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Joint Proceedings of the Work-in-Progress Poster and Invited Young Researcher Symposium at the 18th International Conference on Computers in Education

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Editors

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Preface of Work-in-Progress Poster

This Work-In-Progress Poster (WIPP) presentation is held in conjunction with the main conference: 18th International Conference on Computers in Education (ICCE 2010), takes place on November 29 through December 3, 2010, Putrajaya, Malaysia. The aim of WIPP presentation alongside with the main conference is to provide extra opportunities for poster presenters to showcase well-formulated and innovative ongoing work or late-breaking results.

ICCE 2010 is composed of six them-based sub-conferences as follows:

- C1: ICCE Conference on Artificial Intelligence in Education/Intelligent Tutoring System (AIED/ITS) and Adaptive Learning
- C2: ICCE Conference on Computer-supported Collaborative Learning (CSCL) and Learning Sciences
- C3: ICCE Conference on Advanced Learning Technologies, Open Contents, and Standards
- C4: ICCE Conference on Classroom, Ubiquitous, and Mobile Technologies Enhanced Learning (CUMTEL)
- C5: ICCE Conference on Game and Toy Enhanced Learning and Society (GTEL&S)
- C6: ICCE Conference on Technology, Pedagogy and Education

In this year, as a new challenge, each of the six theme-based sub-conferences has organized its own program committee for calling WIPP for its own theme. All submissions for the WIPP presentation were reviewed by the program committees and 23 selected papers were accepted in total of the six sub-conferences. We believe this new session, WIPP presentation, provides a great opportunity for presenters and participants to interactively communicate with each other. The excellent papers included in this proceedings, then, would encourage readers to develop and refine their ideas and concepts.

We are grateful to the authors for submitting the papers, to WIPP program committees for the respective sub-conferences, and ICCE 2010 local organizers and program committee members.

Ben CHANG
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Ashok K. GOEL, School of Interactive Computing, Georgia Tech., USA

Preface of Invited Young Researcher Symposium

This section contains the Invited Young Researcher Symposium Proceedings of the 18th International Conference on Computers in Education (ICCE 2010). The Young Researcher Symposium (YRS) brings together young researchers 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 YRS aims to provide an opportunity for young researchers to present their experiences, discuss and receive feedbacks on their dissertation work-in-progress from a panel of established researchers with expertise in the same research areas. The symposium members were carefully selected as a promising and emerging topic in the theme-based sub-conference. Also they should be very active in the research topic of YRS and under 40 years old ranging from senior PhD students to post doc to young professors. The YRS 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.

This year we had 2 invited symposiums in CUMTEL and DIGITEL. The symposium on CUMTEL is included in this Proceedings. We hope that the papers in this proceedings on various research topics will stimulate more research ideas and discussions among the young researchers.

We would like to thank the APSCE SIG Chairs/Co-Chairs, Chen Chung LIU (CUMTEL), and Ben CHANG (GTEL&S) in making this year's YRS a highly successful event. Finally, we would like to take this opportunity to record our sincerest appreciation to Dr. Tak-Wai CHAN for their valuable suggestions at the early stages of organizing the YRS.

On behalf of Invited Young Researcher Symposium editors
Hiroaki OGATA

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= Work-in-Progress Poster Papers =

C1: ICCE Conference on Artificial
Intelligence in Education/Intelligent
Tutoring System (AIED/ITS) and
Adaptive Learning

Design Creativity Education: Cognitive Elements of Creativity and an Affective Model for Personalized Learning

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Abstract: In this work-in-progress report we present a design creativity exercise program which addresses cognitive elements of creativity and an affective model, as an effort to provide learners the opportunity of enhancing design creativity in a personalized adaptive manner. The personalized needs in specific elements and dynamically changing affective states are addressed in the creativity exercise program. Employing the experiment log data, we are using data mining approaches in understanding the relations among various characteristics of learners and their learning experiences.

Keywords: Cognitive Model, Affective Model, Design Creativity, Learning, Data Mining.

1. Introduction

As in general creative activities, design process involves both divergent and convergent thinking processes. Promotion and maximization of the generation of ideas were pursued for enhancing the design creativity [1, 4]. While both vertical and lateral thinking approaches have been identified as used by designers [2], a recent research showed the importance of the commitment mode control strategy in creative designing capabilities [5].

Design creativity cannot simply be defined by only the capability to produce novel and useful ideas. It is important to establish concrete components of design creativity and to find distinct cognitive processes for design problem solving so that education of design creativity could be attempted based on the identified distinct cognitive processes. It is meaningful to further decompose the design creativity into its cognitive elements which are highly related to design thinking ability. Furthermore, it would be desirable if there exists a systematic exercise program to foster design creativity addressing those cognitive elements.

In addition, personal adaptation is important in terms of user learning. A learning user model includes both static and dynamic characteristics of learners [6] and especially, the personal adaptation can be supported through affective modeling which establishes dynamically changing parameters of user emotions.

We have conducted research work towards design creativity education so that various underlying cognitive elements and processes of design creativity are identified, along with affective states. These design creativity elements and processes can be enhanced through training methods reflecting individual learner's cognitive personal characteristics, such as visual reasoning capability which identified as a critical element of design creativity [7].

We discuss our findings and provide an outlook to the coming work in our research, organized as follows: The cognitive elements of creativity are presented in Section 2. The affective model is in Section 3. The exercise program and experiment are described in Section 4. The discussion and future work in Section 5.

2. Cognitive Elements of Design Creativity

In the study, the fundamental cognitive elements of creativity were devised and used throughout the designed creativity exercise program, aiming to improve the design creativity of learners. Details about the program are elaborated in Section 4. The cognitive elements of design creativity have been defined based on Treffinger's creative learning model [9]. The Treffinger's creative learning model encompassed the cognitive and affective aspects. The cognitive aspects in Treffinger's creative learning model are fluency, flexibility, originality, elaboration, and cognition and memory. We replaced cognition and memory with problem sensitivity, and identified five cognitive elements of design creativity:

- **Fluency** is an ability to make multiple answers to the same given information in a limited time [3] and quantity of meaningful solutions [10].
- **Flexibility** is an adaptability to change instructions, freedom from inertia of thought and spontaneous shift of set [3]. That is the mode changing categories [10].
- **Originality** is rarity in the population to which the individual belongs; its probability of occurrence is very low [3, 10].
- **Elaboration** is the realization or transformation of an idea, which may become very general or simple or in contrary very fantastic or enriched into details [10].
- **Problem Sensitivity** is an ability to find problems [10] and to aware needs for change or for new devices or methods [3].

3. Affective Model

In order to measure dynamic characteristics of learners during the creativity exercise program, and to investigate its relationships with the 5 cognitive elements of creativity, we incorporated an affective model which consists of eight states; joy, acceptance, apprehension, distraction, sadness, boredom, annoyance, and anticipation. The affective model was identified based on the basic emotion categories proposed by Plutchik [8].

In the context of computer-assisted learning of creative design capabilities, affective modeling of learner is done in a self-reporting format with a pop-up diagram. The online form of dialog representation provides learners one or more affective states for selection during experiment. Note that the affection capture diagram uses identical icons so that other influences than affective state selection could be isolated in the interaction of the diagram and the users.

4. Creativity Exercise Program

We devised a creativity exercise program which fosters the enhancement of cognitive aspects of the design creativity, grounded on the definition of cognitive elements of creativity in Section 2. The creativity exercise program consists of 5 tasks, that differ in the level (high, medium, and low) of addressed cognitive elements. We hypothesized that the enhancement of underlying cognitive aspects of design creativity can be achieved by the creativity exercise program which consists of 5 tasks with the addressed cognitive elements. The details of the 5 tasks of the creativity exercise program are as follows:

(1) Making Stories: The 'making stories' exercise asks learners to produce different stories using three different pictures by changing the order of them. Therefore, this activity aims to improve the flexibility cognitive element. The elaboration element can also be developed through this activity by implying cause and effect of given pictures and specifying them. Originality can be enhanced through the activity to make unique and novel stories.

(2) Negation: In the 'negation' exercise, the learners are asked to compulsively and purposely negate the given objects. In this activity, the learners are supposed to negate a chair and a

shopping basket and make new ideas about them. As a result, the fixed views or ideas on the objects can be broken, and the learners can find the different and potential aspects of the objects. In this way, this activity can help to make new objects and transform original objects. This program aims to develop flexibility and originality.

(3) Filling Black Box: The objective of ‘filling black box’ is to mainly develop fluency by logically addressing the connections between the given input and output concepts as many times as possible within a limited time. This activity can develop elaboration by explaining the logical relations of input and output concepts. The originality can additionally be enhanced by discovering distinctive connections between given input and output concepts.

(4) Sensitization: In the ‘sensitization’ exercise, the learners are asked to express their feelings on the given physical objects and abstract concepts according to five different senses. In this activity, the problem sensitivity can mainly be developed to dig out potential characteristics of the given objects or concepts. In addition, this activity aims to develop the flexibility by describing concrete feelings on abstract concepts from the view of five senses.

(5) Diverse Classification: The final activity is the ‘diverse classification’ exercise. In this activity, the learners are asked to classify the given objects in several different ways. Therefore, the flexibility can be mainly developed by considering diverse criteria to group the given objects in a different fashion. In addition, this activity aims to develop the problem sensitivity to understand the multiple characteristics of given objects.

5. Discussion & Future Work

This work-in-progress paper has put forth a design creativity education incorporating both static and dynamic characteristics of learners. Forty four senior or first-year graduate students from the Interdisciplinary Design course (Spring, 2010) at the Sungkyunkwan University participated in the program. The log data collected from the experiment are being analyzed by employing data mining approaches, such as associatin rules and decision tree learning. We expect to discover detailed relations among various characteristics of students and their learning experiences in this exercise program. One of the preliminary results indicates that students in non-negative affective states achieved enhanced design creativity in comparison with students in negative affective states (distraction, sadness and apprehension) during the experiment. Adaptation to user characteristics and to user affective states will be realized in a form of recommendation based on the data mining results, in which personalization is provided for learners.

References

- [1] De Bono, E. (1992), *Serious Creativity*, Harper-Collins, London.
- [2] Goel, V. (1995), *Sketches of Thought*, MIT Press, Cambridge, MA
- [3] Guilford, J. P. and Hoepfner, R. (1971), *The Analysis of Intelligence*. New York: McGraw-Hill.
- [4] Isaksen, S. G., Dorval K. B. and Treffinger D. J. (1998) *Toolbox for Creative Problem Solving*, Kendall & Hunt, Dubuque, IA.
- [5] Kim, M. H, Kim, Y. S., Lee, H. S., and Park, J. A. (2007), An Underlying Cognitive Aspect of Design Creativity: Limited Commitment Mode Control Strategy, *Design Studies*, Vol.28, No.6.
- [6] Chen, W. and Mizoguchi, R. (1999), Communication Content Ontology for Learner Model Agent in Multi-Agent Architecture, *In Proc. of AIED99 Workshop on Ontologies for Intelligent Educational Systems*.
- [7] Kim, Y. S., Kim, M. H. and Jin, S. T. (2005), Cognitive Characteristics and Design Creativity: An Experimental Study. *In Proc. of the ASME International Conference on Design Theory & Methodology*.
- [8] Plutchik, R. (2010), The Nature of Emotions by Plutchik ,
<http://www.fractal.org/Bewustzijns-Besturings-Model/Nature-of-emotions.htm>
- [9] Treffinger, D. J. (1980), *Encouraging Creative Learning for the Gifted and Talented*. Ventura, CA: Ventura County Schools/LTI.
- [10] Urban, K. K. (1995). Creativity - A component approach model, *The 11th World Conference on the Education for the Gifted and Talented*, Hong Kong.

Applying a Proposed Recommendation System to Facilitate Web Search in Professional Community

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Abstract: Web search has become an essential pathway to getting information which assists learners to acquire new knowledge and solve problems. However, web search is rather complex and challenging and learners may not acquire valuable information they really need. Recommendation systems are designed to facilitate learner's web search and proved to be efficient. Nevertheless, few recommendation systems have so far been developed to facilitate learners to use precise keywords in specific field. In this paper, an empirical study is developed to evaluate whether a proposed recommendation system can facilitate learners in professional community to use keywords precisely.

Keywords: Web Search, Recommendation Systems, Association Rules

Introduction

With the rapid development of information technology in recent years, web-based learning has been increasingly promoted in education settings. Due to the abundant web content, learners consider web search an essential pathway to getting information which assist them to acquire new knowledge and solve problems [13]. Studies also indicate that web search can facilitate learners to view things in different perspectives and cultivate the problem-solving ability[2][7].

Since the World Wide Web (WWW) is an open-ended environment, web search is rather complex and challenging [5]. For example, since anyone can post any information on the WWW, information is unreliable and incomplete [10]. Learners have to evaluate the reliability of the source and this may lead to learner's heavier cognitive load [13]. In addition, learners may have disorientation problems [6], which means learner have no idea what and how to search useful information [12][13]. Moreover, learners may find it more challenging to use precise keywords for searching in specific fields due to insufficient prior knowledge. As a result, learner's searching will be interrupted and learner's motivation will be decreased. Hence, it is critical to develop mechanism to facilitate learners to web search and extract information in the web-based learning context.

Several studies indicated that recommendation system is one of the most successful techniques to help learners find valuable contents [5][3]. A recommender system is a technique that recommends useful information or strategies that learners may adopt for web search. Many researchers have developed recommendation mechanisms like content-based filtering [3][10] and collaborative filtering [4][8]. Content-based filtering provides suggestions to a learner according to her past search record. Unlike content-based filtering,

collaborative filtering provides recommendations on the basis of a community of learners who have similar search record. With the benefit of the mechanisms above, learner's problems of information overload, disorientation and keywords using can be alleviated to some extent by receiving more precise suggestions [1]. However, few studies have so far been done to use recommend system to facilitate learners to use precise keywords in specific field. Hence, the purpose of this study to evaluate whether a designed recommend system can help learners acquire desired information in the professional community.

Method

1. Participants

Participants are 28 graduate students with e-learning background of a university in Taiwan. Their ages ranged from 22 to 27 years old, and 12 are males while 16 females. All participants are categorized first year students (17) and second year students (11).

2. Procedure

This study adopts quasi-experimental method which includes the pretest and the posttest, and each participant was asked to conduct two activities. All participants implements ISI Web of Knowledge as the platform in the first activity and recommendation system [9] in the second activity. Participants have to complete assigned task and fill in the proposed questions. The time span of each activity is 90 minutes.

3. System design

The proposed system used data mining technology which extracted the relationship and tacit pattern from stacks of data. Association rule approach, one of the data mining technologies, was used in the system to analyze the relations among keywords. A relationship model among keywords, which were filtered from fifty thousand papers of 118 journals, could be further constructed.

As to information retrieval, TF-IDF (Term Frequency-Inverse Document Frequency) was used to evaluate how important a word is to a paper. The importance of keyword increased proportionally to the number of times the keyword appeared in the paper. To recommend learners more suggestive keywords, association rule mining, based on the Apriori algorithm, was used to construct a relationship model. The system could calculate association values among the keywords filtered from the abstract and the keywords provided by authors. Thus, the system would decide the most relevant keywords for recommendation. Values of Support and Confidence technique were further adopted to provide learners most relevant keywords. For instance, when learners input a keyword 'community', the system would present all associative keywords with four categorizations evaluated by the result of Support and Confidence, as illustrated in Figure 1.

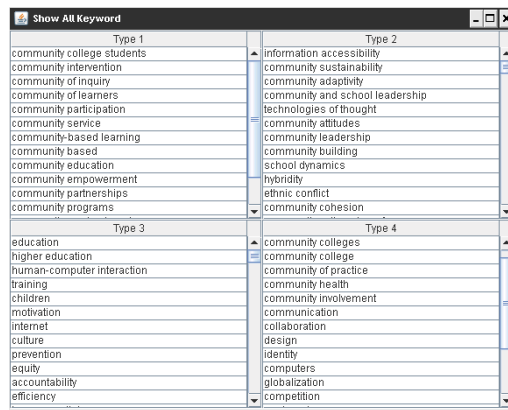


Figure 1. Result of recommendation system

4. Instruments

The questionnaire was adapted from Tsai's Online Information Searching Strategy [11] and revised in order to evaluate whether recommendation system affect learner's online searching strategies. Participant's information-searching processes were recorded by Camtasia Recorder, an on-screen capture software. After the activity, participants were asked to fill out the questionnaires for further analysis.

Acknowledgements

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References

- [1] Arasu, A., Cho, J., Garcia-Molina, H., Paepcke, A., & Raghavan, S. (2001). Searching the Web. *ACM Transactions on Internet Technology*, 1(1), 2-43.
- [2] Brand-Gruwel, S., Wopereis, I., & Walraven, A. (2009). A descriptive model of information problem solving while using internet. *Computers and Education*, 53(4), 1207-1217.
- [3] Burke, R. (2002). Hybrid recommender systems: survey and experiments. *User Modeling and User-Adapted Interaction*, 12, 331-370.
- [4] Chen Y. L., Cheng, L. C., Chuang, C. N. (2008). A group recommendation system with consideration of interactions among group members. *Expert Systems with Applications*, 34(3), 2082-2090.
- [5] Cho, Y. H., & Kim, J. K. (2002). Application of Web usage mining and product taxonomy to collaborative recommendations in e-commerce. *Expert Systems with Application*, 26, 233-246.
- [6] Dias, P., Gomes, M. J., & Correia, A. P. (1999). Disorientation in hypermedia environments: Mechanisms to support navigation. *Journal of Educational Computing Research*, 20(2), 93-117.
- [7] Jonassen, D. H., Howland, J., Moore, J., & Marra, R. M. (2003). *Learning to solve problems with technology: A constructivist perspective*, 2nd. Ed. Columbus, OH: Merrill/Prentice-Hall.
- [8] Kim, J. K., Kim, H. K., & Cho, Y. H. (2008). A user-oriented contents recommendation system in peer-to-peer architecture. *Expert Systems with Applications*, 34(1), 300-312.
- [9] Liu, C. C., Fan-Chiang, S. H., Chou, C. Y., & Chen, S. Y. (2009). Knowledge exploration with concept association techniques, *Online Information Review*.(Accepted)
- [10] Mooney, R. J., & Roy, L. (2000). Content-based book recommending using learning for text categorization. In Proceedings of the Fifth ACM Conference on Digital Libraries, San Antonio, Texas, ACM Press, 195-204.
- [11] Tsai, C. C. (2009). Conceptions of learning versus conceptions of web-based learning: The differences revealed by college students. *Computer and Education*, 53(4), 1092-1103.
- [12] Tsai, M. J. (2009) ,Online Information Searching Strategy Inventory (OISSI): A quick version and a complete version. *Computers and Education*, 53(2), 473-483.
- [13] Walraven, A., Brand-Gruwel, S., & Boshuizen, H. P.A. (2009). How students evaluate information and sources when searching the World Wide Web for information. *Computers and Education*, 52(1), January 2009, 234-246.

Ontologies for Project Management Teaching

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Abstract: The paper presents one practical approach aimed at developing teaching ontologies. The methodology that will scaffold the process of knowledge structuring and ontology design is described. Moreover, special stress should be placed on visual design as a powerful learning mind tool. For more comprehensible understanding the process of developing a practical ontology from the domain of project management is described.

Keywords: ontology, visual knowledge engineering, knowledge acquisition, knowledge sharing and reuse

Introduction

The achievements in the field of Artificial Intelligence help to develop a range of ways of symbolic and graphical representing of knowledge. A well-chosen analogy or diagram can make all the difference when trying to communicate a difficult idea to someone, especially a non-expert in the field. The idea of using visual structuring of information to improve the quality of student learning and understanding is not new. Teachers are used to work with concept maps, mind maps, brain maps, semantic networks, frames (Conlon 2002), (Jonassen 1998), (Sowa 2000) and other conceptual structures. A teacher operates as a knowledge analyst by making the skeleton of the studied discipline visible and showing the domain's conceptual structure called an ontology.

This paper proposes a clear, explicit approach to practical ontology design. We will present our proposed algorithm for ontology design used in the course in project management.

1. Using ontological engineering for teaching purposes

Ontological engineering can provide a clear representation of a course structure, main terms, methods, and their inter-relationship. Ontology as a useful structuring tool may greatly enrich the teaching process, providing students an organizing axis to help them mentally mark their visions in the information hyper-space of the domain knowledge.

Ontology creating also faces the knowledge acquisition bottleneck problem. The ontology developer encounters the additional problem of not having any sufficiently tested and generalized methodologies, which would recommend what activities to perform and at what stage of the ontology development process. An example of this can be seen when each development team usually follows their own set of principles, design criteria, and steps in the ontology development process

We can propose different types of teaching ontologies that can aid effective learning:

- Main concepts ontology,
- Historical ontology (genealogy),

- Partonomy of the discipline,
- Taxonomy of the theories, methods and techniques, etc.

The concrete set of ontologies depends on personal vision, teaching subject and awareness level of the students. Generalizing our experience in developing different teaching ontologies for e-learning in the field of artificial intelligence and neurolinguistics (Gavrilova & Voinov 1996), (Gavrilova 2007), (Gavrilova 2010), we propose a five-step algorithm that may be helpful for visual ontology design. We put stress on visual representation as a powerful mind tool (Jonassen 1998) in structuring process. Visual form influences both analyzing and synthesizing procedures in ontology development process.

The project management course is based on the studying of PMI standard based on the knowledge evolved from the good practices of project management practitioners. The ontologies developed for such concepts as “project”, “risk” and similar ones help the students to better understand the structure and relations in the area under study. On the other hand the ontologies created by the students for the planning of their training projects allow to check the course understanding by the students as well.

2. Developing Practical Ontology

In this section we describe our attempt to develop ontology for project following the 5-step algorithm.

- *Step 1 - Glossary Development*

The first step in building ontology is collecting information in the domain and building a glossary of the terms of the domain. To build a glossary for teaching project management course, we collected the terms from PMBOK (Project Management Body of Knowledge, 2008) and several tutorials. The project is a base concept of this course. All terms were extracted manually.

- *Step 2 - Laddering: Building an Initial Mind Map Structure*

At the second step we built an initial visual structure of the glossary terms. The main goal of this step is the creation of a set of preliminary concepts and the categorization of those terms into concepts. A mind map can be a useful visual structure for this step.

