ICCE 2011

The 19th International Conference on Computers in Education

28 November - 2 December • Chiang Mai, Thailand

Doctoral Student Consortium Proceedings of the 19th International Conference on Computers in Education: ICCE 2011

Editors

Weiqin Chen

Yam San Chee

Chen-Chung Liu

Fu-Yun Yu

Tsukasa Hirashima

Gautam Biswas

APSCE

NECTEC a member of NSTDA

THAILAND CYBER UNIVERSITY

MAEJO UNIVERSITY

Doctoral Student Consortium

Proceedings

of

the 19th International Conference

on

Computers in Education

ICCE 2011

November 28, 2011 - December 2, 2011

Chiang Mai, Thailand

ISBN 978-616-12-0189-0

Publisher
National Electronics and Computer Technology Center, Thailand

Doctoral Student Consortium Proceedings of the 19th International Conference on Computers in Education ICCE 2011

November 28, 2011 - December 2, 2011

Chiang Mai, Thailand

Edited by

Kevin CHAN

Chia-Jung CHANG

Yuki HAYASHI

I-Chun HUNG

Wai Ying KWOK

Chun Hung LIN

Kuo-Ping LIU

William TANG

Noriko UOSAKI

Amali WEERASINGHE

Weiqin CHEN

Yam San CHEE

Chen-Chung LIU

ICCE 2011 Theme-Based Doctoral Student Consortium
November 28, 2011 (Monday) to December 2, 2011 (Friday)
Chiang Mai, Thailand
Organized by the Asia-Pacific Society for Computers in Education
http://apsce.net/

Preface

This volume contains the Doctoral Student Consortium Proceedings of the 19th International Conference on Computers in Education (ICCE 2011). 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 six sub-themes: Artificial Intelligence in Education/Intelligent Tutoring System and Adaptive Learning (AIED/ITS/AL); Computer-supported Collaborative Learning and Learning Sciences (CSCL/LS); Advanced Learning Technologies, Open Contents, and Standards (ALT/OC/S); Classroom, Ubiquitous, and Mobile Technologies Enhanced Learning (CUMTEL); Game and Toy Enhanced Learning and Society (GTEL&S); and Technology, Pedagogy and Education (TPE).

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 (Kevin CHAN, Chia-Jung CHANG, Yuki HAYASHI, I-Chun HUNG, Wai Ying KWOK, Chun Hung LIN, Kuo-Ping LIU, William TANG, Noriko UOSAKI, Amali WEERASINGHE) who were highly recommended by the APSCE Special Interest Group Chairs (SIG) 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 (Weiqin Chen, Yam San CHEE and Chen-Chung LIU). 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 11 submissions where 10 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 the proceedings on various research topics will stimulate more research ideas and discussions among the young researchers.

We would like to thank all the 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 Thepchai SUPNITHI for his valuable support and arrangement in organizing the DSC.

On behalf of editors
Weiqin CHEN
Yam San CHEE
Chen-Chung LIU

Table of contents

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

A scaffolding framework to support learning in multi-agent based simulation environments

Satabdi BASU, Gautam BISWAS
Vanderbilt University, Nashville, TN, USA.
{satabdi.basu, gautam.biswas}@vanderbilt.edu

Abstract: Simulations provide a suitable environment for discovery learning, but are not pedagogically effective unless exploration tasks are suitably scaffolded. We are developing an architecture for a computer based learning environment that includes a multi-agent based simulation, a causal modeling tool, and a set of contextualized scaffolds provided by a virtual agent to help middle school students learn important science concepts. The particular domain of study is ecosystems and ecological processes, and our goal is to help students gain a deep understanding of ecological processes.

Keywords: Inquiry Learning, Simulation-based Learning, Multi-Agent simulations, Scaffolding, Design-based Research

1. Introduction

Students' understanding of complex scientific processes can be improved by using simulation environments that allow users to explore and observe details of dynamic processes in the real world, discover the model(s) underlying the simulation, and assimilate them with their existing knowledge [4]. However, previous studies have not shown univocal outcomes that validate the effectiveness of learning through simulations [3]. When working in simulation environments, students are known to face a multitude of problems linked to hypotheses generation, setting up experiments, interpreting results, and organizing them to construct the underlying model [3]. Hence, these environments need to provide adequate support or scaffolding to students during the discovery process to promote learning. The question which naturally follows is: *What are useful scaffolds and how can they be provided most effectively?*

Multi Agent Based Models (MABMs) [9] provide multiple representations within the simulation environment and are effective scaffolds. At one level, they focus on individuals and their interactions, thereby facilitating "agent-level thinking" that is intuitive for novices. At another, students can study aggregate population models. However, this necessitates scaffolds to help them correlate the multiple representations, along with usual scaffolds for setting up experiments, running relevant simulation scenarios and interpreting results. Thus, a primary component of my research deals with designing and delivering scaffolds in MABM simulation environments to achieve more effective learning of science concepts. My domain of application is ecology, a subject that students of all ages find difficult to learn [5]. The goal is to get students to understand agent-level ecological processes (e.g., the predator-prey relations), and use this knowledge to develop a deep understanding of aggregate ecosystem concepts (e.g., food chain, interdependence, and balance).

2. Literature Review

The need for scaffolding in simulation environments has been widely recognized in the literature. Klahr and Nigam (2004) and Mayer (2004) show that offering computer simulations without support for learners during the inquiry process, often fails to foster deep conceptual learning. Klahr and Nigam even demonstrate that direct instruction (an extreme form of scaffolding) is more productive than unguided discovery learning.

Having recognized the need for scaffolding, the focus in the field of inquiry learning is currently on how to provide the scaffolding and measure its effects. Adapting the scaffolds to students' hypotheses and experiments has been shown to be more beneficial than providing traditional predefined feedback [8].Also, the degree of scaffolding and the immediacy of feedback, have been pointed out as important scaffolding design components [2]. Quintana et al. describe a set of guidelines and strategies for scaffolding scientific inquiry learning, organized around the primary science inquiry components of sense making, process management, and articulation and reflection [6]. de Jong and Joolingen developed SIMQUEST to provide scaffolding while retaining sufficient freedom for learners to regulate their own learning processes [3]. Wilensky & Resiman showed that high school students can develop a deep understanding of population dynamics in a predator-prey ecosystem by building a MABM if they are explicitly assisted through programming support and reflection prompts by the interviewer [9]. Dickes & Sengupta showed that students as young as 4th graders can develop multi-level explanations of population-level dynamics in a predator-prey ecosystem after interacting with a MABM ecosystem when their interactions are verbally scaffolded by the interviewer [5]. For measuring the effects of scaffolds, Sherin, et al. have established a Δ-shift scaffolding framework [7] where the change in performance (ΔP) between an unassisted situation (S_{base}) and a scaffolded situation (S_{scaf}) is measured as $\Delta P = P_{scaf} - P_{base}$.

3. Proposed research work and preliminary research questions

Though several attempts have been made to develop MABM environments which provide effective scaffolding, theoretical frameworks for the analysis and systematic design of scaffolds to support students' learning of complex phenomena are incomplete. My research seeks to address this issue by developing a theoretical framework for the design, analysis, and evaluation of scaffolds to support learning of ecology in MABM simulation environments. For example, I propose to measure the effectiveness of scaffolds by extending Sherin's Δ-shift framework such that ΔP is calculated as the union of two simultaneous interdependent measures: relations learnt and incorrect relations eliminated, taking into account that these measures are inter-related.

My research will focus on designing a computer-based learning environment with a MABM simulation and a set of contextualized scaffolds provided by a virtual agent to help middle school students develop a deep conceptual understanding of important science concepts and processes. My focus is on the domain of ecology, and the intent is to help students interact with a MABM simulation to learn about deep concepts such as dynamic equilibrium in an ecosystem, interdependence between the species in the ecosystem, predator-prey dynamics, and food chains. In particular, this involves answering the following research questions:

1. *Types of scaffolds required and triggers* – (a) What types of scaffolds help students learn the models underlying ecological simulations and related ecology concepts? (b) What are the triggering conditions for each of the scaffolds?
2. *How to deliver scaffolds* - How can the scaffolds be effectively delivered by a virtual agent? What should be the dialog structure between students and the virtual agent be?
3. *Measuring effectiveness of scaffolds* – (a) What is an effective framework for measuring the effects of scaffolding? (b) How effective are the different scaffolds in producing learning gains? (c) How do students' achievement profiles and initial conceptions affect the effectiveness of scaffolds? Do they influence how the scaffolds are delivered?

Overall, I would like to systematically study the individual effects of each of the scaffolds - how the absence of one affects students' learning and the effectiveness of others. I will also study persistence of scaffolding effects in near and far transfer studies.

4. Proposed methodology and preliminary results

I have adopted a design-based approach to develop my learning environment. Currently, I have completed two iterations of this research [1]. The proposed architecture for my learning environment is shown in Figure 1. The plan is to build the system iteratively, using a design, implement, test, and refine cycle, starting from small prototypes and developing and refining the theoretical framework and the system till all the components have been implemented, and experimental studies in science classrooms demonstrate the effectiveness of the system.

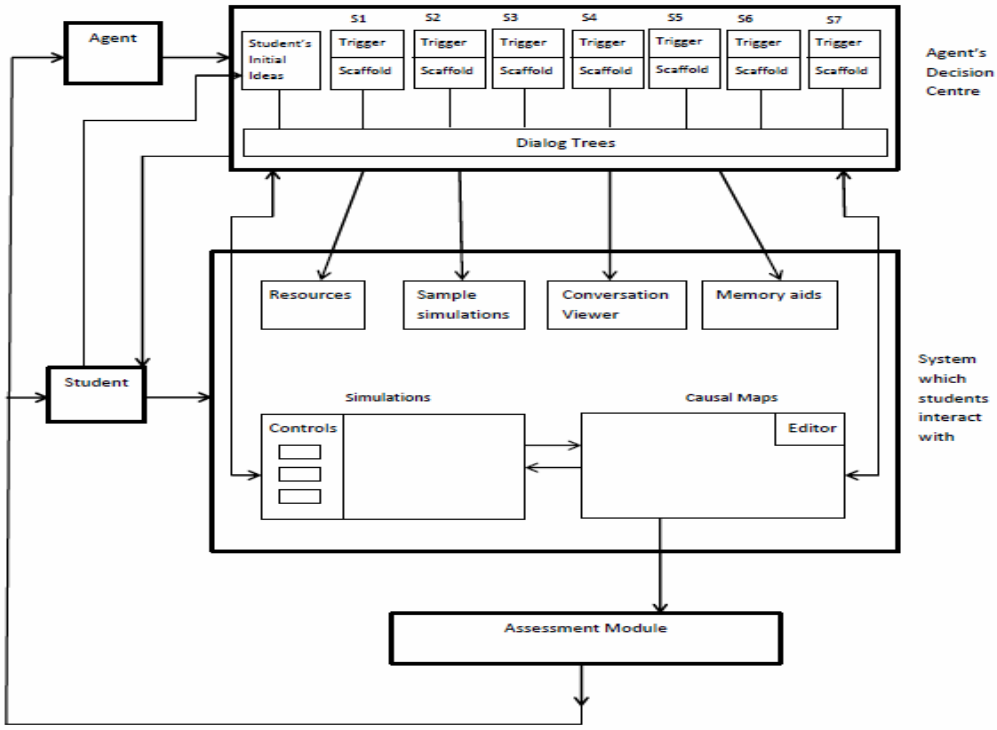


Fig 1: Proposed architecture of the simulation-based learning environment with scaffolds

The learning task in the simulation environment is scaffolded by interactions between the virtual mentor agent and the student. The agent asks specific questions to determine the students' prior domain knowledge, and then tailors the scaffolding to help students overcome their incorrect and incomplete knowledge, and progress in their learning tasks. We have identified 7 scaffolds in our initial design iterations: (S1):Scaffolds for setting up a simulation run with the correct parameters, (S2):Scaffolds for interpreting results of a simulation run, (S3):Scaffolds for controlling variables studied in a simulation experiment, (S4):Scaffolding learning using self-explanations and predictions, (S5):Scaffolding by creating cognitive conflict, (S6):Scaffolding to encourage self-monitoring, and (S7):Scaffolding by providing resources. In the first exploratory study, the scaffolds provided verbally by the interviewer were categorized post hoc as S1-S5 [1]. Though these scaffolds were highly effective [1], further scaffolding, i.e., S6 and S7 were necessary to help students gain mastery of the ecological concepts.

Along with the simulation, students are simultaneously asked to build a causal map of the ecological model underlying the simulation. The agent scaffolds students' learning of the underlying simulation model and its translation into the causal map. Some examples of additional support provided are: example expert simulation scenarios, a hypertext based resources library, the conversation log/viewer, and memory aids for helping student keep track

of experiments they performed using the simulation. The agent is also designed to monitor students' interactions with the simulation controls, the simulation results and the causal maps built by the students. This information helps guide the agent's scaffolding dialogs. Finally, the environment supports dynamic assessment with a tool that allows students to periodically check the correctness and completeness of their causal map. The mentor agent uses the assessment results to further guide the student.

Results from a study with 20 8^{th} graders to test the effectiveness of the scaffolds showed highly significant pre-to-post test gains ($p<0.0001$, effect size=2.18) . Also, students who could reason with their causal models had higher pre-post gains ($r=0.95$, $p<0.0001$). These studies have also helped identify triggering conditions for the scaffolds based on student actions and preconceptions, which will govern the dialog structures in my proposed learning environment.

Using this architecture, I propose running the following experiments in the coming year:

1. Evaluate the effectiveness of the scaffolded intervention by comparing performances using the Δ-shift framework of a control group that works in the simulation environment with no scaffolds and an experimental group that uses all the scaffolds. We may also run variations of this experiment to study the effectiveness of individual or groups of scaffolds.
2. Study the effectiveness of using the causal map representation. All students will receive scaffolds S1-S7, but the control group will not have access to the causal mapping tool.

