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The Work-in-Progress Poster of the 19th International Conference on Computers in Education: ICCE 2011

Editors

Riichiro Mizoguchi

Onjira Sitthisak

Tsukasa Hirashima

Gautum Biswas

Thepchai Supnithi

Fu-Yun Yu

APSCE

NECTEC a member of NSTDA

THAILAND CYBER UNIVERSITY

MAEJO UNIVERSITY

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Preface of Work-in-Progress Posters

Work-In-Progress Poster (WIPP) session is held in conjunction with the conference: 19th International Conference on Computers in Education (ICCE 2011) which takes place during November 28 and December 2, 2011, Chiang Mai, Thailand. The aim of the WIPP session is to provide extra opportunities for poster presenters to showcase well-formulated and innovative ongoing work or late-breaking results.

ICCE 2011 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, each of the six theme-based sub-conferences organized its own program committee for selecting WIPP papers for its own theme. All submissions for the WIPP presentation were reviewed by the program committees and 22 papers were accepted in total of the six sub-conferences. We believe this WIPP session provides a great opportunity for presenters and participants to develop and refine their ideas and concepts through the interactive communication with each other.

We are grateful to the authors of the papers, WIPP program committee members, and ICCE 2011 local organizers for their effort to make this happen.

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Onjira SITTHISAK

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Maiga CHANG, Athabasca University, Canada
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Thapanee THAMMETAR, Thailand Cyber University Project, Office of the Higher Education Commission, Thailand
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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

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

Analysis of Students' Emotion from a Text Corpus

Liang-Chih YU[a*], Shou-Fang LIANG[a], Wei-Hua LIN[a], K. Robert LAI[b], Baw-Jhiune LIU[b]
[a]*Department of Information Management, Yuan Ze University, Taiwan, R.O.C.*
[b]*Department of Computer Science and Engineering, Yuan Ze University, Taiwan, R.O.C.*
*lcyu@saturn.yzu.edu.tw

Abstract: Emotions play an important role in e-learning environments. Previous studies have investigated the prediction of learners' emotions using various features such as acoustic-prosodic features, mouse movements, facial features, and body postures. In addition to these features, linguistic features are also useful for identifying learners' emotions especially in text-based e-learning systems. Therefore, this study attempts to analyze the linguistic features for different types of emotions. To accomplish this goal, we first collect a text corpus of emotion sentences from student-teacher dialogs in mathematics learning. Each sentence is then annotated to provide analysis results such as the linguistic features, proportions, annotator agreements, and annotation accuracy for different emotions.

Keywords: Emotions, natural language processing, language resources

Introduction

Emotions have drawn more attention in the field of e-learning. Previous studies have shown that emotions may have a positive or negative impact on learning outcomes [1][2][3]. For instance, Rodrigo et al. has summarized that boredom may have a negative impact on student achievement, and confusion may have both positive and negative effects [2]. Therefore, researchers have investigated different methods for prediction of learners' emotions to improve learning [4][5][6]. Litman and Silliman used acoustic-prosodic features to detect student's emotions in their ITSPOKE tutoring system [4]. Horiguchi et al. proposed the use of mouse and face movements to explore relationships between mental states and learners' behaviors [5]. Graesser et al. integrated multiple features such as facial features and body postures to identify learners' emotions in their AutoTutor system [6].
In addition to the features mentioned above, linguistic features are also useful for emotion prediction. By incorporating the linguistic features, text-based e-learning systems [7][8] can be enhanced by identifying student's emotions from text inputs and providing personalized suggestions accordingly. To accomplish this goal, the first step is to analyze the linguistic features for different types of emotions occurred in learning environments. Therefore, we first collect a text corpus of emotion sentences from student-teacher dialogs in mathematics learning. Each sentence is then annotated to provide analysis results such as the linguistic features, proportions, annotation agreement and accuracy for different emotions.

1. Text Corpus Collection

We collected a text corpus from a junior high school in Taiwan. Three mathematics teachers and 149 students were involved in the collection process. The teachers and students

Table 1. Text corpus analysis — Emotion types, example sentences, and linguistic features.

Emotion	Example sentence	Linguistic feature
Delight	I made a big progress this time. Oh! Great! This question is so easy.	progress, great, easy, simple
Contempt	This question is so stupid and deserves no response. This question is too elementary. Even a kid can do it.	stupid, basic elementary, kid
Boredom	That's so bored. I have addressed such kind of questions many times before. I don't want to waste my time on such a tedious question.	bored, boring, tedious
Frustration	That's too bad. I will be failed. Forget it. That's too hard.	bad, fail, hard, difficult
Confusion	This question is ambiguous. I do not understand the meaning. Why the question can be solved in this way?	ambiguous, why, weird, confuse,

communicated with each other to discuss mathematical problems in the classroom. A total of 759 sentences with emotions were collected from the student-teacher dialogs to form a text corpus. We herein defined five emotion types: Delight, Contempt, Boredom, Frustration, and Confusion according to the previous studies [1]. Since not all sentences in the corpus contained an emotion type, we added Others to handle out-of-domain emotions.

2. Results

2.1 Linguistic Features of Different Emotions

Table 1 presents several example sentences for the five emotion types. As indicated, students may express Delight when they satisfy their performance or the questions are easy. Nevertheless, if the questions are too simple, then students may express Contempt. Students may also express Boredom when they feel bored due to the pointless or senseless questions. Conversely, students may express Frustration when they worry about their performance or the questions are hard. On the other hand, students may express Confusion when they are confused due to the ambiguous or incomplete questions. By observing the emotion sentences in the corpus, we summarize a number of linguistic features for different emotion types, as shown in the last column of Table 1.