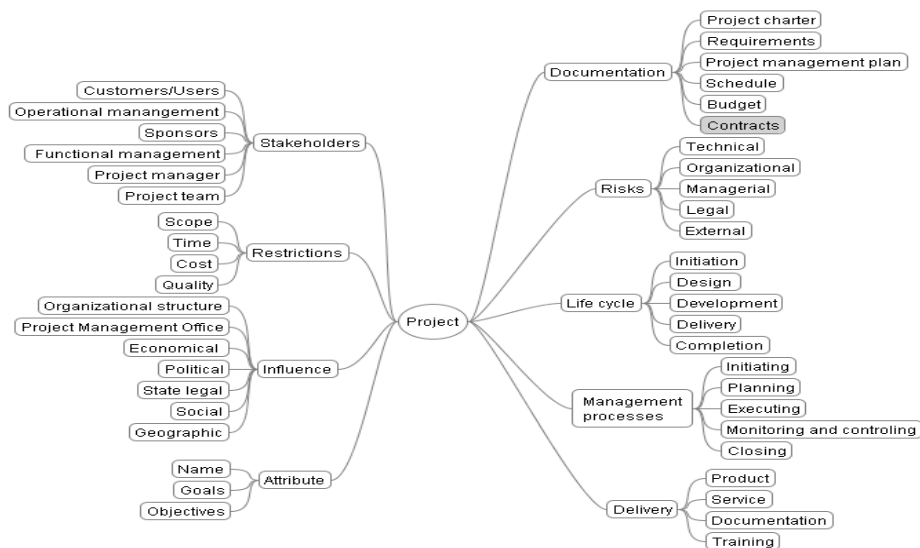


Fig.1 Mind-map for the concept “Project”

- *Steps 3 & 4 - Disintegration/Categorization: Building a Concept map with more Precise*

Hierarchy

At next step we composed more precise concepts and hierarchies by analyzing the glossary and previously built visual structure. Using the bottom-up strategy we tried to fit the terms and concepts into the meta-concept. Moreover, we created the relationships between the concepts. A concept map is the most useful visual structure for representation of the results of this stage, since it gives the ability of defining the relationship in addition to building the hierarchy. The output of this step is a large and detailed map, which covers the course in the hierarchical way. However, since this ontology is designed for teaching purposes it is important to offer the overall picture and a general hierarchy as well.

- *Step 5: Refinement*

The final step is devoted to making the ontology beautiful. The followings are some practical tips that we may be taken into consideration while designing the ontology:

- Use different font sizes for different strata.
- Use different colors to distinguish particular subsets or branches.
- Use a vertical layout of the tree structure/diagram.
- If needed, use different shapes for different types of nodes.

3. Discussion

This described approach can be applied to developing those tutoring systems where general understanding is more important than factual details. Furthermore, ontology design may be used as an assessment procedure for expressive as opposed to exploratory learning. For both formative and summarizing assessment purposes, students can clearly indicate the extent as well as the nature of their knowledge and understanding through creating ontology and explaining the involved processes.

Acknowledgements

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References

- [1] Conlon, T. (2002) Information mapping as support for learning and teaching *Computer Education* 102, 2-12.
- [2] Gavrilova, T.A. & Voinov, A. (1996) Visualized Conceptual Structuring for Heterogeneous Knowledge Acquisition . *In Proceedings of International Conference on Educational Multimedia and Hypermedia, EDMEDIA'96*, MIT, Boston, USA, 258-264.
- [3] Gavrilova T. (2007) Knowledge Mapping for Teaching and Learning // Int. Journal "The 21st Century: a scientific quarterly", Nr 2(24), Warsaw, Poland, 2007. – pp. 21-32.
- [4] Gavrilova T. (2007) Ontological Engineering for Practical Knowledge Work // Lecture Notes in Artificial Intelligence 4693, Proc. of 11-th Int. Conf. "Knowledge-Based Intelligent Information and Engineering Systems" KES 2007, vol.II, Italy, Vietri sul Mare, Springer. - pp. 1154-1162.
- [5] Gavrilova T. (2010) Orchestrating Ontologies for Courseware Design //Affective, Interactive and Cognitive Methods for E-Learning Design: Creating an Optimal Education Experience (Eds. by A. Tzanavari & N. Tsapatsoulis), IGI Global, USA, 2010. – pp. 155-172.
- [6] Jonassen, D.H. (1998) Designing constructivist learning environments. In *Instructional design models and strategies* (Reigeluth, C.M. (Ed), 2nd ed., Lawrence Erlbaum, Mahwah, NJ.
- [7] Sowa, J. F. (2000) *Knowledge Representation: Logical, Philosophical, and Computational Foundations*. Pacific Grove, CA: Brooks/Cole.

Modeling and Personalizing Curriculum Using Petri Nets

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Abstract: We introduce and discuss our ongoing research project using a multi-agent system to model, personalize and track individual students' curriculum within the standards of a given course while monitoring and maintaining opportunities for intra-student collaboration. A Petri Net data structure models the relationships amongst learning objects within the course. A particular marking of the net indicates the current state of a given student or entire class of students. Agents use the net to represent their beliefs and to make plans that maximize curriculum personalization opportunities without compromising collaboration between students.

Keywords: Multi-Agent Systems, Curriculum, Collaboration, Petri Nets, BDI

1. Introduction

Our primary research goal has been to present an approach to constructing adaptive learning systems that exploit multi-agent systems (MAS), machine learning, and novel course modeling to the problem of generating and coordinating student-centered study plans that maximize learners' outcomes while simultaneously reducing instructor workload. A problem in instructional design is the tension between providing personalized learning programs and balancing the workload of instructors. One approach is to marshal technology to provide learners with individual e-learning experiences without requiring the detailed attention of a human instructional designer. Significant research has been conducted into adaptive hypermedia education systems (Henze et al., 2004; Brusilovsky & Peylo, 2003).

Adaptive learning systems provide the promise of improved pedagogical integration of technology for large classes of students with dissimilar goals and preferences. One issue is that a high degree of personalization necessarily limits the opportunities for collaboration. Hamilton & Jago (2010) emphasize the importance of *modeling* and *connectedness* to promote customized and connected learning experiences. *Modeling* involves creating structured representations of systems for exploring a complex knowledge domain. *Connectedness* refers to socialization in learning, including rich multilayered connections between individuals.

We have developed our *eInstructor* platform as a system that depends on interaction between agents to balance two antithetical goals: personalized curriculum for a student and collaborative learning amongst groups. We have implemented a platform that supports the implementation, testing and comparison of several algorithmic approaches. This includes the agent infrastructure, course progression and status modeling system. Of particular interest is the Petri Net data structure used to model the relationships amongst course elements, document student states and inform student and system plans.

2. Modeling Course Progressions Using Petri Nets

We consider a course as some set of learning objects (LOs) and define course completion as completion of some subset of those objects, with several possible sets being available. For example, a course requirement might be met by one of several distinct learning objects, each catering to a different learning style. Learning objects can have pre-requisite skills or knowledge that might be fulfilled by other learning objects. Thus, learning objects can be ordered within a course, with early objects fulfilling the requirements of later objects. As a set of learning objects might fulfill the requirements of another set of objects, this progression is better envisioned as a complex directed graph than a simple path through the objects. For a given course, there might be multiple completion paths that represent a distinct set and ordering of learning objects.

We determined that the Petri Net (PN) (Reisig, 1992) would be an ideal data structure to represent this view of a course. The PN is a graph composed of three elements: places, transitions and arcs. We model a learner's particular cognitive state as a place (circle). An LO is a transition (rectangle). The "firing" of a transition (completion of an LO) causes the learner to transit from an earlier cognitive state to a more advanced one. Arcs connect places to transitions to places. A transition can only fire (an LO can only be completed) if all immediately preceding places have been filled. When the learning object is completed, all immediately subsequent places are so marked with some sort of token to indicate that they are filled.

This simple set of rules permits us to model quite complex relationships amongst learning objects within a course, including conjunctions and disjunctions of predecessors. We define an initial state, representing starting the course or completing all course pre-requisites, and a final state representing completion of the course requirements. Any sequence of transitions starting from the initial state to the final state is a valid completion path for the course.

One of the most important parts of the background logic is the construction of PNs for a course based on metadata of the LOs contained within that course. We consider the places in the PN to be competencies, build fragments around each LO using these competencies, and then join together competencies that are the same. Thus, the PN essentially build itself by matching input competencies with output competencies.

3. Use of the Petri Net to Model and Track Student Status

Once the course network has been constructed, a student's current status can easily be determined, as can their immediately available learning objects. The system marks the course graph by firing the transitions representing learning objects that have been completed for that student. This graph can be calculated by any student agent, representing that agent's beliefs about its state and that of the course.

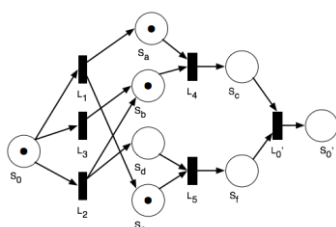


Fig 1: Student Status Net

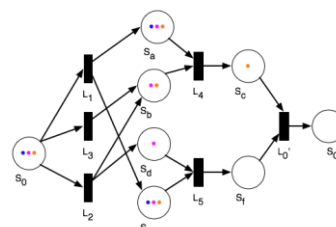


Fig. 2: Class Status Colored Net

The graph in Figure 1 shows a student that can currently attempt only learning object L_2 or L_4 (L_1 and L_3 have either already been completed or would not advance the student). L_5 could only be attempted after L_2 . Not only is the set of learning objects that can be undertaken immediately available, but all paths from the current state to the end of the course can be readily determined. In addition, even if the graph changes (perhaps by the addition of new learning objects), the student's current state can be reconstructed in time linear with the number of learning objects that have already been completed.

By expanding our model to a Colored Petri Net (Jensen, 1997), we obtain the ability to model the current state of all the students in a course. It also offers the facility that the system can quickly determine immediate and future opportunities for collaboration. A Colored Petri Net adds the facility that a given state may be marked with tokens of different "colors". Each student is assigned a token color, and the Petri Net state for the entire class can be calculated in time linear with the product of number of students and number of learning objects. This allows easy assessment of opportunities for collaboration. For example, the network in Figure 2 shows that if students are encouraged to complete learning object L_2 , more opportunities for collaboration by multiple students in L_4 and L_5 will be engendered. In addition, student agents can be informed that a particular learning object requires a minimum number of collaborators, and they can negotiate paths that allow a sufficient number to arrive at that point in the graph at the same time.

5. Conclusion

Innovative coordinated planning and control mechanisms from multi-agent systems, computational intelligence, as well as game theory and dynamic optimization will be needed to integrate modeling, control, communication and computing concerns into a single architecture. The proposed system is being realized through a Moodle learning management system (LMS) in which a variety of students are connected to each other and to a JADE and Jason-based multi-agent system.

MAS have been identified as one of the most suitable technologies to contribute to this domain due to their appropriateness of modeling autonomous individual students as agents in a flexible way and therefore take advantage of algorithms and techniques for group decision making such as voting and coalition formation that is proposed in the MAS literature. The architecture we have developed provides the Petri Net data structure for courses, which is a valuable tool for representing agent beliefs and for providing agents with a consistent framework for generating and representing plans that allow them to realize their desires. When coupled with the framework for agent interaction, a powerful tool for exploring adaptive collaborative learning systems is provided.

References

- [1] Henze, N., P. Dolog, W. Nejdl. (2004). Reasoning and ontologies for personalized e-learning in the semantic web, *Educational Technology & Society*, 7(4), 82-97
- [2] Brusilovsky, P. and Peylo, C. (2003). Adaptive and Intelligent Web-based Educational Systems. *Int. J. Artif. Intell. Ed.* 13, 2-4 (Apr. 2003), 159-172.
- [3] Hamilton, E. and M. Jago, (2010), Toward a theory of Personalized Learning Communities, in *Design for Learning Environments of the Future*, M. J. Jacobson and P. Reimann (eds.), Springer, 263-281
- [4] Jensen, Kurt (1997). *Coloured Petri Nets*. Springer Verlag. ISBN 3-540-62867-3
- [5] Reisig, Wolfgang (1992). *A Primer in Petri Net Design*. Springer-Verlag. ISBN 3-540-62867-3

Development of IR Tool for Tree-Structured MathML-based Mathematical Descriptions

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Abstract: The quantity of Web contents including math has been skyrocketing in recent years, such as Wikipedia articles and BBS focusing on math. Some pieces of previous research have dealt with the development of IR systems targeting MathML-based math expressions. They are, however, still developing in terms of lack of fuzzy search functions or low hit rates. One of the authors in ICCE2008 proposed the IR tool enjoying a fuzzy search function, by adopting regular expressions used in MySQL. In this study, it is our objective to additionally propose a “tree structure” algorithm for the fuzzy search function with better precisions.

Keywords: IR system for math, MathML, fuzzy search, tree structure

Introduction

In this study, it is our objective to propose development of IR systems targeting MathML-based[1] math expressions.[2] is advocated the IR systems of the algorithm that used the regular expression in ICCE2008. Since MathML is an XML-based markup language, it has tree structures by nature.

It is our objective to propose a “tree structure” algorithm for the fuzzy search function with better precisions than [3], and upgrade the interface for a fast input of math expressions being developed by another group in the lab.

1. Previous Research

[4], [5], and [6] are similar to our study although the developed systems are not found completely satisfactory in either that:

- math structure is not fully considered,
- indexing tag information is too rigid to realize fuzzy searching, or
- only partial implementation has been made.

[7] outlines sophisticated IR system for MathML-based math expressions. It further proposes the interface for creating queries combining text- and math-expression editors for fuzzy search using wildcards while there is no description regarding its implementation or results of experiments.

[8] is unique in proposing an IR system by incorporating math expressions in “extended” MathML-formats for better grasping their (mathematical) meanings. Likewise, no results of implementation or experiments are shown.

2. Implementation

2.1 Outline of retrieval with Tree Structure

Since MathML is an XML-based markup language, it has tree structures by nature. Then, implementing a retrieving algorithm with tree structure could be taken for granted. DOM(Document Object Model) format is used for tree-structuring¹.

2.2 Modification of method

In [3], the wildcard “*” use to mean “arbitrary (single) letter or variable(TypeA)”. But in this study, use to mean “a string with arbitrary length(TypeB)”(Fig.1).

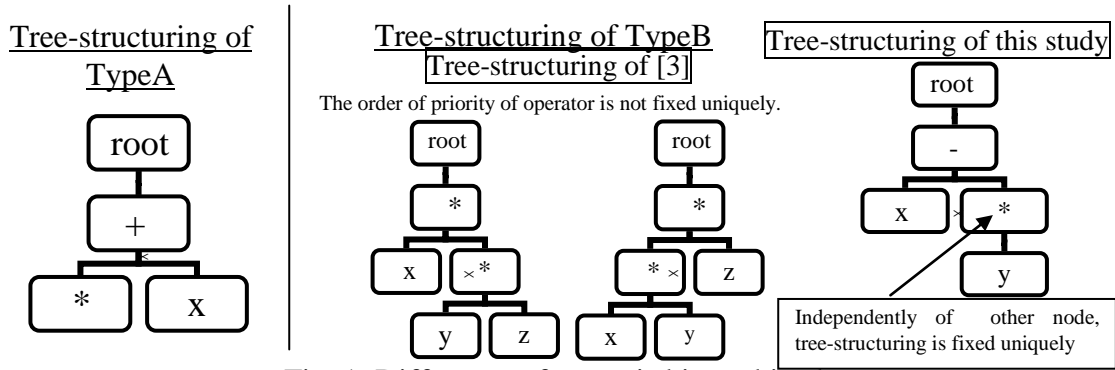


Fig. 1: Difference of query is hierarchized

2.3 Retrieving Algorithm

The wildcard use to part punctuation, and do AND Retrieving and check the hierarchy (Fig.2).

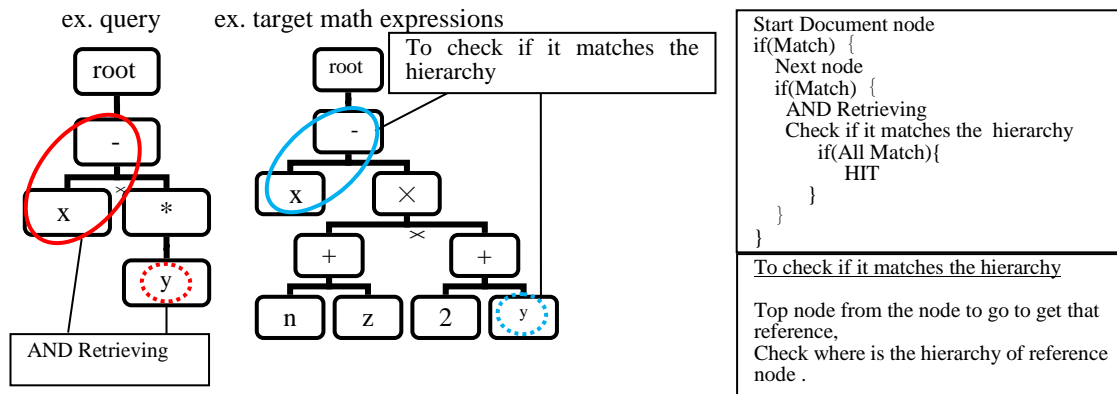


Fig.2:Retrieving Algorithm

3. Language, Style and Content

3.1 Outline of Experiments

¹ DOM enables to treat data described by XML as having tree structures.

IRs were attempted for 1,000 MathML data sampled from [9], with regular expression algorithm and tree structure algorithm, separately. The results of the experiments are shown in Table 1. IR1 to IR3 in the table are the examples of information retrieval, or

$$\text{IR1: } \cos^2(z), \text{ IR2: } \cos(z) + * \cos(z), \text{ IR3: } \frac{*}{* + *}$$

respectively. The numbers of math expressions hit by the selected algorithm are given in the table.

Table 1: Results of Experiments

Retrieval Algorithm	IR1	IR2	IR3
Tree Structure(TypeA)	9	0	67
Tree Structure(TypeB)	9	1	67
Correct numbers	9	1	67

3.2 Discussions

This time, the specification of structured query [3] to change. We can hit the math expressions that in [3] can hit. And, in this study can hit math expressions like a IR2.

4. Upgrade the interface for a fast input of math expressions

We upgrade the interface for a fast input of math expressions being developed by another group in the lab[10]. Details will be announced on the day.

5. Summary and Future Plan

In this study, it is our objective to propose a “tree structure” algorithm for the fuzzy search function with better precisions than [3], and upgrade the interface. Our future plan is increase in data set. And adding Highlighting.

References

- [1] MathML: Mathematical Markup Language Version 2.0 (Second Edition) (2003), <http://www.w3.org/TR/MathML2/>.
- [2] Y. Miyazaki, Y. Iguchi, “Development of Information Retrieval Tool for MathML-based Math Expressions”, Proceedings of the 16th International Conference on Computers in Education (ICCE2008), pp. 419-426 (2008).
- [3] T.Watanabe, Y.Miyazaki, Development of Search Engine for MathML-based Mathematical Descriptions, 34th Japanese Society for Information and Systems in Education, pp. 452-453 (2009)
- [4] T. Nakanishi, S. Kishimoto, M. Murakata, T. Otsuka, T. Sakurai, and T. Kitagawa, “An Implementation Method of Composite Association Retrieval System for Data of Mathematical Formulas”, DBSJ Letters, Vol. 4, No. 1, pp. 29-32 (2005).
- [5] H. Hashimoto, Y. Hijikata, and S. Nishida, “A Survey of index formats for the search of MathML objects”, IPSJ SIG Notes 2007-DBS-142-(10), Vol.2007, No.54(20070531), pp. 55-59 (2007).
- [6] K. Otigiri, T. Murata, “Search of Mathematical Formulas Using MathML”, 22nd Annual Conference of the Japanese Society for Artificial Intelligence, (2008).
- [7] R. Munavalli, R. Miner, “MathFinder: A Math-Aware Search Engine”, ACM, p 735, ISBN: 1-59593-369-7, (2006).
- [8] B. R. Miller, A. Youssef, “Augmenting Presentation MathML for Search”, Intelligent Computer Mathematics, 9th International Conference (AISC 2008), pp. 536-542 (2008).
- [9] The Wolfram Functions Site: <http://functions.wolfram.com/>.
- [10] M. Ogasawara, Y. Miyazaki, “Development of Supporting Tool for Making Mathematical Expressions on Blog System That Uses Java Applet”, 34th Annual Conference of IPSJ, pp.454-455 (2009).

C2: ICCE Conference on
Computer-supported Collaborative
Learning (CSCL) and Learning
Sciences

Collaborative Problem-based Learning: Adaptation of Vygotsky Sociocultural Learning Theory

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Abstract: Adaption of Vygotsky's Sociocultural Learning Theory (SLT) concepts in collaborative problem-based learning are viewed theoretically for synchronicity and richness of feedback highlighting in the collaborative learning system. This study is focusing on workplace problem-based learning and how the selected aspects of collaborative learning system can influence workplace soft-skills performance among graduates and experienced employees.

Keywords: Vygotsky, collaborative learning, problem-based learning, collaborative problem-based learning supported with technology

Introduction

Some authors have noted that certain soft- skill such as problem solving, interpersonal interaction, communication and teamwork were preferred by employers when hiring graduates [1]. However other research has indicated that recent graduates are often lacking in problem solving skill, and face difficulties handling work pressure, making decisions or communicating in the workplace.

Interpersonal interaction and collaboration can create positive experiences and affect cognitive and personal participation positively during discussions. Interactional and collaborative learning approaches are consistent with Vygotsky's Sociocultural Learning Theory (SLT).

Information technology can play a significant and essential role within the collaborative environment. Learning systems are capable of integrating collaboration with technology. Synchronicity and richness of feedback highlighting in collaborative learning system influences learners understanding and affect the individuals' cognitive and social participation [9].

The aim of this study is to determine the effectiveness of selected aspects of collaborative learning systems on the facilitation of the workplace problem solving performance among graduates and experienced employees, within Vygotskian learning framework. Specifically, it examines whether synchronicity and richness of feedback highlighting formats results in great skill-learning and performance within collaborative environments.

1. Vygotsky Sociocultural Learning Theory – The Concepts

According to Vygotsky [7], knowledge is acquired through the cognitive construction of conceptual scaffolds within supportive environments, called Zones of Proximal Development (ZPD). ZPD is a gap between a learner's current development to the learner's potential development. Within each ZPD, individuals can learn from teacher/adult, knowledgeable peer or from external tools such as technological agents, books or learning aids; called scaffolding. Scaffolding can be referred as assistance for learner's to achieve potential development from the learner's current development [8]. Scaffolds within supportive environments will gradually enhanced cognitive development. Social interactions between individuals enhances this learning and collaborative activities provide individuals with the opportunity to experience achievement satisfaction, mastery over factual information to encounter and greater success in problem solving compared to individualistic learning [2].

2. Adaption of Vygotskian to Collaborative Problem-based Learning

Vygotsky's SLT is theoretically significant with collaborative problem-based learning supported with technology. Social interaction during collaboration within supportive environment and reflective activity during collaborative problem-based learning are influences from Vygotsky's SLT.

2.1 Synchronicity and Richness of Feedback Highlighting in Collaborative Learning

Collaborative learning can be defined separately based on the definition of learning and collaboration. Learning can be described as process of acquiring knowledge of facts, skills and methods that can be stored or reproduced when necessary. Dillenbourg [8] interpreted collaboration as situations when more than one person work together, performing the same actions and have a common goal. Students participated in active learning of acquiring knowledge, working together to maximize their own on each other learning during collaboration. Social interaction and collaboration between peer within supportive environments positively influences the cognitive growth to the learners, thus increase learners' motivation and arousal [3].

Learning systems are capable of integrating collaboration with technology. Some authors described computer technology is able to mediate the interactions between participants in collaborative learning [3, 4]. Communication synchronicity during interactions does affect the performance in learning environments. Two types of synchronicity identified from various studies: synchronous (real-time activity) and asynchronous (flexible time activity). Reflective action during collaboration will influence the understanding of learning for individuals or group. Richness of highlighted feedbacks during collaboration using discussion board or chat allows learners to view their feedbacks, interaction and discussions in text-based format and create awareness to the learners. It will ease the learner's to view and search the feedbacks for further discussions. Feedbacks can be highlighted in visual/iconic formats/high rich or by phrase-tagging/low rich [10, 3].

