity of nurturing animal companions provides learners with a reasonable cause to sustain their motivations to learn. In addition, coaching pets for some special skills is naturally an interesting thing for children. In this respect, we encourage children to engage in publishing meaningful articles by harnessing the natural desires of children to coach skills for the pets. By publishing articles and giving feedback, learners earn rewards for the pets to learn new skills. Through this mechanism, we hope to enhance the motivation of the children to engage in composition and to give feedback to others.

2.2 Skill Tree

The second mechanism is called “skill tree”. The main purpose of this mechanism is to mitigate the beginner’s setbacks and supply sufficient self-confident to maintain using blog. In this mechanism, the articles and comments written by the learners will be classified into two major categories, the learning-related articles and the non-learning-related articles. The skill tree illustrates the conditions and the sequence of the new skills that the pets can be coached. As shown in Fig 2, in order to reduce the loading of the beginners, the upper layer skills on the skill tree need more non-learning-related articles and less learning-related articles. With the sustained practice, learners were requested to write more learning-related

articles and comments gradually. Through this mechanism, we hope to avoid the setbacks when the learners begin learning how to make blog become an effective learning tool.

3. Discussion and Future Works

In this paper, we presented preliminary design considerations of a blog-based learning game along two mechanisms to arise and maintain motivation in using blog for educational purposes. The main purpose of this study is to provide a game space where learners are encouraged to engage in writing articles and giving comments. Under the mechanism of coaching skills, learners are motivated by a natural desire to coach their pets towards attainment of certain behaviors and special abilities. Learning companions with pet characteristics may encourage learners to engage fruitfully in composition and giving feedback. The skill tree mechanism may facilitate the learner's self-confident by reducing the entry threshold of writing learning-related articles with blog. The next stage of this study will focus on observing the use of blog-based game in the real learning environments. We hope to get more information from the field experiment to review and modify our design.

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Exploring the Integration of Constructivist Computer Game-based Learning into Formal School Curriculum Teaching

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Abstract: This doctoral research is an exploratory investigation of the integration of constructivist computer game-based learning into formal school curriculum teaching. The entire research consists of three stages. *Stage I* involves the design and technical implementation of an operable pedagogical approach, namely *VISOLE (Virtual Interactive Student-Oriented Learning Environment)* to facilitate the integration. *Stage II* involves a preliminary evaluative study on the deployment of *VISOLE* in 16 schools in the form of a competition. *Stage III* involves a qualitative case study (*with a single-case study approach*) for gaining an in-depth understanding of students' learning process in *VISOLE* in the context of formal school curriculum teaching. This paper gives an overview of the background as well as design of the research.

Keywords: Computer game-based learning, constructivism, educational games, school curriculum teaching, teacher facilitation

1. Background

From its original purpose of “sugaring” the process of learning to today’s purpose of exploiting new constructivist learning environments, the discussion of harnessing computer games (*referred as games hereafter*) in education has been launched for years. Most of the game-based learning studies in the recent decade, however, have been focusing on exploiting games as “self-contained” constructivist learning environments for students to gain additional learning experiences during non-schooling time (e.g., [1], [2], [3], [4]). The domain has yet to have in-depth discussion about how constructivist game-based learning can be integrated into teaching of the existing curricula in school education. This doctoral research is aimed at exploring how gaming can be adopted in learning and teaching in the school context. Specifically, it focuses on the exploration of the design of integrating constructivist game-based learning into formal school curriculum teaching.

2. Research Design

In view of the current deficiencies in the domain of game-based learning (*lack of appropriate games for formal curriculum teaching in school education, lack of pedagogy for game-based learning, and lack of understanding of students' game-based learning process*), a three-stage study approach has been formulated for the present research.

2.1 Stage I: Design and Technical Implementation of VISOLE

This stage has involved the design and technical implementation of an operable pedagogical approach, namely, *VISOLE (Virtual Interactive Student-Oriented Learning Environment)* for facilitating the integration of constructivist game-based learning into formal school curriculum teaching. Based on the theoretical foundation of *intrinsic motivation* [5], *situated learning* [6], *scaffolding* [7], *reflection* [8], and *debriefing* [9], VISOLE has been framed into three pedagogical phases—

Phase 1: Multi-disciplinary Scaffolding. A VISOLE teacher acts as a cognitive coach to activate VISOLE students' initial learning motive, and assist them in gaining some preliminary high-level abstract knowledge based upon a selected multi-disciplinary framework through some face-to-face scaffolding lessons. In this phase, the students are equipped with “just enough” knowledge, and given only some initial “knowledge pointers.” They have to go on acquiring the necessitated knowledge and skills on their own in the next learning phase, not only from the designated learning resources but also a wider repertoire of non-designated learning resources, such as the Internet.