5. Conclusion

In summary, my thesis research involves an iterative design-based-research project for building an effective learning environment using MABM simulations for deep understanding of important scientific concepts. The architecture is based on finding from my first two iterative design studies. Since my research particularly focuses on the domain of ecology, this learning environment, when implemented, will have at least two major contributions: (1) provide a learning tool for a difficult subject like ecology, and (2) demonstrate how to use MABM simulations effectively for learning.

References

[1] Basu, S., Biswas, G., & Sengupta, P. (2011). Scaffolding to Support Learning of Ecology in Simulation Environments. In Susan Bull and Gautam Biswas (Eds.), *Proceedings of The 15th International Conference on Artificial Intelligence in Education*. Auckland, New Zealand.

[2] Clark, D. B., Nelson, B., Sengupta, P., D'Angelo, C. M. (2009). Rethinking Science Learning Through Digital Games and Simulations: Genres, Examples, and Evidence. In the *Proceedings of The National Academies Board on Science Education Workshop on Learning Science: Computer Games, Simulations, and Education. Washington, D.C.*

[3] de Jong, T. (2006). Computer simulations – Technological advances in inquiry learning. *Science 28, 312*, 532–533.

[4] Dewey J. The pattern of inquiry. *The essential Dewey: Vol. 2. Ethics, logic, psychology*, 169-179.

[5] Dickes, A.C. & Sengupta, P. (Under revision). Learning Natural Selection in 4th grade with Multi-Agent-Based Computational Models.

[6] Quintana, C. et al. (2004). A Scaffolding Design Framework for Software to Support Science Inquiry. *Journal of the Learning Sciences, 13*(3), 337-386.

[7] Sherin, B., Reiser, B. J. and Edelson, D. (2004). Scaffolding Analysis: Extending the Scaffolding Metaphor to Learning Artifacts'. *Journal of the Learning Sciences, 13:3, 387-421*

[8] Veermans, K., Joolingen, W., & de Jong, T. (2000). Promoting self-directed learning in Simulated based Discovery Learning Environments through Intelligent Support. *Interactive Learning Environments* 8(3) 229 – 255

[9] Wilensky, U. & Resiman, K. (2006). Thinking like a wolf, a sheep, or a firefly: learning biology through constructing and testing computational theories – an embodied modeling approach. *Cognition and Instruction, 24* (2), 171-209.

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

A Japanese Grammar Learning Support System using Teaching Method Ontology and Course-centered Ontology

Jingyun WANG[ab*], Takahiko MENDORI[a]
[a]*Graduate School of Engineering, Kochi University of Technology, Japan*
[b]*Department of Mathematics and Physics, Xiamen University of Technology, China*
*156014t@gs.kochi-tech.ac.jp

Abstract: This paper describes the framework of a customizable learning support system based on teaching method ontology and course-centered ontology. A partial teaching method ontology which focuses on Japanese grammar teaching and a course-centered ontology which consists of about 200 grammar points have been built to facilitate the personalization of learning support system.

Keywords: teaching method ontology, course-centered ontology, customizable learning objects, language learning support system

Introduction

In recent years, numerous industrial products have been developed based on different learning/content management systems (LMSs/CMSs). These products provide a platform for communication and collaboration among instructors and students. However, e-resources provided by these systems are simply an unorganized collection of some related materials. Without a reasonable classification, it is difficult for students to find the most suitable learning materials.

Recently, ontologies have been used in many research fields to facilitate information sharing and interaction, which are indispensable in e-learning systems. Examples of such facilitation in e-learning are the sematic annotation model developed by Faical et al. [1] using ontologies of three level(pedagogy, domain and document) and the semantic system developed by Kasai et al using ontologies of the fundamental academic ability and of IT education goal [2]. However, these systems cannot completely satisfy the dynamic needs of users, especially with regard to differences in learning abilities. Best-effort minimization of learning curve is another critical issue in system design.

From the educators' perspective, course design must match learning capabilities of learners. It would be of great benefit to learners if teachers could adjust their teaching methods and organize different course materials to reflect of learners' knowledge structures, learning objectives and preferences. In response, a customizable learning support system by integrating traditional education methodologies with advanced e-learning systems is developed in this research.

1. System framework design

To provide the personalized e-learning services to learners, a system framework as shown in

Figure 1 which combines teaching method ontology with course-centered ontology is proposed.

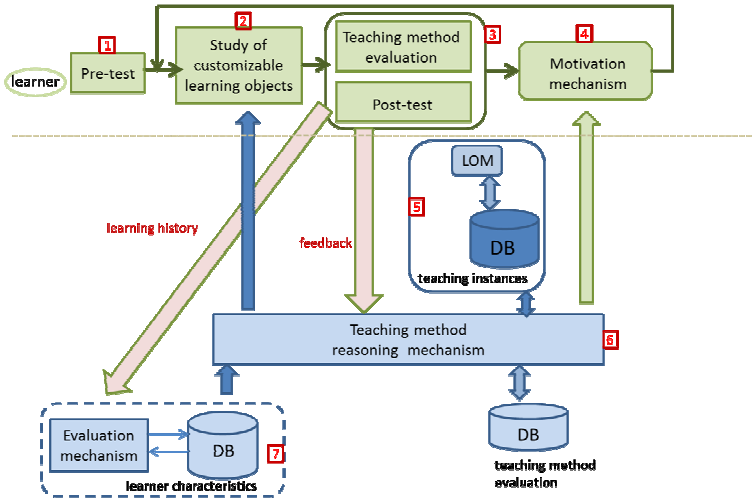


Figure 1. The framework of personalized learning Support System

To decide the customizable learning objects from the database of teaching instances (Item 5, Figure 1), the teaching method reasoning mechanism (Item 6, Figure 1) integrates learner characteristics (Item 7, Figure 1), teaching method ontology, and learner knowledge structures identified by a course-centered ontology. For the reusability and interoperability, the metadata description of the learning objects (Item 5, Figure 1) is in compliance with Learning Object Metadata (LOM) [6] standard and conforms to these two ontologies. On the other hand, feedback of the teaching method evaluation by learners and the result of tests are given to the teaching method reasoning mechanism.

1.1 The ontology of teaching method

The concepts of teaching method and their relations are the foundations for generating a personalized teaching method from the learning processes. The framework shown in Figure1 could be suitable for any education fields, but this research just focuses on Japanese grammar teaching. According to the Language Interface Model [3], grammar teaching method could be generally divided into exposure with explanation and practice. Although the ontology of Japanese grammar teaching method might have numerous concepts, this paper only discusses the process shown in Figure 2.

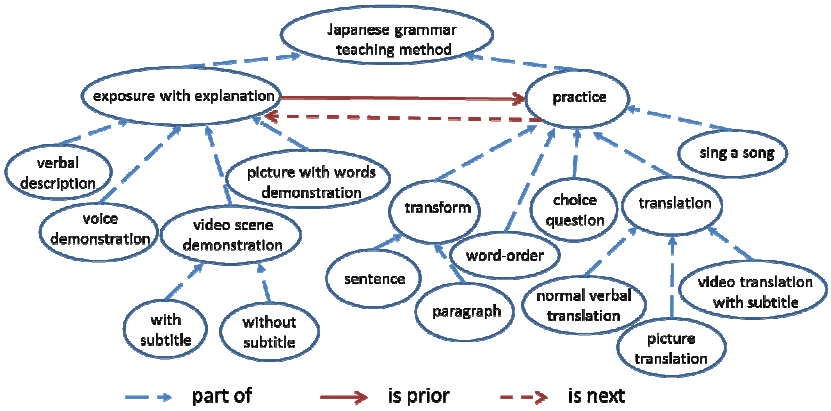


Figure 2. A partial structure of Japanese grammar teaching method

The exposure with explanation which has 4 kinds of demonstration, and the subsequent practice which has 5 exercise forms to guarantee the expansion of the learner competence. Based on the analysis of characteristics of both learners and courses, an effective teaching solution will be offered.

1.2 The ontology of a specific Japanese grammar course

In order to organize various learning materials based on knowledge structures of learners, a course-centered ontology is presented. To some extent, the course-centered ontology in Figure 1 generated from the course design and teaching strategy is a type of task-specific ontology [4]. The concepts are the knowledge points (rather than chapters/sections), and the relations include the concept dependences, similarities and contrasts.

The design of the course-centered ontology in this paper is based on a Japanese grammar book [5] which has been extensively used by Chinese learners of Japanese for years. Assume all the course-centered ontology as O, all the knowledge points of this book as G, all the attribute of the knowledge points as A, and the relations among G as R, then

$$O=<G, A, R>.$$

A are consists of two types: the static attribute (SA) which describe the datatype property of concepts and the dynamic attribute (DA) which describes the relations between two concepts. G approximately contains 200 grammar points which can be generalized into 22 top-level concepts, such as Nominal Predicate Sentences, Existential Sentences, Adjectival Predicate Sentences, and Verbal Predicate Sentences. Figure 3 describes a part of the course-centered ontology model of Japanese grammar (Level 3) while the SA is implied in the figure, in which 3 top-level concepts (Causative Expression, Giving and Receiving Expressions, and the Expressions of Request) are included.

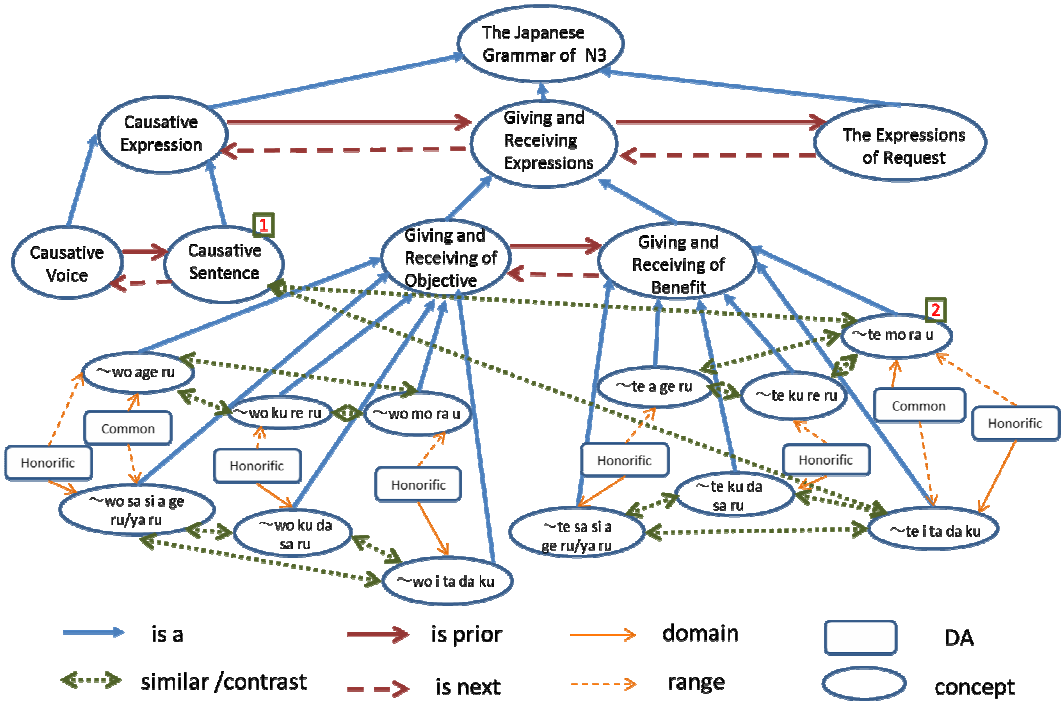


Figure 3. A part of the course-centered ontology of Japanese grammar (Level 3)

Beside the common relations is-a, relations including is-prior, is-next, similar/contrast are considered according to the teaching procedures and teaching goal of the book [5]. When two concepts have the same SA (for example, Items 1 and 2 in Figure 3

have the same SA "request sentence"), a similar/contrast relation exists between them, which make it more convenience for learner to compare their different SAs.

2. Learning process

The learner in this learning support system is first required to take an identical pre-test (Item 1, Figure 1); then, customizable learning objects are provided (Item 2, Figure 1); next, a questionnaire survey to evaluate the teaching method and a post-test to examine learner perception of the learned contents are conducted (Item 3, Figure 1); and finally, a motivation mechanism(Item 4, Figure 1) provides encouragement (for example, gives the performance comparison with other peers, like"Congratulations! Your performance is in the top 10 of this class!") to the learner. In the subsequent iterations of this process, items 2, 3, 4 in Figure 1 are repeated in new customizable learning materials. The learning history, which includes the involved learned contents, time on task, learner interest and preference survey results, and the academic performance, is recorded in the log files (Item 6, Figure 1). Some data mining techniques can be directly applied in the evaluation mechanism to capture the internal rules and learner characteristics.

3. Conclusion and Future Work

In essence, the personalization of learning support system is to provide individualized e-learning environment for maximizing the performance improvement. The core is how to match the course contents to the learner characteristics. These above machine-interpretable ontologies will facilitate matching performance because of the formalization.

Besides the initial ontology construction, the existing ontologies should be expanded to allow for adaptation to changes in learner characteristics. Graphical interface will be developed for instructors to enable the development of ontologies and the organization of learning objects. Following the system framework in Figure 1, a prototype system will be developed and evaluated by means of analysis of learner data from the foreign language department of a Chinese university.

References

[1] Faical, A., & Cyrille, D. (2006). Teachers' document annotating: models for a digital memory tool. *International Journal of Continuing Engineering Education and Life-Long Learning*, 16(1–2), 18–34.

[2] Kasai, T., & Yamaguchi, H. (2007). A Semantic Web System for supporting teachers using ontology alignment. *Int. J. Metadata, Semantics and Ontologies*, 2(1), 35-44.

[3] Paradowski, M. B. (2006). Facing the challenge of modern language pedagogy. *International Conference on English Instruction and Assessment.* 22-23 April 2006 (pp.1-17).