2.2 Annotation Results

In order to analyze student's emotions, the three mathematics teachers annotated the corpus to create a gold standard of the emotion types. Each sentence in the corpus was first annotated with one of the five emotion types by two teachers (annotators). If there is a disagreement between the two annotators, then this sentence will be judged by the third teacher (adjudicator) for final decision. After all disagreements were resolved by the adjudicator, the proportions of the emotion types and the accuracy of the two annotators can be calculated from the corpus. Table 2 shows the annotation results. The results show that around 74% of the sentences in the corpus contained an emotion type, and the remaining 26% were out-of-domain sentences. Additionally, among the five emotion types, Delight and Confusion were the two major types.

For the analysis of agreement, Table 2 shows that the agreement between the two annotators A1 and A2 was 81.16%. Additionally, the agreement of Contempt and

Table 2. Annotation results.

Emotion	Num. of sentence	Proportion	A1-A2 Agreement	A1 Accuracy	A2 Accuracy
Delight	194	26%	93.30%	94.85%	98.45%
Contempt	53	7%	62.26%	77.36%	84.91%
Boredom	81	11%	69.14%	88.89%	80.25%
Frustration	99	13%	59.60%	79.80%	78.79%
Confusion	134	18%	84.33%	92.54%	91.79%
Others	198	26%	87.88%	89.90%	97.98%
Sum/Avg.	759	100%	81.16%	89.33%	91.70%

Frustration were relative low, indicating that these two emotion types were more ambiguous. Another observation is that the accuracy of A1 and A2 were 89.33% and 91.70%, respectively. Such human (expert) results can be viewed as the upper bound for automatic emotion classification using machine learning algorithms.

3. Conclusion and Future Work

In this study, we have collected a text corpus with different types of emotions. We also annotated this corpus to analyze the linguistic features, proportions, annotator agreements, and annotation accuracy for different emotions. Future work will be devoted to developing machine learning algorithms using the analysis results to automatically identify learners' emotions and provide personalized suggestions in mathematics e-learning systems.

Acknowledgements

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Practical Use of Kit-Build Concept Map in Classroom with Tablet-PC

Shinsuke NAKATA[a], Hideo FUNAOI[b], Tsukasa HIRASHIMA[b*]
[a]*Elementary School, Hiroshima University, Japan*
[b]*Graduate School of Engineering, Hiroshima University, Japan*
*tsukasa@isl.hiroshima-u.ac.jp

Abstract: We have proposed a framework of kit-build concept map that can be diagnosed automatically, and have already implemented two fundamental softwares to practically use the kit-build concept map, that is, (1) KB-map Builder where learners can build concept map by combining provided kit, and (2) KB-map Analyzer that gathers the maps built by learners on-line and diagnoses them. We have been using the kit-build concept map in real class in an elementary school. This paper is a work-in-progress report of the practical use of the kit-build concept map for science learning in the elementary school. In this report, map building with tablet-PCs is mainly described. Based on the results of questionnaire, we have confirmed that the students found concept-map building useful, and preferred to use tablet-PCs rather than desk-top PCs.

Keywords: Kit-Build Concept Map, Tablet-PC, Waxing and Waning of the Moon,

Introduction

"Kit-Build Concept Map" is a framework to realize automatic diagnosis of concept maps [1, 2]. In the framework of the kit-build concept map, the task to build a concept map is divided into two sub-tasks: 1) "segmentation task" where parts (called "kits") of a concept map are extracted and 2) "structuring task" where the extracted parts are connected. An ideal concept map (goal map) is, then, prepared by an expert or a teacher at first, and parts are generated by decomposing the goal map. The parts are provided to the learner, and then the learner builds a concept map (learner map) by connecting the parts. Therefore, in the framework of the kit-build concept map, the segmentation task is carried out by teacher or domain expert, and learner carries out recognition task instead of the segmentation task. Then, the construction task remains as it is.

In the KB map, because the learner builds a learner map with the same parts with the goal map, it is possible to diagnose learner maps automatically by comparing with the goal map. This diagnosis makes the following matters possible for a teacher and learners: (i) getting the differences between a goal map and a learner map, (ii) getting the differences between each of learner maps, and (iii) getting an overlaid concept map which is generated by overlaying several learner maps including a group of learners. We have already implemented (I) Kit-Build Concept Map Building Tool for a learner (KB-Map Builder) and (II) Analyzer of KB-Map for educator (KB-Map Analyzer). KB-Map Builder and KB-Map Analyzer are connected through internet and real time analysis is realized.

This paper is a work-in-progress report of practical use of the kit-build concept map in an elementary school. The learning target is "waxing and waning of the Moon" in science learning. Map building on tablet-PCs is mainly described in this paper.

1. Practical Used of Kit-Build Concept Map for "Waxing and Waning of the Moon"

1.1 Goal map, learner map and overlaid map

Figure 1 is the goal map that was prepared by a class teacher. By taking apart the goal map, kit of a concept map is generated. A learner builds a concept map by using the kit. Figure 2 shows parts of the kit and a half-build learner's map. Because all nodes and links are the same ones, the differences between a learner map and the goal map appear as inconsistence in the link connections. Then the links are targets for remedial learning of the learners. Figure 3 shows an example of an overlaid map which is generated by overlaying several learner maps. The overlaid map describes understanding of a student group.