Phase 2: Game-based Situated Learning. This phase deploys an online multi-player interactive game portraying a virtual world. The scenarios therein become the dominant motivator driving the students to go on to pursue the inter-related understandings of the multi-disciplinary abstractions encountered in Phase 1. The game encompasses the creation of a virtual interactive world in which each student plays a role to shape the development of this world for a period of time. The missions, tasks and problems therein are generative and open-ended, and there is no prescribed solution. Since every single action can affect the whole virtual world, the students have to take account of the overall effects associated with their strategies and decisions on others contextually and socio-culturally.

Phase 3: Reflection and Debriefing. This phase interleaves with the activities in Phase 2. After each game-playing session, students are required to write their own reflective journal to internalize their learning experiences in the virtual world in a just-in-time fashion. Moreover, at the end of this phase, they are required to write their own report in a summative fashion to reflect on their overall learning experiences. In addition, teachers monitor closely the progress of students' development of the virtual world at the backend, and look for and try to act on “debriefable” moments to “lift” students out of particular situations in the game. Respectively during the course and at the end of this phase, teachers extract problematic and critical scenarios arising in the virtual world, and then conduct just-in-time and summative case studies with their students in face-to-face debriefing lessons.

FARMTASIA is the first technical implementation of VISOLE, in which the content is developed based on the topic of Agriculture in the senior secondary Geography curriculum in Hong Kong. The subject matter of this topic is of a multi-disciplinary nature, involving the areas of *Natural Environment, Biology, Economics, Government, Production Systems, Technology, Natural Hazards, and Environmental Problems*.

2.2. Stage II: Preliminary Evaluation of VISOLE

A preliminary evaluative study on VISOLE in the form of a competition has been conducted in this stage, involving 28 teachers and 254 students from 16 participating schools.

Notwithstanding the positive quantitative findings (*such as the students' positive perceptions of VISOLE, advancement in the subject knowledge, and self-evaluated enhancement on their problem-solving generic skills*), the qualitative findings have revealed that some phenomena emerged during the VISOLE process, impeding the students' learning process. These phenomena are termed "impeding phenomena." Plausible factors leading to these impeding phenomena have been identified. Apart from that, a number of the participating teachers have suggested or even initiated some new interventions targeting on mitigating / overcoming some of the impeding phenomena.

In spite of the flaws in the setting of this evaluative study (*such as the non-naturalistic learning and teaching context, students' distraction caused by the competition context, sampling problem, teachers' effects, etc.*), some preliminary understanding of students' learning process in VISOLE has been gained, throwing light on the design of the next study stage.

2.3. Stage III: In-depth Understanding of Students' Learning Process in VISOLE

This study stage is aimed at gaining an in-depth understanding of students' learning process in VISOLE, and hence shedding light on the enhancement of VISOLE's existing design and technical / classroom implementation, and providing insights into constructivist game-based learning in school education. Based on the preliminary qualitative findings of Stage II (*the preliminary identification of the impeding phenomena and their corresponding plausible leading factors, as well as the teachers' suggested or initiated interventions*), the research questions of this stage are framed as follows:

1. When VISOLE is adopted and implemented in the setting of a *formal school curriculum teaching*, do any phenomena, which emerge during the VISOLE process, impede students' learning process?
2. *How* do these phenomena impede the students' learning process?
3. *Why* do these phenomena emerge?
4. Is the teacher facilitation (*[1] the designated teacher facilitation tasks specified in VISOLE, and [2] any other new teacher interventions*) able to mitigate / overcome these phenomena in VISOLE?
 - If *yes*, *how* do they work?
 - If *no*, *why* do they fail?

This stage will involve an in-depth qualitative case study, and the work in Stage I and Stage II constructs an "educated" research framework for this case study (*see Figure 1*). With regard to Research Questions 1, 2, and 3, the qualitative findings of Stage II about the impeding phenomena and the corresponding "plausible" leading factors will direct the identification of initial key student informants, conduct of preliminary exercise of data collection and analysis, as well as selection of potential units of analysis (*some students*) in the case study (*as illustrated in the left-hand part of Figure 1*). Moreover, observing a teacher implementing VISOLE's designated teacher facilitation tasks designed in Stage I (*as illustrated in the upper part of Figure 1*), and employing the new interventions suggested or initiated by the participating teachers in Stage II (*as illustrated in the left-hand part of Figure 1*) will offer initial clues to answer Research Question 4.