2.2 Problem-based Learning supported with technology

Problem-based learning (PBL) was introduced and implemented at MacMaster medical school in 1969 by Howard S. Barrows. PBL is a learning that results from working towards understanding of a problem and the problem must be encounter first in the learning process [5], and as a learning approach in seeking solutions for given complex situations or

scenarios. PBL stimulates learners learning from the cognitive conflicts during problem solving, learning interactions, social negotiation and evaluation within social interaction, constructed by the learners' prior knowledge or with knowledgeable partner and reflective activity [6].

In collaborative learning environment, learners work together based on given workplace problem by the system. Learners for each group will participate in problem-based learning process to generate solutions for workplace problems. Each group will use different levels of synchronicity for interaction and different richness of feedback highlighting formats for reflective actions during communication in collaborative learning. Solutions generated from the collaborative problem-based learning process hypothetically influence workplace soft-skills performance among selected learners.

Social interaction and collaboration mediated with computer technology in problem based learning are consistent with concepts of scaffolds and Zone of Proximal Development in Vygotsky's Sociocultural Learning Theory (SLT). Reflective action in learning significant with collaborative and problem-based learning thus influences learning achievement for participants [6].

3. Future Works

Collaborative learning prototype with problem scenarios related to workplace environments will be developed and implemented to selected participants. Solutions generated in discussions during collaborative learning will be analysed to measure their quality and effectiveness towards workplace soft-skills performance.

4. Conclusion

Workplace soft-skills are one of the key to achieve successful working life. Collaborative problem-based learning within supportive environment hypothetically influences learners in problem solving specifically for problems in the workplace. Hopefully, solutions generated from collaborative learning system prototype will contribute to workplace soft-skills performance among graduates and experienced employees.

References

- [1] (2009). National Industry Dialogue 2009: Workforce Development in a Changing Market by Engaging Industries. Department Of Polytechnic Education Ministry Of Higher Education Malaysia.
- [2] A. F. d. Andrade, P. A. Jaques, J. L. Jung, R. H. Bordini, and R. M. Vicari. (2001). A Computational Model of Distance Learning Based on Vygotsky's Socio-Cultural Approach. *International Conference on AI and Education* pp. 33-40.
- [3] C. A. Jara, F. A. Candelas, F. Torres, S. Dormido and F. Esquembre. (2009). *Synchronous collaboration of virtual and remote library*: Wiley Periodical Inc.
- [4] C.-H. Chiu and H.-F. Hsiao. (2010). Group differences in computer supported collaborative learning: Evidence from patterns of Taiwanese students' online communication. *Computers & Education* 54 pp. 427-435.
- [5] H. S. Barrows and R. M. Tamblyn. (1980). *Problem Based Learning: An Approach To Medical Education*. New York: Springer Publishing Company, Inc.
- [6] L. Uden and C. Beaumont. (2006). *Technology and Problem-Based Learning*: Idea Group Inc.
- [7] M. Cole, V. John-Steiner, S. Scribner, and E. Soubberman. (1978) L. S. VYGOTSKY Mind in Society. *The Development of Higher Psychological Processes*: Harvard University Press.
- [8] P. Dillenbourg. (1999). What do you mean by 'collaborative learning'? *Collaborative-learning: Cognitive and Computational Approaches*: Oxford: Elsevier pp. 1-19.
- [9] P. Resta and T. Laferrière. (2007). Technology in Support of Collaborative Learning. *Edu Psychol Rev* pp. 65-83.
- [10] S. Caballe and J. Feldman. (2008). CoLPE: Communities of Learning Practice Environment. Open University of Catalonia, Barcelona, Spain International Computer Science Institute, USA.

Expectation & Experience of ICT in University: A Comparative Study

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Abstract: Nowadays most of the students in the universities have been exposed to Information and Communication Technology (ICT) at school or home. At certain extent, they are good at exploring and evaluating any new technology options presented to them. They might expect more when coming to university or no less than what they have experienced previously. What expectations they have on IT provision in university? How ICT influences their learning experiences at university? Does it measure up to the expectations? Does the university's IT provision is adequate to support new teaching and learning methods in collaborative learning environment? These are some of the questions we hope to explore. Finding from this research will help determine what kind of improvement through ICT that is relevant to improve learning and teaching methods that will enhance learning experiences of the students.

Keywords: ICT, Internet, Communication, Collaborative Learning.

Introduction

As the result of development in ICT at school, nowadays we can see most of the university students, if not well-versed are adept to mastering the technology. When coming to university, there is possibility that they might expect more or equal to what they have experienced previously. Thus, it is important to understand how ICT affects their experience in learning or personal use, so that we could direct the use of it in a direction that introduces different and effective way of learning. In this way of learning, they will be involved more in collaborative learning process. At the same time the technological options that can complement and assist their studies in unexpected yet affective, but not by the way which they think will complicate them, may encouraged them to focus on study. Nevertheless, guidance from the teacher is still necessary to give them idea on how technologies can be applied during learning process.

1. Research Objectives

This research project is undertaken among first year university students in order to understand the following issue:

- To measure the expectations of the students on IT provision at university.
- To understand how ICT affects on student experiences in teaching, learning and personal use.
- To understand if what they experienced in university is measure up with the expectations.

2. Research Methodology

In order to explore the research objectives, a mixture of both qualitative and quantitative study are undertaken. The target audience is the first year undergraduate students who are just started their first semester in university. They are selected randomly from all faculties in Universiti Sains Islam Malaysia (USIM). This study is expected to compare student's expectations and experiences on ICT at university, and explore the findings in more detail in qualitative interviews. The items measured in this study including the frequency of use of internet applications, the amount of ICT use in learning and so forth. Overview of the research design is depicted as in Figure 1.

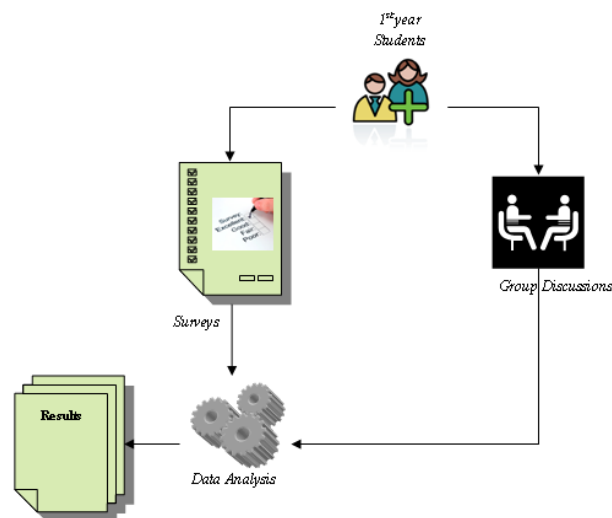


Figure 1: Overview of the research design

The research project comprises two stages. The first stage of this research comprises an online survey and personal interviews. The online survey is conducted during the start of the first semester. In the interviews, several respondents are selected from the target audience on a voluntarily basis to discuss in depth their expectation of ICT at university. Personal interviews are not meant to cover the whole student population. It is used to understand how ICT at home and school affects their use of technologies in personal life and their point of view on the ICT provision at university.

The second stage uses online survey and personal interviews too except it is conducted at the end of the first semester. The same target audience is invited again to take part in the second stage. They are among first year students who are selected at random from all faculties. A follow-up to previous interview with the same group of respondents in the first stage is conducted to further discuss their experiences of ICT in order to understand in depth how ICT affects their personal use and learning at university. After the end of the second stage, the results of both quantitative and qualitative study are analyzed to meet the objective of the research project.

3. Literature Review

Study by D. Galanouli and V. McNair [3] has provided evidence that students perceive three main barriers to their use of ICT during school practice: teachers' attitudes, lack of resources and time. Among of these, teachers' attitudes play the most crucial role compared to other factors. Teachers can put an effort by making use of technologies such as online

videos, blogs, Wikis, and social networking websites as part of teaching and learning activities. Students may become more proactive in constructive learning environment if teachers are willing to guide the students in a way that help them perceive technologies as instruments that are not limited for personal use but also useful for effective learning.

In collaborative learning, students are actively constructing their concept of idea and share it among others. Breeding [2] describes environment that not only delivers content to users but also seeks content from users fosters engagement, participation and collaboration. ICT promotes many different ways of handling problems, acquiring, constructing and presenting information to users. As Schulz, Büchter and Dalmer [5] in their study argue that learning culture that allows cooperation and embedded with ICT may stimulate essential changes in schools thus preparing the students to meet the demands of the knowledge society.

However, study by Mayes [4] has shown that the use of this technology in itself does not lead to effective learning despite its ability in efficient delivery of information. Results of study by Anstey [1] verified that teachers still use the web in passive and instructive forms of teaching and learning. The academic staffs must have clear understanding that the technology must be used in a way that will introduce students to new learning experiences, not just for the sake of it. Improvement in ICT and implementation of any value added services might benefit the students, especially in improving their learning process. Furthermore, IT provision in the university must be adequate to support new learning and teaching methods in a collaborative learning environment.

4. Conclusion

Nowadays, we can see communication and internet technologies have become part of student's life. They are adept to mastering any technological options provided to them or at least aware of their existence. Thus, we propose a research in this area that will contribute towards further understanding of student's expectation as well as their experiences of ICT in the university. At the same time, this could determine whether IT provision in the university is adequate to support new learning and teaching methods and facilitate collaborative learning environment in university. Furthermore, the findings from the study will help university to determine any improvement and value added services that are relevant in providing better learning experiences to the students.

References

- [1] P. Anstey (2000). Jcalt report on developing staff C&IT capability in higher education. Technical report.
- [2] M. Breeding (2007). We need to go beyond web 2.0. *Computers in Libraries*, 27(5):22–25.
- [3] D. Galanouli and V. McNair (2001). Students' perceptions of ICT-related support in teaching placements. *Journal of Computer Assisted Learning*, 17(4):396–408.
- [4] J. Mayes (1993). Impact of cognitive theory on the practice of courseware authoring. *Journal of Computer Assisted Learning*, 9(4):222–228.
- [5] R. Schulz-Zander, A. Bchter, and R. Dalmer (2002). The role of ICT as a promoter of students' cooperation. *Journal of Computer Assisted Learning*, 18(4):438–448.

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Learning Technologies, Open Contents,
and Standards**

The Effects of Programming Using Collective Intelligence on Problem Solving Ability and Programming Attitude

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Abstract: A programming education has a favorable influences on creative and logical thinking and problem solving abilities of students. However, students typically have spent too much effort in learning basic grammar and using the model of programming language, which negatively affect their eagerness in learning. In this respect, the purpose of this study is to investigate learner's programming attitude towards collective intelligence in the context of secondary school students' programming classes and to verify the possible application of a new instructional method.

Keywords: Collective Intelligence, Programming Attitude, Problem Solving Ability

Introduction

Information has become the most important element in knowledge-based societies. The Internet which was brought about by the development of information and communications technology has caused many changes all over the world particularly in the educational environment. Interests on computers have increased because it can change the traditional learning environment. Learning how to use computers has been developed differently compared with traditional face-to-face learning in which teachers and learners share limited time and space[7]. The emergence of Internet in the change of educational environment had become a system of administering knowledge which is implemented and eventually brings a significant change inside the classroom. In the Center of cultural phenomenon, a new paradigm of Web 2.0 has been created and called "User participation in the open space". The Web 2.0 provides the foundation that users can interact directly, and have a variety of sharing and spreading of knowledge by a direct connection. The aforementioned phenomenon can be explained by "*Collective Intelligence*"[1].

1. Literature Review

1.1 *Collective Intelligence(CI)*

The *Collective Intelligence(CI)*, also called "The wisdom of crowds", or "swarm intelligence"[5], has been recognized as a new value with the advent of Web 2.0.

Collective Intelligence is a shared or group intelligence that emerges from the collaboration and competition of many individuals. *Collective Intelligence* can also be defined as a form of networking enabled by the rise of communications technology, namely the Internet. Web 2.0 has enabled interactivity and thus, users are able to generate their own content. Further, The *Collective Intelligence* draws on this to enhance the social pool of existing knowledge[2]. Pierre Lévy (1994) has defined *Collective Intelligence* as "distributed

everywhere, and is given the value of continuous, real-time adjustments, and the practical ability to bring intelligence”[1]. Lévy and de Kerckhove consider *Collective Intelligence* from a mass communications perspective, focusing on the ability of networked ICT’s to enhance the community knowledge pool[2]. Also, James Surowiecki(2004) has defined the *Collective Intelligence* as a moving power in the economy and society. In some situations, a smart group discussion will lead to a wise decision and is better than it could have been made by any single member of the group[3]. According to Don Tapscott and Anthony D. Williams(2008), *Collective Intelligence* is mass collaboration. In order for this concept to happen, four principles need to exist. These are openness, peering, sharing and acting globally[6][9].

1.2 Design of Collective Intelligence Programming

In this study, the content of *Design of Collective Intelligence Programming* is based on the *Problem-Based Learning model*. The following Table 1 is *Collective Intelligence programming* contents.

Table 1: *Collective Intelligence Programming* contents

Sessions	Subjects	Contents and Tools	
1	How to use Web2.0 Tools	Wiki, Mind Map tools, Messenger Program et al.	
2	How to use Scratch	Block, Sound, Motion, et al. (Scratch)	
3	Problem recognition	Learning Objectives and Problem Set (Wiki)	
4	Problem solving planning	Current contents arrangement (Mind manager), The establishment of a plan to solve the problem.	
5	Searching	Data Searching and Data Saving	Wiki, Messenger Program, Scratch’s Web
6	Solution	Creative ideas and programming	
7		Programming Analysis and Exchange	
8		Applications of Programming	
9	Presentation and Evaluation	Discussion, Sharing, Review	
10	Publication	Online Publication and Print (Scratch’s Web site)	

Also, *Collective Intelligence Programming Learning* has the following effects[8].

- Learners can solve problems by implementing algorithms.
- Teachers are facilitators in programming learning.
- Interaction between learners for effective problem solving.

2. Methodology

2.1 Design

They were divided into a Treatment Group (G_1), which consisted of students using the *Collective Intelligence programming learning* and Control Group(G_2), which had students using the *Traditional Programming Learning* for comparison. Table 2 illustrates the design of the study.

Table 2: Design

Treatment Group(G_1)	O_1	X_1	O_3
Control Group(G_2)	O_2	X_2	O_4

O₁, O₂: Pre-test (Problem Solving Ability, Programming Attitude Test)

X₁: Collective Intelligence Programming Learning

X₂: Traditional Programming Learning

O₃, O₄: Post-test (Problem Solving Ability, Programming Attitude Test)

2.2 Test items

- *Programming Attitude* test items was conducted by Cho (2008) in the attitude of programming[10]. We were used modify and supplement. Programming attitude test items were verified by the expert group. The result of the pilot test reliability was Cronbach's alpha = .921(n=73).
- *Problem Solving Ability* test items was conducted by the OECD PISA(Program for International Student Assessment) in 2003[11]. Problem solving ability test items had 19 questions in the area of public. We were used modify 12 questions. Question has been verified of expert group. The result of the pilot test reliability was Cronbach's alpha = .824(n=73).

3. Conclusion and Discussion

Web 2.0 has attained attention in terms of the flexibility and diversity providing users with various teaching and learning materials. Programming education has favorable influence on creative, logical thinking and problem solving abilities of students. However, students typically have to spend too much effort in learning basic grammar and the usage model of programming language, which negatively affects their eagerness in learning. In this respect, the purpose of this study is to investigate learner's programming attitude of the *Collective Intelligence programming learning* on Secondary school student's programming classes and to verify the possible application of this now instruction method. Through this research, the researcher findings to be bases for a more active participation of student's in computer field.

References

- [1] Pierre Lévy (1994). *L' intelligence Collective: Pour une anthropologie de cyberspace*. La Decouverte.
- [2] Flew, Terry (2008). *New Media: an introduction*. Melbourne: Oxford University Press.
- [3] James Surowiecki (2005). *Wisdom Of Crowds*. Random House.
- [4] Tony Jenkins (2002). On the Difficulty of Learning to Program. [On-line], <<http://www.psy.gla.ac.uk/~steve/localed/jenkins.html>>
- [5] Wheeler William M's (2009). *Ants: Their Structure, Development, And Behavior*. Bibliolife.
- [6] Tapscott, D., & Williams, A. D. (2008). *Wikinomics: How Mass Collaboration Changes Everything*. USA: Penguin Group
- [7] Morrison, G. R, Lowther, D.L., and DeMeulle. L. (2005). *Integrating Computer Technology into the Classroom*. New Jersey: Prentice Hell.
- [8] Bae, H et al., (2009). A Problem Based Teaching and Learning Model for Scratch Programming Educatin. *The Journal of Korean Association of Computer Education*. 12(3), 11-21.
- [9] Jean-François Noubel (2006). Collective Intelligence, The Invisible Revolution. The transitioner.
- [10] Cho, S et al., (2008). The effect of CPS-based Scratch EPL on problem solving ability and programming attitude. *The Korean Association of Information Education*, 12(1), 77-88.
- [11] CSTA(2003). A Model Curriculum for K-12 Computer Science. [On-line], <http://www.acm.org/education/curric_vols/k12final022.pdf>

C4: ICCE Conference on Classroom,
Ubiquitous, and Mobile Technologies
Enhanced Learning (CUMTEL)

Presentation Support Software Using Mobile Device For Interactive Lectures

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Abstract: We developed a software to support PowerPoint presentations with mobile device. The software enables users to refer to the thumbnails of the slides, jump to a particular page, draw annotations directly on the slide during the presentation, and distribute annotated slides as an integrated PowerPoint file. Our goal is to enhance PowerPoint-based lectures making them more interactive with this software. We describe the features of the software and the result of a first evaluation as an initial progress toward our goal.

Keywords: Android, Mobile Device, Lectures, PowerPoint, Presentation

Introduction

Microsoft PowerPoint is nowadays greatly-wide spread over the world, and used for business and education. Many presentations are performed with equipped fixed PC or laptop PC on desk. In such a situation, a presenter can use following support tools:

- Presenter View, Built-in feature of PowerPoint. It helps user to control slides by thumbnails. A presenter can also perform presentation, viewing notes at the same time.
- Tablet, a computer input device and PowerPoint pen tools. User can write annotations on a slide in the similar way as to draw images with a pencil and paper.
- Wireless controller. Presenter can turn over slides remotely.

Since these tools are not integrated, it is difficult to use all features remotely at the same time. Therefore we have developed software which allows a presenter to use above features with a single device with PowerPoint. By using this software in lectures in colleges or universities, we expect increase of interactivity in lectures as follows:

- A lecturer can walk around a room and perform lecture interactively while getting students' attitudes.
- A lecturer can draw annotations instantly from anywhere in a class room. For example, underline important sentences in order to emphasize them or write answers for the questions from students.
- Students can refer to the PowerPoint slideshow file with annotation after the lecture by downloading via web.

We aimed to develop the presentation support software mentioned above and performed an evaluation.

1. Related Work

Pebbles Project[1] has introduced SlideShow Commander Application. With this software users can handle PowerPoint presentations remotely with Palm or Pocket PC. However, this software does not

enable users to refer to thumbnails in order to jump to a particular page, nor to save annotations as an integrated PowerPoint Presentation file.

Pen-based presentation tool Kotodama[2] is a presentation software which enables users to perform authoring and presentations with pen-based computers. The authors showed that pen-based interface is easy to handle even for inexperienced computer users, and the feature to edit the material by simple handwriting and change the flow of the presentation on the fly is significant, through a practical user study in elementary, junior-high and high school classrooms.

2. Software Description

Architecture

This software consists of a server software and a client software. Server software works as a PowerPoint 2007 Add-in, which was implemented in C#, and runs on .NET Framework 3.5 or later. Client software is implemented in Java and runs on a mobile device with Android platform 1.5 or later. They are connected each other by TCP through a wireless network.

Key Features

This software has the following 3 key features:

1. Draw annotations on slides. When we write down a text, or draw marks and underlines on the device's LCD with stylus pen, they appear on the slide on a screen immediately. Those annotations remain in the slide after the presentation is done. The user can save, print and distribute them for the audience. (Figure 1)
2. Refer to thumbnails of slides, and turn over any pages easily. It can be done anywhere in room while showing slides. (Figure 2)
3. Refer to notes of slides on the device. We no longer have to look at notepad while walking around the room.

Furthermore, users can flip slide pages remotely and see the time of presentation.

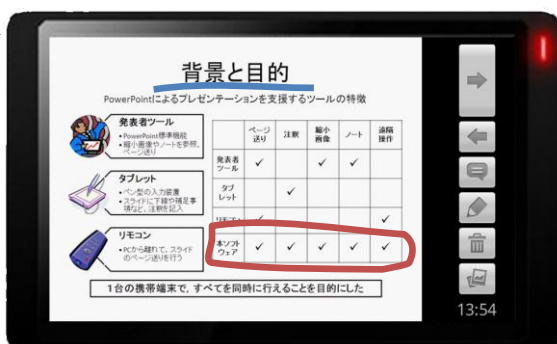


Figure 1. Screen for referring to the slide, and writing annotations on the slide



Figure 2. Screen for referring to the thumbnails of the slides

3. Evaluation

Eight graduate students of Tokyo Institute of Technology participated in an evaluation of this software. We provided a mobile device SmartQ5, which has 4.3" LCD and 480 * 800 resolutions with Android 1.5, laptop PC with Windows XP and PowerPoint 2007, and a projector. We prepared

2 slides, the first one on which was how to give presentation with slides for practice about the functionality of this software, and the second one was about how to use the features of this software in practice. The presentations consisted of 14 pages slides and it took approximately 10 minutes to perform. Table 1 shows the results of a post-questionnaire (Due to the restriction of pages, only some of the questions are shown). They were answered on a 1 to 5 Likert scale (5 is the best). Overall, the participants rated this software very positively. Basic interfaces, especially turning over pages, switching screens for referring to the slides and viewing notes, and simplicity of icons, ranked very highly. On the other hand, the speed of response while turning over pages and writing annotations did not rank highly. We have to improve the software, in particular, the performance of drawing and corresponding with a server. During an interview participants suggested desirable improvement of interface, such as referring to the slide and notes at the same time.

Table 1 Results for the post-questionnaire

Question	Mean	SD
Did you turn over pages using forward and back button as you intended?	4.3	1.0
Did you underline and circle words as you intended?	3.8	1.0
Did you write down words and numbers as you intended?	3.1	1.5
Did you think that presentations would be easier to understand by writing annotations, such as underlines and notes?	4.4	0.7
Did you view notes as you intended?	4.5	0.8
Did you think that you would be able to perform presentations more easily by viewing notes with mobile devices?	4.4	1.1
Did you find the layout of buttons (icons) appropriate?	4.5	0.5
Did you understand the meanings of buttons (icons) easily?	4.9	1.1
Did you turn over pages smoothly?	2.8	1.3
Did you write words and numbers smoothly?	2.1	1.1
Did you learn the usage of this software easily?	4.8	0.5
Did you find this software useful?	4.5	0.5

4. Conclusion

We have developed and evaluated a presentation support software using mobile devices. The software allows users to control PowerPoint presentation remotely, such as turning over pages, viewing notes, drawing annotations on slides, and referring to the thumbnails to jump to a particular page easily with a single mobile device. The evaluation showed that the software is significantly effective. We aim to make lectures with PowerPoint more interactive. In the future, we plan to perform evaluations with college lecturers. Moreover, we will perform further evaluation and improve this software taking into account the feedback from participants.