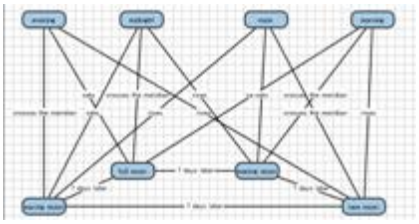

Fig. 1: Goal Map

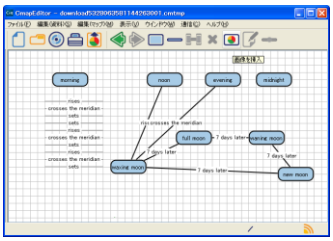

Fig. 2: Learner Map Building

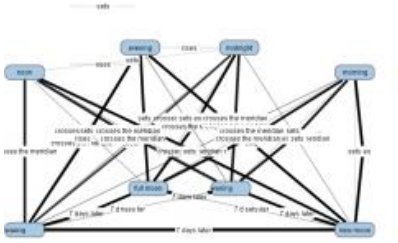

Fig. 3: Overlaid Map

1.2 Practical Use

Seventy-three 4th grade students in two classes attended this practical use. The student firstly received two classes of "waxing and waning of the Moon" by building the kit-build concept map. Three weeks later, the students build the maps with table-PCs as an additional class. In this class, the students built the maps individually for twenty minutes, and then, improved the maps collaboratively with peers while moving with the tablet-PC freely. Questionnaire was carried out three days after the use.

Figure 4 shows a map building on a desktop PC. Figure 5 is a scene of the classroom of map building with table-PCs. Figure 6 shows a map building on a tablet-PC. Figure 7 shows a scene where two students are collaboratively improving their maps.

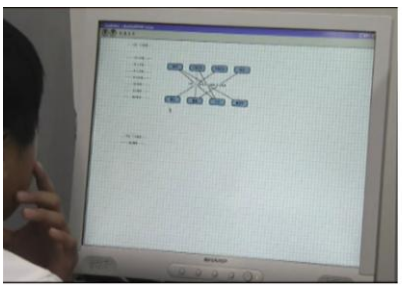

Fig. 4: Map Building with Desktop PC

Fig. 5: A Scene of the class

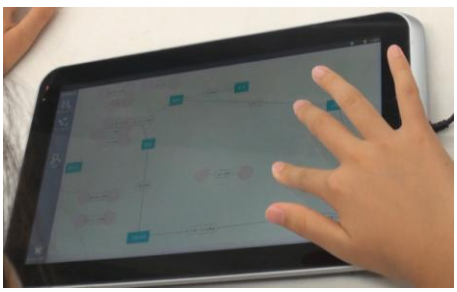

Fig. 6: Map Building with Table-PC

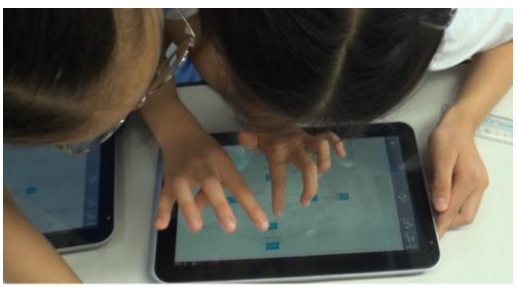

Fig. 7: Collaborative Building

1.3 Results

Figure 8 shows average scores of similarity of learner maps to the goal map in three times, that is, (1) "first map" means that a leaner made it in previous class with desktop PC (score = 79.6 (SD=25.4)), (2) "second map" means that a learner made it by him/herself at the beginning of this class with tablet-PCs (74.4(28.1)), and (3) "third map" means that a learner improved it though collaboration with other students (83.3(24.2)). The data was analyzed by one-way ANOVA followed by Ryan's method. As the result, there is a significant difference in the map scores ($F(2, 134)=4.89$, $p < 0.01$). There is also significant difference between scores in the second maps and the third maps ($p < 0.01$). These results suggest that the collaborative building was useful to improve the quality of their maps.

Table 1 shows the results of questionnaire. For questions from (1) to (4), we asked the students to agree or disagree with statements on 4 point scales, that is, 4 =strongly agree, 3=agree, 2=disagree and 1=strongly disagree. As for questions from (5) to (7), we asked them to select 3=tablet-PC, 2=both, and 1=desktop-PC. The results suggest that most of the students find map building a useful and enjoyable activity. Furthermore, they prefer to use tablet-PC to build the maps.

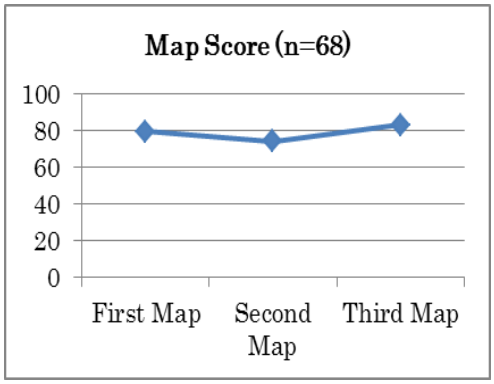

Fig. 8: Map scores

Table 1: Results of questionnaire

	4	3	2	1
(1) Did you enjoy map building?	68	6	0	0
(2) Was map building useful to learn the Moon?	57	15	1	0
(3) Do you like to use the map for other subjects?	66	8	0	0
(4) Was talking about the maps with your friends useful for your learning?	55	18	1	0
(5) Which tablet-PC or desktop-PC was better for you to build the maps?		62	5	7
(6) Which tablet-PC or desktop-PC was better for you to talk about the maps with your friends?		73	1	0
(7) Which tablet-PC or desktop-PC will you prefer to use in the next time?		64	8	2