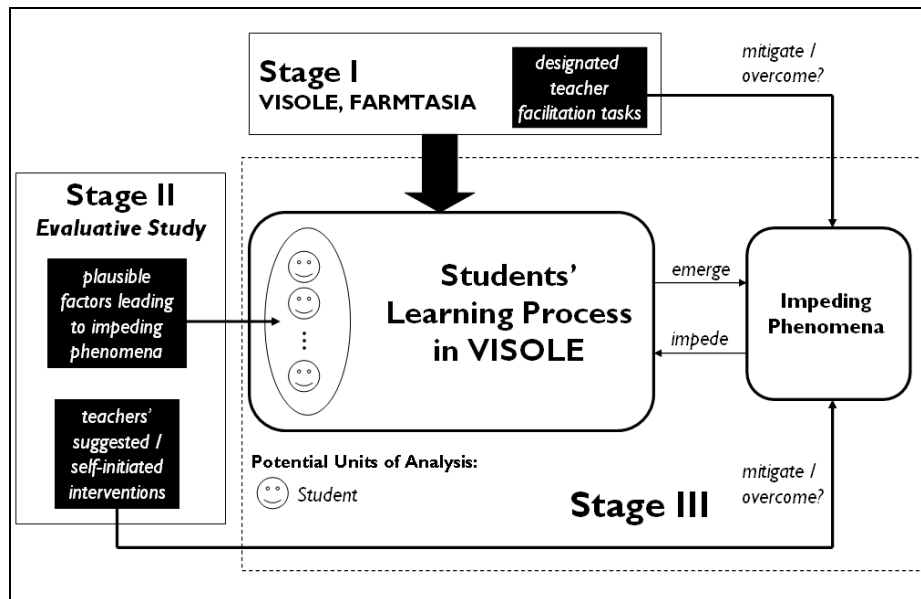


Figure 1. "Educated" research framework

3. Conclusion

Unlike other "classical" empirical experiments in the domain, this doctoral research is NOT to prove nor disprove the effectiveness of game-based learning. It is also NOT to demonstrate whether game-based learning is a better approach than conventional classroom teaching, or other contemporary constructivist educational approaches. Instead, this research focuses specifically on exploring a "lacking" pedagogical framework in the current domain for enabling the integration of constructivist game-based learning into formal curriculum teaching in school education. Furthermore, instead of merely relying on the theoretical perspectives, this "exploration" has been iterated continuously by my increasing understanding of students' actual game-based learning process throughout the research. It is expected that the research findings can provide both theoretical and empirical reference for other designers and researchers of game-based learning, and for those (*such as education policy makers, educators, school teachers, practitioners in game companies*) who are interested in appropriating games or gaming technology to support learning and teaching in school education.

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Computer Ethic Scale: A Study of Reliability and Validity on the Middle School Students

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Abstract: In this paper, we developed, through the scientific and systematic processes, a scale that can measure the Computer Ethic Awareness (CEA) of the middle school students. Then, the validity and reliability of the scale were verified. For this, first, we identified four major indices that consist of the CEA through meta-analysis and then, they are validated by experts. Second, we extracted 22 sub-factors related to the CEA by applying the Delphi technique with public middle school teachers teaching the Computer Ethic, university professors, and professional researchers at the computer ethic related institutes in Korea. Third, we identified 33 items reflecting the cognitive and moral development characteristics of the middle school students to measure CEA. Finally, we verified the validity and reliability of the CEA scale items through statistical methods.

Keywords: Information Ethics, Delphi, scale development

Introduction

The Internet communication and computer technologies have brought us the convenience and efficiency, and became a key part in our daily life. On the other hand, despite its benefit, the misuse of computer through the Internet also became the major source of problems for both individuals and society in general, including easily accessible filthy and violent media, identity theft, copyright infringement, Internet addiction, etc (Selwyn & David, 2001; KADO, 2006). However, the most serious problem is that these reverse functions have a negative influence on the middle school students whose identities are not fully established. As a result, they often end up being both the harmer and the victim from such reverse functions without realizing what's ethical and what's not. (Gregory & Udo, 1994). To address such problems, a nation-wide education in the computer ethic has been carried out so far. However, it is often not easy to observe a foreseeable result due to the lack of an objective scale that can measure the Computer Ethic Awareness (CEA). Besides, the existing investigation methods are typically limited to specific areas such as the Internet and game addiction and are also evaluated focusing on the adults, not students. Hence, the development and application of such scale is crucial in solving the reverse problems from the Internet and computer misuse.

1. Literature Review

1.1 What's Computer Ethic (CE)

The CE can be defined as a yardstick that can be used to handle ethical issues in information-oriented societies; It defines the basic moral standards-right and wrong, good and evil, and moral and immoral-to attain the most desirable behavior while living in and information-oriented society as well as handling computer and communication devices (KERIS, 2000).

1.2 The Four basic principles of CE

In this research, the scope and contents of the CE is classified into four categories as shown below. These are the fundamental principles we need to consider when making ethical decisions in an abstract and complex information society. They have been established based on the meta-analysis of related research papers and references and the fundamental concept of each of the category was defined as well.