References

- [1] Brad A. M. (2001). Using Handhelds and PCs Together. *Communications of the ACM*, 44(11), 34-41.
- [2] Kurihara, K., Igarashi, T., & Ito, K. (2006). A Pen-based Presentation Tool with a Unified Interface for Preparing and Presenting and Its Application to Education Field. *Computer Software*, 23(4), 14-25.
- [3] Covia Networks, Inc. <http://www.covia.net/> (visited in August, 2010)

A Study on the Mobile English Vocabulary Learning System with the Function of Conducting Formative Assessment

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Abstract: The study first focuses on analyzing the features and related functions of mobile learning, and then, moves on to review the learning strategies of English vocabulary to form the theoretical basis for the mobile English vocabulary learning system developed in the study. 103 seventh-graders from 3 intact classes in a junior high school in Taipei City were recruited. The three classes were randomly assigned to three different treatments. Experimental group A learned English vocabulary through the mobile learning system with the function of formative assessment. Experimental group B learned English vocabulary through the same system but without the function of formative assessment. Finally, the control group received traditional classroom-based teaching of the same English vocabulary. The differences of learners' achievements, vocabulary retention, and learning process were compared and analyzed.

Keywords: Mobile learning, English vocabulary learning, formative assessment, context awareness

Introduction

The essence of language learning lies in the buildup of vocabulary competence (McCarthy, 1990); it could be found in contemporary researches that situation-embedded English vocabulary learning is highly emphasized, and that conversational and situational contexts are key to the mastering of lexicon competence. Mobile computers and context-aware services could appropriately adapt the contents of learning, based on personal situation, environmental situation, personal data, and environmental data (Hwan, 2006; Schiller, Adams & Want, 1994), to tap into the needs of learners. Accordingly, there is a need to better integrate technologies of mobile learning and context awareness to aid English vocabulary learning. As for formative assessment, it's been empirically proven to be able to facilitate learning and provide timely corrective feedbacks for learners (Bransford, Brown, and Cocking, 2000).

1. Research Goal

The purpose of the study is to establish a mobile English vocabulary learning system which could assess learners formatively, and to investigate the impacts such system might exert on users' learning achievements and vocabulary retention. Meanwhile, suggestions on current designs and studies regarding formative assessments are given, based on the results of the study.

2. Establishment of the System

The mobile English vocabulary learning system is primarily composed of two services, namely, “context-aware service” and “English vocabulary filtering service,” which could provide learners with situation-based materials and formative assessment. In context-aware service, the “positioning service” could sense learners’ current positions with both GPS and Wifi positioning system (Figure 1). Regional information would be displayed on the device after positioning was accomplished (Figure 2). On the other hand, the “learning process recording service” provided records of learner’s learning process and formed the foundation for context-aware service and formative assessment tools.



Figure 1 Automatic positioning is being carried out



Figure 2 Automatic distribution of learning materials

English vocabulary filtering service, built upon context-aware service, would “filter” all the English vocabulary learning materials, and then, present appropriate ones to the learners. Learners could access all of the situation-related English vocabulary after entering the learning system; information, such as Chinese translation, phonetic alphabets, pictures, sample sentences, hand-writing practice, and pronunciation were available to them (Figure 3). The flashcard-like display of English vocabulary (Figure 4) could boost learners’ memorization of vocabulary and self-directed learning. Also, the visual aids enabled learners to better associate vocabulary with real objects.



Figure 3 The platform of English vocabulary learning

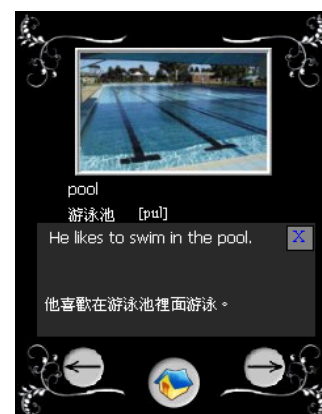


Figure 4 Learning materials filtered by the system

In the formative assessment tools, there were three types of vocabulary tests, including matching test, spelling test, and sentence-making test. Learners could adjust the difficulty of tests by themselves and get more familiar with the learning materials as they got repetitive exposure to the same group of vocabulary. Moreover, the system didn’t offer learners the correct answers immediately after they made a mistake; instead, it showed learners the definitions of the vocabulary, giving learners the chance to figure out the answers on their own. Buchanan (2000) points out that learners’ retention of

learning materials could be fostered by prompting them to figure out confusing concepts on their own.

3. Research Method

The study aimed at comparing the effects of three teaching methods, namely, mobile English vocabulary learning systems with and without the function of conducting formative assessment, and traditional classroom-based teaching, on learners' achievements, vocabulary retention, and learning process. Teaching methods and learning anxiety served as independent variables, while learners' performance on the English vocabulary achievement tests and their learning process serves as dependent variables.

The study adopted a quasi-experimental design, in which control group is not commensurate to experimental groups. The subjects of the study were 103 seventh-graders from three classes in a junior high school in Taipei City; all three classes received instructions from the same teacher. The two experimental groups learned through the mobile English vocabulary learning device, while the control group learned in traditional setting, the classroom. A pre-test and post-test were implemented to measure learners' mastery of the learning materials. And to testify whether learners achieve long-term retention of the materials, the participants were asked to take a delayed post-test ten days after the experiment.

An evaluation questionnaire was administered to gather information about learners' perceptions of the learning materials, learners' willingness to learn, ease of operating the system, learners' reflections and suggestions, and the overall evaluation of the system; another questionnaire regarding English learning anxiety was also presented. Finally, six participants with high, intermediate, and low level of learning anxiety were randomly picked from experimental group A and experimental group B for an in-depth interview. The purpose of the interview was to find out learners' perceptions of mobile learning, such as problems they encountered, benefits in motivation and achievements, strategies they adopted, as well as formative assessment tools.

References

- [1] Bransford, J. D., Brown, A., & Cocking, R. (2000). *How people learn: Mind, brain, experience and school, expanded edition*. Washington, DC: National Academy Press.
- [2] Buchanan, T. (2000). The efficacy of a World-Wide Web mediated formative assessment. *Journal of Computer Assisted Learning*, 16, 193-200.
- [3] Hwan, G. J. (2006). Criteria and strategies of ubiquitous learning. *IEEE International Conference on Sensor Networks, Ubiquitous, and Trustworthy Computing*, 2, 72-77, Taichung, Taiwan.
- [4] McCarthy, M. (1990). *Vocabulary*. Oxford: Oxford University Press.
- [5] Schilit, B., Adams, N., & Want, R. (1994). Context-aware computing applications. *Workshop on Mobile Computing Systems and Applications*, Santa Cruz, CA, USA.

A Conceptual Framework for Ambient Learning Displays

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Abstract: In this paper, we describe ongoing work focusing on the situated support of informal and non-formal learning scenarios. Relevant research findings, models, design dimensions, and taxonomies have been examined resulting in a conceptual framework, that facilitates the acquisition, channeling, delivery, and framing of contextualized information in the learning process.

Keywords: Ubiquitous Learning Support, Ambient Information Channel, Awareness, Conceptual Framework

Introduction

In the context of an ongoing PhD project - focusing on the situated support of informal and non-formal learning scenarios by enabling learners to view, access, and interact with contextualized digital content presented in an ambient way - a conceptual framework for *Ambient Learning Displays* has been developed. The project sets up to answer the research question: *What are the effects of ambient information presentation on learning in a situated learning context within ubiquitous learning environments?* In order to measure these effects the information presented in context first needs to be acquired, channeled, delivered, and framed in the learning process. Relevant research findings, models, design dimensions, and taxonomies have been examined and will be described in the following sections resulting in the proposed conceptual framework that defines the envisioned *Ambient Learning Displays*.

1. Acquisition: Awareness within Ubiquitous Learning Environments

For mobile and ubiquitous learning, adaptivity and awareness are considered as key concepts especially for informal learning support [1]. Awareness is a concept that can also be utilized to acquire relevant information for the design of *Ambient Learning Displays* within ubiquitous learning environments. In doing so learners can be kept continuously aware about the environment he is proactive in as well as the available resources matching the learning activity. Based on current CSCW and CSCL research social, task, concept, and workspace awareness have been identified for ubiquitous learning environments [2, 3]; completed by knowledge awareness “for inducing collaboration in a shared knowledge space” and context awareness as crucial “to provide the right information to the right person at the right time and the right place with the right form” [4].

Within a ubiquitous learning environment creating workspace awareness would mean to keep the learner aware on what is currently happening or what has happened in the environment.

Knowledge awareness would mean to keep the learner aware when someone enters the environment, who is using the same or related resources and therefore might offer learning support. Finally, creating context awareness would mean to keep the learner aware on relevant resources in the environment.

To set up the conceptual framework the above presented types of awareness are used as acquisition instrument of the relevant information for the learner within the ubiquitous learning environment.

2. Channeling: Ambient Information Channels

In order to present the acquired information in context an appropriate model is needed that can be used to process and transfer this information in the next step. The Ambient Information Channels model allows the description of contextual learning support patterns [5]. The model is based on four infrastructure layers encapsulating the sensor functionality, the informational aggregation, the instructional logic, as well as the visualization and interaction of a context-aware system. The sensor layer collects and handles all sensor information while the aggregation layer combines this information in a meaningful way, which is then used by the control layer to enrich the entities involved in the learning process. The indicator layer finally describes the user interface providing feedback to the user and enabling the interaction with the system.

The defined layer structure facilitates sensors, channels, and artefacts as components while using control structures to describe their functionality. The channels are the main component used to deliver information and services but also to feed information into the system. Therefore, the channels are bound to sensors and/or artefacts. Sensors provide the system with measures but can also be used as a direct source of information. While sensors within a mostly invisible information grid measure the user and the environment he is proactive in, artefacts form a direct interface for the user, enabling the user to interact with the environment. The combination of components complemented by aggregation, enrichment, synchronization, and framing processes finally leads to contextual learning support.

In order to develop the conceptual framework further the Ambient Information Channels are used as an instrument to inject the previously acquired information into the ubiquitous learning environment.

3. Delivery: Design Dimensions of Ambient Systems

To be able to present the information relevant to the learner in context appropriate systems and applications have to be designed and evaluated. Within the numerous research papers describing ambient information systems some include extended discussions of the covered design dimensions as well. Examining these dimensions is then likewise a common method to evaluate existing systems. Ideally this method results in the description of specific design patterns that can be used to build similar systems. For this purpose several design dimensions of existing ambient information systems have been compared and discussed [6]. As a major outcome the authors present the four design dimensions information capacity, notification level, representational fidelity, and aesthetic emphasis. Each dimension can be ranked from low to high in five grades covering to which degree the dimension specific attributes are implemented.

Furthermore the authors introduce four design patterns that illustrate coherent combinations of the design dimensions, e.g. Symbolic Sculptural Display or Multiple-Information Consolidators. With comparable design patterns for *Ambient Learning Displays* in mind the presented design dimensions of ambient systems are used as a design instrument to deliver the previously channeled

information within the ubiquitous learning environment. As a result the conceptual framework is completed by ambient systems utilizing the previously channeled information.

4. Framing: Revised Taxonomy of Educational Objectives

Learning involves various aspects of human beings including a cognitive, affective, and psychomotor part. In each domain learning is classified on the basis of taxonomies that give a structure starting from simple activities to more complex ones. Focusing on informal and non-formal learning support the project constrains to the cognitive domain of learning.

In this domain several attempts have been made to classify learning. Amongst others Benjamin Bloom and colleagues created a taxonomy of educational objectives for the cognitive dimension of learning. These cognitive processes include activities like knowledge recall, comprehending information, organizing ideas, analyzing and synthesizing data, applying knowledge, choosing among alternatives in problem-solving, and evaluating ideas or actions. This work has been refined and adapted, mainly differentiated in the more useful and comprehensive additions of how the taxonomy intersects and acts upon different types and levels of knowledge [7]. This revised taxonomy of educational objectives describes several cognitive process dimensions and distinguishes factual, conceptual, procedural, and metacognitive knowledge. It can be used to match activities and objectives to the types of knowledge and the cognition processes.

Utilizing this capability, the taxonomy is used to frame the previously acquired, channeled, and delivered information in a learning context. Tentatively the conceptual framework is specifying ambient systems now framed in the learning process as *Ambient Learning Displays*.

References

- [1] Syvanen, A., Beale, R., Sharples, M., Ahonen, M., & Lonsdale, P. (2005). Supporting Pervasive Learning Environments: Adaptability and Context Awareness in Mobile Learning. In *IEEE International Workshop on Wireless and Mobile Technologies in Education*, 251-253. IEEE.
- [2] Goldman, S. (1992). Computer Resources for Supporting Student Conversations about Science Concepts. *ACM SIGCUE Outlook*, 21(3), 4-7.
- [3] Gutwin, C., & Greenberg, S. (2002). A Descriptive Framework of Workspace Awareness for Real-Time Groupware. *Computer Supported Cooperative Work*, 11(3).
- [4] Ogata, H. (2009). Assisting Awareness in Ubiquitous Learning. In *Proceedings of the IADIS Mobile Learning 2009*, 21-27. IADIS.
- [5] Specht, M. (2009). Learning in a Technology Enhanced World. Maastricht, The Netherlands: OCÉ.
- [6] Pousman, Z., & Stasko, J. (2006). A taxonomy of ambient information systems: four patterns of design. In *Proceedings of the working conference on Advanced visual interfaces*, 67-74. ACM.
- [7] Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of educational objectives* (Complete edition). New York, USA: Longman.

Seamless Learning Environment to Support English Course Using Smartphones

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Abstract: In this paper, we propose mobile-assisted vocabulary learning and present learning scenarios seeking seamless transitions between learning in-class and outside-class, incorporating students' self-learning into classroom activities which is expected to result in fruitful vocabulary learning. Two experiments using smartphones are proposed to find out some answers to the following questions: (1) Does the use of smartphones support seamless English vocabulary learning? (2) Can the additional adaptive contents recommended by the system help vocabulary learning?

Keywords: Seamless Learning, Smartphones, Vocabulary Learning, ESL

Introduction

It has been pointed out that Japanese ESL learners are in lack of vocabulary. It is evident that with more unknown words, more difficulty learners face in understanding English [1]. Therefore it is very important to build up vocabulary to improve one's English skill. But vocabulary teaching/learning methods are often considered boring [2]. Then the following question occurs: 1) What if technology can support effective/enjoyable vocabulary learning for ESL learners? If such a system were successfully implemented, its contribution to vocabulary learning or furthermore, language education in general, would be immeasurable.

1. Theoretical Background

1.1 Seamless Learning

Recent progress of mobile and wireless technologies offers us the potential for a new learning environment, namely "seamless learning" [3]. In this paper, by seamless learning, we mean learning which occurs with seamless transitions between in-class and outside-class learning, between handheld use outside-class and desktop use inside-class.

1.2 Cyclic Model of Learning

Takeuchi (2007) proposed the concept idea called 'cyclic model of learning' [4] (Figure 1), where 'class', in a broad sense, means not only learning in-class but also learning outside-class and it allows teachers to incorporate students' self-learning into classroom activities [5]. Seamless learning and cyclic model of learning, these two concepts share the same idea that learning can occur wherever they are, and that every learning experience both in-class and outside-class interacts each other.

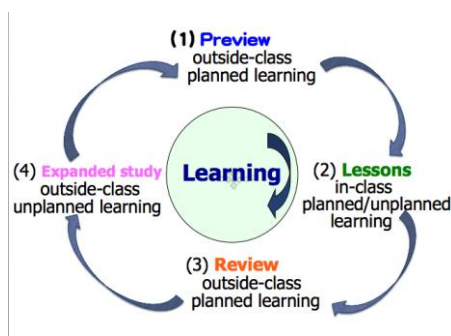


Figure 1. Cyclic Model of Learning (adapted from Takeuchi, 2007)

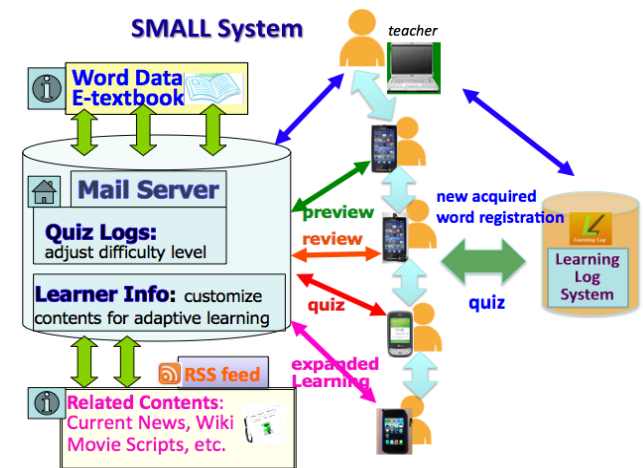


Figure 2. SMALL System

2. System Design

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

Word Data in Figure 2 consists of target words to be learned through one semester. Data is imported to the system from an electric or OCR scanned textbook.

Quiz Logs consist of all the quiz results the students, which are analyzed and evaluated. This newly gained data reflect review quizzes and difficulty level adjustment and facilitate their learning processes.

Learner Info contains the students' English levels and their fields of interests for the distribution of the customized contents.

Related Contents are obtained through RSS feed and delivered to the students' mobile devices according to their English levels and their interests for the expanded study.

Learning Log System supports the students to register their newly acquired words and the system give them quizzes made by new words.

The scenarios based on Figure 1 are as follows. Students will be beforehand given vocabulary tests and questionnaires to grasp their English levels and the fields of their interests. They are assigned to write about their current interests on the designated website on a regular basis so that the system can grasp them which reflect the contents to be delivered for extended study.

- (1) **Preview (mobile-based outside-class planned learning):** Students receive messages which show the URLs to read the text for preview and take target word quizzes. They answer multiple-choice quizzes until they make correct answers.
- (2) **Lessons (PC-based in-class planned/unplanned learning):** In the electronic/scanned textbook, target words are hyperlinked and when the teacher clicks them, new windows will be opened and they show names of the students who made wrong answers so he can pay attention to them during class. They are given web-based quizzes to make sure if they learn the target words in the lesson.
- (3) **Review (mobile-based outside-class planned learning):** Students receive messages which show the URLs to read the text for review and take target word quizzes. The system reports the review test results with most frequently mistaken word ranking lists and the instructor will review these words in the next class. So the learning occurs continuously.
- (4) **Expanded Study (mobile-based outside-class unplanned learning):** SMALL System recommends the contents of each student's interests which include target words. The

students register newly acquired words. If some students have read the same contents or register the same word, the system will let them know, which will lead to peer-to-peer discussion and let them interact each other. Each student is supposed to present in-class in turn what he/she has learned through his/her expanded study. Students are encouraged to collaborate other students who have the same interests during presentation task.

3. Methods

3.1 Experiment 1

Twenty four students will be divided into two groups. Each group of students engage with the two conditions with and without SMALL System in turn (Phase 1 and 2) over six weeks. Pre- and post-tests will be conducted, and their test results and all the students' learning logs will be analyzed to see if there is any significant difference between the two conditions. The questionnaires will be used to assess advantages and disadvantage of SMALL System.

3.2 Experiment 2

The purpose of this experiment is to verify the validity of adaptive Expanded Study of SMALL System. Twenty four university students will be divided into two groups (Group A with adaptive Expanded Study & B with Expanded Study without adaptation) to see if there will be any significant difference in vocabulary learning. Questionnaires and learning logs will be analyzed to assess its availability.

4. Early Insight

Possible advantages of SMALL System are: 1) Learners are provided with anytime-anywhere-based learning environment 2) Its implementation is easy. 3) In-class and outside-class learning are closely related so that learners can learn under the guidance of their teachers. 4) It compensates the lack of learning time in class. 5) Automatic message/contents delivery helps reduce teachers' heavy workload. 6) Customized contents help students enhance their motivation to learn more.

References

- [1] Takanashi, T. and Takahashi, M. (1987). *Eigo Reading shidou no kiso / Basic guidance to teach English Reading (in Japanese)* Tokyo: Kenkyusha Publishing Co., Ltd.
- [2] Krashen, S. (1989). We acquire vocabulary and spelling by reading: Additional evidence for the input hypothesis. *Modern Language Journal*, 65, 43-58.
- [3] Chan, T.-W., Roschelle, J., Hsi, S., Kinshuk, Sharples M., et al. (2006). One-to-one technology enhanced learning: an opportunity for global research collaboration. *Research and Practice of Technology Enhanced Learning*, 1, 3-29.
- [4] Takeuchi, O. (2007) *Autonomy and self-learning: Necessities and methods (in Japanese)*. *Teaching English Now* 8, 2-5.
- [5] 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.

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Primary Students' Financial Learning within a Pet-Nurturing Game Environment

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Abstract: In this paper, a My-Investment system was proposed to facilitate students' financial management learning in a game-based environment, in which each student owns a virtual pet and are responsible for a better life through learning financial management. To get some cues to understand the effect of the system, a case study was conducted through collecting and analyzing 21 primary students' interview data. The results show that My-Investment system can help students learn the knowledge of financial management, and the pets in the game can enhance their motivation to learn the knowledge of financial management.

Keywords: game-based learning, primary students, financial education

1. Introduction

In recent years, game-based learning has become a significant learning environment that can enhance students' learning motivation [1]. Some literature found that digital games can promote students' motivation in specific subject matters [2]. Among different game categories, simulation games are the one that could be applied to education in our daily life. This is because experience is the best teacher, and simulation games can simulate some phenomena in real life so that players immerse in these experience [3]. In addition, the game-playing in simulation games makes students' learning experience be more enjoyable [4].

Financial management plays an important role in human life, because many activities are related to consumption. Therefore, it is very important to develop the concept of financial management in early age. One of example is the use of credit cards. If people improper use the credit cards, the credit card debt will cause personal bankruptcy and increase the family's financial difficulties [5]. Recently, the financial education is also emphasized in primary schools. However, primary students are unfamiliar with the knowledge about financial management, because they have seldom experience in using credit cards or madding investments. Therefore, we develop a game-based learning system, My-Investment, for primary school students to help them learn the knowledge of financial management.

2. My-Investment system

The target uses of this system are primary students. To motivate students to learn in My-Investment, students are assigned as the role of host to take good care of their pets, as shown in Figure 1. For this purpose, students need to earn virtual coins and cultivate a good financial management habit. More specifically, students not only earn virtual coins, but also learn how to save or invest these coins in the system, so that students have more coins to satisfy their pets' needs. The conceptual diagram is illustrated in Figure 2.



Figure 1. The system snapshot

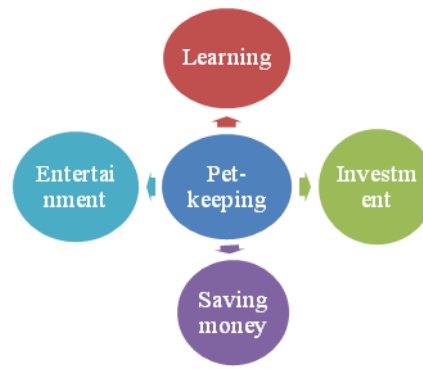


Figure 2. Conceptual diagram

3. Case study

After the My-Investment system was developed, a case study was undertaken to examine the design of the My-Investment system since we hope to use a design-based research to gain some revision cues after students' use in a practical setting. The purpose of the case study is to investigate the following three questions: (1) what did students learn from the My-Investment system? (2) what was students' perception of virtual pets?