2. Conclusions Remarks

This paper is a work-in-progress report of practical use of the kit-build concept map. In this paper, we mainly described practical use with tablet-PCs. By using tablet-PCs, learning activity with the kit-build concept map can be conducted in a usual classroom although wireless LAN is necessary. Moreover, students are allowed to collaboratively build the maps while moving with their own tablet-PC freely. Results of questionnaire suggest that they really enjoyed this learning activity. Detailed analysis of this practice has not been completed, but we have already confirmed that tablet-PC is a promising approach to use the kit-build concept map practically.

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An Adaptive ICT Education Service based on Course Knowledge Database in Science and Technologies

Hiroto YAMAKAWA*, Hiroshi KOMATSUGAWA & Junichi YOSHIDA
Graduate School of Photonics Science, Chitose Institute of Science and Technology, Japan
*h-yamaka@photon.chitose.ac.jp

Abstract: This paper describes the structure and results of case studies of a new adaptive ICT education service based on the course knowledge database in science and technologies. The adaptive ICT education service links various university's ICT learning recourses by using knowledge items in the knowledge database. The service provides functions for reminding students of their own learning approach and to explore further knowledge. The case study revealed the effectiveness of the service.

Keywords: Knowledge Database, ICT Education Service, Linkage between ICT Systems

Introduction

Recently, setting the goal of individual student's study and managing the learning process have become an important target to be managed within the entire course in most Japanese universities. In order to let students recognize their level of achievement of their learning results, ICT systems are most powerful and useful. However, ICT systems, such as e-learning, Course Management System (CMS) etc., are generally running independently in most universities. This leads to be difficult for the students to understand how to extend their study for further development of their knowledge and/or career. Consequently, it is not always successful to activate the students' spontaneous will or aspiration of study. The goal of our study is to provide an adaptive ICT education service, which reminds students of their own learning approach referring learning resources and records across ICT systems. By linking multiple learning resources spread over university's ICT system with adequate basis of the study, we have realized several useful functions for the students to remind and find their study results and to set up their future learning plans. The linkage of learning resources is simply structure with the course knowledge database. The following session describes essential structures, functions and the case study results of the new ICT education service.

1. Structure and of ICT Education Service

Figure 1 shows the structure of the new ICT education service that is constructed based on three ICT systems. The CMS manages syllabuses in which various information of each course are included[1]. The e-learning is a WBT system that uses the function of textbook and problem solving. It consists of the LMS and materials[2]. The Learning Portfolio System manages course learning results of students[3]. These three ICT systems are designed to run independently. Therefore, we introduced a knowledge database as the linkage basis between those ICT Systems. The knowledge database is constructed by using the relational database

technology. The database items have been registered from knowledge items determined by course teachers and structured with technological keywords that are commonly used in science and technology field. We assume those knowledge items cover the expertise in our university. In addition to technological keywords, combinations based on the knowledge items of syllabuses and e-learning materials have been registered on the knowledge database. Using the knowledge database as the linkage tool enables the ICT education service to provide the following three services through the Learning Portfolio System:

1. Referring combinations based on knowledge items of syllabuses and e-learning materials.
2. Requesting the appropriate learning recourses (for example: course information, e-learning materials, student efforts of e-learning materials, etc.) on ICT systems, when necessary.
3. Reminding examples of each student's learning approach using his record and the learning recourses.

2. Functions of ICT Education Service

We have implemented two functions for the ICT education service on the Learning Portfolio System.

2.1.1 Function of reminding the link between courses, and showing ease of learning in other course materials

When a student clicks a course name in the list of courses, all courses linked by the knowledge items are displayed on the screen in colored-code. If a student clicks an uncompleted course, then the ease of learning is displayed by star icons. The star icons are displayed up to four of max, and the number of icons indicates a prediction of average ease of the course completion. The prediction is based on the assumption that the ease of the learning in the course for a student is determined by the score of the course based on the linkage between his completed courses.

2.1.2 Function of supplementing with additional learning for the knowledge

When a student clicks "show details" button on the course menu, e-learning materials linked to the course are displayed. The linkage between each course and related e-learning materials are determined based on the commonality of the knowledge items. When a student makes the effort to learning materials, Learning results of knowledge for each student are updated instantaneously when he accomplished the e-learning materials. This leads to students to guide into further development of their knowledge or career.

3. Case study to Explored Effectiveness of ICT Education Service

A case study explored the effectiveness of the new service through a questionnaire. In the cases of the function described in section 2.1.1, generally students use this function in conjunction with syllabuses to select their courses at the beginning of semester. For the questionnaire, we surveyed total number of 274 students, and about 70% of the students answered "the function is useful". The reason why "useful" was "by using the data provided

by the new service, they could investigate the course further and confirm the information which they could not get by legacy syllabuses". In the cases of function described in section 2.1.2, students used this function to confirm the knowledge and also used related e-learning materials to review and prepare for the final test of the course. For the questionnaire, total number of 272 students answered, and about 80% of the students answered "it is useful". The reason why "useful" was "by using the data provided by the new service, they could confirm specific learning items by themselves". There results indicate the new ICT education service has successfully spread to students and accepted as an effective tool to get much information on the course for developing their learning processed.