Principles	Fundamental concept
Moderation	Considering current situation, properly control one's behavior based on the decision criteria – what's right and wrong, and what's good and bad.
Respect	Value and admire others as well as oneself; regard others as human beings with dignity by caring for their identity and cherishing their self-esteem.
Responsibility	Predict the outcome of one's behavior onto others and be liable for possible loss and/or sanctions from it.
Participation	As an independent information user, offer help to others while abiding by the responsibility and eager participation. Also create / present valuable information and vigorously contribute to various cyber activities.

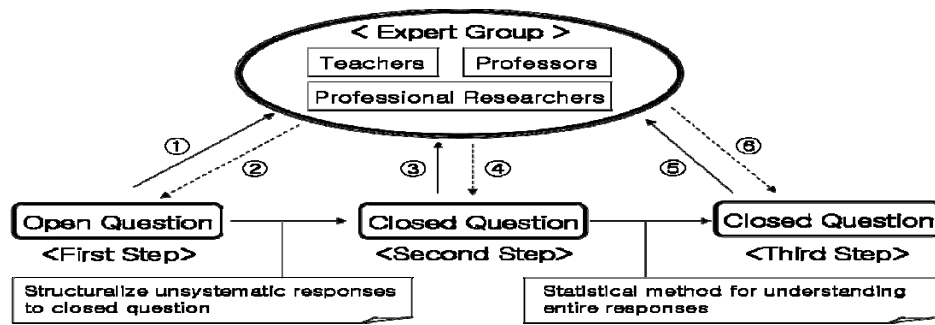
2. Methodology

2.1 The process of scale development

To develop an appropriate scale of the information ethic for students, in this research, we adopted the 7-stage methodology proposed by DeVellis (1991). The first stage is the definition of the concepts, which is followed by the identification of evaluation items using the Delphi method – a scientific and systematic procedure for collecting opinions.

2.2 Extraction of 22 Sub-factors using the Delphi method

To identify the sub-factors of the CE based on the classification of the previous 4 principles, the Delphi technique was used in this research. The Delphi technique is a research method based on both the quantitative objectiveness that 'the opinion of two people is more correct than that of a person' and the democratic decision making procedure that 'the majority vote is more correct than that of the minority' (Lee, Jong Sung, 1977). This technique is typically used in developing the assessment standard of the evaluation methods. The Delphi technique involves repetitive Q&A sessions to collect, consolidate, and quantify the opinion of many expert panel members. Typical Delphi methods have 3-4 iterations and in this research, we performed 3-stage Delphi analysis.



2.3 Development of the Scale Items

Based on the 22 sub-factors identified by the Delphi technique, the final scale contains 33 items presented in the Likert-type scale, where 1 and 5 represent the lowest and highest degree of the respondents' agreement, respectively. More specifically, it consists of 7 items for the 'Moderation', 8 items for the 'Respect', 12 items for the 'Responsibility', and 6 items for the 'Participation' principles, respectively.

3. Results

3.1 Reliability Analysis

To analyze the reliability of the items, coherency tests were performed in terms of both the questions as a whole and 4 principle areas, respectively. The overall reliability of the 33 questions showed the Cronbach's alpha value of 0.843. As for the four principle areas, 'Moderation', 'Respect', 'Responsibility', and 'Participation' scored 0.749, 0.814, 0.902, and 0.799, respectively. Therefore, we can safely conclude that the reliability of the presented scale shows a meaningful coherency.

3.2 Validate Analysis

In the course of scale development, this research attempted through factor analysis that are frequently used to validate structure validity (SPSS, 2005). Before the structure validity test was initiated, KMO and Bartlett's test of sphericity (BTS) were conducted to determine whether the data were suitable for factor analysis. Kaiser-Meyer-Olkin (KMO) value was found to be 0.919 in the analysis. KMO test were carried out to find out whether the partial correlations are low and the distribution is sufficient for factor analysis or not. KMO value should be over 0.60, and if it is closed to 0.90 it is stated to be perfect (Hutcheson & Sofroniou, 1999). Therefore the KMO value in this research can be said to be perfect. The research also used Barlett's test of sphericity (BTS) which tests the hypothesis "correlation matrix = unit matrix". The rejection of the hypothesis shows that correlation between the variables is different from 1 and the factor analysis is appropriate for the variables. Approximately χ^2 value for BTS was found 38213.5 ($p < 0.000$) for the study. So the results of those two tests were satisfactory.