[4] Mizoguchi, R., Vanwelkenhuysen J., & Ikeda, M. (1995). Task ontology for reuse of problem solving knowledge. N.J.I.Mars (Ed), *Towards Very Large Knowledge Bases* (pp.46-59). IOS Press.

[5] Shigeno, M., Seki, K., & Nishikimi, S. (2009). *The Japanese Language Proficiency Test (level 3): grammar Exercises.* China: Foreign Language and Teaching Research Press.

[6] The Institute of Electrical and Electronics Engineers Standards Association (2002). *Learning Object Metadata.* Retrieved July 15, 2002, from http://ltsc.ieee.org/wg12/index.html

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

Class Design with Multi-Mouse Quiz in Elementary Schools

Juan ZHOU [a], Hajime KITA [b]
[a] *Graduate School of Informatics, Kyoto University*
juan.z.kt@gmail.com
[b] *Academic Center for Computing and Media Studies, Kyoto University*
kita@media.kyoto-u.ac.jp

Abstract: To motivate learning is one of the key problems in education in elementary schools. Collaborative learning is one of promising methods in teaching, and therefore its support by ICT is an important subject. Single Display Groupware (SDG) is a promising approach to encourage collaborative learning in ordinary classroom by ICT. In this paper, we describe the Multi-Mouse Quiz (MMQ) system, an application of SGD which allows several users to answer quiz questions sharing one screen. The authors are planning to study class design and its effect with MMQ in elementary schools. As a preliminary study, we carried out four experiments that support collaborative learning in two elementary schools. The teachers were able to design their course by using MMQ considering their teaching plans and available resources in the classroom. We observed how MMQ raises children's motivation of learning. It is also proved that MMQ can help children remember the knowledge shown in the quiz. The experiments show that the MMQ system is helpful in education in elementary schools.

Keywords: collaborative learning, single display groupware, quiz, elementary school, children

1. Background and Motivation

Elementary education, as the formative education in the compulsory education, has special roles in teaching rudimentary knowledge and developing good study habits. Children in this period have characteristics that they prefer to pay attention only to what they are interested in. It is widely believed that they have difficulty in controlling their sentiment. Hence, how to maintain the attention as well as how to encourage the enthusiasm to learn is an important issue in education in elementary schools. There are several studies designing practices of achieving educational goals through pleasing the children and amusing them. ICT environments are also developed continuously for supporting school education. Nowadays, it is popularized and in Japanese elementary schools, at least one digital blackboard is equipped in the every classroom.

However, most of the conventional ICT systems are based on the concept of personal computers. That is, the ICT systems are supposed to support collaborative learning by connecting personal computers with network, and each student has to use his or her own seat and computer in a classroom. When a student is going to discuss with his classmates, he or she has to move to others so to see other's computer screen and change views. Considering face-to-face collaborative learning, such inconvenience in activities is a disadvantage to the education in elementary schools.

In this paper, the author discusses usage of Single Display Groupware (SDG) to encourage collaborative learning in face-to-face environment in ordinary classrooms. The Multi Mouse Quiz (MMQ) system was developed as a concrete application of SDG, and

four experiments were conducted in the social studies class through collaboration with two primary schools.

2. Related work

The desire to develop technologies that enhance richness of collaboration in a face-to-face setting by ICT has spurred researchers to investigate a variety of multi-user environments. The Single Display Groupware (SDG) model proposed by Stewart [1] refers to systems with which each of collocating users uses an input device such as mouse sharing a display. SDGtoolkit was a middle ware that provides multi-user interaction environment through multiple mice and keyboards handled independently (Tse et al., 2002) [2]. Mischief proposed by Moraveji et al. is a system to support traditional classroom practices between a remote instructor and a group of collocated students with SDG. Most of the SDG researches assume small number of interacting uses, they tried to make all students in a class use their own mice. In these researches of SDG, the multiple mice have been shown to lead users' higher engagement, a positive impact on collaboration and motivation. As for relating technologies for education, many universities have adopted the Clicker systems to achieve a large classroom to collect students' feedback. Compared to Clickers, SDG with multiple mice provides users more graphical and flexible interaction.

MMQ system studied in this paper is a concrete application of SDG. It allows four users to share one screen to answer quiz questions. Because each user has their own cursor shown on the sharing screen, they can share what they thought during the quiz. Though the sharing results may cause the disadvantage in the sense of a test, the enjoyment and communication encouraged by sharing movement of cursors are supposed to be effective in learning in the classes of elementary schools.

3. Using Multi Mouse Quiz in Elementary Schools

3.1 Multi Mouse Quiz System

Considering the limited computer resources and support in elementary schools in Japan, this system is designed not to use special devices and administrative task using network.

Figure. 1 shows the screen shots of the MMQ system. In (a), teacher can choose the question file and a number of questions he/she wants to use. In (b), any user can click the start button to start the quiz. In (c), each user can choose his or her own color for differing from others, once a color is selected corresponding button disappears. (d) shows a question screen that four users have to click his answer within the time limit. (e) shows the correct answer and commentary. Finally, (f) shows the total score of the whole players. All screens will be controlled by a timer. This timer can be set by the teacher when he or she edits the questions. In actual run of MMQ, the teacher can also stop the timer by pressing the space bar. With this operation, teacher can control the classroom, and also can ask a question or make some comments by him or herself.

Fig. 1. The interface of MMQ

We also developed a quiz question editor for MMQ. As Fig. 2 shows, we proposed an easy-handled question editor for the teachers (and students). So they can create their own questions for MMQ easily.

Fig. 2. Quiz Editor

Fig. 3. Using MMQ in H school

3.2 Research Question and Methodology

My research question is how can we enhance collaborative learning in elementary school with MMQ, or more broadly with applications of SDG. That is, class design and its effectiveness are the topics to be investigated.

Fig. 4. Using MMQ in S school

With assistance of the Board of Education, Kyoto City, we ask several school teachers collaborative study of using MMQ in elementary school. Once, the field of using MMQ is decided, we carry out discussion of using MMQ with the teachers, and also we observe the ordinary classes by the teachers to know the children in the class and teaching style and objectives of the teachers. Then, we ask the teachers to design the class with MMQ considering his goals of teaching, and subject topics to be taught. In classes using MMQ, before the experiment, we took a training session to help children become accustom to the system. Finally, after using MMQ, we ask the children to answer tests of the same questions to examine how much knowledge they remembered. We also ask the children to completed questionnaires to determine their overall impressions of the MMQ. We also conduct interview to teachers after class with the results of test and answers to the questionnaires.

Because of the limited opportunities of experiments and ethical consideration of the experiments carried out in the actual school classes, control groups such as teaching without MMQ were not set. Instead, we carried out data gathering from multiple aspects such as testing, questionnaire to children, interviews to teachers, participant observation and video analysis of the classes for both qualitative and quantitative study.

4. Current Result of Practice

We carried out four experiments that support collaborative learning in two elementary schools (say School H and S) in Japan. MMQ was used for 60 children in total ranging from grades 5 and 6 in two classes. The experiments were performed two times during a month on different days in each school. In both schools, MMQ were used for classes of subject ` social studies'. According to the environment of classroom, as shown in Fig. 3, in the H primary school, we could use two digital blackboards. With them, 8 mice were available in the class with two sets of MMQ working in parallel. Each mouse was used by a group of 3 or 4 children. In primary school S, because only one digital blackboard was available and we used single MMQ set. So, we set up four groups each had 8 children (shown in Fig. 4). Quantitative and qualitative analyses of videotapes, questionnaire and interview to teachers revealed that providing children with MMQ can positively impact their engagement, participation, and enjoyment of the activity. In the questionnaire, we asked children questions "Did you enjoy system?" "Do you want to play again with your friends?". As the result in these items, we obtained positive answers from more than 90% of children. We also

carried out tests asking same questions at the end of each class, and in all of the experiments, children are getting about 80% accuracy rate. The teachers evaluated that this score were good or higher considering usual performance of the children [4].

Qualitative analyses of the videotapes showed that in learning with MMQ, the children become more active. The following two cases are interesting examples of children‘s activities with MMQ.

2. *At the first experiment in H school, child H22 (a girl) didn't touch the mouse even if it is her turn. She just saw her friend answering the quiz. But in the second experiment, she got the mouse when her friend release the mouse, and answered the quiz. We observed she is very interested in the quiz. After watching friends playing the first experiment, she looks confident and active. She asked her friend questions about quiz, confirmed her reply, and got the advice from her friend. Her score in the test after the class was improved largely in the second experiment (89.47%) from the first one (36.36%). The teacher said that her score in the second experiment was higher than usual.*
3. *At the second experiment in H school, H18 (a boy) was able to understand problem of higher level than a level that the teacher expected. The teacher asked him this content a week later, and he could answer it correctly. It proved that he certainly remembered the content.*

According to the observation of the experiments, most of the students show more active in using the MMQ system. The communication and scoring in the quiz have efforts on their understanding of high level acknowledges.

The experiments showed that MMQ and the quiz editor could be operated by the school teachers by themselves with particular assistance by the researchers. The teachers used MMQ with their own arrangement to meet their teaching styles and objectives. In H elementary school, the teacher wanted to emphasize children's writing ability as his objective of class design. He used MMQ as a tool to make children discuss the subject actively. He gave out answer sheets to every children groups, and asked descriptive question during the experiments. Further, he first used basic questions let children feel sure that they can answer questions. Then, he asked a descriptive question so as to encourage discussion. As the result, children could write answers better than usual classes.

In S elementary school, the teacher took a teaching style to make children feel fun in the classroom. After trial use of MMQ as the first experiment, he asked children to make some quiz questions to use them for MMQ. Collected questions were edited for MMQ by the teacher, and were shown to children with MMQ.

5. Future Work

As future work of this study, the author is planning the following:

- To continue evaluation of the MMQ system and class design with it in several different classes with cooperation of more elementary schools, and to clarify the effects of the MMQ system.
- To encourage community of school teachers by gathering and sharing the cases of class design with MMQ and quizzes for MMQ.
- To discuss possibility of using SDG in school, and to try to develop other applications of SDG, by exchanging opinions with school teachers,.

References

[1] Stewart, J., Bederson, B.B., & Druin, A. (1999). Single display groupware: a model for co-present collaboration. *ACM CHI Conference.* 286-293.

[2] Tse, E. (2002). S. SDGtookkit: A Toolkit for Rapidly Prototyping Single Display Groupware. *Screen (London), 91*,79-81.

[3] Neema Moraveji et al.. (2008). Mischief supporting remote teaching in developing regions. *CHI '08*, 353-362.

[4] Zhou J., Mori M., Uehara T., Kita H. (2011) Practice using Multi Mouse Quiz in elementary school social studies, *JSET, 11*(1). 305-312 (In Japanese)

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

The Effects of Reading and Writing Habit on Blog Adoption

Benazir QUADIR[a*], Nian-Shing CHEN[b] and Daniel Chia-En TENG[b]
[a]*Department of Business Management, National SunYat-Sen University,Taiwan*
[b]*Department of Information Management, National SunYat-Sen University,Taiwan*
*benazir.quadir@gmail.com

Abstract: This paper investigates how one's reading and writing habit contributes to his/her blog adoption. A survey will be conducted towards understanding the relationship between individual's reading and writing habit, in terms of attitude and behavioral pattern respectively and the adoption of blogs. Since the survey has not yet started at this point, only the theoretical and methodological approaches are reported in this paper. This study will give insights for learners on adopting blogs for actual learning effectiveness.

Keywords: Reading habit, writing habit, blog adoption, adoption of innovations

Introduction

Weblogs (or blogs) had its current form around 1997. Since then, there has been a steadily growing body of bloggers and blog readers around the globe. Blogs are regularly updated web pages which include journal-like text entries, pictures as well as other multimedia content, and hyper texts linking to other web sites. Typical entries of a blog are presented in a reverse-chronological format, and many of them allow people to comment or feedback on.

There have been a number of studies attempting to understand what motivates people to use blog and why. Regarding blogging as a social activity, for example, Nardi, Schiano, Gumbrecht, and Swartz [1] found five major motivations for blogging, including documenting one's life, providing commentary and opinions, expressing deeply felt emotions, articulating ideas through writing, and forming and maintaining community forums. From the perspective of individual difference, Guadagno, Eno, and Okdie [2] found that self-expression was a consistent factor among studies that motivates people to blog or read blogs, and the personalities of openness to new experience and neuroticism can also contribute to blogging [3].

There could be numerous reasons for people to blog or read blogs. However, because both blogging and reading blogs are isomorphic to conventional writing and reading in their cognitive dimension of self-reflection [4], there should exist some intrinsic factors which motivate one to adopt blogs. From the viewpoint of diffusion of innovations [5], blogging and reading blogs have apparent relative advantages over conventional writing and reading [e.g., 6], and are compatible with the cognitive aspects of writing and reading practices [4]. Current blogging tools are user-friendly, simple to use, and have observable results. Such qualities of blogs, may have promoted the adoption of blogs as an extension of one's habitual writing and reading practices. In other words, blogging or reading blogs can be simply a result of one's writing or/and reading habit. As a preliminary investigation on the effect of one's habit on the adoption of blogs, this study will focus only on how one's reading and writing habit contributes to his/her blog adoption.

1. Literature Review

1.1 Blog Adoption

Adoption is "a decision to make full use of an innovation as the best course of action available" [5, p. 21]. It contains a psychological process leading up to one's decision to accept an innovation [7]. Blog adoption, therefore, can be defined as one's decision to accept and engage in the continual use of blogs.

There have been several studies investigating why people blog. Nardi, Schiano, Gumbrecht, and Swartz [1] conducted an ethnographical study on 23 bloggers. From in-depth interview, they found their informants typically found blogs through other blogs they were reading, through their friends or colleagues, or through the link included in instant messages or web pages. Guadagno, Okdie, and Eno [3] suggested that personality factors may contribute to the likelihood of being a blogger and predict who blogs. They investigated how the five measures of personality in the Big Five personality inventory [9] contribute to blogging. Their findings suggested that people who are high in the openness to new experience and high in neuroticism are likely to be bloggers. In another study, Guadagno, Eno, and Okdie [2] found that self-expression was a consistent factor across different studies investigating what motivates people to blog or read blogs.