For an issue in the future, further effectiveness verification of the functions provided by the new ICT education service should be conducted especially from the viewpoint of students' autonomous learning. In particular, the function described in section 2.1.2 is quite unique and important for students not only to remind their learning approach but also to develop their own learning style. The use of this function is not limited to the course learning. It can be widely used in carrier development programs. Linking those applicable fields by this new ICT education service is also an important future subject.

4. Conclusion

We have proposed an new ICT education service based on a knowledge database of courses in science and technology for reminding students of their own learning approach and activate them getting further knowledge. From our case study, the ICT education service inspired students to consider their learning approach that is not reminded before.

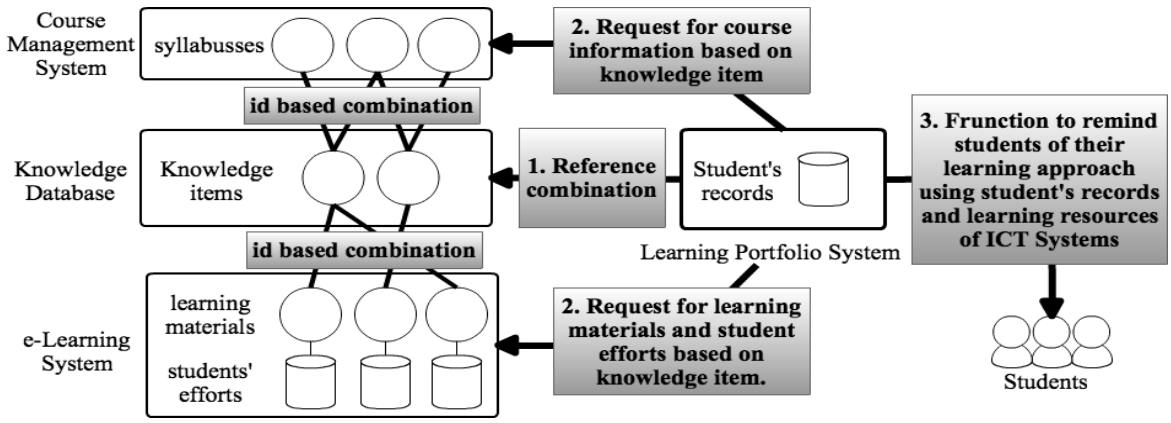

Figure1. Structure of the ICT Education Service based on Knowledge Database

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Proposal for a Conversational English Tutoring System that Encourages User Engagement

Michal MAZUR[a]*, Rafal RZEPKA[a] & Kenji ARAKI[a]
[a]*Graduate School of Information Science and Technology, Hokkaido University, Japan*
*mazzi@media.eng.hokudai.ac.jp

Abstract: The need for successful communication between people from different countries has become a growing necessity of modern times. The necessary medium for cross-cultural communication, English, has gained the status of an international language. In our paper propose a free-talking dialogue system designed for tutoring English as a second language. We also discuss the development and capabilities of such conversational agent and possible applications. Among the key features of such system we emphasize the principals of gamification, a notion of integrating game mechanics into non-game systems, applications and services in order to encourage user interaction. Next, we present the novel idea of teaching foreign languages to users by sentential context-learning method. Finally, we underline the importance of emotion recognition by introducing a potential foundation for verifying the assumption that certain words containing emotional content can improve learning.

Keywords: Human-Computer Interaction, Natural Language Processing, Second Language Acquisition, Code-Mixing, Emotion Recognition

Introduction

In recent years, various non-task oriented conversational agents for second language acquisition have been developed [1][2][3]. The object of our scientific interest embraces pedagogical conversational agent that would assist students by providing a support to their learning efforts. Fryer et al. assessed the usefulness of chatterbots as language learning tools [5]. Nowadays, when access to real teachers is often limited, the demand for inexpensive solutions has increased and the systems already proposed to respond to this issue have been too expensive to use on a large scale [4]. One of the possible ways to significantly reduce the costs of studying is to deploy an automated solution - a tutoring system that might be used to replace or at least support human teachers in situations where there are no other alternatives.

1. State of the Art

Over the last decade, there have been a few attempts to satisfy the demand for artificial partners in learning. CSIEC (Computer Simulation in Educational Communication) is an Artificial Intelligence (AI) framework developed at Peking University [6]. Even though CSIEC provides learners with a chatting partner, there are still many unsolved problems regarding the ability of understanding and generating natural language or dealing with textual ambiguity. In another project, a prototype of a computer dialogue system, Let's Chat, allowed students to practice second language in social situations [7]. This project is only using pre-stored utterances, so conversation topics in the dialogue system were significantly limited. In other approach to create a conversational language tutor, an AI chatterbot architecture called CLIVE was presented by Zakos et al. [8]. CLIVE accepts input messages in two languages and thereby allows learning also for students with a limited knowledge of the second language. However, this system is built on top of a commercial

stand-alone AI technology platform, which makes it incapable of retrieving new vocabulary and topics and is entirely dependent on its limited knowledge base.

2. System Development

In our work we incorporated the methodology previously used in a casual conversation system using modality and word associations retrieved from the Web, developed by Higuchi [9]. This system has been originally designed to operate on Japanese utterances and we currently work on an extension of its functionality to perform a textual conversation environment also in English. Our system will harness a few independent modules that will cooperate with each other to achieve anticipated results.