Kaiser-Meyer-Olkin measure of sampling adequacy		0.919
Bartlett's test of sphericity	Approx. Chi-Square	38213.500
	df	528

	Sig	0.000
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In the next step, factors were extracted by the principal-axis factoring method. An Eigenvalues >1.0 was used as the criterion for factor extraction with factor loading after Varimax orthogonal rotation $>.04$ was set as the limit in the selection of meaningful items in each factor. As can be seen in Table, the cumulative explanation percentage for the 4 factors is 48.051%. The results showed that total and loadings percentage of variance, respectively, are as follows; first factor 7.318 and 22.175%, second factor 4.403 and 13.342%, third factor 2.243 and 6.797%, fourth factor 1.893 and 5.736%.

It is stated that the higher the variation gained as a result of the factor analysis, the stronger the factor structure of the scale is. Besides, variance between 40% and 60% is claimed to be sufficient for social science studies (Dunteman, 1989). Therefore the variance percentage, found over 48% for the study can be said to be between the acceptable limits.

The percentages of variances explained by 4 factors as a result of varimax rotation carried out were as follows: 18.399% for the first factor, 10.960% for the second factor, 9.461% for the third factor, 9.231% for the fourth factor. Table presents the items included in the factors after the varimax rotation.

Component	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	7.318	22.175	22.175	7.318	22.175	22.175	6.072	18.399	18.399
2	4.403	13.342	35.518	4.403	13.342	35.518	3.617	10.960	29.359
3	2.243	6.797	42.315	2.243	6.797	42.315	3.122	9.461	38.820
4	1.893	5.736	48.051	1.893	5.736	48.051	3.046	9.231	48.051

4. Summary and Results

The goal of the education of CE is to improve the Awareness level of the students so that they themselves are able to judge between what's ethically right and wrong and, as a result, to take the right behavior (Jennifer & Timothy, 2000). This is because the behavioral intention is heavily dependent on the Perceived Importance (PI), since the higher PI escalates the intention for ethical behaviors while the lower PI tends to render unethical deeds (Robin et al, 1996). For this, it is vital to begin from thoroughly identifying the level of their Awareness in the IE in the same manner as doctors analyze the symptoms of the patients first and then treat them appropriately. In this research, 33 scale items were developed by using the Delphi technique and they were evaluated for validity and reliability through the factor analysis. It will become a fundamental foundation in developing materials for the education and consultation appropriate for each and every level of student, while being a suitable method for achieving the utmost goal of the Computer Ethic education.

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Scaffolding Strategies for Teaching Introductory Programming

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Abstract: Traditionally the learning of programming is documented as being a challenging activity among higher education students all over the world. This paper will provide an overview of the current literature on learning strategies with respect to programming with a view to identify mechanisms for scaffolding student learning in introductory programming courses. Typically scaffolding the learning of programming with respect to students' cognition and collaboration in order to improve their self-efficacy in producing programs will be addressed. The aim is to find if such scaffolding will have an impact on the learning of programming.

Keywords: introductory programming, scaffolding

Introduction

Programming is typically a constructive activity where programmers use their cognitive skills and group skills to model real world systems. However, many students perceive programming as cognitively challenging and not enjoyable, resulting in lack of belief in developing programs on their own (Teague & Roe, 2008). While some students are able to read and understand given programs, many lack the skills to be able to construct a program themselves. Scaffolding can be used to help students' develop their ability to construct a program. Scaffolding is defined as "an act of teaching that (i) supports the immediate construction of knowledge by the learner; and (ii) provides the basis for the future independent learning of the individual" (Holton & Clarke, 2006).

1. Rationale and Literature Review

1.1 Rationale

A multi-national, multi-institutional study on programming skills of first year Computer Science (CS) students revealed that many students struggle to achieve an average score above 25% in their assessments (McCracken, et al., 2001). Researchers have identified factors for the success or failure of students in programming but research on the pedagogical approaches to programming rarely covers related scaffolding mechanisms for programming tasks. Hence this research explores if programming success can be enhanced by scaffolding students' learning through cognitive scaffolding and collaborative scaffolding to improve their self-efficacy and constructive abilities. Self-efficacy is a motivational factor and is defined as an individual's judgment of his or her ability to perform a task. Students with

high self-efficacy have been found to have high cognitive abilities (Ramalingam, et al., 2004)(Ramalingam, LaBelle, & Wiedenbeck, 2004).

1.2 Literature Review

A review of some of the current literature on learning programming shows that the factors for success or failure can include: student-effort, mathematics capability, experience in programming languages, problem-solving ability, abstract reasoning and logical ability, self-efficacy, comfort level and support from peers and instructors (Bennedsen & Caspersen, 2005; Wilson & Shrock, 2001).

It has been found that student-effort in programming is strongly related to self-efficacy. Hence Ramalingam, LaBelle and Wiedenbeck, (2004) recommend that programming students must be challenged but not overwhelmed by the program complexity. They identify performance attainment, observation of the performance of others and social persuasion as important self-efficacy factors.