Deng and Yuen [4] proposed a framework to structure three major blogging behaviors: blog writing, reading, and commenting. As shown in Figure 1, three blogging behaviors were considered in both the social/psychological and cognitive dimensions along the continuum between individual and community. In this framework, writing blogs allows self-expression of personal feelings and thoughts, which foster self-reflection. Reading blogs allows the reader to interact with the content and connect to the community for self-reflection and inspiration. Commenting on blogs is a way to converse with the blog author as well as the community for reflective dialogue and social support.

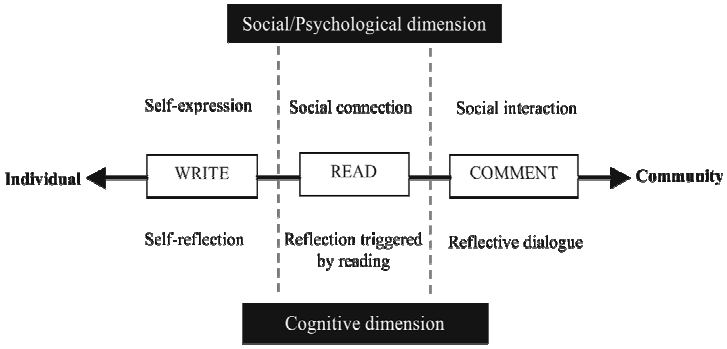


Figure 1. Deng & Yuen's (2011) framework for the educational affordances of blogs

From the perspective of diffusion of innovations [5], blog writing, reading, and commenting are not only compatible with conventional writing, reading, and commenting practices in the cognitive dimension, but also have relative advantages of social expression, social connection, and social interaction. As Rogers (2003) pointed out, one needs to perceive at least some of the relative advantages of blogging and is willing to cope with the uncertainty of this new media before he or she can make the decision of adopting it. In addition to the social aspects of blogging [1, 8], and the personalities that make the adoption of blogs easy or difficult [2, 3], we claimed that there is still some factor that drove one to adopt blogs and sustained the continual usage of blogging. And one's writing and reading habits are the very factors from within.

1.2 Reading habit and reading blogs

A habit, according to Merriam Webster dictionary, refers to "a behavior pattern acquired by frequent repetition or physiologic exposure that shows itself in regularity or increased facility of performance". Reading habit, in this study, was defined by one's attitude toward reading [10] and his/her behavioral pattern [11] with respect to the frequency and regularity of reading. One who has the reading habit holds positive attitude to it, and reads mostly for pleasure and enjoyment [12, 13]; this reading behavior is habitual, which occurs constantly and regularly. Liu [14] conducted a survey to understand how the burgeoning of digital media impacts reading behaviors. He found that people spend more time on reading due to information explosion and digital technology, and there is an increasing amount of people developing screen-based reading. He noticed that there emerged screen-based reading behaviors, which are characterized by "more time on browsing and scanning, keyword spotting, one-time reading, non-linear reading, and more selective reading; while less time is spent on in-depth reading and concentrated reading, and sustained attention is decreasing" (p. 705). Blogging (writing, reading, or commenting blogs), more or less, exhibits similar characteristics summarized by Liu [14].

1.3 Writing habit and writing blogs

Writing habit, in this study, was defined by one's attitude toward writing [15] and his/her behavioral pattern [16] with respect to the frequency and regularity of writing. According to a definition provided by Graham, Berninger & Fan [15] "Writing attitude as an affective disposition involving how the act of writing makes the author feel, ranging from happy to unhappy". One who has writing habit holds favorable attitude toward it, and write more often and expend greater effort when composing [15].

The students who have writing habit usually spend hours posting on their blogs and making comments to their friends' posting. Apart from the social/psychological aspects of blogging [4], to a reader or writer, who keeps a reading & writing habit, blogging may differ from reading & writing conventional print materials in the form the content was structured and manifested. Therefore, the adoption of blogs can be regarded as an inclusion of a new medium (i.e., the web) into the habitual writing or/and reading practices.

2. Methodology

2.1 The Conceptual Model

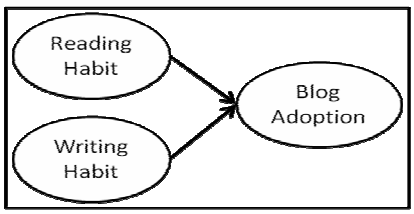


Figure 2. The research framework of this study

2.2 Instrument Development Procedures

We develop Questionnaire items for each construct. And then we will conduct a survey to blog users and finally to validate the instrument and test the relationship between factors.

2.3 Data Analysis Procedures

To verify the dimensionality and reliability of the research constructs, purification process, including factor analysis, correlation analysis, and internal consistency analysis (Cronbach's alpha) will be conducted. Multiple regressions will be conducted to evaluate for cause and effect of research variables. Independent sample t-test one way-ANOVA will be conducted for demographics. Finally Structural Equation Model (SEM) will be conducted to examine the overall research framework.

Acknowledgements

This study is supported in part by the National Science Council, Taiwan, under contract numbers NSC97-2511-S-110-005-MY3, NSC99-2631-S-011-002, and NSC99-2511-S-110-004-MY3.

References

[1] Nardi, B. A., Schiano, D. J., Gumbrecht, M., & Swartz, L. (2004). Why we blog. *Communications of the ACM*, 47(12), 41-46.

[2] Guadagno, R. E., Eno, C. A., & Okdie, B. M. (2010). Personal blogging: individual differences and motications In T. Dumova & R. Fiordo (Eds.), Handbook of Research on Social Interaction Technologies and Collaboration Software: Concepts and Trends (pp. 292-301). Hershey, NY: Information Science Reference.

[3] Guadagno, R. E., Okdie, B. M., & Eno, C. A. (2008). Who blogs? Personality predictors of blogging. *Computers in Human Behavior*, 24(5), 1993-2004.

[4] Deng, L., & Yuen, A. H. K. (2011). Towards a framework for educational affordances of blogs. *Computers & Education*, 56(2), 441-451.

[5] Rogers, E. M. (2003). Diffusion of innovations (5th ed.). New York, NY: Free Press.

[6] Kajder, S., & Bull, G. (2003). Scaffolding for struggling students: reading and writing with blogs. *Learning & Leading with Technology*, 31(2), 32-35.

[7] Alexander, J. E., & Filler, R. C. (1976). Attitudes and reading. Newark, DE: International Reading Association.

[8] Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124(1), 54-74.

[9] Ozanne, U. B., & Churchill, G. A. (1971). Five dimensions of the industrial adoption process. *Journal of Marketing Research*, 8(3), 322-328.

[10] Costa Jr., P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, 4(1), 5-13.

[11] Hollenbaugh, E. E. (2010). Personal journal bloggers: profiles of disclosiveness. *Computers in Human Behavior, 26(6)*, 1657-1666.

[12] Dungworth, N., Grimshaw, S., McKnight, C., & Morris, A. (2004). Reading for pleasure? A summary of the findings from a survey of the reading habits of year 5 pupils. *New Review of Children□s Literature and Librarianship*, 10(2), 169-188.

[13] McKenna, M. C., Kear, D. J., & Ellsworth, R. A. (1995). Children's attitudes toward reading: A national survey. *Reading Research Quarterly*, 30(4), 934-956.

[14] Liu, Z. (2005). Reading behavior in the digital environment: Changes in reading behavior over the past ten years. *Journal of Documentation*, 61(6), 700-712.

[15] Graham, S., Berninger, V., & Fan, W (2007). The structural relationships between writing attitude and writing achievement in the first and third grade students. *Contemporary Educational Psychology. 32, 516-536.*

[16] Aarts, H., & Dijksterhuis, A. (2007). Habits as knowledge Structure: Automacity Goal-Directed Behavior. Journal of Personality and social Psychology.78 (1) 53-63.

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

Recalling Learning Log Based on Learning Style and Context

Mengmeng Li[a], Hiroaki Ogata[a], Bin Hou[a], Noriko Uosaki [a], Yoneo Yano [a]
[a]*Graduate School of Advanced Technology and Science, University of Tokushima, Japan*
lemonrian99@gmail.com

Abstract: This study primarily exploits a context-awareness and personalization model supporting ubiquitous learning log system. The goal of the model lies in helping learners recall what they have learned utilizing the context and learner' learning style.

Keywords: personalized learning, learning log, context-aware learning

Introduction

The new generation smartphones such as iPhone and Android accommodating users with many advanced functions such as the multi-touch interface, GPS, millions of applications are becoming more and more popular. One key feature of smartphones is that they are equipped with a range of sensors like the accelerometer, compass. This paper investigates the capabilities of the sensors of smartphones in context-aware and personalized learning based on two basic ideas. On one hand, it can monitor learners' current contexts including their activities and the environmental information and then it can support specified learner's learning taking into account both the context and his study needs. On the other hand, the model can track learners' contextual data as context history when they learn something using smartphones and catch individual's personal learning styles through analyzing the context history.

In addition, the model depends on a system called SCROLL (System for Capturing and Reminding of Learning Log) that allows learners to log learning experiences. The detailed introduction about SCROLL is given in Section 2. Section 3 presents the model in terms of its three dimensions. At last, the conclusion is given.

1. SCROLL

SCROLL is a system designed to aid users to simply capture the learning logs they have learned, review and reflect their old learning logs, reuse the knowledge when in need, be reminded at right time at right place and be recommended others' learning logs properly. Detailed introduction can be found in [1]. Based on the theory of encoding specificity and the theory of test-enhanced learning, quiz function is proposed to aid learners to recall their past learning logs [2], [3]. Its typical scenario of use is to assist international students to study Japanese in Japan. In this case, Japanese learners, who face rich learning contexts every day, can gain abundant of knowledge from their daily lives in different kinds of situations, such as shopping in the market, seeing doctor in the hospital, having a haircut in a barbershop, visiting the museum and so on. They cannot only take down what they have learned in those situations, but also will receive support from the system to recall and review them after that. This paper is presented based on the case study under this scenario.

2. Personalization and Context-awareness model

The model we proposed consists of three dimensions, which are learners' current context, their learning styles or preferences and the learning objects. The following sections will introduce the three dimensions respectively in detail.

2.1 Learners' context

In order to fully capture learners' context we propose a complicated model. We divide the context into three parts: learner's activity, status of device and environmental data. Based on the contextual data, the system will behave as follows:

(1) Firstly, it will check the availability of the context. If the availability is high, the system then will ascertain whether there are learning objects near him (within 50 meters). The learning objects include two parts: those he learned and those that he may want to learn.
(2) If the learning objects he learned exist, the system will show him reminder quizzes and he can finish quizzes considering the place as a retrieval cue.
(3) If the learning objects that meet his learning requirement, the system will recommend these new learning logs for him.
(4) Finally, the system will check whether the recommendation is responded. If not responded, the system will recommend one more time when the user comes to the place again. But totally the number of times of recommendation in a same area cannot exceed three times.

2.2 Learners' Personal Learning Styles and Preferences

In our model, some personal attributes such as appropriate learning objects and memory cycle, are exploited as well. The detailed description about this is touched upon in the section 2.3. In this section, we will talk about some more personal learning styles or learning habits that can only be detected by mobile sensors. These learning styles involve where a learner usually studies (such as home or school), whether a learner has a habit of studying on the commuting train and when a learner prefers to study (e.g. before sleeping at night) and so on. In our opinion, these kinds of learning styles play a very important role on our learning because usually they are related to learners' daily customs and habits. The context histories collected from SCROLL consist of the context data when the users take down learning logs and do quizzes. The context history data covering location, time, and speed are utilized to detect whether a learner has any of the three learning styles mentioned above.

Take the learners' preferred learning time as an example. Because the time of learning every day is a discrete random value, we determine to repeat observing the regularity of the learning time in several periods to examine whether a learner has such learning style or not. Concretely speaking, we separate a day into 24 phases. Each phase stands for an hour. Then we count the number of times of learning collected from a two weeks period in different phase. The next two periods of four weeks will be observed as well. Finally, the frequency phase which occupies more than 25% of the all learning times in three periods will be thought as the learner's preferred learning time.

After achieved the learners' learning styles, the system can recommend messages when learners entered those environments. For example, when a learner stays in the place where he usually studies, a piece of message writing "The system guesses you are in a place where you usually do studies. Do you want to review what you have learned?" will be given. When it is his preferred learning time or when he is moving on a commuting train, he will receive a similar message as well. Finally, by checking the learners' response the system can

modify its prediction: if the system shows messages for him more than three times based on the same learning style without any responses, this learning style will be disabled.

2.3 Learning Objects

In this study, a learner's learning objects can be separated into two types: the learning logs that he learned (the ones that he uploaded or glanced through) and the ones recommended by the system. In order to provide learners with appropriate learning objects, when to remind them of the learned learning logs and what to recommend for them are two important issues. The former one is about the timing to show learners their learned learning logs in quizzes. The system adopts the graduated-interval recall method proposed by Pimsleur [4]. The intervals are 5 hour, 1 day, 5 days, 25 days, and 4 months and so on. That is to say, after a learner added a learning log, the quiz about it will be available after 5 hours and then after 1 day and so on. Learners will be reminded continually. As for what to recommend, the system takes into account the profile of the owner of to be recommended learning objects. It means that the learning log whose owner has the same both study language and mother language will be firstly recommended. And the specified learner should have the same ability level with the owner.

3. Conclusion

In this paper, we introduced a personalization and context-awareness model on the basis of learning log system. It assists learners to review what they have learned and recommend others' learning experience for them by utilizing the context. Also, it can detect learners' learning styles by analyzing their context history and prompt them to review past knowledge according to their learning styles.