2.1 Gamification Module

In CSIEC system a scoring mechanism has been used to motivate users and facilitate self-studying and progress evaluation [6]. The main disadvantage of this approach is the outdated score calculation system that may be useful to monitor students' progress by a teacher, but do not fully respond to the expectations and needs of a user. To improve this idea, we propose the "gamified" scoring mechanism, reinforced by adding some game design mechanics on top of its main functionality. Gamification is an informal term for the use of elements of video game design in non-gaming systems. Recent psychological studies brought the evidence that such systems may bring motivation by creating the reward and reputation systems inspired by the principles of video game design [10]. We believe that our approach may build users' competitive spirits and improve the overall user experience since, as stated by Detering et al., "Gamification may bring the ability to shape user behavior in directions intended by the project of a given system" [11].

2.2 Co-Mix Module

In our research, we implement a context learning method based on the phenomenon of code-mixing into chatterbot in order to generate code-mixed phrases. Code-mixing is the transition between linguistic units (words or phrases) from one language into another, within one sentence, where original grammar of the native language is usually preserved unchanged [12]. During conversations, students will encounter second language lexis and thereby establishing a connection between the meaning of a certain difficult word in the first (L1) and second (L2) language. The results of preliminary experiments described by Mazur et al. [13] indicate that code-mixed sentences may be an effective way of expanding one's L2 vocabulary.

2.3 Emotion Recognition and Humor Module

The ambiguity is a significant drawback in processing, recognition and analysis of emotions. Currently, there are many existing classifications of emotions but there is no universally accepted emotional model. Darwin and Tomkins first proposed so-called basic emotions [14][15]. Pluchtik defined 8 basic emotions and enhanced his theory with the aspect of intensity [16]. In our research, we use the classification of emotions proposed by Nakamura [17]. To recognize speakers' emotions and words with certain emotional load we plan to adapt a system for affect analysis, developed by Ptaszynski et al. [18]. To boost user interaction with the chatterbot we will use system developed by Dybala et al. [19] which has proved to successfully activate humans with humor.

2.4 Language Normalization Module

We would like to address the current problem of user creativity and individuality of the language, caused by its irregularity and a problem to understand the English language used in social media (like Twitter). The research performed by Clark et al. [20] responds to this issue by presenting a system for automatic normalization of the English language - CECS (Casual English Conversion System). Applying certain functions of this system such as aiding non-native speakers' reading comprehension on informal English may reinforce our system and create the opportunity of expansion of the project into less-formal aspects of language.

3. Conclusions

A novel Open-domain Conversational Tutoring System specialized in teaching English has been proposed in this paper. It is still a work in progress and we plan to improve its design by incorporating additional components such as dialog management module, user-specific knowledge module or machine learning module.

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A Personalized Patient Education Framework to Support Diabetes Patients Self-management

Marut BURANARACH[a*], Thepchai SUPNITHI[a], Nattanun THATPHITHAKKUL[a]. Suwaree WONGROCHANANAN[b], & Wiroj JIAMJARASRANGSI[b]
[a]*National Electronics and Computer Technology Center (NECTEC), Thailand*
[b]*Faculty of Medicine, Chulalongkorn University, Thailand*
*marut.bur@nectec.or.th

Abstract: Patient self-management support focuses on encouraging patients to be knowledgeable about their illness and to be able to sufficiently look after themselves. Some key elements to this achievement include knowledge, motivation, self-efficacy, goal-setting, action planning and problem-solving. In this paper, we describe a personalized patient education framework aimed to provide personalized learning resource recommendations for patients. Specifically, resources are recommended based on patients' goals and barriers. We built a patient's self-management portal that allows a patient to define his or her goals and barriers in the patient profile. Learning resources help to support patient education that can promote a patient to achieve the specified goals. In this framework, an ontology-based approach will be used for modeling patient's goals and barriers as well as learning subjects. Ontology allows patient conditions and learning resource metadata to be linked. Finally, we discuss evaluation plan for assessing the framework effectiveness in terms of improvement of patient's efficacy, i.e., knowledge test score, confidence levels and satisfaction.

Keywords: Personalization, Ontology Engineering, Patient Education Technology

Introduction

Diabetes is a chronic disease which requires special attention both from healthcare providers and patients. Its treatment procedure is typically complicated and requires a lot of interactions between medical personnel and patients. However, due to the limited number of medical personnel and the increasing number of patients, the time and attention that the medical personnel can spend with each patient becomes less and less. In alleviating the problems, we proposed uses of specialized technology to support self-management activities for diabetes patients. Supplement to conventional healthcare, they offer added services that are important for the patients especially while they are waiting for next visits to their doctors.

In this paper, we focus on patient education, which encourages patients to be knowledgeable about their illness and to be able to sufficiently look after themselves. Specifically, learning resources are provided to support patient education. In this framework, learning resources will be recommended for a patient based on the patient's selected goals and barriers. An ontology-based approach will be used for modeling patient's goals and barriers as well as learning subjects. Ontology allows patient conditions and learning resource metadata to be mapped, which will enable personalized resource recommendation.