Fuller, et al., (Fuller, et al., 2007) note that the principal learning objective in applied subjects such as computing is the ability to develop artifacts rather than the ability to critique or interpret. Hence Fuller, et al. have developed a taxonomy called Matrix Taxonomy targeting the learning of programming wherein comprehension of program code and the ability to produce program code are viewed as two primary learning outcomes. The taxonomy is shown as a two dimensional matrix in Figure 1. The dimension of interpreting and the dimension of producing correspond to the two competencies of ability to understand and interpret an existing program and the ability to design a new product. Typical learning pathways by various kinds of students are also illustrated by Fuller et.al. (2007). Two illustrations of these are given in Figure 2 and in Figure 3. Since student effort is one of the significant predictors of success, we believe this taxonomy can be utilized by educators to provide scaffolding activities that help learners to attain pathways indicated in Figure 3.

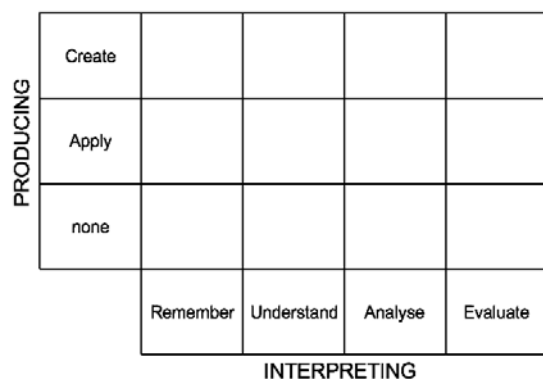


Figure 1: A Graphical Presentation of the Matrix Taxonomy

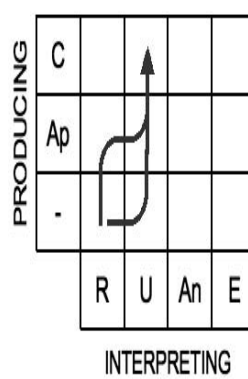


Figure 2: Pathways to practical competencies

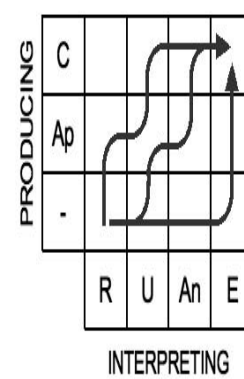


Figure 3: Pathways to higher level competencies

Another taxonomy that is used with regards to assessing the learning of programming is the Structure of the Observed Learning Outcome (SOLO) taxonomy (Fuller et al., 2007; Johnson & Fuller, 2006; Sheard, et al., 2008). The SOLO taxonomy focuses on the content of the learner's response to what is being assessed rather than on the cognitive characteristics of the learner's performance. Illustrations of how the SOLO taxonomy can be used as an effective tool for the design of assessment tasks with respect to programming is given by Fuller, et al., (2007) and Sheard, et al., (2008). Programming teachers can scaffold student learning through formative assessments using SOLO principles. The two

taxonomies provide direction regarding learning outcomes and assessment structures for the teaching of programming but not for scaffolding. Scaffolding can help students build their self-efficacy and improve their current knowledge and ability to learn how to program. Different types of scaffolding can be used.

1.2.1 Scaffolding students' cognitive programming skills

Ramalingam, LaBelle and Wiedenbeck (Ramalingam, et al., 2004) suggest helping students internalize good cognitive models for programming through tasks such as real world object-oriented perspectives, experiential learning involving tracing the logic of program, debugging and modifying programs and adding new modules that involves interactions with other parts of the program. Scaffolding occurs when students are given part of a program and asked to expand on that program.

Thomas, Davis and Kazlauskas (Thomas, Davis, & Kazlauskas, 2007) have illustrated scaffolding mechanisms for critical thinking in various subjects in the Information Systems domain. Ramalingam, LaBelle and Wiedenbeck (2004), discuss the need for programming instructors to teach students to comprehend a block of programming code as one unit rather than individual lines of code, in order to reduce the cognitive load on working memory. Similarly to minimize the mental load on the students' sparse working memory Mead, et al., (Mead, et al., 2006) uses Anchor Concept (AC) graphs for programming pedagogy. An AC is a concept that is either foundational or is both integrative and transformative. These graphs can be utilized by educators to highlight locations of learning that may benefit from a scaffolding approach.

1.2.2 Scaffolding using collaborative techniques

Peer learning is a recognized method for scaffolding students' in their learning as they learn from one another. Collaboration can be used to improve self-efficacy as students work together to produce programs they learn from one another (Teague & Roe, 2008). For example, student pair programming can be used as a collaboration strategy to increase confidence and decrease frustration (Preston, 2006). Programming teachers may enhance collaborative work effort by setting common but ill-structured tasks, small groups and by illustrations of cooperative behavior, interdependence behavior and individual accountability.