References

[1] H. Ogata, M. Li, H. Bin, N. Uosaki, M. E.-B. Moushir, and Y. Yano, "SCROLL: Supporting to Share and Reuse Ubiquitous Learning Log in the Context of Language Learning," in *Proc. of mLearn 2010*, Malta, 2010, pp. 69-82.

[2] E. Tulving and D. M. Thomson, "Encoding specificity and retrieval processes in episodic memory.," *Psychological review*, vol. 80, no. 5, p. 352, 1973.

[3] J. D. Karpicke, A. C. Butler, H. L. Roediger, and others, "Metacognitive strategies in student learning: Do students practice retrieval when they study on their own," *Memory*, vol. 17, no. 4, pp. 471–479, 2009.

[4] P. Pimsleur, "A memory schedule," *The Modern Language Journal*, vol. 51, no. 2, pp. 73–75, 1967.

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

PACALL: Passive Capture for Ubiquitous Learning Log Using SenseCam

Bin HOU [a*], Hiroaki OGATA [a], Toma KUNITA [a], Mengmeng LI [a], Noriko UOSAKI [a] & Yoneo YANO [a]

[a] *Graduate School of Advanced Technology and Science, The University of Tokushima, Japan*

*hou-bin@iss.tokushima-u.ac.jp

Abstract: In our previous works, we developed a system named SCROLL in order to log, organize, recall and evaluate the learning log. However up to now, we just use an active mode to record logs. Learners must take a capture of learned contents consciously and most of learning chances is lost unconsciously. In order to solve this problem, we started a project named PACALL (Passive Capture for Learning Log) in order to have a passive capture using SenseCam. With the help of SenseCam, learner's activity can be captured as a series of images. We also developed a system to help a learner find the important images by analyzing sensor data and images processing technology. Finally, the selected images will be uploaded to the current SCROLL system as ubiquitous learning logs. This research suggests that SenseCam can be used to do passive capture of learning experiences and workload of reflection can be reduced by analyzing sensor data of SenseCam.

Keywords: passive capture, learning log, life log, sensor data, SenseCam, ubiquitous learning

Introduction

Learning Log was originally designed for children as a personalized learning resource ("Learning log - Wikipedia, the free encyclopedia," n.d.). It was set by teachers to help their students record their thinking and learning. In this learning log, the logs were usually visually written notes of learning journals. Since 2009, we started our project named Ubiquitous Learning Log supported by PRESTO (Sakigake) JST (Japan Science and Technology Agency) (Ogata, Li, Hou, Uosaki, M.El-Bishouty Moushir, et al., 2010). We defined a ubiquitous learning log as a digital record of what a learner has learned in the daily life using ubiquitous technologies and proposed the SCROLL (System for Capturing and Reminding Of Learning Log) (Ogata, Li, Hou, Uosaki, M.EI-Bishouty Moushir, et al., 2010) to help learners collect their learning experiences as ubiquitous learning objects (ULLOs). However, currently ULLOs are created by learners manually. Learners must record their learning experiences in the form of photo, video or other formats consciously. It is evident that learners cannot record all of the learning experiences in the system and most of them will be lost and forgotten.

In order to solve this problem, we attempt to introduce the concept of life log into this system. The notion of life log can be tracked back at least 60 years (Bush, 1945). It means to capture a person's entire life or large portions of life. It usually uses digital devices to record life log such as wearable cameras or video recorders. However, if there is any way that we can extract the learning part from it, the learning log will be more significant and more sufficient. Besides, our system captures the learning log beyond their consciousness and learners' burden will also be reduced.

In this research, we use SenseCam to have a passive capture. SenseCam is a prototype device under the development of Microsoft Research (Hodges et al., 2006). It is a small digital camera that is combined with a number of sensors to help to capture a series of images of the wearer's whole daily life at the proper time and it can be worn around the neck. Actually this device is designed for memory aid. The SenseCam itself has an algorithm for capturing images by a time trigger and other triggers that use sensor data. However, because SenseCam is designed for memory aid, it takes photos continuously even if it is dark or the situation is not been changed. The result is that there are so many photos that are duplicated or blurred or dark.

1. Related Works

MyLifeBits ("MyLifeBits - Microsoft Research," n.d.) is a Microsoft's project. The aim of this project is to implement Bush's Memex model (Bush, 1945) that proposed to store everything that you saw and you heard. MyLifeBits has a large amount of storage that can store email messages, web pages, books, photos, sounds, videos, etc. In addition, the MyLifeBits project team is also using SenseCam to have the passive capture of life log and upload the sensor information along with the photos to the MyLifeBits repository (Gemmell, Williams, Wood, Lueder, & Bell, 2004).

Fleck and Fitzpatrick (Fleck & Fitzpatrick, 2006) used SensorCam to support collaborative reflection. In their research, the students were asked to wear SenseCam when they played arcade games. After that, they did a reflection on their learning experiences. They found that SenseCam images were not only used to support memory aids but also can be used as resources for supporting the collaborative reflective discussion.

2. Research Design

2.1 Learning Process

The whole process of passive capture happens unconsciously. However it is no doubt that the photo capturing is not the whole process of learning. It is necessary for learners to look through the captured photos and find the learning contents with the help of system. After entering the information of the image such as title and description, this learning content will be saved into SCROLL system as a ULLO. Of course, the saved ULLOs need to be recalled to help learners to remember, but this is the feature of SCROLL. That is to say, a process of passive capture includes capture, reflect and store. Such process is called a PACALL frame. Figure 2.1 shows this model.

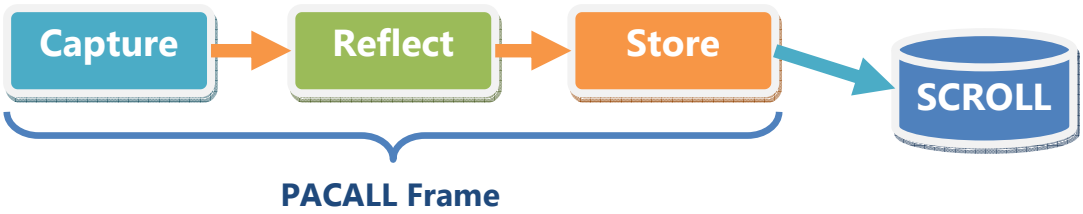


Figure 2.1 Model of Learning Process

2.2 Photo Classification and Sensor Data

In PACALL, we use SenseCam to have a passive capture of learner's daily life. However, since this device takes photos continuously, more than 200 photos will be taken in one hour, and more than 1500 photos in one day. Therefore, we propose a method to classify these photos by sensor data.

All photos are divided into 5 levels based on importance – manual, normal, duplicate, shake and dark. Manual means the photo is taken by pressing manual button consciously. When a learner takes a photo manually, it means that this photo must be important from his point of view. Normal means the photo is clear and can be used as learning log object. After excluding the duplicates, shake and dark, left photos are judged as normal. Duplicate means the photos are duplicated. Duplicated photos usually have same conditions. Shake means the photo is blurred. It usually happens when the light level is low and the camera shakes. Dark means the photo is taken with insufficient light and the photo is dark.

3. Implementation

In this research, the SenseCam that we are using is produced by Vicon Revue ("Vicon Revue | Memories for life," n.d.). When the SenseCam is connected to the computer, all photos will be imported into computer by software of SenseCam.

This system is programmed using Java and runs in Tomcat. When using this system, Tomcat accesses the repository of SensorCam photos directly and shows them in web browser.

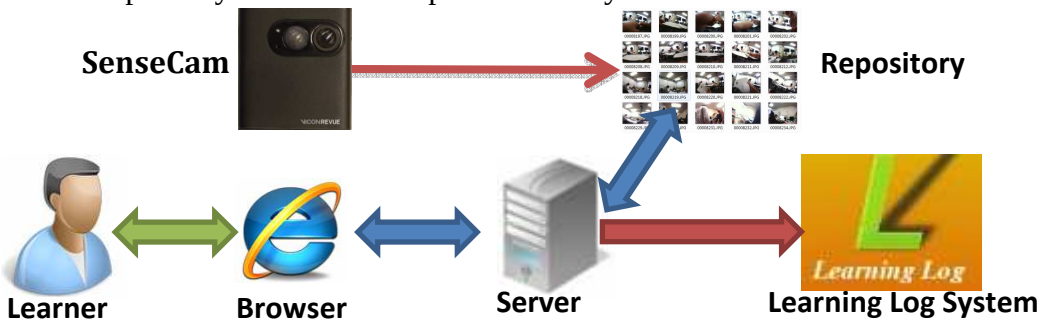
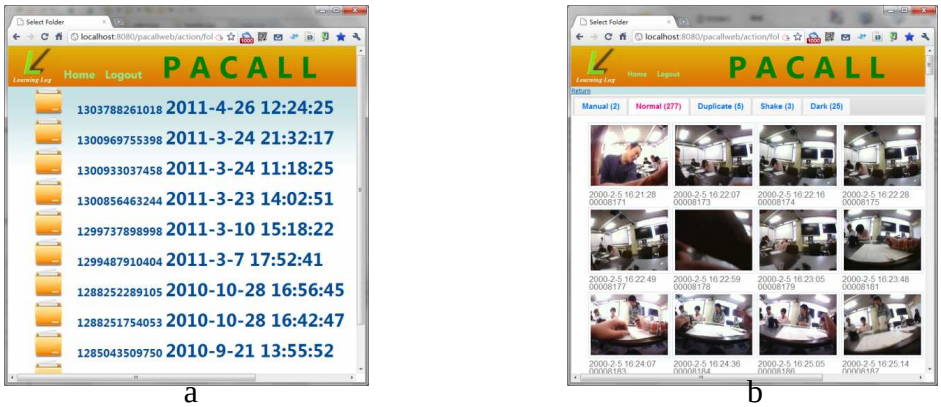


Figure 3.1 System Architecture

Figure 3.1 shows the system architecture. All the photos captured by SenseCam and sensor data are imported into repository. When a learner uses this system through browser, server accesses repository and analyzes the photos by sensor data, then returns the classified photos to learner. Then he selects proper photos and uploads them to learning log system through the server. We have a plan to use image processing technology to detect the photos which contains faces or texts.



a b

Figure 3.2 Interface of PACALL

When the system starts, folders will be shown to them including the name of the folder and imported time (Figure 3.2a). Each folder contains photos for a PACALL frame. On the page of Figure 3.2a, a learner selects a folder. After selecting one folder, the system fetches photos in this folder, and analyzing the sensor data, finally Figure 3.2b will be shown. All photos are classified into five tabs. He can switch between tabs and find proper photos. Finally, the selected photos will be uploaded to SCROLL system.

4. Conclusion and Future Work

In this paper, we introduced a project named PACALL that supports passive capture for learning log using SenseCam. We have designed a model of learning process in passive capture mode including capture, reflect, store. The PACALL system has been also developed in order to support reflection and reduce the workload of reviewing photos. During this research, we found that the SenseCam that originally designed for memory aid can be also used to capture learning log for passive mode. However, it usually takes too many photos, and many of them are duplicated or dark. Therefore, we must introduce other technology to help learners find out important photos. Currently, we are using sensor data to help us do it. In the future, we also use images processing technology to detect the contents of photos. Besides, current algorithm and user interface also need improvement. In addition, we plan to conduct a full evaluation experiment and invite students to use this system in the near future.

References

[1] Bush, V. (1945). As we may think. the atlantic monthly, 176(1), 101–108.
[2] Fleck, R., & Fitzpatrick, G. (2006). Supporting collaborative reflection with passive image capture. Supplementary Proceedings of COOP'06 (pp. 41-48).
[3] Gemmell, J., Williams, L., Wood, K., Lueder, R., & Bell, G. (2004). Passive capture and ensuing issues for a personal lifetime store. Proceedings of the the 1st ACM workshop on Continuous archival and retrieval of personal experiences (pp. 48-55).
[4] Hodges, S., Williams, L., Berry, E., Izadi, S., Srinivasan, J., Butler, A., Smyth, G., et al. (2006). SenseCam: A retrospective memory aid. UbiComp 2006: Proceedings (pp. 177-193). Presented at the UbiComp 2006, Orange County, CA, USA.
[5] Hou, B., Ogata, H., Miyata, M., Li, M., Liu, Y., & Yano, Y. (2010). JAMIOLAS 3.0: Supporting Japanese Mimicry and Onomatopoeia Learning Using Sensor Data. International Journal of Mobile and Blended Learning (IJMBL), 2(1), 40–54.
[6] Learning log - Wikipedia, the free encyclopedia. (n.d.). . Retrieved May 18, 2011, from http://en.wikipedia.org/wiki/Learning_log
[7] Mann, S., Picard, R. W., & Section, M. I. of T. P. C. (1995). On being'undigital'with digital cameras: Extending dynamic range by combining differently exposed pictures. Citeseer.
[8] Miyata, M., Ogata, H., Kondo, T., & Yano, Y. (2008). JAMIOLAS 2.0: Supporting to Learn Japanese Mimetic Words and Onomatopoeia with Wireless Sensor Networks. Proceedings of ICCE 2008 (pp. 643-650).
[9] MyLifeBits - Microsoft Research. (n.d.). . Retrieved May 19, 2011, from http://research.microsoft.com/en-us/projects/mylifebits/
[10] Ogata, H., Li, M., Hou, B., Uosaki, N., Moushir, M.EI-Bishouty, & Yano, Y. (2010). SCROLL: Supporting to Share and Reuse Ubiquitous Learning Log in the Context of Language Learning. Proc. of mLearn 2010 (pp. 40-47). Presented at the mLearn 2010, Malta.
[11] Ogata, H., Li, M., Hou, B., Uosaki, N., Moushir, M.El-Bishouty, & Yano, Y. (2010). Ubiquitous Learning Log: What if we can log our ubiquitous learning? Proc. of ICCE 2010 (pp. 360-367). Presented at the ICCE 2010, Malaysia.
[12] Ogata, H., Yin, C., & Yano, Y. (2006). JAMIOLAS: Supporting Japanese mimicry and onomatopoeia learning with sensors. Wireless, Mobile and Ubiquitous Technology in Education, 2006. WMUTE'06. Fourth IEEE International Workshop on (pp. 111-115).
[13] Vicon Revue | Memories for life. (n.d.). . Retrieved May 26, 2011, from http://www.viconrevue.com/

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

Supporting English Class using Mobile Devices: How Can We Intertwine In-class Learning with Out-class Learning?