3.1 Participants and method

The participants were 21 fifth-grade primary school students in Taiwan (aged eleven), including 12 boys and 9 girls. Every participant used the My-Investment system in a computer laboratory for four 50-minute sessions within a month. After their use sessions, a one-by-one oral interview method was conducted by two researchers to collect data about these three questions. To raise the validity, students could immediately use the system during the interview to remind them of the details.

3.2 Results

3.2.1 What students learned

The result of interview was analyzed by two researchers, respectively. The comparison of their coding consistency was further conducted and the reliability of .86 was gained. Those inconsistent items were discussed again for final coding. Table 1 summarizes the result of their analysis. Four major categories about what students learned from the system are listed, including "distinguishing the needs and wants", "saving money", "taking notes", and "considering both price and quality". It seems to imply that what students learned about financial management were conservative strategies, such as saving money (38%) and taking notes (24%); distinguishing the needs and wants (33%) is a part of reducing expenditure, conservative strategy, too.

Table 1. Summary of what students learned

Categories (percentage)	Selected responses of students
Distinguishing the needs and wants (7/21=33%)	"Could not buy something unnecessary." (#02), "Only buy what I need." (#04), "I would think whether I really need it." (#05).
Saving money (8/21=38%)	"Save money in the bank will receive interest." (#08), "Know how to save money." (#10), "It is important to save money." (#13), "Taught us how to save money." (#15).
Taking notes (5/21=24%)	"Now I know the importance of taking notes." (#16), "Taking notes helped remind me of not spending too much money." (#19), "When I earn money, I would take notes." (#20)
Considering price and quality	"If I want to buy a computer from two choices: one is with a discount; another has good quality but without discount. I would choose the latter." (#21)

(1/21=5%)

3.2.2 Students' perception of virtual pets

Table 2 shows the result of students' perception of virtual pets, of which reliability was .76. Students' perception of virtual pets was categorized as three levels: "very care", "care", and "don't care". It is apparent that most of the students (76%) care about their pets, especially they are willing to spend money for their pets (11/16=68%) or earn money harder for their pets (5/16=31%). It appears that virtual pets play a driving force for students' money making, which further results in an economy cycle (i.e., earning money, and then spending or investing these money), and provides more opportunities for students to learn financial management.

Table 2. Summary of students' perception of virtual pets

<i>Perception (percentage)</i>	<i>Behaviors</i>	<i>Selected responses of students</i>
Very care (16/21=76%)	Earning money (5)	"The purpose of playing this game is to nurture the pet and make money." (#01), "Earn more money to buy food for my pet." (#09), "Play this (game) is to satisfy the pet. Thus, I try to make money as could as possible." (#12)
	Consumption (11)	"Buy some goods that the pet likes." (#19), "Buy the food for my pet." (#13), "Often go to the store to buy something. It depends on the pet's needs." (#20), "Buy something to eat." (#07), "I will go to the bank (to withdraw money)" (#08).
Care (3/21=14%)	Consumption (3)	"Often buy the rice to feed" (#05), "It depends on what the pet wants, and I just buy them for him." (#06)
Don't care (2/21=10%)	Earning money (1)	"I just want to make money only." (#04)
	Consumption (1)	"Sometimes (buy food for the pet)." (#15)

4. Conclusion

Through analysis of interview results, we have some preliminary results: (1) students can learn financial management from My-Investment, especially the strategies conservative but closely related to their daily life. (2) Pet-nurturing can enhance students' motivation to learning the knowledge of financial management, which drives a game cycle and offer more learning opportunities for student to learn financial management. Further system revision could be planned according to these results in the future work.

Acknowledgements

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References

- [1] Keller, J. M., & Suzuki, K. (2004). Learner motivation and e-learning design: A multinationally Validated process. *Journal of Educational Media*, 29(3), 229-239.
- [2] Sasha Barab & Michael Thomas & Tyler Dodge & Robert Carteaux & Hakan Tuzun (2005). Making Learning Fun: Quest Atlantis, A Game Without Guns *ETR&D*, 53(1), 86-107.
- [3] Teach, Richard D. (1990). "Designing Business Simulations," in: Gentry, James W. (1990) ed., *Guide to Business Gaming and Experiential Learning*, Chapter 7, Association for Business Simulation and Experiential Learning (ABSEL), pp. 93-116. East Brunswick/Kogan Page, London: Nichols/GP Publishing.
- [4] Sue R. Curland & S. Lyn Fawcett. (2001). Using simulation and gaming to develop financial skills in undergraduates. *International Journal of Contemporary Hospitality Management*, 13(3), 116-119
- [5] Brobeck, S. (1997). The consumer impacts of expanding credit card debt. *Consumer Federation of America News Release*.

On the Quest – Standards & Practices for User-generated Online Games & Their Communities

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Abstract: We report on the progress of an effort, the Role Play Nexus, to identify best practices and develop de facto standards for user-created and user-managed role playing games using the medium of Second Life. The case of the Nexus indicates the ability of spontaneous, non-commercial, informal game and community development to identify issues and practices, and generate concepts, mechanisms, and standards of significance for educational, research, and commercial online game design and operation.

Keywords: Online communities, role playing games, Second Life, standards and practices, user creation, user generation, user management

Introduction

The shared environment of Second Life is distinguished from other widely known “virtual worlds” such as MMOs (“massively multiplayer online games”) by the fact that nearly all content, from buildings, vehicles, and furniture to the hair, skin, and clothing of avatars, is created by users. What sorts of interactions and activities they engage in, and how these are regulated and mediated, are freely chosen by users themselves[1].

One of the most popular activities in Second Life is role playing games. The settings, rules, membership, ownership, and practices of these games are all user-generated. Some emulate the tightly-scripted mechanics of MMOs, while others use open-ended collaborative storytelling or LARP (“live action role playing”) styles. These games and communities are generating a massive body of practice, with potential implications for understanding and managing online games and communities, that has gone largely unreported and unexamined.

Newly established and documented is the Role Play Nexus, a forum for creators, operators, and players of role playing games in Second Life to share knowledge, experiences, techniques, content, and proposals for participation in and management of such games and their communities[2].

Here, we report on the progress of the Role Play Nexus effort in 2010, as it moves from identifying challenges and issues facing role playing game communities in Second Life toward developing de facto standards of good practice, and discuss implications for creation and management of online games and communities. Data is gathered from public performances, transcripts available online, and personal communications.

1. Establishment of the Role Play Nexus

1.1 Background

As Second Life has moved from the stage of “early adoption” to mainstream use, users have encountered patterns of common experience, including challenges and issues facing role playing games and their communities[2].

1.2 The Role Play Nexus

1.2.1 Nature and Venue

The Role Play Nexus holds events, organized and carried out on a voluntary basis by interested users, on topics and themes related to creating, managing, and participating in role playing games and communities in Second Life. It is located in the Second Life mainland region of Mul (64, 224, 1001), with a circular central seating and discussion area surrounded by panels dispensing information and transcripts of past events[2].

1.2.2 Topics and Issues in 2009

Nine lecture and discussion events were held from October, 2009 to the end of the year, on topics such as “What is RP in SL?”, “Narrative in Roleplaying”, and “Flawed RP Communities”. Issues that continued to dominate discussions included identifying different styles of role playing and evaluating their validity or suitability for the online medium, sustaining a role playing venue and community, and challenges inherent to the Second Life medium and online communities in general, such as cost, communications across time zones, and pitfalls of text-mediated communication[3].

2. Progress of the Role Play Nexus

2.1 Topics and Issues in 2010

Thirteen lecture and discussion events have been held at the Nexus so far in 2010 (as of July). The trend of topics and issues has moved from challenges, problems, and pitfalls (such as “Cold Hearted Roleplay”, dealing with personal trauma from events in role play, and “Supersize Me?”, dealing with the phenomenon of oversized human avatars) toward consideration of the future (“2010: Whither SL RP? Trends and Observations”).

Focus has come to center on specific attitudes, practices, and methods for improving game design and operation (“Creating Consistency and Coherence in Long Term Role Play”, “The Intricacies of Making Machines in Second Life”, “Investigation Skills and Role Playing”, and “RP Management – Flexibility, Available Resources, and Balancing Work and Fun”).

Of particular note is the topic, “What Role Play Means To You”, which was intended as a single event, but grew to four sessions due to lively and productive sharing and discussion of fundamental assumptions and definitions, and of connecting them to effective practice[4].

3. Discussion & Conclusion

3.1 Discussion

The activities of the Role Play Nexus have brought forth a wide variety of issues and challenges facing creators, operators, and participants. Some of these are specific to the medium and venue of Second Life, but most are, or are likely to be, common to online games and communities in general. These include infrastructure costs, maintaining effective communication among individuals living in time zones spread across the world, and the lack of nonverbal affect cues in text-based communication.

Consensus was developed on a variety of assumptions, attitudes and practices, such as the need for a core stakeholder group sharing stewardship of a core concept, careful metacognitive assessment of personal motivations, goals and values to evaluate potential for successful collaboration, and rigorous clarity in identifying roles, tasks, and privileges, both within role playing activities and in “out of character” community management.

Explicit codification of a de facto “Role Play Nexus Standard of Practice” is not yet planned or proposed. Nonetheless, a clear trend in that direction seems evident.

3.2 Conclusion

We have reported on the progress of the Role Play Nexus effort in 2010, as it moves from identifying challenges and issues facing role playing game communities in Second Life toward developing de facto standards of good practice, and discussed implications for creation and management of online games and communities.

The case of the Nexus indicates the ability of spontaneous, non-commercial, informal game and community development to identify issues and practices, and generate concepts, mechanisms, and standards of significance for educational, research, and commercial online game design and operation.

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References

- [1] Elwell, M. G., Cook, S. A., & Medeni, T. D. (2007). Creative Skill Learning in Second Life. *The 15th International Conference on Computers in Education*. Supplementary Proceedings: Workshop / Doctoral Student Consortium (ISBN: 978-4-924861-19-0), pp. 18-20
- [2] Elwell, M. G. (2011). Questing for Standards – Role Playing Games in Second Life. In M. M. Cruz-Cunha, V. H. Carvalho & P. Tavares (Eds), *Business, Technological and Social Dimensions of Computer Games: Multidisciplinary Developments*. IGI Global (in press).
- [3] Warwillow, M. (2010). *Nexus Notes*. <http://slnexusnotes.blogspot.com/> (Retrieved Sept. 3, 2010).
- [4] Charisma, C. (2010). *Transcripts of Role Play Nexus Events*. Mul, Second Life.

Ambient Displays and Game Design Patterns for Social Learning

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Abstract: In this paper, we describe a social game we implemented to evaluate various means of learning support. Making use of game design patterns it was possible to implement respective information channels in such a way that we could simulate ubiquitous learning support in an authentic situation. The result is a prototype game in which the participants have to identify a wanted person.

Keywords: Ubiquitous Learning, Awareness, Game Based Learning, Game Learning Patterns

1. Background

Permanency, accessibility, immediacy, interactivity, situatedness, and adaptability have been identified as the main characteristics for ubiquitous learning environments [2]. Most of these characteristics deal with informational aspects, whereas the major challenge is to enable learners to navigate more efficiently through information and find the right information in any given context [3]. To implement this concept it is essential to keep the learner continuously aware about the learning environment. Thereby several types of awareness can be distinguished [1]: social, task, concept, workspace, knowledge, and context awareness. We suggest utilizing these types to feed information channels in the learning environment contributing to a non-intrusive way of interaction through available ambient displays.

One of the most motivating and versatile ways of doing so is the methodology of serious games (SG) and game design patterns. The discussed channels can technically be realized as game elements, giving clues about the game's storyline or progress of opponents or collaborators. In game design, such elements are formally described as game design patterns. From a technical design point of view the use of such patterns has several advantages supporting reusability and interoperability [4]. A pattern consists of several description fields in which there is information on the pattern itself, its possible combinations with other patterns, its functionality, its consequences and examples. A large repository of game design patterns derived from actual game elements has been compiled by Björk & Holopainen [5].

2. Analysis and Design

Social, workspace, and task awareness have been identified as the awareness types. They provide the most support for a social game setting where information is shared and distributed across different contexts.

Social awareness reflects how the other participants are progressing in comparison to the individual progress; we decided to implement this with a competition pattern. Competition can be a social concept especially when competing teams are formed. In a more fuzzy sense competition also would have a social dimension because it draws attention and creates a “motto” for social interaction. According to [5] competition is “the struggle between players or against the game system to achieve a certain goal where the performance of the players can be measured at least relatively”.

Workspace awareness facilitates different types of resources supporting ubiquitous learning in a shared workspace. These resources are fed into the system and visualized using a various displays. Game elements in this case can be realized using the Clues and Gain Information pattern. The clues pattern is described in [5] as “the game elements that give the players information about how the goals of the game can be reached”. The Gain Information pattern is described as “the goal of performing actions in the game in order to be able to receive information or make deductions”.

Task awareness supports the learner by facilitating and indicating the accomplishment of goals. Applying a goal pattern thus extends the abstract task into a concrete set of actions the participants can choose from for reaching a goal, i.e. accomplishing the task. Being aware of the progress in accomplishing the task, individually or socially, creates an additional clue with respect to keeping up a certain momentum of motivation, which is supported by the score pattern, where score “is the numerical representation of the player's success in the game, often not only representing the success but also defining it” [5].

3. Methodology and Implementation

Based on the previous analysis and the elaborated research questions a technical design has been implemented covering different design dimensions for the selected awareness types. A main point of interest was how the implementation got assimilated and perceived in a social setting simulating a ubiquitous learning environment. Furthermore the implications for its usage in a game based learning scenario were assessed experimentally. On day one, the information clues were given via email only, on day two they were given only with information displays, and on day three we used both channels.

The scenario selected for application of the game was at a seminar-style international meeting of PhD students of educational technology and a set of renowned instructors drawn from around Europe [6]. Initially ascertained user data was used to display clues on screens installed in the main lecture room (workspace environment), and in the entrance respectively cafeteria (personal and social environment). The data was grouped according to the different environments: “professional” information was displayed in the workspace environment, “personal” and “social” information was displayed in the personal and social environment.

The following rules were given to the participants: The game was played in several rounds. At the beginning of each round one of the participants was selected as Mr. X by random. Periodically the participants received three hints about the wanted person. These hints described Mr. X in person as well as his/her social and professional life. The task was to gather information about fellow participants. The participants were prompted to vote for the person they suspected to be Mr. X. They were allowed to change their mind anytime and

vote again as long as the current round was open. The round closed once more than 50% of all participants voted for the right person OR the wanted person was not identified after giving five times three hints. After each round Mr. X was revealed. The score was allocated accordingly and could be found in an online high score list. If Mr. X was not revealed by the participants Mr. X had won the game. Everybody who voted for the right Mr. X got 100 points, everybody who voted for the wrong person got -50 points, Mr. X him/herself got 200 points if not revealed, and -100 points were the punishment for not voting at all.

The game was technically implemented by making use of the Google Application Engine [7] and the Adobe FLEX framework [8], facilitating the FLAR toolkit [9].

4. Results

The effectiveness of the game with respect to the prospective benefit for social interaction was monitored in two ways: the user activity (system logs) and the user response to a feedback questionnaire at the end of the event. The results of the user monitoring were that a strong influence was measurable for task awareness, where workspace and social awareness ranked lower. In the questionnaire it turned out that most of the participants had the impression that the game rather helped fostering social interaction not because of specific mechanisms like “personal” or “professional” information clues, but simply by the fact that there was a game being played. From a critical point of view the game in its current form and limited time frame has not proven to significantly enhance social collaboration. Due to the overall rising user activity it could, however, be theorized that a growing social bond between the participants indeed has led to a higher incentive to play the game together, and not the other way round. Besides the evaluation of data and feedback we could notice that people would in fact talk about the game in a cheerful way suspecting each other to be Mr. X. Finding ways how to implement all three awareness types in a more efficient way will be a matter of our attention in future research.

References

- [1] Ogata, H. (2009). Assisting Awareness in Ubiquitous Learning. *Proceedings of the IADIS Mobile Learning 2009* (pp. 21-27). Barcelona, Spain.
- [2] Ogata, H., Yano, Y. (2004). Context-aware support for computer-supported ubiquitous learning. *Proceedings of the 2nd IEEE international Workshop on Wireless and Mobile Technologies in Education* (p. 27).
- [3] Koole, M. (2009). A model for framing mobile learning. In M. Ally (Ed.) *Mobile Learning: Transforming the Delivery of Education and Training*. Edmonton, Canada: AU Press.
- [4] Agerbo, E., Cornils, A. (1998). How to preserve the benefits of design patterns. *Proceedings of the 13th ACM SIGPLAN conference on Object-oriented programming, systems, languages, and applications* (p. 143).
- [5] Björk, S., Holopainen, J. (2004). *Patterns in Game Design*. Charles River Media.
- [6] TEL Europe: JTEL Winter School on Advanced Learning Technologies 2010. <http://www.teleurope.eu/pg/groups/43>.
- [7] Google App Engine. <http://code.google.com/appengine/>.
- [8] Adobe Flex. <http://www.adobe.com/products/flex/>.
- [9] Saqoosha.net: Start-up guide for FLARToolkit. <http://saqoosha.net/en/flartoolkit/start-up-guide/>.

Classroom Learning, Virtual World Application - Developing the SVECTAT Method

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Abstract: This paper reports on progress in developing the SVECTAT (Shared Virtual Environment Complementing Task Achievement Training) method for language instruction. Testing with tertiary-level learners of English in Japan reveals new perspectives on the pedagogical and learning characteristics and value of the method, and on challenges and pitfalls to be considered in its use. Specifically, learners reported particular value from immediate application of material from classroom activities in real communications through the medium of Second Life.

Keywords: Application of learned material, language instruction, Second Life

Introduction

Among the serious limitations and challenges of formal language instruction are the problems of providing sufficient individual instructional time and guidance. Furthermore, typical formal language instruction faces a wide gap between the material studied in the classroom and the actual practical application of such material in authentic communications with speakers and writers of the target language.[1]

The SVECTAT (Shared Virtual Environment Complementing Task Achievement Training) method has been found to enable learners to experience individual progress (as measured by self-assessment in ability to achieve specific communication tasks, scoring 0 points for “not able” up to 3 points for “independent”) in less instructional time compared with a control of traditional face-to-face role playing exercises alone.[2]

The first test divided subjects into three groups: a control group A, which received instructions and carried out tasks solely in the physical classroom environment; group B, which received instructions and carried out tasks in the physical classroom environment, then carried out the same tasks in the virtual environment of Second Life; and group C, which received instructions and carried out tasks solely in the virtual environment. Group A showed an aggregated improvement of 18 points, or 32%, group B of 17 points, or 31%, and Group C of 5, or 1%.

The first test of the method involved a small sample size (twelve subjects) and short testing period (three hours), half of which was used in groups B and C for familiarizing the subjects with the use of Second Life. There was clearly a need for further testing.

This paper will present and discuss the results of the second test of the SVECTAT method. This test was intended to validate our previous findings and to gather feedback and insights from the subjects themselves. Of particular interest was the self-perceived educational value for the subjects of being able to immediately apply material learned in classroom activities in authentic communications in public venues using the shared virtual environment of Second Life.

1. March 2010 Test

1.1 Methodology

A total of 24 participants (12 male and 12 female, from the countries China, Japan, Mexico, and Thailand, Tunisia, and Vietnam) were given a succession of tasks to be achieved using the English language, success being determined by obtaining a tangible result within the time allocated. Testing lasted for 12 hours over two days.

Based on the findings of the initial control test [2], we chose to conduct this round of testing by having the 24 participants and 2 instructors co-located physically for the instructional elements, role-playing, and task achievement within the virtual environment.

Participants first received modeling of the language skills needed for obtaining the desired result, then each of the participants was separated from the group and asked to role-play one task at a time with one of the two instructors, then finally to complete the same task in an open public social venue (Korea1 222,10,24) in Second Life.

1.2 Testing Protocol

The same self-assessment instrument used in the 2009 test served as a pre-test and a post-test, in which participants were asked to rate themselves on their English language ability with the 10 tasks allocated. The choices were: “NA” - “not able” to successfully complete the task; “Competent” - able to successfully complete the task with guidance or assistance; “Confident” - able to successfully complete the task without guidance or assistance; “Independent” - able to successfully provide guidance or assistance to others.

2. Results and Discussion

2.1 Results

All participants reported self-assessed improvement in their ability to carry out functional tasks using English, including tasks which they did not specifically practice in the exercise. Our findings also reflected the benefits surrounding the physical co-location of instructors and participants.

2.2 Discussion

The culmination of the exercise was a debriefing and discussion session. One participant summed up the overall consensus regarding the SVECTAT exercise by saying “the educational value I experienced was to practice material in the classroom and then immediately being able to apply it in the real world” (referring to communication with peers outside the formal educational environment).

The physical co-location of instructors and participants for the scaffolded learning activities and instruction, role-play exercises, and finally the learner-guided public interaction within the virtual environment, seemed to help participants take the skills acquired in the formal classroom setting and immediately apply those skills in the virtual environment with the public. This was an unexpected, but very welcome outcome that we believe requires further exploration.

3. Conclusion

The SVECTAT method when applied to a physically colocated larger sample size demonstrated the effectiveness of using a virtual environment with access to public interaction in tandem with traditional scaffolded learning settings.

Participants reported value in using the virtual environment to apply language skills acquired from classroom exercises with people in authentic English-language settings not easily replicated in the confines of a formal classroom setting.

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References

- [1] Elwell, M. & Chang, B. (2010, January). Mission-Oriented Situated Second Language Learning in Second Life. *IEEE Learning Technology Newsletter*, 12(1). 62-65.
- [2] Elwell, M., Cook, S., Leigh, M., & Terrillon, J-C. Shared Virtual Environment Complementing Task Achievement Training. *Proceedings of the 17th International Conference on Computers in Education, Hong Kong*. <http://www.icce2009.ied.edu.hk/pdf/C5/proceedings757-759.pdf>

Beating the Odds – The Successful Online Game Community of DeX

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Abstract: In this paper, we propose an in-depth case study of one successful online game community, Dungeon Eternal X (DeX). This user created and maintained game has been sustained for eight years, and continues to attract new users, while based on Neverwinter Nights, a game engine sold in 2002. We suggest that this case has the potential to challenge conventional views regarding online game communities and their members, and may offer indications of significance to educational game design and use.

Keywords: Guidelines, formatting instructions, author's kit, conference publications

Introduction

A long-standing obstacle to the success of educational computer games is that they typically fail to capture and maintain player engagement compared to commercial games[1], and this problem is evident in the case of multiplayer online games.

Current educational interest is focused on bridging formal and informal learning, learner-centered, and learner-directed learning. Non-commercial, informal, user generated, user maintained online game communities may provide useful indications for improving educational game design, consistent with current theory and priorities.[2]

On the other hand, online gamers are known for negative social interaction, emphasis on competition over collaboration, and moving to new games and communities rather than constructing solutions to dissatisfaction. These commonly observed traits of online gamers lead to the conception that creating and maintaining online game communities successfully is impossible.[3]

If an online game community can be found that bridges these gaps, sustaining both players interest and commitment and social functionality, this should be of interest and significance to the educational game research community.