2. Description of the proposal and research questions

2.1 Proposal

Given the factors that influence learning in introductory programming and the CS specific learning taxonomies, CS educators may be able to scaffold the learning of introductory programmers. There is very little evidence from current research papers of a holistic scaffolding technique being directed at improving introductory programmers' ability to learn programming skills using collaborative scaffolding and cognitive scaffolding techniques. We will be providing cognitive scaffolding to help students' bridge the gap from understanding programs to constructing programs. Similarly we will be providing collaborative scaffolding to help them improve their self-efficacy.

2.2 Research Questions

Specifically we will investigate the effect of cognitive scaffolding and collaborative scaffolding on introductory programming students' self-efficacy and constructive ability. In the absence of any standard measures of success for programmability, grades earned by students will be used as an indicator of success.

2.3 Data Collection

Data will be collected from about forty students during semester 1, 2010 at an Australian university running an introductory programming unit as a part of Business Information Systems course. Data collection will be from questionnaires, student group assessments, individual answer scripts, final grades and online discussion forums. Two sets of questionnaires will be used, one near the start of the semester and one at the end.

3. Description of the contributions of the research

This research will highlight the effect of scaffolding the teaching of introductory programming. If successful, CS academics can import scaffolding into other subject areas. If not, the reasons can be analyzed to potentially create alternate scaffolding strategies.

4. Proposed research methodology

Quantitative analysis of the survey questions will be conducted to find correlations if any among potential dependent and independent variables. The two sets of questionnaire data will primarily ascertain the difference in the level of motivation of each student during the course of the semester as a result of the scaffolding provided. The qualitative analysis of the data from answer scripts and online discussion forums will help gather information about the effectiveness cognitive scaffolding. Qualitative analysis of group assessments will be used to study collaborative scaffolding effectiveness.

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The Impact of ICT-Enhanced Learning Context on Students' Conceptions of and Approaches to Learning for Learning Outcomes in Principles of Accounting

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Abstract: This research aims to study the impact of ICT-enhanced learning context on learning process and learning outcomes in the context of Malaysian accounting education at high school level. The variables of learning process i.e. students' perceptions on the learning context, conceptions of and approaches to learning as well as learner's characteristics in terms of academic ability and ICT proficiency level are to be studied for their interrelationships and impact on learning outcomes. Contributions of this study are discussed together with proposed research questions and approaches in this paper. Preliminary results of this study depict a tendency of students' receptiveness towards the new pedagogical approach with significantly higher receptiveness demonstrated by the under-achievers.

Keywords: ICT-enhanced learning context, conceptions of learning, approaches to learning, learning outcomes, academic ability, ICT proficiency level, Principles of Accounting, high school learners

Introduction

Accounting is widely referred to as the "language of business". It serves as an information development and communication function that supports economic decision-making. With the advent of Information and Communication Technology (ICT) and globalization where the computerized accounting systems and a dynamic working environment were witnessed, accounting education was in a reengineered stage globally. It needs to go beyond the traditional approach, which has emphasized "transfer of knowledge" to the development of knowledge, skills and professional values that are broad enough to enable adaptation to constant change in the workplace.

In view of the changes above, the Malaysian Ministry of Education (MOE) decided to employ ICT and skill-based pedagogical approach for the subject of Principles of Accounting at secondary schools. It involved the supply and installation of the educational accounting software, ASSETBase (version 2), in 1,365 national and technical secondary schools nationwide since 2005. Following this, accounting teachers underwent trainings to enhance their skills and knowledge at using the software as a complementary tool to support teaching and learning, and in preparing full-cycle accounts. All the activities above were instrumental as precursors to the implementation of the revised curriculum by 2010 with the

aims of fostering competent individuals who are highly skilled, knowledgeable, ethically grounded, and life-long learners.

The overarching question now is how effective is ICT-enhanced learning context in impacting the students' learning process in terms of their perceptions on the new learning environment, conceptions of learning and approaches to learning which will ultimately lead to improved learning outcomes? This stands as the general motivation for this research, specifically in terms of improving the quality of accounting education at the high school level.

1. Literature Review

1.1 Conceptions of Learning

Säljö (1979) is widely acknowledged as the pioneer researcher on conceptions of learning. He distinguished five qualitatively different conceptions as (a) increase of knowledge, (b) memorizing, (c) acquisition of facts or procedures that can be retained and/or utilized in practice, (d) abstraction of meaning, and (e) an interpretative process aimed at the understanding of reality.

From the findings above, it can be concluded that learning can be viewed as something "external" to the learner e.g. conception (a) to (c) or the other way, the "internal" or personal aspect of a learner e.g. conception (d) and (e) which denotes how a learner understands the real world.