Noriko UOSAKI [a], Hiroaki OGATA [a], Taro SUGIMOTO [a], Bin HOU[a], Mengmeng LI [a], & Yoneo YANO[a]
[a]*The University of Tokushima, Japan*
orchard.place@gmail.com

Abstract: We proposed SMALL system seeking for seamless language learning in our previous study [1]. In this paper, we describe how far we have developed the system for the realization of seamless learning. As our first step, we aim to support English vocabulary learning, since vocabulary learning is one of the fundamental aspects of language learning. We also aim to create a knowledge-aware virtual learning community to promote P2P interaction in our seamless learning environment. An evaluation experiment is scheduled to be conducted soon.

Keywords: Mobile Assisted Language Learning (MALL), Seamless Learning

Introduction

English has been a dominant language in the world due to globalization and internationalization in recent decades [2]. Therefore EFL (English as a Foreign Language) education is pivotal for non-English speaking countries including Japan. However, Japan is facing a serious problem in terms of English proficiency. One of the factors which have caused this disappointing situation is lack of learning time of English at school [3]. How should we cope with this situation? If time to study in class is limited, there is no other way but to learn outside class. Here our basic issue is to establish an effective method to carry out outside-class learning and to entwine in-class learning with outside-class learning. Along with the shortage problem, it has been pointed out that Japanese EFL learners are in lack of vocabulary. Since it is an essential component in language, it is pivotal to build up vocabulary to improve one's language skill. We believe one solution of these problems lies in mobile assisted learning, which has been gaining global attention in recent years. So our aim is to provide EFL learners with a seamless vocabulary learning support system, namely SMALL system.

1. Theoretical Background

1.1 Seamless Learning & Cyclic Model of Learning

Recent progress of mobile and wireless technologies offers us a new learning environment, namely "seamless learning". It allows learners to learn anytime, anywhere, and provides them with multiple ways of learning throughout the day. In this paper, by seamless learning, we mean learning which occurs with seamless transitions between in-class and out-class learning. The basis of our seamless learning idea is 'cyclic model of learning', proposed by

Takeuchi (2007), that there are four processes of learning: preview, in-class lesson, review, and expanded self-learning, where 'class', in a broad sense, means not only learning in-class but also learning out-class and it allows teachers to incorporate students' self- learning into classroom activities [4].

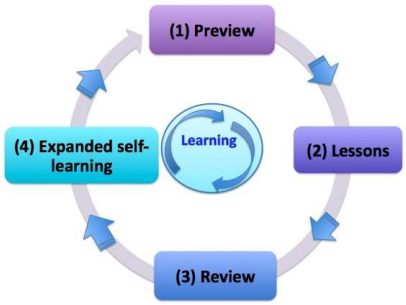


Figure 1. Cyclic Model of Learning
(adapted from Takeuchi, 2007[3])

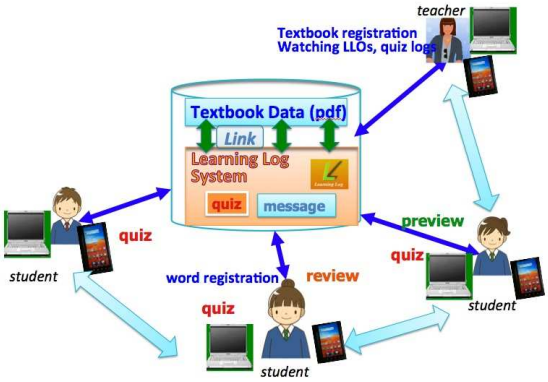


Figure 2. SMALL System

2. System Design

Based upon the above ideas, we designed the following Seamless Mobile-Assisted Language Learning Support System (hereafter SMALL System) (Figure 2).

Texbook Data consists of the whole units of the textbook to be learned through one semester. A teacher uploads Pdf file textbook data to the system in advance.

Learning Log System or SCROLL is a system developed by our team. Users register what they have learned, which we call "learning log objects (LLO)" to the system and view LLOs uploaded by themselves and others, then it supports recalling of their learning logs by giving them quizzes [5].

Quiz : The students register textbook target words and their newly acquired words during their self-learning and the system gives them quizzes. It generates quizzes based on the LLOs registered and viewed by the students.

Message : Users can send massages to other users in this system. When a viewer clicks the author name of the LLO, new window will be popped up and can send a message to him. This function will promote the students' interaction or discussion and will lead to collaborative learning which will be inevitable where the teacher in not there outside-class self-learning.

The scenarios based on Figure 1 are as follows:

(1) **Preview**: Students resiger textbook target words instructed by the teacher and read the text for preview and take target word quizzes. They answer multiple-choice quizzes. Quizzes will be generated until they make correct answers.

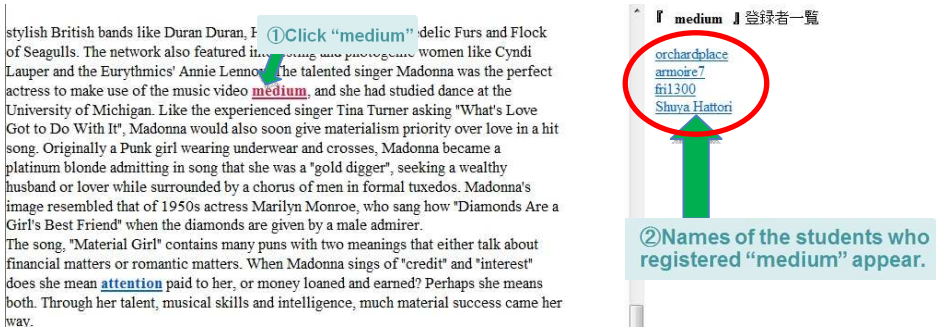


Figure 3. textbook interface

(2) **Lessons**:In the textbook, student registered words are hyperlinked and when the teacher clicks them, a side bar will appear and it shows names of the students who registered them so that the teacher will be able to know how many students have learned them. (Figure 3).
(3) **Review**: Students read the text for review and take target word quizzes. The quiz logs show the results with most frequently mistaken words and the teacher will review these words in the next class. So the learning occurs continuously.
(4) **Expanded Self-learning** : Students are assigned to do self-learning and register new words to the system, This system aims to intertwine outside-class learning with in-class learning. The system let them aware that they have learned it before when they come across the same word in the different contexts.

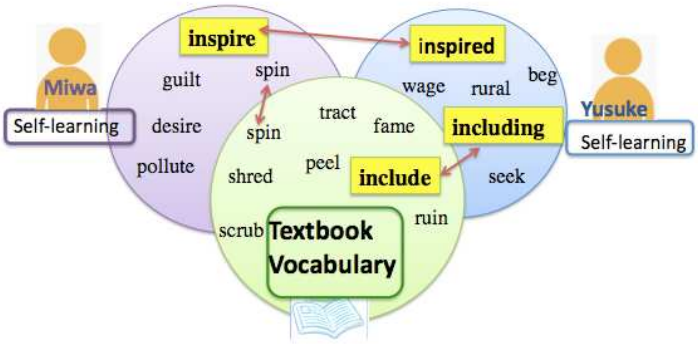


Figure 4. Link between in-class and outside learning

Figure 4 shows how in-class vocabulary learning and out-class vocabulary learning are linked. When Yusuke registers new word, “including”, which he already learned in the textbook, then the system shows him the textbook context where it appears. Our premise is that we learn words from the context [6]. Therefore in order to retain vocabulary in our memory, we need to make much of the contexts. The system provides the contexts to let them learn how the word is used. With the help from the system, students can be aware of what they have learned before, and what other students are learning. As one of the scales to show how out-class vocabulary learning is linked with in-class one, we propose *link rate* which is caliculated as follows:

$$\frac{\text{number of registered words}}{\text{n. of words in the textbook} - (\text{n. of words learned during } 7^{\text{th}} \text{ grade} + \alpha)^*}$$

This figure shows the rate of overlapped vocabulary learned in- and out-class learning. This notion is still in progress and we are far from being sure whether this rate shows the effectiveness rate of vocabulary learning. Further exploration would be necessary.

3. Pilot

Before the actual classroom use, 6 university graduate students and 1 undergraduate were asked to give a trial use of the system to see if any serious problem exists to carry out the above mentioned experiment. The subjects were asked to register 5 recommended words with their contexts, click the words they registered in the textbook pages to learn other contexts and send messages to other users. In the end of the experiment, they were asked to answer the questionnaire. Table 1 shows the result of the questionnaire.

Table 1 Questionnaire Results (five-point-scale)

Questions	M	SD
Did you like it when the system let you know that you can find your self acquired vocabulary in the textbook?	4.57	0.49
Did you like it when the system let you know that your self-acquired vocabulary is also registered by other users?	4	1.07
Was it useful for your vocabulary learning to read textbook contexts where your registered words appeared?	4.57	0.49
Was it useful for your vocabulary learning to read other contexts of your self-acquired words which were registered by other users?	4.43	0.73
Was the message system useful for collaborative work?	3.71	1.16

Open Comments

- It would be better if I can see the meaning and contexts of the word registered by others at the same time (by one click)
- The letter size and space between lines of the textbook were small. it would be more convenient if I could see the meaning of the words not by clicking but by just positioning the cursor.
- Color coding of the words in the textbook was helpful for me to know if those are my registered words or those by others. Linking my newly registered words with textbook page would be more convenient.
- The textbook interface and layout were not user-friendly. I wanted to see the illustrations in the web textbook just like its paper textbook version.
- I could not check if I could send the message successfully.
- If I click the words in the textbook, it shows the names of the learners who registered the word, but I'd like to know the contexts rather than the authors.
- Word registration in this system helped me retaining the word in my memory.

4. Early Insight and Future Works

Upon the above questionnaire results, we have found that we need to improve textbook interface and linking function of registered words and textbook contexts. We have not acquired any data on the classroom use, but possible advantages of the System that we expect are: 1) In-class and out-class vocabulary learning are closely linked so that what they learn in-class will be reinforces in out-class learning and vice versa. 2) Since we learn words from contexts, its linking context function can lead to effective vocabulary learning. 3) It encourages out-class self-learning, which is expected to compensate the lack of learning time in class. The disadvantage of this system is that it may be unfair for the students who do not own mobile phones unless the project team could provide them.

References

[1] Uosaki,N., Li, M., Hou, B., Ogata, H., & Yano, Y. (2010). Supporting an English Course Using Handhelds in a Seamless Learning Environment. *Workshop Proc. of the 18th International Conference on Computers in Education (ICCE2010)*,185-192, Putrajaya, Malaysia,.

[2] Lan, Y-J., Sung, Y-T., and Chang, K-E (2007). A Mobile-device-supported Peer-assisted Learning System for Collaborative Early EFL Reading. *Language Learning & Technology*, 11(2007), 130-151.

[3] Takeuchi, O. Autonomy and self-learning: Necessities and methods (in Japanese). *Teaching English Now* 8 (2007), 02-05.

[4] Sumi, S. & Takeuchi, O. (2008) Using an LMS for Foreign Language Teaching/Learning: Attempt Based on the "Cyclic Model of Learning". *Information and Systems in Education*, 7, 59-66.

[5] Ogata, H., Hou, B., Li, M., El-Bishouty, M.M., Uosaki, N. & Yano, Y. (2010). What if we can log our ubiquitous learning? *Proc. of the 18th International Conference on Computers in Education (1 ICCE 2010)* , 360-367, Putrajaya, Malaysia.

[6] Nagy, W.E, Herman, P.A & Anderson, R.C. (1985). Learning Words from Context. *Reading Research Quarterly* 20, 233-253.

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

The Role of Visual Grammar in Online Three-dimension Games

Banphot NOBAEW[a*]
[a]*Department of Communication and psychology, Aalborg University, Denmark*
*banphot@hum.aau.dk

Abstract: This research focuses on the role of visual grammar in online three-dimension games (MMORPGs). The three-dimension games are a new convergent media form, and it has strongly influenced the real and virtual world among the young generation. The research aims to investigate and develop a new theoretical framework of visual language and therefore analyzes the elements of visual design in online three-dimension games. Of course, there are some theoretical frameworks which have been applied to existing media, such as media studies. These have been used to analyze printed media, images, arts, television, film, advertisements, etc., but they still study a common media which concerns a communication process. Multimodal analysis is seemingly to go further than other theories, but it is a broad extensive tools and not sufficient to deeply analyze the designed elements and other effects in online three-dimension games. Online games are a newly emerging media which constitute a new cultural form, game culture; and it needs more specifically developed analytical tools. Therefore, we need to extend the existing frameworks to understand, make sense of interpret three-dimension online games.