We propose an in-depth case study of the online game, Dungeon Eternal X (DeX), and its community. We will show that DeX, first, is a user-generated game community with no commercial or other outside structure or support, second, has been sustained successfully for eight years, and, third, continues to use Neverwinter Nights (v1.69), a game first sold in 2002 and last updated in 2007. This will draw on extensive participatory experience in a wide variety of online game communities; two years of participant observation of the DeX community; and interviews with creators, administrators and players.[4]

1. Neverwinter Nights

1.1 Background

Neverwinter Nights (NWN) is a commercial computer game that was sold in 2002, was last updated in 2007, and is currently discontinued. The game contains a single player campaign and comes with a program called the Aurora Toolset which allows the user to create original content (modules) based on the game's engine.

2. The DeX Community

2.1 User-Generated

There are three elements that comprise DeX. First, it is a game instance, called a module, created using the Neverwinter Nights Aurora Toolset. Second, DeX is hosted through a Gamespy meta-server. Third, DeX is a community of managers and players, who communicate both in game and through a forum site created by the community managers. NWN contains a server program that allows users to host the modules they create on their computer, which other users can connect to from all around the world through the Gamespy meta-server. All of DeX's content is created using the toolset, making it extremely easy to add changes to the module on the server according to the community's interests.

2.2 Non-Commercial

Neverwinter Nights is a commercial game that users purchase. The DeX community, however, has no commercial backing, and requires no fee to play in. The content comes purely from the community's interest, and continues to draw and sustain an active player base. This challenges the notion that successful game communities require financial backing from the participants and administrators.

2.3 Informal Community

The administrators and developers of DeX do not belong to any formal organizations or companies that support the game or the community. The goals of the game and community are not related to outside structures such as enterprise, education, and so forth.

2.4 Continued Success Over Eight Years

DeX was created as one of the first servers in NWN, and is still maintained to this day. While there have been several changes to the administrator and developer positions, the community itself continues to thrive and new content is being developed on a daily basis. Players often spend dozens of hours per week playing on DeX, and the server boasts high traffic by Neverwinter standards, with 20 or more players playing at any given time, depending on the days of the week.

2.4.1 Positive Social Interaction and Collaboration Within the Community

While Player Versus Player (PvP) competition is a common sport within the DeX

community, players collaborate and interact positively to create balanced instances of PvP. This challenges the common conception that active PvP focused players tend to be socially destructive and negatively competitive.

2.5 Continues to Use a Heavily Outdated Game Engine

Neverwinter Nights is a very old game, with graphics and other features primitive in comparison to games released in the past two or three years, yet the DeX community continues to prosper and appeals to newcomers, who join the community and stay. This goes against the commonly cited behavior of online gamers, that they are attracted to newer games and communities abandon ones perceived as older and less “flashy”.

Conclusion

We have proposed an in-depth case study of a successful online game community, Dungeon Eternal X (DeX). We have shown that DeX is a user-generated game community that has been sustained successfully for eight years; and is based on an eight year old game engine. Data will be collected via extensive participatory experience in a wide variety of online game communities; two years of participant observation of the DeX community; and interviews with creators, administrators and players.

We conclude that the DeX community will provide useful implications for improving educational game designs.

Acknowledgements

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References

- [1] Elwell, M.G., Cook S.A., Ikeda, M., Medeni, T.D. (2006) Acquisition of 'Soft' Skills in a Computer Game Environment. The 14th International Conference on Computers in Education, Beijing, China, November 30 – December 4. Workshop Proceedings, pp. 5-8
- [2] Elwell, MG & Medeni, T.D (2008). Technology Change and Online Community Development. In Putnik, G. D. & Cunha, M. M. (Eds.) Encyclopedia of Networked and Virtual Organizations Idea Group Reference
- [3] Medeni, T. D., Elwell, M. G., Cook, S. A., & deSouza G. M. S. Learning Reflection and Creativity in Online Game Communities. In Putnik, G. D., & Cunha, M. M., Eds. Encyclopedia of Networked and Virtual Organizations..IGI Global, 2008. ISBN:978-1-59904-885-7
- [4] DeWalt, K. M., DeWalt, B. R., & Wayland, C. B. (1998). Participant observation. In H. R. Bernard (Ed.), Handbook of methods in cultural anthropology. Pp: 259-299. Walnut Creek, CA: AltaMira Press

C6: ICCE Conference on Technology, Pedagogy and Education

An Evaluation of “Face-to-Face” Group Activity on Blended-Learning in University Cooperation

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Abstract: At Oita University, lectures were organized for both Oita University students and students from other universities (also called on-demand students) as a part of an investigation into the notion of university cooperation. We hypothesized that the student-focused “face-to-face” lessons would fulfill the blended-learning lessons’ objective of achieving student interaction. In the final lesson, a review of the lessons was completed using a learning portfolio. In this thesis, I will not only report the results and examine the learning effects but will also discuss the review of the learning portfolio.

Keywords: blended-learning, on-demand, group work, university cooperation

Introduction

Many universities in Japan often fill classes by sharing classes with each other. However, universities usually just offer their main classes to other institutions by using on-demand video contents, video-conference or other e-learning systems. These modes of delivery are easy for the university’s staff to share their classes, but some students are not interested in on-demand only classes. They cannot continue their course as they lose motivation. We know the importance of online mentors to support students’ learning. So we used mentors in other classes. But mentors alone were not adequate in sustaining students’ motivation.

One way to solve these problems is to use the blended-learning class [1]. Blended-learning incorporates the advantages of the “face-to-face” class with the advantages of e-learning. At Oita University, we examined a class entitled ‘Introduction to Oita’ and allowed other universities to participate in it as an on-demand class. “Face-to-face” lessons were held in the middle of the term. The aim of these classes was to inspire learning through group interaction. The organization of this class was difficult because each theme was different, so the students were not easy to combine some knowledge that they learned by the face-to-face classes. In order to solve this problem, we utilized the learning portfolio. We organized the minute paper as a learning portfolio and supported their combination of the knowledge that they learned at the end of the term.

This research focused on “face-to-face” group work in a blended-learning environment and discussed the effectiveness of the reflection using the learning portfolio.

1. The Objective of the Research

In this research, we examined a teaching module entitled ‘Introduction to Oita’ which was developed at Oita University as a common subject throughout all faculties. The students learn not only about the industry in Oita but also learn about Oita’s culture and history across different themes. Approximately, 90 Oita University students took this particular class while 28 other students registered from other universities and took the lessons online. All students handed in their minute paper where they wrote about their thoughts, ideas or opinion they got from the classes [2].

The on-demand students took advantage of a ‘Moodle’, which is an on-line Learning Management System (LMS). The LMS had four main functions; (1) Watching on-demand videos. (2) Submission of minute paper. (3) Questions (4) Interaction through a class BBS. By using ‘Moodle’, the students could ask questions, watch the videos and submit reports.



Figure.1. Screenshot after log in



Figure.2. Watching the video of class

The 10th and 11th classes were “face-to-face” lessons. Both on-demand students and Oita University students were connected to the learning facility. Then, groups were constructed and students worked cooperatively. In this research, we focus on group work and investigate the learning effect by the group work.

2. Research design

2.1 “Face-to-face” class and group work

For the “face-to-face” classes, we divided 69 students into 12 groups consisting of 6 members. In order to facilitate the discussion between Oita University and students from other universities, we gave them some themes. Initially, every group discussed and determined their projects. Subsequently, the students were reorganized into a new group by the jigsaw method [4]. In this group, the students exchanged their original group’s opinions. After the students considered the knowledge that was gained from the opinion exchange in the jigsaw group, they summarized and presented the project in a poster. Additionally, a survey about the group work was completed during the last class.

2.2 Reflection using the learning portfolio

In the final class, we returned the students’ minute papers to the students as a learning portfolio in order to facilitate their combination of the knowledge and review of all classes. For the purpose of these activities, we checked all the minute paper and had all students discuss what they learned through this course. Through an online assignment, they had to answer the question ‘what did you learn in this class?’ The students recognized and picked out the key-words from minute papers and exchanged their opinions with other members.

3. Results of the Questionnaire

There were 69 students who attended the “face-to-face” classes in the middle of the term. In the group work, each group tended to gradually discuss and then present the poster at the end. We analyzed the results of the questionnaire in Table 1. The followings are the four questions that were asked in the questionnaire; (1) Did you enjoy the group work? (2) Were there any new findings in the interaction activity? (3) Do you have the motivation to complete the subsequent lessons? (4) Should we try this type of lesson next year? Each question was evaluated out of 5.

Table1. Questionnaire results

	Students on-demand	Oita-university students
Questions	Average (standard deviation)	Average (standard deviation)
(1)	4.26 (1.01)	4.22 (0.86)
(2)	4.37 (0.98)	4.12 (0.91)
(3)	4.32 (0.98)	4.02 (1.01)
(4)	4.53 (0.82)	4.22 (0.88)

According to the t-test that was done using the figures in Table 1, there was no significant difference between on-demand student and Oita University students. However, according to the result of questionnaires, we obtained positive opinions such as ‘I would like to participate in the lesson again’ or ‘I should have more time to participate in the lesson’. It means that on-demand students took part in the face-to-face lessons willingly. Additionally, many similar opinions such as ‘I acquired much knowledge about Oita’ and ‘I acquired the expression skill’ were written on the reflection forms. We can suggest that the students could combine their knowledge about Oita that they learned through the course.

As a result of course evaluation, we could pass 67 students who participated in face-to-face group work activities. It means 97.1% passed, we could say this ratio is very high.

Conclusions and Future Work

We came to the conclusion that all of the students were inspired to learn through both the “face-to-face” learning and the blended-learning. On-demand students were able to display a positive attitude towards every class and could thoroughly consider every lesson despite learning across different themes. This could be attributed to the effectiveness of the learning portfolio. Our future work will look into the effect of blended learning on student grades.

References

- [1] Michael Derntl & Juergen Mangler (2004), Web Services for Blended Learning Patterns, ICALT’04.
- [2] Barbara Gross Davis (2009), Tools for Teaching, Jossey-Bass
- [3] Harri Hämäläinen, Jari Porras & Jouni Ikonen (2009), Integration of learning support applications in the development of e-Portfolios, IEEE Multidisciplinary Engineering Education Magazine, vol.3,no.4.
- [4] Aronson, E. & Patnoe, S. (1997), The Jigsaw Classroom. 2nd ed, Longman. New York.
- [5] Georg Turban & Max Mühlhäuser (2006), An open architecture for face-to-face learning and its benefits, ISM’06.

Example Choice and ExampleWiki

--A step towards making formal principles interesting to students

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Abstract: We first present the concept of Example Choice which links formal principles in science to examples that students find interesting. We then describe a platform – ExampleWiki – which allows teachers to contribute and retrieve examples and students to choose the most interesting examples in order to learn formal principles.

Keywords: Example Choice, wiki

Introduction

Modern technology - especially the Internet - enables educators to let students choose from examples of their interest before or after they gather in class to discuss the formal principle which underlies all those examples. With example choice [11], we have developed a theoretical framework with implications for practice. Our first laboratory study on example choice shows that students are both more interested and use more time to learn the formal principles.

To implement example choice, we developed ExampleWiki, a web-based platform with a backend database that combines formal principles with students' personal interests by providing real life examples. This platform will allow entering, editing and retrieving formal principles and examples. Currently we focus on mathematics, with applications in science. The platform supports self-regulated learning that is adapted to the students' skills and needs.

1. Theoretical Background

Both constructivist and situated learning approaches have been criticized by cognitive psychologists. Some constructivist methods – such as pure discovery learning – generally have been proven ineffective [10]. Although some studies documented better understanding of arithmetic operations when they were performed in everyday situations (e.g., [4]), situated learning is often inefficient (see [1]). A proven learning method is to combine teaching of basic principles with practice in relevant settings, as shown in studies on learning to throw darts to targets underwater [8], or on sexing chickens [3]. In the latter study, novices learned a formal principle that enabled them to perform the task within 20 minutes at an expert level; practitioners who never have learnt the formal principle needed years to attain expert performance from mere practice.

When constructivist approaches apparently fail to provide high-quality science teaching: Shall schools go back to traditional modes of teaching, e.g., teaching formal principles and presenting an example which often is unattractive to students, such as teaching probability

calculus with an example from gambling? We do not think so. Modern information technology makes possible what would not have been possible two decades ago. For example, a teacher could not think of giving different examples – suited to individual interests – for every student. Teachers often do not know the individual interests of their students; even if they do, they do not know good examples connected to each topic of interest; even if they do, they are not able to present all examples simultaneously.

We address these issues by building a shared platform including a database that provides different examples for formal principles. Teachers then have a choice: Before or after presenting the basic principle, they either can let students work on their favorite examples, or they can print out examples and distribute them to the students. The use of different examples for each individual student does not stop here: For example, a teacher can assign the task that some students have to present their favorite example in class so that every student gets multiple worked examples that illustrate the principle to be learned (see [2] for the use of multiple worked examples).

2. ExampleWiki

In recent years, Wiki technology has become a popular pedagogical tool to support information dissemination, sharing knowledge resources, and collaborative learning [12]. ExampleWiki can facilitate the community of practice [9] and community of interests [6]. ExampleWiki provides a platform that allows entering, editing and retrieving formal principles and examples. The system architecture includes three main components: examples, short explanation of the formal principles linked to the related examples, and the formal principles themselves. This design reflects the principle of example choice [11]. The prototype is shown in Figure 1 and it is based on MediaWiki.

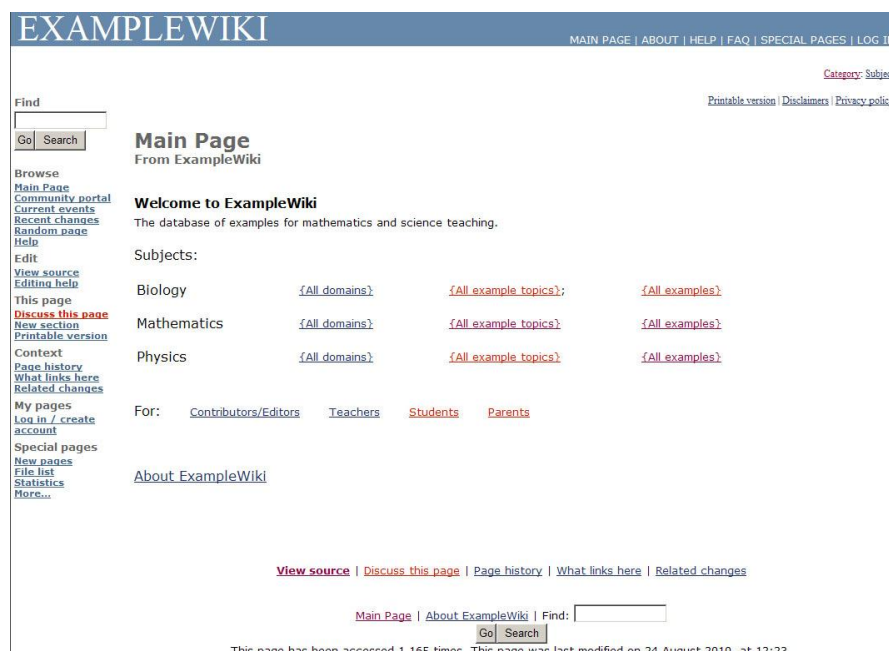


Figure 1. ExampleWiki main page

3. Discussion

Hoffmann [7] reported an intervention study that comes close to ExampleWiki, but it did not include example choice. She assessed what could make basic physics training in high school

more interesting for both boys and girls. She then connected formal contents to contents that students judged as being interesting and compared this interest-based instruction to more traditional instruction. She indeed found that interest-based instruction helped increasing physics achievement, and students became more interested in the topic. Another approach lets students generate examples [13]. The idea is that understanding is promoted by construction of own examples. Our approach does not preclude that students later construct their own examples and even submit it to ExampleWiki, but before students can construct their own example, they have to know a minimum about the formal principle. In line with criticisms from the viewpoint of cognitive psychology [10], we start with guiding students to elaborate on the formal principle before they then may construct their own examples, as proposed by [13].

Our long-term goal is to create a web-based learning environment that helps teachers “making things interesting” by connecting what students have to learn to what students are interested in. Such an environment allows teachers to contribute and retrieve examples and students to choose the most interesting examples to learn formal principles. One scenario for using such an environment could be that after choosing an example, students can answer a question that relates the example to the formal principle. The student gets feedback from the environment and then is instructed in class about the formal principle. Such a tool would facilitate diversity in teaching that an educator could provide only with much effort, and it provides teachers with multiple good examples from the same topic. In sum, we try to link formal principles that are not interesting in themselves to topics that are intrinsically interesting; thus, fascination for a formal topic may be elicited by the fact that it helps understanding more deeply the things one has a real interest in – according to Dewey [5] the only proper way of “making things interesting”.

References

- [1] Anderson, J. R., Reder, L. M., & Simon, H. A. (1996). Situated Learning and Education. *Educational Researcher*(25), 5-11
- [2] Atkinson, R. K., Derry, S. J., Renkl, A., & Wortham, D. (2000). Learning from examples: Instructional principles from the worked examples research. *Review of Educational Research* (70), 181-214.
- [3] Biederman, I., & Shiffrar, M. (1987). Sexing day-old chicks: A case study and expert systems analysis of a difficult perceptual learning task. *Journal of Experimental Psychology: Learning, Memory and Cognition* (13), 640-645.
- [4] Carraher, T. N., Carraher, D. W., & Schliemann, A. D. (1985). Mathematics in the streets and in the schools. *British Journal of Developmental Psychology* (3), 21-29.
- [5] Dewey, J. (1913). *Interest and effort in education*. Boston: Riverside.
- [6] Fischer, G. (2001). Communities of Interest: Learning through the Interaction of Multiple Knowledge Systems. In S. Bjornestad, R. Moe, A. Mørch & A. Opdahl (Eds.), *Proceedings of the 24th IRIS Conference* (pp. 1-14): University of Bergen.
- [7] Hoffmann, L. (2002). Promoting girls' interest and achievement in physics classes for beginners. *Learning and Instruction* (12), 447-465.
- [8] Judd, C. H. (1908). The relation of special training to general intelligence. *Educational Review* (36), 28-42.
- [9] Lave, J., & Wenger, E. (1991). *Situated learning. Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- [10] Mayer, R. E. (2004). Should there be a three-strikes rule against pure discovery learning? The case for guided methods of instruction. *American Psychologist* (59), 14-19.
- [11] Reber, R., Hetland, H., Chen, W., Norman, E., & Kobbeltvedt, T. (2009). Effects of Example Choice on Interest, Control, and Learning. *Journal of the Learning Sciences* (18), 509-548.
- [12] Ruth, A., & Houghton, L. (2009). The wiki way of learning. *Australasian Journal of Educational Technology*, 25(2), 135-152.
- [13] Watson, A., & Mason, J. (2002). Student-generated examples in the learning of mathematics. *Canadian Journal of Science, Mathematics and Technology Education*, 2(2), 237-249.

Implementation of Instructional Design in a Blended Learning Development Project

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Abstract: Instructional design is critical to the success of blended learning development. This paper investigates the implementation of instructional design in a blended learning environment in order to develop a model of practice for improving teaching effectiveness at sub-degree level. Implementation steps of instructional design are identified, and templates for teachers to facilitate blended learning course development are illustrated.

Keywords: Instructional design, blended learning, e-course development

1. The Blended Learning Development Project

Blended learning is literally defined as the combination of traditional face-to-face classroom learning with a certain minimum level of basic e-learning features incorporated (Graham, 2005). To enhance the quality of learning support to the students, the School of Professional and Continuing Education of the University of Hong Kong (HKU SPACE) had introduced the Blended Learning Policy in 2004. Together with over ten years in practicing e-learning, HKU SPACE used the pedagogy-driven approach to develop e-courses for complementing and supplementing the face-to-face learning delivery (Cheung et al, 2008). In August 2009, a two-year e-course development project was kicked off for developing a blended learning model for improving teaching effectiveness in sub-degree accounting courses. After the first year implementation, all blended learning materials of the project were designed and developed. This paper serves to share our experience and some preliminary findings from the project, with a focus on the implementation of instructional design for blending learning.

2. Implementation of Instructional Design in the Blended Learning Project

2.1 Project Team with Academic and IT Staff

Restauri (2007) suggested teachers should work as instructional designers, technology specialists and course administrators at the same time in the blended learning mode. Biggs (2003) mentioned that many institutes often wrongly deployed the IT experts only to carry out e-learning development. According to our experience, an e-learning development project should be developed by a project team, consisting of academic and technical staff (Cheung et al, 2009). Therefore, instead of developing the e-course by a group of teachers or IT developers solely, the programme team, teachers, instructional designer and IT experts were to join together to form a project team.

2.2 *Instructional Design*

The project team identified the major difficulties encountered by teachers in developing blended learning course were insufficient knowledge on how to start with the development and how to continue the development. Instructional tools and design strategies are important components for successful blending and all the components within the instructional method should be appropriately integrated (Rossett et al, 2003). In this project, ADDIE model was chosen by the project team for e-course development after evaluation of several models, such as Dick and Carey model and Instructional Development Learning System (IDLS).

2.3 *Key Steps of Instructional Design*

Hollis and Madill (2006) found that teachers had pedagogical difficulties in adapting to new instructional delivery methods. Even though the teachers were asked to follow the model to develop e-course materials, they puzzled in how to implement it. In view of this, we developed a six-step paradigm in instructional design to support blended learning to enable the teachers to develop the e-course step-by-step (Cheung et al, 2010):

- **Create an overview for the course.** The teacher would develop an initial plan for the course structure, teaching and learning strategies, learning objectives, teaching plans and assessment methods.
- **Write the re-designed lesson plan.** The teacher would re-design the lesson plan to explore how e-learning can be integrated into the face-to-face learning.
- **Prepare the lesson materials.** Following the re-designed lesson plan, the teacher would prepare the lesson materials, such as handouts, notes, presentation slides and video clips. Assessment questions and discussion topics would also be prepared.
- **Perform research and prepare resources.** The teacher would then perform research and prepare extensive educational resources to support the teaching and learning.
- **Incorporate into learning management system.** The lesson materials, together with the open education resources, are packaged as learning objects for incorporation into a learning management system.
- **Review the created lessons and materials.** The teacher would finally review the lessons and materials before course delivery.