1.2 Learning Context

The learning context related to the present study involves the aspects of ICT-enhanced course materials, particularly the educational accounting software used in teaching and learning in tandem with new ways of teaching approach.

With regards the course materials, Noyes and Garland (2003) studied the effectiveness of computer-based instructional methods, and they claim that this method enables the reduction of cognitive load of a learner and articulated the rationale which supports the notion that humans are more capable of dealing with concrete information that appears salient in the environment than abstractly generating inferences.

On the other hand, the study of teaching approach by Leveson (2004) found that some educators have the intent of transferring information using teacher-centered strategies; while some have the intention of encouraging students to engage in meaningful learning by employing student-centered strategies.

1.3 Approaches to Learning

Earlier studies of Students' Approaches to Learning (SAL) were conducted by Marton and Säljö (1976) who claimed that approaches to learning refer to the ways in which students process their academic tasks and affect learning outcomes. They identified two contrasting learning approaches i.e. deep approach and surface approach.

1.4 Learning Outcomes

The taxonomy of outcomes proposed by Bloom (1956) is widely used for defining learning objectives and outcomes. It classifies learning outcomes into three domains, namely Cognition (thinking); Affection (feeling); and Psychomotor (doing). However, Carter (1985) argued that a major defect of Bloom's Taxonomy is the absence of a distinction between knowledge and skill where knowing how to do something and being able to do it competently are two different issues. Thus, he suggested an alternative taxonomy which are founded upon the domains of Knowledge (what the student knows); Skills (what he can do); and Personal Qualities (what he is).

1.5 Learner Characteristics

Learner characteristics are important factors which contribute to student perceptions (Thomas and Rohwer, 1986). They play a role in decision making and capabilities to conduct various study events. In the present study, the influence of learners' characteristics in terms of academic ability and ICT proficiency level will be specially examined.

1.6 Overview of Relationships Among Variables

Research has established close links between students' perceptions of learning and teaching environments, their personal characteristics, approaches to learning and learning outcomes (Ramsden and Entwistle, 1981; Ramsden, Martin and Bowden, 1989).

A number of researchers have implied that students' conceptions of learning correlate with their approaches to learning (Lee, Johanson and Tsai, 2007; van Rossum and Schenk, 1984).

On the other hand, Trigwell and Prosser (1991) claim that deep approaches contribute to high quality learning outcomes through the acquisition of relationally structured knowledge, while surface approaches result in fragmented learning and "missing the point" of the material.

Finally, in terms of students' academic ability, Biggs (2001) postulated that a "hard" (not easily changed by teaching) factor has more direct influence on leaning outcomes than approaches to learning.

2. Research Questions

- 2.1 Do the perceptions on ICT-enhanced learning context influence students' learning conceptions for the subject of Principles of Accounting?
- 2.2 Do the perceptions on ICT-enhanced learning context influence students' approaches to learning the subject of Principles of Accounting?
- 2.3 Do students' conceptions of learning influence their approaches to learning the subject of Principles of Accounting?
- 2.4 Do students' approaches to learning influence their learning outcomes?
- 2.5 Do students' conceptions of learning, approaches to learning and learning outcomes influenced by their academic ability and ICT proficiency level?

3. Contribution

There have been many published studies on the effectiveness of educational technology on learning outcomes of accounting education but a dearth of studies on the learning process which involves learners' perceptions on learning context, conception of and approaches to learning, particularly in the context of high school students. Thus, this research contributes to the corpus of knowledge of theories in learning process. It makes a prima facie case for educators to vary the methods of their teaching to stimulate quality learning outcomes in accounting education through enhancing the academic environment that encourages deep learning.

4. Methodology

This research will be conducted in two phases using qualitative research in the first phase, and then followed by descriptive research in the second phase. The purpose of conducting qualitative research is to obtain an in-depth understanding on the relationships of variables and discover additional information that could refine the conceptual framework and instruments which will be used for the second phase of study. In this respect, interviews and observations will be conducted in several randomly selected schools. Further, descriptive research will be undertaken to establish the empirical relationships of variables within the conceptual framework through the dispensation of closed-ended questionnaire.

5. Preliminary Results

To ensure the successful implementation of the revised curriculum by year 2010, a "try-out" project was conducted in 150 technical and national secondary schools nationwide in Malaysia. Studies on students' receptiveness on the ICT-enhanced learning environment have been conducted through the use of quantitative and qualitative instruments concurrently in the "try-out" project which obtained 1,322 and 238 student respondents respectively. The results reveal an overall positive tendency of receptiveness by students with the under-achievers demonstrate significantly higher receptiveness. The findings from qualitative instrument reveal that the major factors which influence receptiveness are efficiency in learning process, teaching competency, discovery learning, conceptual and technical accounting learning problems, and preference for traditional learning approach.

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