Keywords: Visual grammar, online three-dimension games, digital literacy

Introduction

At the present time, “Games” not only has the meaning of “for Fun or Entertainment”, as the traditional meaning, but also it has varied greatly in meanings: for learning in education, medical training, training simulation, arts creating, industrial designing, film industry, etc. Gameplay is often accompanied by a lot of activities where users produce new storylines, new material or objects for the game. However, we might face a lot of problems from game. For example, some games are criticized for enforcing gender stereotypes or suspected of creating more violence in children, addiction, etc., some games are mistrusted for persuading people to gamble such as Farmville, a real-time farm simulation game, which always rule the players to trading with other players during gaming. On the other hand games are argued to be good for learning; they can teach people to valuable skills and literacy. Some games can educate and teach young people facing with the real problem and solving it; for instance, Hans, the Moose-Taunter, the 12-years-old boy who utilized knowledge from a World of Warcraft game to fend off moose [1], etc. We need more knowledge about how games operate, how players make sense of them and how they are produced and co-consumed? As all issues, it leads to the research questions; how visual elements of game design transform the visual meaning to players, how game players perceive and conceive elements of design and interpret the meaning of references, and what is the visual grammar of online games. The research will apply cross-disciplinary methods such as multimodal analysis, visual grammar, media discourse analysis and semiotics to analyze the objects of study which includes game

players and co-producers, game designers and others. The research will collect and analyze systems of signs from games in term of designed elements and meaning-making message. In this empirical study, it will be done as a "cycle step", starting from the first field work research by interviewing the game designers and game players, next arranging the games workshop, then setting the second interview and data collecting. At the same time, an online research is also investigated during the research cycle by joining and analyzing the online games. When we know the visual grammar, people can use it for design games, for learning indifferent meaning. That is what we call digital literacy and this research also contributes to our understanding of what digital literacy is and how it unfolds in relation to online three-dimension games.

1. Theoretical and empirical approach

A theoretical approach of visual media analysis has been developed since 1916 by Ferdinand de Saussure in linguistic sign and the sign relation by C.S. Peirce (1860) as he devised his system of three categories. He based his semiotic theory always on the conception of a triadic sign relation. He defined semiosis as "action, or influence, which is, or involves, a cooperation of three subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs" and Barthes in mythologies, proposed that the aim of semiological research is to reconstitute the functioning of the systems of significant other than language in accordance with the process typical of any structuralist activity, which is to build a simulacrum of the objects under observation [2]. Therefore, making comprehension of visual digital game which is a hybrid form of multi-disciplinary study, which needs to employ a variety of disciplines and methodologies such as compositional interpretation, content analysis, semiotics, psychoanalysis, media discourse analysis and audience studies for analyzing the visual image e.g. as Rose proposed the sites modalities and methods for interpretation visual materials [3]. In addition Cubitt also argues the step from still images to moving images concerns especially the temporal dimension of human communication, a focus too often missing from poststructural analyses by the uses of visual cultural analysis in the emergence of new visual practices [4]. Moreover, this research is also applied to other disciplines which include both grounded theory and existing theory, such as film analysis, crash theory, and custom theory; consequently, social semiotic context is strongly considerate analysis in differ research area both physical world and virtual world.

The digital media, as video games, is a compound of the complex form, or a system of signs as stated by Barthes. Moreover, it is also a structure of elements of design: point, line, color, texture, space, shape, form, direction and value. It is encapsulated a collective meaning by the elements of semiotic or 'visual language'. Visual language is not simply producing the 'set of reality'; on the other hand, it reproduces images of reality which are associated with the interest of social institutions. This reality is reproduced and circulated in different media. "They are ideological. Visual structures are not merely formal: they have a deeply important semantic dimension" [5]. Theoretical studies within arts history, media study and visual culture, have been applied to analyze and interpret the meaning of media such as art works, films, television and others. However, there are still has the question with theoretical framework for analyze the new convergence media which produced by new media technology as 'visual grammar' propose by Buckingham [6].

2. Research Question

What is the visual digital grammar of three-dimension online massively multiplayer role playing games affordance players as the sense of learning?

3. Research Landscape

Analyzing the visual grammar structure is necessary to conduct research within the visual language in media arena. An online game is the best sample of a visual digital production (Figure 1) to be selected for the research's unit of analysis. Because it mixes all techniques of media production from a variety of media such as film, painting, sound design, etc. This research focuses on the visual-media discourse analysis of digital games landscape in side of both designers and players who participants with elements of the design in game space. Moreover, the player is a crucial person who involves with a game interaction by using their field of experience and social structures to encapsulate and decapsulate [7] the designed elements of games and meaning. Also this research project will analyze the role of game designers who create the complex systems and encode the meaning of message in object elements. Digital game production will be collected and analyzed from different game genres in term of designed elements and meaning-making message.

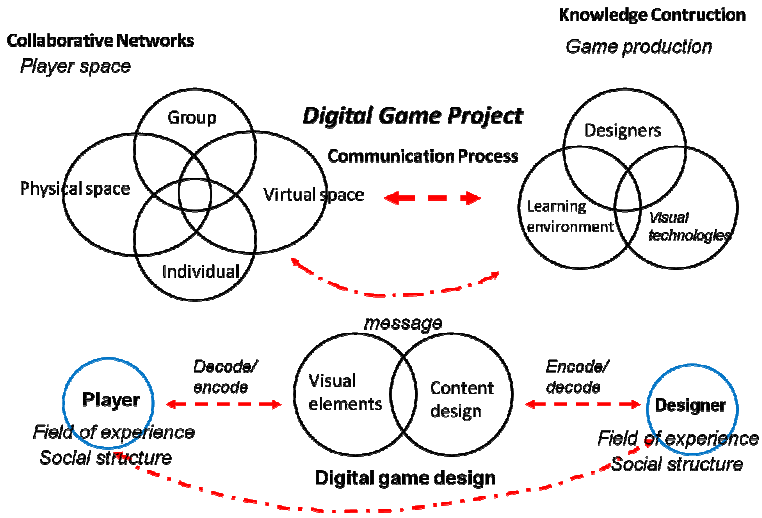


Figure 1 Visual digital production landscape

4. Research Methodology

This study is emphatically analysis of the meaning of design elements from game landscape which is designed by game designers. In addition, it also analyzes the visual grammar of game objectives via discursive practice of game creators. Therefore, the research will apply more attention to a range of methodologies and empirical studies including: selecting game genre for focusing, online research by joining with gameplay and collecting data, define the design elements and visual elements of game genre for analysis, determine game players and focus groups for research field and data collecting, in deep interview and video ethnography recording game designers and players' behavior, and game workshop arrangement and testing the visual elements by cooperating with game designer, and applying the technique of self-play experiments [8].

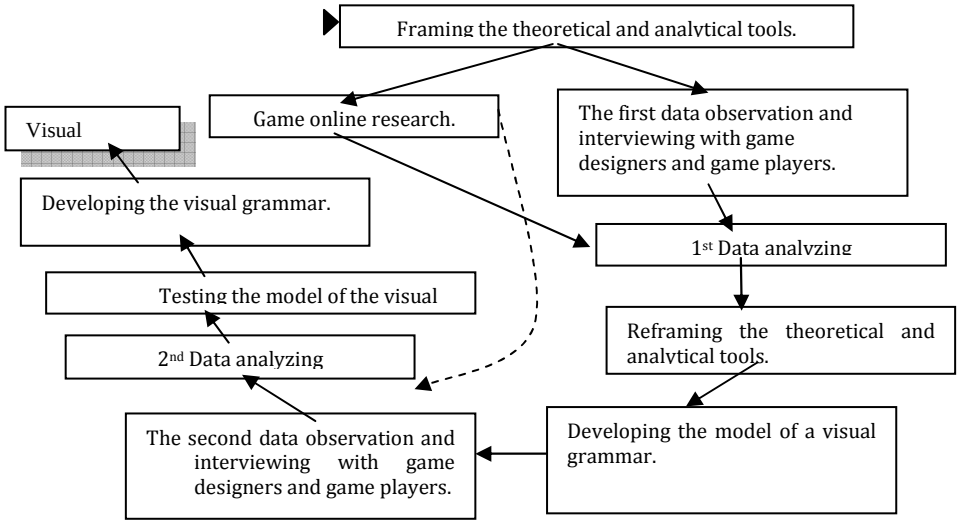


Figure 2 Visual digital production landscape

Setting the visual grammar framework (Figure 2), this research starts with framing the theoretical and analytical tools from analyzing data included the game online research and the first interviewing with game designers and game players. Then, reframing the theoretical and analytical tools for developing the first model of a visual grammar, after that collecting research data by the second interviewing with game designers and game players are the further development of the visual grammar model. Finally, it needs to be tested the theoretical model and framing the visual grammar. This research will collect data via various research tools, such as interview, sound recording, photo shooting, and video ethnography.

Acknowledgements

I thank all the people who contribute the previous knowledge of visual grammar, and interviewees who give me a chance for discussions.

References

[1] http://www.nettavisen.no/innenriks/article1453635.ece
[2] Barthes, R. (1972). Mythologies. Hill and Wang.
[3] Rose, G. (2007). Visual methodologies: An introduction to the interpretation of visual materials. Sage Publications Ltd.
[4] Cubitt, S. (2002). Visual and audiovisual: from image to moving image. Journal of Visual Culture, 1(3), 359.
[5] Kress, G. R., & Van Leeuwen, T. (2006). Reading images: The grammar of visual design. Routledge.
[6] Buckingham, D. (2006). Defining digital literacy: What do young people need to know about digital literacy. Nordic Journal of Digital Literacy, 4(1), 263-276.
[7] Jansson, A., & Lagerkvist, A. (2009). The future gaze: City panoramas as politico-emotive geographies. Journal of Visual Culture, 8(1), 25.
[8] Macleod, A. (2005). Game design through self-play experiments. Proceedings of the 2005 ACM SIGCHI International Conference on Advances in computer entertainment technology (pp. 421-428). Valencia, Spain: ACM.

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

Mobile Learning for Higher Education in Problem-Based Learning Environment

Nikorn RONGBUTSRI*
Department of Communication and Psychology, Aalborg University, Denmark

*nikorn@hum.aau.dk

Abstract: This paper describes the PhD project on Mobile Learning for Higher Education in Problem-Based Learning Environment which aims to understand how students gain benefit from using mobile devices in the aspect of project work collaboration. It demonstrates research questions, theoretical perspective, research methodology, and current progression.

Keywords: Mobile Learning, problem-based learning, personal learning environment

Introduction

The research aim to investigate what is benefit which students as learners can get from mobile learning in Problem Based Learning (PBL) environment. Research question is "How mobile technologies can increase the quality of collaboration and group work in Problem-Based Learning environment?" Furthermore the research project will address these questions.

- How do student use technologies to support their collaboration and how can mobile technology be used to enhance the collaboration in project?
- What are the benefits students can get from mobile learning in Problem-Based Learning environment?
- How do mobile technologies change the way of students' learning and collaboration?

1. Context and Background

We started using web as resource of information and for marketing purpose. Virtual Learning Environment (VLE) was being used among many institutes in early 2000s. It is used as a communication channel between instructors and learners. It has become a virtual space which instructors and learners can share, exchange, discuss, do exercise, and even evaluate. Anyway there were a few researches focus on learners' perspective. Currently, learners have more resources available for them to access, as promise by web 2.0 they have their own communities to share experience and for both formal and informal learning. Young people, if they are interested they can learn from the Internet individually or by joining a community. Therefore, now we are moving forward to a research paradigm about personal learning environment (PLE) which focuses on how learners, they build up an environment (timing, space, tools, accessibility, and social) that they are comfortable. Every learners may have different learning environments depends on various factors, such as personal characteristics, cohort culture, available time for learning, extrinsic and intrinsic motivations, technology using and their affordances, social and personal properties, and pedagogy which is set by their instructor. ICT has made new space for learners. Learning is

not only limited by physical space: formal space (e.g. classroom), social space (e.g. canteen, café), transition space (e.g. hall way), small group work space (e.g. project room, library), private (house). Learning can be leverage via virtual space – social (e.g. social network), formal and informal public communication (e.g. VLE, blog), and private (e.g. email, chat) [1]. Collis and Moonen (2010) [1] have found that twenty-first century learners different from the previous generation of learners. Twenty-first century learners make use of digital learning activities which relate to their personal learning organization to access, linkage, and share. This is a new phenomenon because their sharing influences to their learning resources. They put their ideas, thoughts, and any kind of reflection on resources. The reflections are noticed by other learners and even by the learning-resource creator. Later on, it influences the resources, for instance, changing the content in the resources.

In order to increase the level of personal context, mobile devices which are considered as personal devices take place. Leaners are familiar with this kind of smart devices, for example, smart phones, computer tablets, computer netbook, and computer laptop. These devices have ability to access the Internet through wireless technology e.g. WIFI, 2G or 3G technologies. These mobile devices can help twenty-first century learners to capture, annotate, share, reflect, and exchange their idea for their learning. Learners use different kind of tools on their mobile devices, for instance, checking email, chatting, social network, and gaming.

The implementation of technology to enhance learning cannot be successful without an appropriate pedagogy. It is learning approach which instructor employs for their class in a formal context. What kind of pedagogy is compatible with characteristics of twenty-first century learners? In higher education we try to develop competencies for learners to archive their future work, which may be industrial or academic. For learner, the successful completion of a course may be different. In traditional education may refer to being at lectures, listening, reading, and remembering for an examination. However, nowadays requirements from working environment have been changed. Industries need people who can collaboratively work in team. Therefore, the successful completion of a course may mean working collaboratively with others learners to find, collaboratively decompose and recombine, and create new learning artifacts whose value include the extent to new contribution will be useful for others. For these learning approach requirements we are looking at a pedagogy called ‘Problem Based Learning’ (PBL) which is an active learning [2]. PBL is quite compatible with twenty-first century learners’ characteristics in the sense of personal learning since PBL is learner-centered and learner can control their learning. PBL students can design they own learning goal or achievement and learning process. Students work in team to complete a non pre-define problem. This can practice their teamwork skill, critical thinking and also their domain disciplinary.

This project concerns mobile technologies as a means to support learning in higher education with a particular focus on Problem and Project based learning environments. The project aims to investigate how mobile technology can support learning and collaboration. The project focuses on scenarios within higher education which adopts a problem and project-based learning approach often called the Aalborg PBL model [3]. Within some environments Aalborg university students have experimented and used ICT tools to support their project work.

2. Theoretical Perspective

The research will go in depth by studying four main concepts. The first is Problem-Based Learning-PBL. PBL has been focused since 30 years ago specially in medical school. It leverages students to engage with real life problem and take student-centered strategy.