2.4 *Working Templates for Teachers*

The six steps were intentionally designed to minimize uncertainties of teachers to develop blended learning course and to attract more teachers to develop blended learning in the future. By implementing the six steps one-by-one, the teachers were guided to develop the blended learning course. First, teachers were asked to create an overview for the blended learning course by filling in a template. Contact hours, teaching strategies and teaching plan including pre-class activities, in-class activities and post-class activities are the required fields. Then, the teachers were asked to write a redesigned lesson plan by filling in another template. Detailed learning activities to be carried out by both teachers and students were to be listed in the template. The two templates are illustrated as below:

Course Title	_____	Teaching Plan		
Course Hour	_____	Week	Topic	Tasks
Course Code	_____	xxx	xxx	pre-class
Contact Hours	Lecture and tutorial _____ hours			xxx
	Practical _____ hours			in-class
	e-learning _____ hours			xxx
	Total _____ hours			post-class
Pre-requisites	_____			xxx
Course Aim	_____	xxx	xxx	pre-class
Teaching & Learning Strategies	_____			xxx
	_____			in-class
	_____			xxx
	_____			post-class
	_____			xxx

Figure 1. Course Overview Template

Week 1	Teacher	Student
Pre-Class Activities		
Class Preparation	1. Put a flash game on the platform 2. Create a topic for online discussion	1. Play the flash game 2. Express views in the forum
In-Class Activities		
Lecturing	1. Conduct the lecture with PPT slides	1. Discuss and present their ideas
Group Discussion	2. Separate the students into groups for discussion and presentation	
Post-Class Activities		
Chapter Review	1. Prepare a chapter quiz 2. Prepare a chapter review PPT file	1. Answer the quiz 2. View the chapter review

Figure 2. Sample of Redesigned Lesson Plan Template

3. Conclusion

Blended learning is widely adopted in the delivery of quality learning. Institutes adopt different extents of e-learning to supplement and complement traditional face-to-face teaching. The role of instructional designer is important in bridging academic and IT staff during the e-course development process. In our project, instructional design was applied and six steps were identified for teachers to follow when developing the blended learning courses. With guided instructions, teachers successfully designed and developed their courses very effectively. The blended learning courses are now developed and launched in the e-learning platform. The courses will be delivered to students in the new academic year. In the following year, we will focus on evaluating the effectiveness of the blended learning courses and making further improvement to enhance teaching and learning continuously. The effectiveness of the six steps of instructional design will also be evaluated. These steps will be introduced to more teachers to help them to develop blended learning more easily.

References

- [1] Biggs, J. (2003). *Teaching for Quality Learning at University*, UK: Open University Press.
- [2] Cheung, K. S., Lam, J., Im, T., Szeto, R. & Yau, J. (2008). Exploring a Pedagogy-Driven Approach to e-Course Development. Proceedings of the 2008 International Workshop on Education Technology and Training & 2008 International Workshop on Geoscience and Remote Sensing.
- [3] Cheung, K. S., Lam, J., Im, T. & Szeto, R. (2009). Some Principle for Good Practices of E-learning in Continuing Education Institutions. Proceedings of the International Conference on Education Technology and Computer, pp. 69-72, IEEE Press.
- [4] Graham, C. R., (2005). Blended learning systems: Definition, current trends, and future directions. In Bonk, C. J. & Graham, C. R. (Eds.). Handbook of blended learning: Global perspectives, local designs, pp. 3-21, San Francisco, CA: Pfeiffer Publishing.
- [5] Retauri, S. (2007). Creating an effective online distance education program using target support factors, *TechTrends*, 48(6), 32-39.
- [6] Rossett, A., Douglis, F. & Frazee, R. V. (2003). Strategies for building blended learning. *Learning Circuits*. Retrieved August 30, 2010, at <http://www.essentiallearning.net/news/Strategies%20for%20Building%20Blended%20learning.pdf>.

Computer-Assisted Virtual Reality Imaging in Education and Therapeutic Intervention

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Abstract: Creation of virtual environments and simulations has helped to expand student learning experiences across the medical sciences and, in health care, enhanced patient understanding of their own pathologies or even modify behavioral patterns through integrated biofeedback control methodologies. Collaborative work is underway to bring imaging science technologies from the Rochester Institute of Technology (RIT) together with scientific data generated through the Department of Psychiatry/Forensic Drug Diversion Clinic to create new, interactive computer-assisted simulations for educational and therapeutic applications. Over the past seven years, RIT faculty of the Human Visualization Project (HVP) have worked within a multidisciplinary team of graphic artists/medical illustrators, software engineers, game designers, biochemists, and anatomists to generate scientific images and animations of select organ systems from the gross to molecular level of detail. Work is underway to create virtual models of the brain and neuronal pathways known to be affected by chronic abuse of illicit drugs with particular attention paid to structural and physiological adaptations that become manifest as altered patterns of (criminal) behavior in the addict. Progress is being made to generate a library of virtual 3D models that would serve to educate health care personnel and patients about the dangerous effects of chronic drug abuse. Additionally, computer-assisted images/environments will also be created as a complement to biofeedback equipment designed to assist the drug abuser with behavior modification. This cultural shift in pedagogy will prove beneficial to students, faculty, and patients with the desire and ability to take advantage of the growing power of visualization technology.

Keywords: Virtual reality, science visualization, drug abuse, neurotransmitters, biofeedback

1.0 Introduction

Collaborative efforts are underway to develop state of the art virtual reality interactive tools and a bank of virtual images and models in support of both educational and clinical psychology intervention methodologies. When completed, fully interactive, virtual models will help medical personnel (residents, interns, fellows, allied health professionals) learn about the effects of alcohol and illicit drugs on brain, behavior and organ system function as a result of chronic abuse and adaptive physiological change. This innovative blend of technology and pedagogy will be combined with more traditional tools to create a virtual library of educational materials. Such an approach will provide a deeper learning experience for students training across diverse fields of study at Yale University School of Medicine (e.g., psychology, psychiatry, nursing, physicians), on the RIT campus (physician assistants, biomedical sciences, psychology, clinical chemistry) and ultimately adapted to support widespread dissemination to the general population at-large. In addition, a new set of models within a fully interactive virtual tool accessible through any standard desktop computer is being tailored and built into current therapeutic biofeedback technologies to teach chronic drug abuse clients about the negative effects of drugs on their health complete

with pre/post testing and options for direct feedback and reflection on their own experiences and consequences of criminal behavior.

2.0 Creation of Virtual Models

New, 3D models of select regions of the brain, corresponding neuronal pathways, and detailed neurotransmitter actions are being constructed down to the molecular level to demonstrate the structural and physiological adaptive changes known to occur during chronic drug/alcohol abuse. Correlates will also be drawn to connect dysfunctional behavioral consequences (i.e. criminal behavior) to neurotransmitter and physiological changes known to occur in the brains of chronic abusers. Initially, the focus has been to create images and educational materials that relate to the multisystem effects of alcohol abuse. From an initial set of graphite, 2D storyboards, 3D virtual models of organ and cellular structures are created using animation software, *Maya3D*, to show molecular and biochemical effects of alcohol that lead to structural changes and adaptations in the brain and liver of diseased patients. Within a standard desktop display, these 3D environments provide users demonstrations or full maneuverability to visualize and learn about disease processes above and beyond what is possible through simple 2D graphics and text. The next step is to move on to create models to show the effects illegal drugs such as opiates/morphine, benzodiazepines, cannabinoids, cocaine metabolites, and methamphetamines have on brain function at the cellular/molecular level as a means of helping users learn about underlying causes for physical and chemical addiction. In each case, molecular models of specific drugs and select neurotransmitters (derived from the Protein Data Bank) will be built into 3D brain neuronal models by the same methodology described above. In the past, we have used this same approach to create virtual environments and educational models of the heart, lung, liver, kidney, spleen, pancreas, kidney, and the entire musculoskeletal and peripheral nervous systems. In each case, special attention was paid to accurate anatomical detail based on quantitative data available in the literature and through scanning/transmission electron microscopy studies.

3.0 Development of Educational Materials

Our virtual training tool will be adapted to include narrative and imaging content around effects of alcohol and drugs on neural pathways, clinical manifestations, treatment, and health policy consistent with current literature. The user will have the opportunity to observe animated demonstrations and/or to maneuver their way through a virtual environment to examine specific structural details and hyperlinked text-based explanations. A strength of the proposed protocol is that a survey will be incorporated into the tool to assess trainee attitudes, knowledge of drug abuse, and connections between structural change and behavioral patterns in the abuser as well as rating the content of the modules at pre and post interactive tool use.

4.0 Use of Simulation in Clinical Intervention

Within the scope of a psychiatric therapeutic intervention at our clinic, interactive computer technology as an integral part of biofeedback allows a patient to role-play and be immersed in a skill training exercise to support healthier communication and anger management skills. In the past, in the Forensic Drug Diversion Clinic, use of a virtual system has helped users

by guiding them through cause and effect-based interactions to provide them with personalized feedback through employment of pre & post interactive game/quiz formats. Clients are posed questions pertaining to anger management skills, communication skills, and negative consequences regarding alcohol and drug use as it pertains to healthier lifestyles. In response to simulated situations, patient physiological responses such as heart rate, visual eye tracking, phonetic indexing [e.g., pick up “I feel” statements and profanity], and loudness of voice are recorded to provide additional data. As well, video footage of clients during their interactive role-play provides feedback regarding how they looked (nonverbal communication) and sounded (content/verbal communication skills), while probing them to assess their responses to simulated situations. Interactive characters and sounds are provided to coach, give thumbs up and light positive sounds for positive feedback when a desired behavioral response occurs. All patients are counseled with new skills at the end of each role-play for each scenario they role encounter (communication skills training, anger management, conflict resolution, coping with criticisms, coping with high risk situations). Each week, patients participate in the interactive role-play and receive feedback and tested on skills acquisition for a total of 12 weeks.

To expand our capabilities, the plan is to build an interactive touch screen desktop application that allows communication between the patient and a Virtual Character (VC). The VC will be able to react to the user’s input and manage the user’s communication level by manipulating a pre-defined response. While being recorded, the VC will perform role-plays of typical scenarios that occur just prior to domestic violence dispute. For example, in one “real life” vignette, the client comes home late, was out drinking, and does not call and the VC is upset. The VC role-plays three unhealthy communication styles [passive, passive-aggressive, and aggressive] and eventually role-plays a healthy communication style [assertive] in response to the patient’s healthy communication style. It is the intention of the collaborative research team to also incorporate anatomical and physiological neuronal models to help educate patients about the effects of chronic drug abuse particularly as pertains to behavioral changes and errors in judgment. The hope is to interface physiological signals (heart rate, skin conductance, eye-tracking) as part of a “biofeedback game” so patients can work to impact changes that would affect positive functions within the virtual neuronal models. This system is consistent with technological advances in game design i.e., in a “biofeedback game”, people navigate the game by changing something about their body in a conscious or unconscious manner. Such games are often designed along a reward model, with the game rewarding the player when she or he achieves a desired change. Design of randomized clinical trials is currently underway to assess the efficacy of these virtual reality tools and role-play in effective improvement of patient health.

The mission of this project and collaboration is to discover, exploit, and build computer software and hardware solutions that will enable teachers and learners to take full advantage of the latest visualization technology. In sum, should the results of this study show favorable outcomes, it has the potential to lead to future studies that could greatly improve the overall health of men, women and their families. This innovative virtual reality tool can be easily replicated, disseminated, and sustained in real world clinical settings.

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Reference

[1] Easton, C.J., Devine, S., Crowley, M., Edwards, L., and Mayes, L. (2009). Using virtual reality tasks among substance abusing domestic violence offenders: A preliminary look at Cyber Ball and facial morphing. *Annual Conference on American Academy of Psychiatry and the Law*, 10(2), 453-469.

Factors Influencing the Use of E-Forums among Undergraduates: An Exploratory Study at Universiti Putra Malaysia

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Abstract: In this paper, the researchers describe a study that aims to explore the factors that can influence the use of e-forums in Putra LMS, the official Learning Management System of Universiti Putra Malaysia. Seven factors have been identified based on past studies: behavior - instructors or moderators and peers, discussion contents, knowledge, individual characteristic, technical aspect, incentives and time constraints. The study is currently underway and the outcome of this study will be pertinent to instructors to encourage more students to utilize e-forums as a means to enhance and sustain their knowledge learnt.

Keywords: Factors, use of E-forums, undergraduates

Introduction

Student discussion is a crucial component in interactive online learning environment [16, 6, 4, 21]. Discussion is a dynamic approach that encourages student interaction and active participation in the teaching-learning process [19]. In order to create an active student discussion, they have to communicate with one another. The major advantage of discussions is the total quantity of interactions that occur and the learning that results from the interaction [18]. Student participations are crucial in order for the discussion activity to be successful [5, 21]. However, interaction among students is more complicated to support [7]. Undoubtedly, even though e-forums are available 24 hours 7 days a week, it does not mean students will use it effectively [21] and participate actively [12]. Problems usually arise when the majority of students only posted one message only and never participated again; hence, no further communication occurs [7]. Therefore, understanding how to promote student contribution in e-forums has become increasingly crucial [2].

1.1 Factors influencing the use of e-forums

Past studies have shown that, several factors contribute to student participation in e-forums. The factors are: (a) behavior - instructors or moderators and peers [8, 10, 9, 11, 13, 20]; (b) discussion contents [8, 10, 3, 14]; (c) knowledge [10, 7, 11, 15]; (d) individual characteristic [10, 1, 15, 20]; (e) technical aspect [10, 12, 17]; (f) incentives [10, 5, 7, 20]; and (g) time constraint [2].

1.2 Research Framework

The research framework was developed based on the literature review of past studies. The research framework is illustrated in Figure 1. The independent variables of this study are; behavior (instructor/moderator and peers), discussion contents, knowledge, individual

characteristics, technical aspect, incentive and time constrain. The dependent variable of this study is the use of e-forums in terms of students' contribution or participation in e-forums.

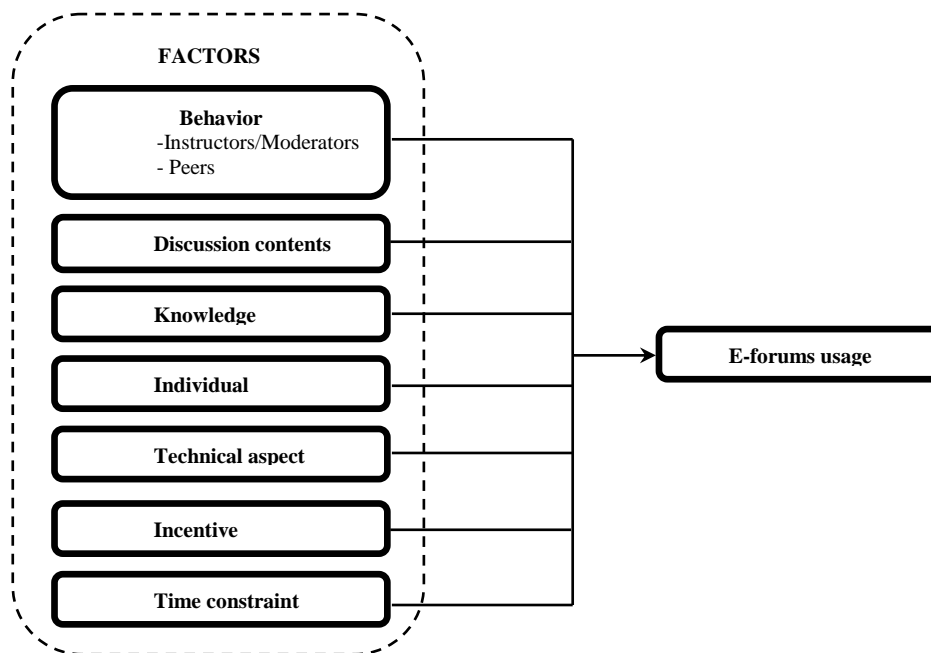


Figure 1: Research Framework

2. Research Objective and Research Questions

The main objective of this study is to investigate the factors influencing the use of e-forums in an Learning Management System among undergraduates at Universiti Putra Malaysia (UPM). The research questions of this study are listed as follows:

- What is the extent of e-forums use in the Putra LMS?
- Which is the best predictor of factor influencing the use of e-forums: behavior, discussion contents, knowledge, individual characteristics, technical aspect, incentive, or time constraint?

3. Research Method

3.1 Population and Sample of the study

The population of this study is the undergraduate students at UPM who are using e-forums in addition to the conventional learning. The researchers will acquire the list of lecturers who are active users of the Putra LMS from the Centre of Academic Development (CADE), UPM. Based on the name list, researchers will then identify lecturers who are using e-forums as part of their instructions. The accessible population for this study will be the total numbers of students obtained from the student name list name given by the respective lecturers. The sample size for this study is 106 undergraduate students. This figure is derived from the formula $N \geq 50 + 8(7)$ where seven is the number of independent variables measured [22].

3.2 Instrument

Three instruments are use in order to collect data for this study: (a) students' postings on the e-forums; (b) survey questionnaire measuring the seven aforementioned factors; and (c) interview sessions with students where they will be asked for their opinions in relation to the factors influencing their e-forums use.

4. Concluding Remarks

Data collection will commence in late December of 2010. The findings of this study will be crucial to instructors who face challenges when encouraging their students to participate in e-forums discussions.

References

- [1] Chen, S.-J., & Caropreso, E. J. (2004). Influence of personality on online discussion. *Journal of Interactive Online Learning*, 3(2).
- [2] Cheung, W. S., Hew, K. F., & Ng, C. S. L. (2008). Toward an understanding of why students contribute in asynchronous online discussions. *Journal Educational Computing Research*, 38(1), 29-50.
- [3] Cheung, W. S., & Hew, K. F. (2006). Examining students' creative and critical thinking and student to student interactions in an asynchronous online discussion environment: A Singapore case study. *Asia-Pacific Cybereducation Journal*, 2(2).
- [4] Courtney, A. M., & King, F. B. (2009). Online dialog: A tool to support preservice teacher candidates' understanding of literacy teaching and practice. *Contemporary Issues in Technology and Teacher Education (Online serial)*, 9(3), 226-256.
- [5] Dennen, V. P. (2005). From Message Posting to Learning Dialogues: Factors affecting learner participation in asynchronous discussion. *Distance Education*, 26(1), 127-148.
- [6] Ertmer, P. A., Richardson, J. C., Belland, B., Camin, D., Connolly, P., Coulthard, G., et al. (2007). Using peer feedback to enhance the quality of student online postings: An exploratory study. *Journal of Computer-Mediated Communication*, 78-99.
- [7] Fung, Y. Y. H. (2004). Collaborative Online Learning : Interaction Patterns and Limiting Factors. *Open Learning*, 19(2), 135-149.
- [8] Hamzah, M. (2007). *Keberkesanan Penggunaan Perbincangan Atas Talian dalam Portal My Guru 2 Terhadap Pembelajaran di UPSI*. Paper presented at the 1st International Malaysian Educational Technology Convention 2007, Johor Bahru, Malaysia.
- [9] Hew, K. F., & Cheung, W. S. (2003b). An exploratory study of the use of asynchronous online discussion in hypermedia design. *Journal of Instructional Science & Technology*, 6(1).
- [10] Hew, K. F., Cheung, W. S., & Ng, C. S. L. (2008). Student Contribution in Asynchronous Online Discussion: A Review of the Research and Empirical Exploration.
- [11] Hewitt, J. (2005). Toward an Understanding of How Threads Die in Asynchronous Computer Conferences. *The Journal of the Learning Sciences*, 14(4), 567-589.
- [12] Hummel, H. G. K., Tattersall, C., Burgos, D., Brouns, F., Kurvers, H., & Koper, R. (2005). Facilitating Participation: From the EML web site to the Learning Network for Learning Design. *Interactive Learning Environments*, 13(1-2), 55-69.
- [13] Jeong, A. (2004). The combined effects of response time and message content on growth patterns of discussion threads in computer-supported collaborative argumentation. *Journal of Distance Education*, 19(1), 36-53.
- [14] Kaer, K. (2001). Following the thread in computer conferences. *Computers & Education*, 37, 81-99.
- [15] Khan, S. (2005). Listservs in the college science classroom: Evaluating participation and "richness" in computer-mediated discourse. *Journal of Technology and Teacher Education*, 13(2), 325-351.
- [16] Mazzolini, M., & Maddison, S. (2003). Sage, guide or ghost? The effect of instructor intervention on student participation in online discussion forums. *Computers & Education*, 40(3), 237-253.
- [17] Murphy, E., & Coleman, E. (2004). Graduate students' experiences of challenges in online asynchronous discussion. *Canadian Journal of Learning and Technology*, 30(2).
- [18] Newby, T. J., Stepich, D. A., Lehman, J. D., & Russell, J. D. (1996). *Instructional technology for teaching and learning*. Englewood Cliffs, New Jersey: Prentice-Hall.
- [19] Newby, T. J., Stepich, D. A., Lehman, J. D., & Russell, J. D. (2006). *Educational Technology for Teaching and Learning* (3rd ed.). Upper Saddle River, New Jersey Columbus, Ohio: Pearson Merrill Prentice Hall.
- [20] Oliver, M., & Shaw, G. P. (2003). Asynchronous discussion in support of medical education. *Journal of Asynchronous Learning Networks*, 7(1), 56-67.
- [21] Shana, Z. (2009). Learning with Technology: Using Discussion Forums to Augment a Traditional-Style Class. *Educational Technology & Society*, 12(3), 214-228.
- [22] Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics*: Pearson Education.

Crazy Brush: Designing the Scribbles Environment to Improve Children' Interest in Writing

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Abstract: Writing is important because students are through written language to express their ideas to interact with others. However, only few students like writing; on the contrary, most students like scribble. We hope to improve students' interest through scribbling and writing a story on their own or with others. Step by step from scribble to writing, we want to let students feel that they are doing creative works instead of formal writing. Hence, we develop an on-line scribble environment to assist students' writing and to improve their interest of writing, entitled Crazy Brush. We facilitate students to write a story with their produce of scribble. The study process described as follow: firstly, we examined children's the produce of scribble; secondly based on the pilot results, we designed a system which would improve students' interest of writing; finally, we explained how to use Crazy Brush to assist students' writing. Future work will examine the effects of Crazy Brush and further adjustments in the system design.

Keywords: interest of writing, scribbles environment, creativity

1. Introduction

In 2003, America's National Commission on Writing proposed a concept, as "The Neglected "R": The Need for a Writing Revolution" [1]. They considered that writing can enhance students thinking, reasoning, and communication skills. So students should first learn to write and to learn better. However, the past education tends to ignore the importance of writing [1]. Besides, some studies report also indicated that students think formal writing is not bad, but they do not want to write because it is not fun [2]. Several studies [3, 4] have suggested that comic or graphic novels style could enhance students' writing interest. Words could express the full meaning of picture, and pictures could show the things that words cannot express. If we could combine writing and scribble, writing will be more fun for students to learn.

Hence, we design an on-line scribble environment to assist students' writing and to improve their interest of writing, entitled Crazy Brush. We hope the Crazy Brush system could let students draw their scribble and have fun, and meanwhile students would write a story about their scribble. In other words, students would find the interesting element from the process of drawing their scribble and transfer into writing. Next section, this paper will focus on describe the scribble system develop process and activity flow.

2. Designing the Scribble Environment: Crazy Brush

The main sources of writing include two ways: one is reading and the other is life experience. The Crazy Brush system would provide a writing channel and students could

write a story through describing others' scribble. Through the system, students could mutually share ideas and maybe they could get more creative inspirations and ideas which will not be limited to reading or experience. The study process described as follow: firstly, we examined children's the produce of scribble; secondly based on the pilot results, we designed a system which would improve students' interest of writing; finally, we explained how to use Crazy Brush to assist students' writing.

2.1 Examining the Scribble Capability of Students in Pilot

The main purpose of the pilot is to understand students' scribble and writing capability. The former means that how students can scribble a story. The latter means that how students speak their own scribble and write a story. We had ten students from a kindergarten, and they based on their ideas and created scribble on the paper in 30 minutes. After they finished scribbling, we interviewed students about their creative concept, and let students tell a story by reading their own scribble picture.