1. Background

1.1 Self-management Support for Diabetes Patients

Self-management support is a component of the Chronic Care Model (CCM) [1] which focuses on encouraging patients to be knowledgeable about their illness and to be able to sufficiently look after themselves. Some key elements to this achievement include knowledge, motivation, self-efficacy, goal-setting, action planning and problem-solving. Diabetes patients' daily lives are generally known to have a great impact on the patients' health. It is advocated that diabetes must be principally managed by the patient on a day-to-day basis such as dietary habits, increase in exercise, intake of medications, and monitoring of blood sugar levels, blood pressure, blood lipids, feet, and eyes.

Effective diabetes self-management support requires a complex series of assessments and instructions. As a result, patients often require additional support and communication outside of the traditional clinician visit [2]. Further, the information provided for patients should take into account each patient's distinctive life circumstances.

1.2 Patient Education

Patient education is the process of influencing patient behavior and producing the changes in knowledge, attitudes and skills necessary to maintain or improve health [3]. However, a number of research studies have found that much of the medical information provided for patients cannot be understood by most of the patient population [4, 5]. It was suggested that patient education materials should be short and simple, contain graphics and encourage desired behavior [5]. Patient education can help to improve patient's health literacy, which is the capacity to seek, understand and act on health information that is important for patient's self-management [6].

2. A Personalized Patient Education Framework for Patient Self-management Portal

2.1 Learning Resource Metadata

In our project, we have developed a diabetes patient self-management knowledge portal [7] that adopted a personalized service framework. The portal consists of a learning resource repository to support patient education. Articles and video clips are provided in the repository in four subject categories: food, exercises, emotions and healthiness. Each article contains metadata information that will be used in searching. Specifically, keywords that are best described each article are included in a metadata field of the article.

2.2 Patient Profile

In addition to the patient's personal and health information, the patient can set his or her targets and plans. The patient can set up goals such as food control, weight control, exercises, medication intakes, etc. After setting the goals, the patient can choose from a list of possible barriers that may prevent the patient to achieve each goal. After the patient specifies his or her barriers, the system shows recommended strategies that the patient can adopt to overcome the barriers. The patient can then create daily action plan on his or her calendar that is linked with a reminder service.

2.3 Personalized Learning Resource Recommendation

The personalized recommender framework focuses on providing each patient with the learning resources related with his or her selected goals, and barriers. Ontology model is used for mapping between patient profiles and learning resources. Figure 1 shows instance to concept mapping between patients' conditions, i.e. goals and barriers, and patient profile

ontology. In associating the learning resource metadata with ontology, keywords are linked with concepts in the learning subject ontology. Thus, each resource can be mapped to concepts in the subject ontology. The learning subject ontology is designed such that it can represent concepts associated with patient's goals and barriers. In order to create learning resource recommendation for each patient, rules are created to associate different patient conditions with different learning resource subjects.

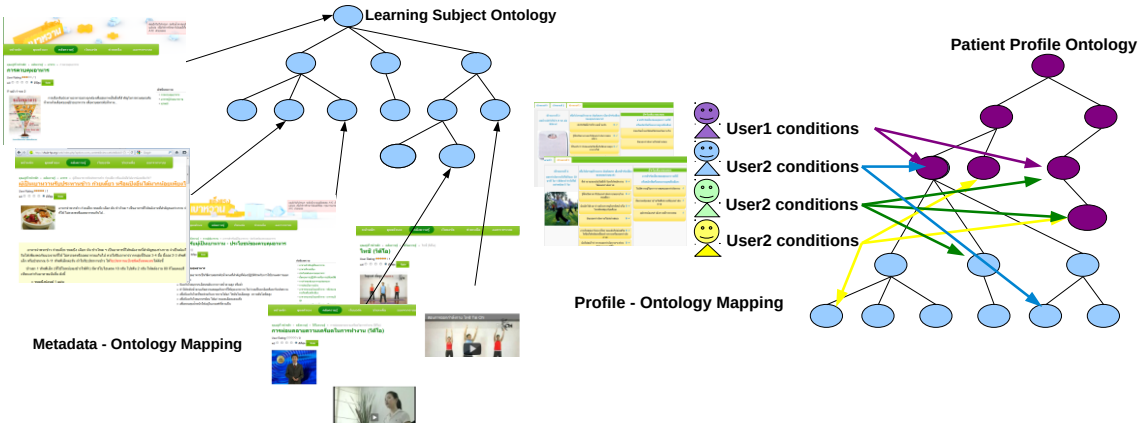

Figure 1 An ontology-based framework for personalized resource recommendations

3. Discussion

In this paper, we describe a personalized patient education framework designed for a diabetes patient self-management portal. The framework allows automatic recommendations of learning resources based on each patient's selected goals and barriers. Ontology is used as a means for associating patient profiles with learning resource metadata. Evaluation of the framework is planned in terms of patient efficacy improvement at every three-month interval. Questionnaires and pre-test and post-test score comparisons will be used to assess patient knowledge, patient confidence in self-care and patient satisfaction.