Aalborg University has employed PBL since 1974. At the present they have refined their model called problem and project-based learning [3]. The second concept is Computer-Supported Cooperative Learning-CSCL concepts, which is a pedagogical approach which learning takes place via social interaction using a computer device. This kind of learning is characterized by the sharing and construction of knowledge among participants using technology for communication and sharing resources [4]. The concept has been adopted and implemented in class conductions among many universities. We are looking at learning process from project work collaboration which is mandatory for students to work on project every semester. The project will be evaluated and graded to students at the end of semester. Personal Learning Environments –PLE is concept which concentrates on learner as a person who makes decision what, when, where and how to learn for him/herself. The concept tries to explain what tools choose to learn for a particular learning knowledge [5]. The last part is about web 2.0 and mobile technologies. Web 2.0 as web technologies that aim to enhance creativity, communication, secure information sharing, collaboration and functionality of the web, they have led to the development of web culture communities and hosted services [6].

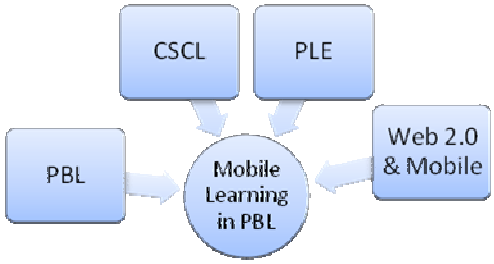


Figure 1. Theoretical study model

3. Methods

The research applies Action Research as the methodology for the project. It starts from cycle of data gathering by doing empirical study and applying the concept of ethnography. As in research question we start from looking at the learning current practice of students in PBL environment. In order to investigate the issue, we apply the concept of ethnography by observation, interview, and also getting students' narratives from their writing blogs. From these data collection, we can get reflection from students about both practices of using technologies to support their learning and also benefit from using them as in the second research question. In the last research question about how mobile devices change their learning practice, we plan to organize workshop to design their learning model with mobile technology and evaluate the model with focus groups.

4. Current Progression

Currently the project is in the half of second year. The project has been defined theoretical framework. The research has got result from empirical study as followed.

4.1 ICT support project collaboration survey

It was conducted across faculties at Aalborg University to find how students in PBL use digital tools for their learning and project collaboration support. The author used Diffusion of innovation model [7] to analyze how students adopt technology into the practice. So far

we have got 256 participants and we found that students get to know tools differently approach. Some department they introduced students about tools but others they have to learn from friends or by their own communities. Student they use a lot of tools as they are digital age but their need more advice about using tools for academic purpose. Some students they are really interested in using tools for their learning and group working but they do not know where to get support.

4.2 Student observation

The project had followed a group of students during Spring 2011 semester. It gives detail how students in PBL environment actually learn and work including how they use digital tools to support their learning activity. It is very different how students they use technologies to support their academic work. It depends on major of students, ICT skill, type of project, and also support from institution. The group that we followed, they prefer to meet face-to-face when they can organize. They separated to smaller groups for smaller task and sometimes they also work individually. They defined their working space both physically and virtually. Tools were used for collaboration, for instance, sharing resources, communication, and tracking progression.

4.3 Students' narrative

It is reflections on using tools for their learning and project collaboration support. Here we found students they have good attitude about using tools for group work collaboration. They tried to implement different tools. Some of them found it was very useful and continue using it. Some said they tried and it is useful, but not for the current project. We found that they need support in order to implement tools for their learning.

However, we still working on empirical study and hope to gain more evidence before making conclusion about PBL students using tool.

References

[1] Sharpe, R., Beetham, H., & Freitas, S. de. (2010). *Rethinking learning for a digital age*. Routledge.
[2] Graaff, E., & Kolmos, A. (Eds.). (2007). *Management of change implementation of problem-based and project-based learning in engineering*. Rotterdam: Sense Publishers.
[3] Kolmos, A., K.Fink, F., & Krogh, L. (2004). *The Aalborg PBL model Progress, Diversity and Chalenges*. Aalborg: Aalborg University Press.
[4] Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. *Cambridge handbook of the learning sciences*, *2006*.
[5] Attwell, G. (2007). Personal Learning Environments - the future of eLearning?, *2*.
[6] O'reilly, T. (2005). What is web 2.0. *Design patterns and business models for the next generation of software*, *30*, 2005.
[7] Rogers, E. M. (1995). *Diffusion of innovations*. Free Pr.

T. Hirashima et al. (Eds.) (2011). Proceedings of the 19th International Conference on Computers in Education. Chiang Mai, Thailand: Asia-Pacific Society for Computers in Education

Exploration of Technology-Mediated Signature Pedagogy for English Grammar Learning in Elementary School Education

Wai Ying KWOK

Department of Mathematics and Information Technology,
The Hong Kong Institute of Education,
Hong Kong

waiyingk@ied.edu.hk

Abstract: This study aims to explore a signature pedagogy using two selected types of free digital resources for supporting English as Second Language (ESL) learners at the elementary school level to learn grammatical knowledge of English grammar. Through a combination of qualitative and quantitative methods, this study will progressively design, evaluate and then establish a signature pedagogy that fully exploits the use of free digital resources for learning elementary English grammar. A twofold documentary analysis will be conducted for the design of the target signature pedagogy. To evaluate the effectiveness of the designed signature pedagogy in the real classroom environment, two classes of Grade 4 ESL students will be subsequently invited to a one-month trial teaching. Students in the experimental group will learn the target topic under the designed signature pedagogy; while students in the control group will learn under traditional classroom teaching approach during the trial teaching period. This study will conduct attainment tests, classroom observations, questionnaire survey and semi-structured interviews to investigate the impact of the designed signature pedagogy on the achievements, processes and perceptions of students in the learning of elementary English grammar. This study will finally advise a signature pedagogy potential to maximize the effectiveness of free digital resources on the learning of elementary English grammar among ESL learners.

Keywords: Elementary school education, English, grammar, signature pedagogy, technology-mediated

1. Research Motivation

The trend toward the integration of information and communication technology (ICT) into the delivery of English Language curriculum has spread over the world for decades ([1]; [2]). The development of grammatical knowledge of English Language is important for English as Second Language (ESL) learners at the elementary school level to advance their learning of the language. Therefore, topics about grammatical knowledge such as tense and agreement are essential components in the English Language curriculum for ESL learners at the elementary school level around the world.

Nowadays English teachers over the world prefer using free digital resources, ranging from static PowerPoint slides to interactive subject-related websites, available on the Internet to promote ESL learners at the elementary school level to learn grammatical knowledge of English Language on both the individual and group bases. This drives

researchers in the field of ESL to call for more attention to the investigation of meaningful pedagogies with the use of free digital resources on the Internet in ESL classrooms ([3]; [4]).

2. Research Plan

This study aims to explore a signature pedagogy that maximizes the potential of free digital resources for supporting ESL learners at the elementary school level to learn English grammar. In line with the trends in the use of free digital resources in ESL education, the significant pedagogy designed in this study focuses on the use of two types of free digital resources, namely online learning websites and online communication tools. Three research questions are made for this study:

(i) What are the achievements of ESL learners at the elementary school level toward English grammar learning under the designed signature pedagogy?

(ii) What are the processes of ESL learners at the elementary school level toward English grammar learning under the designed signature pedagogy?

(iii) What are the perceptions of ESL learners at the elementary school level toward English grammar learning under the designed signature pedagogy?

This study will adopt a combination of quantitative and qualitative methods to explore the target signature pedagogy. At the first stage of this study, the potential signature pedagogy will be designed for supporting ESL learners at the elementary school level to learn grammatical knowledge of English Language. A twofold documentary analysis will be conducted to inform the formulation of the target signature pedagogy. The first documentary analysis will focus on academic work related to English grammar learning in elementary school education. It aims to gain insights into a list of the target two types of free digital resources that is considered constructive for learning elementary English grammar. The second documentary analysis will focus on academic work related to pedagogical use of digital resources for English grammar teaching in elementary school education. It aims to gain insights into a range of technology-mediated pedagogical strategies that is considered suitable for teaching elementary English grammar. Based on the results of the documentary analysis, a signature pedagogy using potential free digital resources for enhancing English grammar learning and teaching in elementary school education will be designed for further evaluation.

At the second stage of this study, the designed signature pedagogy will be evaluated in the real classroom environment. An elementary school that has rich experience in IT in education will be purposefully sampled in the author's home city as the partner school for this study. A trial teaching in the form of one-month summer supplementary course, which amounts around 20 one-and-a-half-hour lessons, will be arranged in the partner school. Two classes of Grade 4 students, of each consists of around 30 students with similar learning ability, will be randomly selected and then assigned to the experimental and control groups. During the trial teaching period, students in the experimental group will be grouped into pairs to learn English grammar under the designed signature pedagogy, which emphasizes the use of the selected two types of free digital resources with tailor-made learning worksheets. Students in the control group will also be grouped into pairs to learn under traditional classroom teaching approach, which emphasizes the use of traditional learning materials such as textbooks and worksheets. In each lesson students in both the experimental and control groups will first learn the target knowledge from class teaching

and then explore the target knowledge with the assigned learning materials in pairs. The author will take charge of the classroom instruction for the one-month trial teaching.

3. Research Method

Four methods will be adopted in the evaluation work to investigate the effect of the designed signature pedagogy. First, students of both the experimental and control groups will sit for identical pre-test and post-test ([5]) before and after the trial teaching, respectively. The test papers will include a series of questions that assesses knowledge of the students about key grammatical knowledge of English Language, such as tense and agreement. Second, an uptake analysis ([6]) will be conducted to investigate the effect of the designed signature pedagogy on the learning process of students in the experimental group. A number of student groups which amounts about one-fifth of the students will be randomly selected in the experimental group. The selected student groups will be observed and videotaped in all lessons throughout the teaching period for collecting data on the learner-learner and learner-technology-learner interactions in collaborative learning activities. A systematic analysis of the modes of uptakes will follow to trace the learning process among students under the designed signature pedagogy.

Third, a questionnaire survey ([5]) will be conducted at the end of the trial teaching. All students in the experimental group will be asked to complete a self-administered questionnaire to indicate their perceptions of the implementation of the designed signature pedagogy for English grammar lessons. Fourth, one-fifth of the students in the experimental group will be randomly selected for the semi-structured, individual interviews ([5]) to further investigate their perceptions of the implementation of the designed signature pedagogy. The selected students will be asked to describe the changes in their process, motivation and achievement in the learning of English grammar through the lessons that implement the designed signature pedagogy. The evaluation results obtained at this stage will contribute to the establishment of a signature pedagogy that uses free digital resources for maximizing the learning effectiveness among ESL learners in English grammar learning in elementary school education.

4. Research Contribution

This study will make two contributions to the research on technology-mediated pedagogy in ESL education in future.

Firstly, this study can provide English teachers with insights into the innovative design of pedagogical interventions for the teaching of the target topic. The research outcome of this study will be a signature pedagogy potential to maximize the effectiveness of free digital resources on the learning of elementary English grammar among ESL learners. The notion of signature pedagogy refers to a collection of discipline-specific teaching methods that focus on preparing learners to perform and think like the experts in the target discipline ([7]). Through the routinized approach to classroom teaching, a signature pedagogy could promote learners to habitually bridge abstract knowledge and regular practice for the deep learning of core knowledge in the target discipline. The implementation of significant pedagogy is regarded as important in the learning of rule-based topics. It is therefore good to implement significant pedagogy in the teaching of English grammar, which is a topic comprised of language rules. Currently, however, there is a lack of research on identifying signature pedagogy in the field of ESL education. The research outcome of this study can help address such limitation, because it will advise practical ideas for supporting English

teachers to design topic-specific methods that effectively use free and relevant digital resources for teaching the fundamental knowledge and the acts of process for developing grammatical knowledge of English Language.

Secondly, this study can provide ESL researchers with insights into the comprehensive analysis of pedagogical interventions for the teaching of the target topic. The research design of this study will include an uptake analysis of data collected from classroom observations. Uptake analysis qualitatively investigates different categories of verbal and non-verbal interactions in collaborative learning processes of which learners learn with technology ([6]). It focuses on the deep interpretation of the dynamic relationships between all learner-learner and learner-technology-learner interactions in a computer-supported collaborative learning process, which is commonly found in ESL classrooms. Currently there is a lack of ESL research studies which include uptake analysis for a comprehensive analysis of qualitative data on the classroom learning process. The research design of this study can help address such limitation, because it will conduct an uptake analysis of all categories of interactions among the ESL learners at the elementary school level in English grammar learning.

References

[1] del Puerto, F. G., & Gamboa, E. (2009). The evaluation of computer-mediated technology by second language teachers: collaboration and interaction in CALL. *Educational Media International*, *46*(2), 137-152.

[2] Zhao, Y., & Lai, C. (2008). Technology and second language learning. In L. L. Parker (Ed.), *Technology-mediated learning environments for young English learners: connections in and out of school* (pp. 167-206). New York: Lawrence Erlbaum Associates.

[3] Hunt, M., Neill, S., & Barnes, A. (2007). The use of ICT in the assessment of modern languages: the English context and European viewpoints. *Educational Review*, *59*(2), 195-213.

[4] Richards, G. (2009). Technology-mediated learning environments for young English learners. *Educational Technology and Society*, *12*(2), 334-336.

[5] Creswell, J. W. (2008). *Educational research: planning, conducting, and evaluating quantitative and qualitative research* (3rd ed.). Upper Saddle River, NJ: Prentice Hall.

[6] Suthers, D. D. (2006). Technology affordances for intersubjective meaning-making: a research agenda for CSCL. *International Journal of Computer Supported Collaborative Learning*, *1*(2), 315-337.

[7] Shulman, L. S. (2005). Signature pedagogies in the professions. *Daedalus Summer*, *134*(3), 52-59.

ICCE 2011

The 19th International Conference on Computers in Education

28 November - 2 December • Chiang Mai, Thailand

Proceedings of the 19th International Conference on Computers in Education ICCE 2011

ISBN 978-616-12-0189-0