Figure 1 showed that one student's scribble picture and it means that he wanted to go to the beach. We found that most students are able to scribble and they would talk about the scribble idea. Although some students could not clearly express their meaning on the picture (Figure 2), maybe the process of scribble could stimulate students' creativity and ideas from other children. From the above initial observation results, we could find that kindergarten children already have the capacity of scribble and describe their ideas through scribble and speak.



Figure 1 Kindergarten student scribbles' picture

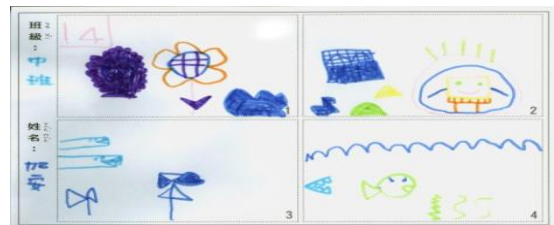


Figure 2 Kindergarten student scribbles' picture

2.2 Designing of Crazy Brush

We hope system design is flexibility and it could support various activities, whether in the classroom or after school. The Crazy Brush system function contains three parts: scribbles, story writing, and portfolio. Therefore, before using this system, students must first login ID and password.

Scribbles: The system provides the most basic functions, for example: brush, eraser, and color etc, see Figure 3. Using the eraser tool can easy clear unwanted drafts and the undo tool can quickly return to the previous step. Paper cannot provide these functions. The button design principle is intuitive which could avoid children's cognitive overload. Students could scribble through system function to name their scribble. The system will also investigate creator the sources of ideas: (1) imagination, (2) their own experience, (3) reading experience, and (4) other. After the completion of creation, the students could choose whether to share their scribble picture with others and the scribbles could become one of storytelling resources.

Story writing: Students have to write a story in light of choosing their own scribble or others'. Students can use keyboard input words or handwrite on the screen (Figure 4). Students have to input a story topic and the system will search related words. Students can write a story using related words. In this part, the system provides video and sound recording functions and students could telling a story according to their write story. After

story writing or telling, the students could choose whether to share with others and to publish to portfolio.

Portfolio: The portfolio function would collect students' scribble and story and students could review all their works. They could press the triangle button and watch others' creative writing or speech (Figure 5). Paper cannot record students scribble process, but the system provide this function. In portfolio, students can see others scribble process, and they can learn from each other. In addition, the system also provides recommend feature, students can vote their favorite creation. We hope to make writing more fun and let students do the initiative writing.



Fig. 3 Scribbles system screen



Fig. 4 System image of story writing



Fig. 5 Portfolio

2.3 Activity Design

This section describes the Crazy Brush system how to use in the classroom learning activities. In the activity, teachers provide a scribble topic. Through the topic, students cooperate with each other to scribble and to write story. The system randomly divided students into groups, 5-6 members per group, students have to collaborate to discuss and complete a scribble story with others. The learning activity includes 4 steps. Step 1, students will need to search related vocabulary with the scribble topic and discuss with group members, and complete the story. Step 2, students scribble must be completed within a limited time. Step 3 students look at scribble picture and complete story writing together. Step 4 the system randomly selects a student to share story. The Crazy Brush system can support a variety of activities, but we offer just one example here.

3. Conclusion & Future Work

Writing skills and express ability are not separate. When writing becomes a work, the students will gradually hate writing and feel pain. This study tries to combine scribble and writing activities. We designed a Crazy Brush system to assist story writing, to provide a stress-free space, and to let students showing creative. Through this approach we want to improve students' interest of writing and to let students taking the initiative writing.

Next, we will have an experiment into a kindergarten to understand students' writing situation and the effect of Crazy Brush system. We will explore to students use the system through the frequency, to determine whether the increased their interest of writing. We are hopeful that future research will provide more detailed results. Besides, we also hope to design the variety activities, and to explore the Crazy Brush system whether could train arts, literature literacy.

References

- [1] Grant, A., Hutchinson, K., Hornsby, D., & Brooke, S. (2008). Creative Pedagogies: "Art-Full" Reading and Writing. *English Teaching: Practice and Critique*, 7(1), 57-72.
- [2] National Commission on Writing. (2003). *The Neglected "R": The Need for a Writing Revolution*. Retrieved August 26, 2010, from <http://www.host-collegeboard.com/advocacy/writing/publications.html>
- [3] National Commission on Writing. (2010). *Writing, Technology and Teens* Retrieved August 26, 2010, from <http://www.host-collegeboard.com/advocacy/writing/publications.html>
- [4] Samantha, C. (2008). Comics & Graphic Novels. *Instructor*, 117(6), 28-30.

= Invited Young Researcher Symposium =

One-to-One Classroom Technologies Transforming Teaching and Learning Practice

Organizer: Chen-Chung LIU, Taiwan and Hiroaki OGATA, Japan

Moderator: Lung-Hsiang WONG, Singapore

Panelists: Hui-Chun CHU, Taiwan / Robin LIN, Taiwan / Noriko UOSAKI, Japan / Chengjiu YIN, Japan

Researchers into technology-enhanced learning are increasingly aware of how new learning tools based on mobile and ubiquitous technologies impact daily life. Therefore, research into one-to-one learning (<http://www.g1to1.org/>) has focused on the tools (such as pencils or computing devices) adopted by students for learning. Students in a one-to-one learning scenario use handheld devices fitted with wireless communication capabilities for various learning activities. These handheld devices may improve current classroom learning in the following ways: they connect the classroom to the outside world, facilitate social learning process, and contextualize learning experience.

One-to-one learning is based on the belief that people learn differently as a result of owning personal computing devices [1]. The attributes of these devices, including portability, connectivity and context sensitivity, can transform the learning process from productive knowledge acquisition to active and social learning. The argument that one-to-one computational environment may alter the way that people learn is largely based on the ownership of learning devices. Learners who have their own computational learning devices can obtain newly enhanced learning experiences. As a result, many new learning scenarios, which envisioned the possible learning contexts in the future, were proposed.

However, as computational power is becoming ubiquitous, we could access computers and the Internet, even when we do not carry our own laptop computers. The ownership of devices and the mobility of the personally-owned devices is no longer a critical issue. Accordingly, one-to-one learning should not refer solely to learning with handheld devices. An analogy that explains the necessity of the ownership shift is that vehicle vendors do not advertise that their vehicle small enough to be mobile and carried between different continents when every family has their own vehicle. The critical issue becomes the promotion of the desire to exploit the usage of the vehicle to achieve a better life style. In the same vein, the current technological and the social environments, compared to those when the notion of one-to-one was proposed, have been changed significantly. It has to address these changes in the research and practice of one-to-one learning. Therefore, a new line of research and practice, that highlights both social and technological innovation in order to support and amalgamate contemporary social learning theories, will become more and more imperative than before. The aim of this symposium was thus to expose the current researches and emergent practice which address the aforementioned social and technological innovations.

References

- [1] Chan, T.-W., Roschelle, J., Hsi, S., Kinshuk, Sharples, M., Brown, T., *et al.* (2006). One-to-one technology-enhanced learning: An opportunity for global research collaboration. *Research and Practice in Technology Enhanced Learning*, 1(1), 3–29.

1:1 Mobile-Assisted Seamless Learning: One Learning Hub? Or Multiple Devices for More Holistic Learning Experience?

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With research in CUMTEL ongoing for a decade and through rapid evolution, there is great diversity in the scholars' and educators' conceptual understanding and approaches to harnessing mobile and ubiquitous computing. Barbosa and Geyers' [1] view summarises the essence of one of the latest developments of mobile learning, characterised by 1:1, extensive (perhaps 24x7) access to mobile devices – it is about “increasing a learner’s capability to physically move their own learning environment as they move.” This would transform students into genuine “nomadic learners” [2]. Hence, this development is about creating the impact of stitching the learners’ formal and informal learning contexts together to lead towards seamless learning and making their learning experiences more personalised.

Chan et al. [3] define seamless learning as a learning model where a student can learn whenever they are curious in a variety of scenarios and in which they can switch from one scenario or context (such as formal and informal learning, personal and social learning, physical world and cyberspace, etc.) to another easily and quickly using the personal device as a mediator. So, what kind of mobile device is more suitable for seamless learning?

Despite the usual criticism of the form factor and limited computing power, smartphones (or the “obsoleting” PDA’s) have the advantage of instantaneous turning on and off, and being more blended or assimilated into everyday life experiences. The use of the mobile device would become a routine practice for learners and general users [4]. Rogers, Connelly, Hazlewood and Tedesco [5] argue that such devices tend to be used for short bursts of times (e.g., entering and comparing data, looking up and reviewing information, sending texts or photos to remote people, map navigation and geotagging) to support foregrounded physical activities (e.g., observing, probing, measuring) in a particular environment (e.g., city centre, forest). A potential benefit of being able to switch intermittently between activities and foci of interest is to provide multiple opportunities for students to step in and out and reflect upon these transitions. In so doing, it could deepen their understanding and help integrate their ideas, data and observations. Our 1:1, 24x7 seamless learning studies at the Primary school (in particular, Grade 3-5) level [6][7][8][9][10][11] show that smartphones can function as a personal “learning hub” that integrates various personal learning resources (including learning materials, applications and learner artefacts) at one place.

Nevertheless, the notion of 1:1, according to Cathie Norris and Elliot Soloway [12][13] is in fact “one device *or more* per student.” With the proliferation of netbook as a viable laptop replacement, for 1:1, 24x7 mobile-assisted seamless learning access, we advocate each student to keep one smartphone and one netbook or notebook device at hand to handle the needs of various formal and informal, planned and incidental learning tasks. The small size and light weight of smartphones make them the perfect tool for students to perform quick and rapid learning tasks on the move. Whenever the students have the chance to sit down (either during a field trip, on the public transport, in the library, in the park, or at home), their netbooks or notebooks would compensate the limitation of computing power and screen size of the smartphones by supporting them in carrying out more “complex” learning tasks such as detailed data analysis, report writing, Powerpoint creation, learning in

virtual environments, etc. We foresee the division of labor between the two devices would bring the students a more holistic, seamless learning experience by enabling or supporting them to engage in a greater range of learning activities, which is what 24x7 access of either device could not achieve.

References

- [1] Barbosa, D. N. F., & Geyer, C. F. R. (2005). Pervasive personal pedagogical agent: mobile agent shall always be with a learner. *Proceedings of the IADIS International Conference on Mobile Learning 2005* (pp. 281-285), Qawra, Malta.
- [2] Brodersen, C., Christensen, B. G., Grønbaek, K., Dindler, C., & Sundararajah, B. (2005). *eBag: A ubiquitous web infrastructure for nomadic learning*. Paper presented at the International Conference on World Wide Web 2005, Chiba, Japan.
- [3] Chan, T.-W., Roschelle, J., Hsi, S., Kinshuk, Sharples, M., Brown, T., et al. (2006). One-to-one technology-enhanced learning: An opportunity for global research collaboration. *Research and Practice in Technology Enhanced Learning*, 1(1), 3-29.
- [4] Chen, W., Seow, P., So, H.-J., Toh, Y., & Looi, C.-K. (2010). Extending students' learning spaces: Technology-supported seamless learning. *Proceedings of the International Conference on Learning Sciences 2010* (pp. 484-491), Chicago, USA.
- [5] Rogers, Y., Connelly, K., Hazlewood, W., & Tedesco, L. (2010). Enhance learning: A study of how mobile devices can facilitate sensemaking. *Personal and Ubiquitous Computing*, 14(2), 111-124.
- [6] Looi, C.-K., Seow, P., Zhang, B., So, H.-J., Chen, W., & Wong, L.-H. (2010). Leveraging mobile technology for sustainable seamless learning. *British Journal of Educational Technology*, 42(1), 154-169.
- [7] Looi, C.-K., Wong, L.-H., So, H.-J., Seow, P., Toh, Y., Chen, W., et al. (2009). Anatomy of a mobilized lesson: Learning my way. *Computers & Education*, 53(4), 1120-1132.
- [8] Wong, L.-H., Chen, W., Looi, C.-K., & Zhang, B. (2010). Analysis of attributes of mobile learning activities: Two case studies of m-learning design. *China Educational Technology*, 2010(2), 7-15.
- [9] Wong, L.-H., Chin, C.-K., Tan, C.-L., & Liu, M. (2010). Students' personal and social meaning making in a Chinese idiom mobile learning environment. *Educational Technology & Society*, 13(4).
- [10] Wong, L.-H., & Looi, C.-K. (2010). Vocabulary learning by mobile-assisted authentic content creation and social meaning-making: Two case studies. *Computer Assisted Learning*, 26(5), 421-433.
- [11] Zhang, B., Looi, C.-K., Seow, P., Chia, G., Wong, L.-H., Chen, W., et al. (2010). Deconstructing and reconstructing: Transforming primary science learning via a mobilized curriculum. *Computers & Education*, 55(4), 1504-1523.
- [12] Norris, C., & Soloway, E. (2002). *Keynote speech*. IEEE International Workshop on Wireless and Mobile Technologies in Education 2002, Växjö, Sweden.
- [13] Norris, C., & Soloway, E. (2004). *Keynote speech*. International Conference on Intelligent Tutoring Systems 2004, Maceio, Brazil.

Knowledge Engineering Technologies and Semantic Networks as Mindtools for Context-Aware Ubiquitous Learning

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Introduction

Recent advances in mobile and wireless communication technologies have enabled various new learning approaches which situate students in environments that combine real-world and digital-world learning resources; moreover, students are allowed to share knowledge or experiences with others during the learning process. Although such an approach seems to be promising and innovative, researchers have indicated several problems when applying it to practical applications, in particular, the lack of proper strategies or tools to assist the students to learn collaboratively in such a learning scenario with abundant content. Students might feel interested when using the mobile devices to learn; however, without proper assistance or guidance, their learning achievements could be disappointing. To cope with this problem, I and my colleagues tried to develop Mindtools for ubiquitous learning based on knowledge engineering and concept map approaches. Experimental results on several elementary school natural science courses showed that such approaches not only enhance learning motivation, but also improve the learning achievements of the students.

1. A Knowledge Engineering Approach to Developing Mindtools for Context-Aware Ubiquitous Learning

In this paper, a knowledge engineering method, the repertory grid, is proposed to develop Mindtools for context-aware u-learning. Moreover, a learning activity has been conducted for a natural science course of an elementary school to investigate the effectiveness of this innovative approach.

2. A Concept Map Approach to Developing Collaborative Mindtools for Context-Aware Ubiquitous Learning

This study presents a collaborative Mindtool for mobile and ubiquitous learning based on the concept map approach. Moreover, a learning activity has been conducted to evaluate the effectiveness of the innovative approach. Experimental results show that the learning achievements of the students who learn with the collaborative Mindtool achieve significantly better results than those who participate in tour-based mobile learning or the traditional concept map approach.

3. A Two-Tier Test Approach to Developing Location-Aware Mobile Learning System for Natural Science Course

In this study, we present a mobile learning system that employs Radio Frequency Identification (RFID) technology to detect and examine real-world learning behaviors of students. This study also utilizes each student's responses from two-tier test (i.e., multiple choice questions in two-level format) to provide personalized learning guidance (called two-tier test guiding, T³G). Experimental results from a natural science course of an elementary school show that this innovative approach is able to improve the learning achievements of students as well as enhance their learning motivation.

The CSCL technology used in the Classroom - GS2.0

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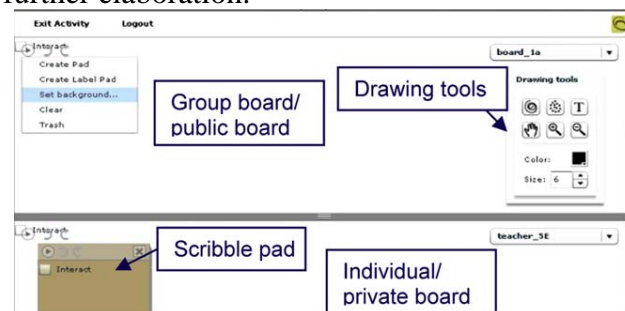
Introduction

In recent years, computer technologies play an important role in supporting students' collaborative learning. One-to-one technology enhanced learning is the way that a student uses at least one powerful portable computing devices with internet access and communication capabilities. These devices will be used frequently and integrally as part of learning activities, becoming indispensable learning tools that will allow learners to learn with more fun in the classroom.

In this study, we will introduce Group Scribbles (GS) [1], a CSCL software co-developed by SRI International and NIE, which enables collaborative generation, collection and aggregation of ideas through a shared space upon individual effort and social sharing of notes in graphical and textual form in the face-to-face classroom.

GS2.0

The CSCL technology used in classroom is Group Scribbles (GS) 2.0, a general purpose collaboration tool in the sense that we do not need a pre-defined topic or task. GS user interface presents each user with a two-paned window (Fig.1). The lower pane is the user's personal work area ("private board") with a virtual pad of fresh "scribble sheets" on which the user can draw or type with different colors. A scribble can be visible to others by dragging it into the "public board" in the upper pane which is synchronized across all devices. It enhances the characteristics of sticky paper notes and student response systems by providing their key features while avoiding some of their physical constraints. The essential feature of the GS is the combination of the private board where students can work individually and group boards or public boards where students can post the work and position it relative to others, view others' work, and take items back to the private board for further elaboration.



Conclusion and future work

We already designed several learning activities based-on GS and the results indicated that GS is really easy for use and facilitate group interaction in the classroom. Although most of CUMTEL researchers are focus on small devices used in outdoor scenarios. But we believe that most of the learning occurs in classroom settings. And more and more 1:1 classrooms will be setting in the school. We need to prepare a more efficiently and deeply environment for teachers and students in the near future.

References:

- [1] Chaudhury, S. R., Roschelle, J., Patton, C., et al. (2006). *Coordinating student learning in the collaborative classroom with interactive technologies*. Poster presented at the 3rd International Society for the Scholarship of Teaching and Learning Conference, Washington D.C.

Toward Seamless Language Learning: How Can We Incorporate In-Class Learning with Outside-Class Learning?

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Introduction

In this talk, the focus is how we can incorporate in-class formal learning with outside-class self-learning for the realization of seamless learning. As a possible solution, we will propose our ongoing system called SMALL system.

4. Seamless Learning

In this talk, by seamless learning, we mean learning which occurs with seamless transitions between in-class and outside-class learning. There is a related notion called ‘cyclic model of learning’, where ‘class’ means not only learning in-class but also learning outside-class allowing teachers to incorporate students’ self-learning into in-class learning. These two ideas share the same concept that learning can occur wherever they are and that both in-class and outside-class learning links each other. This concept is critical for English education in Japan since it has been pointed out that learning time of English at school is not sufficient.

5. SMALL System (Seamless Mobile-Assisted Language Learning Support System)

This system makes outside-class learning connected to in-class learning. It is likely that people learn but forget soon. Therefore even though students learn new words in the textbook, they soon forget them. So the system let them aware that they have learned it before when they come across the same word in the different contents provided by the system (cf. Figure 1 & 2). When a student, Yusuke, registers new word, “including”, which he already learned in the textbook, then it is hyperlinked. If he clicks it, it jumps to the textbook page where it appears. The same system works when Yusuke and Miwa registered the same new word, “inspire”. We learn words from the context. The system provides the contexts to let them learn how the word is used, which leads to the effective vocabulary learning. With the help from the system, students can be aware of what they have learned before, and what other students are learning, and the teacher can grasp what the students are learning outside-class and incorporate students’ self-learning into classroom activities so that close link between in-class and out-class learning will be realized.

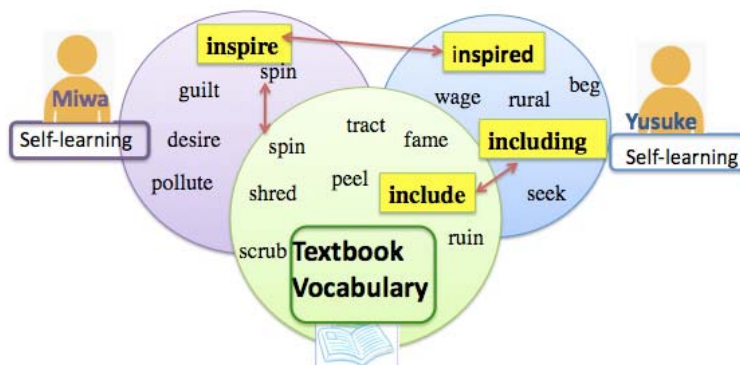


Figure 1 Link between in-class learning and outside learning

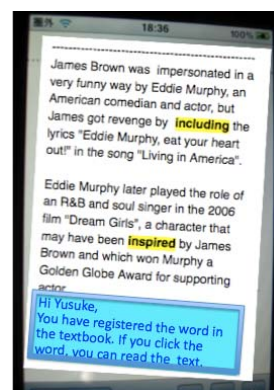


Figure 2 Mobile user interface while reading contents provided by the system

Utilizing Mobile Technologies to Realize “Learning by Doing”

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Introduction

With the development of the mobile technology, mobile/ubiquitous learning becomes feasible and offers new benefits to instructors and learners. In the past decade, various mobile/ubiquitous learning environments have been implemented. These researches are all about utilizing these new equipments to improve teaching and learning in education.

“Learning by doing” is a natural study method which has been used since ancient times. Utilizing mobile technologies to improve this “learning by doing” is a good choice.

In this paper, we will introduce two prototype systems which were developed in the past. One of them is called ALGOS and the other is called JAPELAS. Then, we will introduce an ongoing system, called SONKULE. These systems are all using mobile technology that follows that same principle presented.

6. JAPELAS

It is very difficult for foreigner students to master Japanese polite expressions (JPE) because the expressions may turn out complicated depending on the context, for instance, hyponymy, social distance, and the formality of conversation. In order to help the foreigners understand JPE anywhere anytime, we developed a system, called JAPELAS.

7. ALGOS

We implemented a system to support the process of learning the sorting algorithms, called ALGOS. Making use of the ALGOS, the learner plays the role as a data in the simulation of sorting algorithm to visualize the data flow of computers in the real world.

Using this system, all the students stand in a line with a PDA each, and the teacher assigns an array of numbers to the students and asks them to sort these numbers according to a certain algorithm, and the new position of each step is sent to the server. Then, they receive these tasks, collaborate together and exchange their physical positions according to the algorithm.

8. SONKULE

In order to support learner to find learning partners for mobile language learning, we are currently developing a system called SONKULE. It is a website for language exchange and international communication. For example, when a Japanese is studying English and an American Japanese, they will be capable of correcting each other’s mistakes through this tool.

A novel approach using this relationship helps learners to find an appropriate person who is able to solve the problem even if he is a stranger, an appropriate request CF (Figure 1) will be recommended upon their request, and then they help each other through the SONKULE service. This way it can enhance personal relationship, expand network of friendship, and support knowledge sharing and knowledge creation.

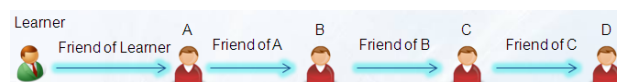


Figure 1 CF.

9. Conclusion and future work

In this paper, we introduced 3 mobile learning systems, JAPELAS, ALGOS and SONKULE. All of these systems showed the effectiveness of utilizing mobile technologies on “learning by doing”.