Acknowledgements

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

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Analyzing the Dimensions of Social Knowledge Construction of a Socio-scientific Issue Instructional Activity under an Online Collaborative Discussion Environment: A Preliminary Quantitative Content Analysis

Huei-Tse HOU[a*], Jui-Chu LIN[b]
[a]*Graduate Institute of Applied Science and Technology, National Taiwan University of Science and Technology, Taiwan*
[b]*The Department of Humanities and Social Sciences, National Taiwan University of Science and Technology, Taiwan*
[*] hthou@mail.ntust.edu.tw

Abstract: Socio-scientific issues combining both dimensions of science and social science (e.g., issues of energy policy etc.) will help students cultivate interdisciplinary thinking and decision-making abilities. Through quantitative content analysis, this study preliminarily explored the distribution of each dimension of social knowledge construction that learners showed by discussing socio-scientific issues in the environment of online asynchronous discussion collaborative learning. Also, this study discussed and provided relevant suggestions as references for instructional practices based on the research results.
Keywords: socio-scientific issues, collaborative learning, asynchronous discussion

1. Introduction

We people face many important, interdisciplinary socio-scientific issues presently. These issues combine the intellectual issues of both dimensions of natural science and social science (e.g., energy policy and gene modification issues etc.)[1][2]. Also, it is an important task to develop students to have this decision-making ability [3]. This kind of issue is usually more complicated, so students needed more time to think, argue, and conduct extensive information searching to get evidences for argumentation. In a real classroom, discussion activities will make learners' knowledge construction restricted because of the limitations of time and lack of instant interaction with online information. Applying the computer-supported collaborative learning (CSCL) environment to help the discussion on this issue may be beneficial for students to develop interdisciplinary thinking and decision-making abilities, and further to construct more knowledge. We have more relevant studies on social knowledge construction through online discussion instruction now (e.g., [4]), but the studies on applying computers to help students have socio-scientific issues collaborative discussion instruction activities are still limited. Also, the analysis of the dimensions of learners' social knowledge construction in socio-scientific issues collaborative discussion is lacking. Therefore, with quantitative content analysis and applying Interaction Analysis Model (IAM) coding scheme of social knowledge construction [5], the purposes of this study were to preliminarily explore the distribution of each dimension of social knowledge construction that learners showed by discussing socio-scientific issues under the online asynchronous discussion collaborative learning environment. Also, the discussions and relevant suggestions were provided as references for instructional practices based on the research results.

2. Method

In this study, the participants were 24 college students majoring in the same course related to energy technology. In this course, we implemented an online asynchronous discussion instruction activity. During a 16-day period, students were asked to discuss relevant issues based on a certain energy policy, share their opinions, collect relevant data as references, and discuss different policy views (e.g., whether you support to build a nuclear generating station in a certain specific ocean city or not). Finally, students were asked to collaboratively integrate views and display in the form of project. Students discussed in a general discussion board, and they could post new topics or respond to others' topics. To explore the process of learners' knowledge construction in socio-scientific issue discussions, we adopted IAM coding scheme [5] to code the data. This coding scheme was extensively used in many studies related to CSCL (e.g., [4], [6]). The coding scheme was shown in Table 1. One researcher coded all contents of topics and replies gradually; besides, to assure the inter-coder reliability, the other coder also coded these messages. The *Kappa* coefficient representing the inter-coder reliability between the two coders was 0.85, which showed high degree of agreement.

Table 1 Gunawardena, Lowe, and Anderson (2007) Interaction Analysis Model (IAM)

Code	Phase	Descriptions
C1	Sharing / comparing of information	Statement of observation or opinion; statement of agreement between participants
C2	Discovery and exploration of dissonance or inconsistency among participants	Identifying areas of disagreement; asking and answering questions to clarify disagreement
C3	Negotiation of meaning/co-construction of knowledge	Negotiating meanings of terms and negotiation of the relative weight to be used for various agreement
C4	Testing and modification of proposed synthesis or co-construction	Testing the proposed new knowledge against existing cognitive schema, personal experience or other sources
C5	Agreement statement(s)/application of newly constructed meaning	Summarizing agreement and meta-cognitive statements that show new knowledge construction
C6	Others	Discussions irrelevant to knowledge construction

3. Results and Discussion

The frequency and proportion of each code are shown in Figure 1. Among these, we can discover that learners display "Sharing/ comparing of information" most (C1, 60.65%); the next is "Discovery and exploration of dissonance or inconsistency among participants" (C2, 34.19%). Also, "Negotiation of meaning/ co-construction of knowledge" simply have 1 percentage (C3, 1.29%). Other phases "Testing and modification of proposed synthesis or co-construction" (C4) and "Agreement statements/ application of newly construct meaning" (C5) are not found in this study. From the preliminary results, we know that the major components of social knowledge construction are knowledge sharing and clarification of disagreement in online socio-scientific issue CSCL discussion. This will help students collect and share more information as evidence by asynchronous technologies; also, conduct an analysis based on different data and views between each other. Besides, the percentage of off-topic discussions (C6, 3.87%) is extremely low, indicating that students have level of concentration on socio-scientific issue CSCL discussion to a certain degree. However, the depth of students' deeper argument and debate, schema testing, and the aspects of creative thinking is still limited.

4. Conclusion and Suggestions

This study preliminarily explored college students' dimensions of social knowledge and component structure in socio-scientific issue discussion under the CSCL environment. To promote deeper and diverse discussions to reach more knowledge argumentation (e.g., C3, C4, C5), we suggest teachers can consider the adoption of problem-solving strategy instruction by appointing learners concrete open-ended unsolved problems to motivate their inference and deeper discussions. From the past studies taking college students as samples on non-socio-scientific issue online problem-solving discussions, we have discovered that

the application of this strategy did help students have better learning behavioral patterns (e.g., [6]). Also, the present studies on socio-scientific issue CSCL discussion-based learning are rather limited, we suggest more diverse research methods, such as social network analysis [7] and progressive sequential analysis [8] can be applied in the future to explore students' specific online learning behavior patterns on socio-scientific issues.

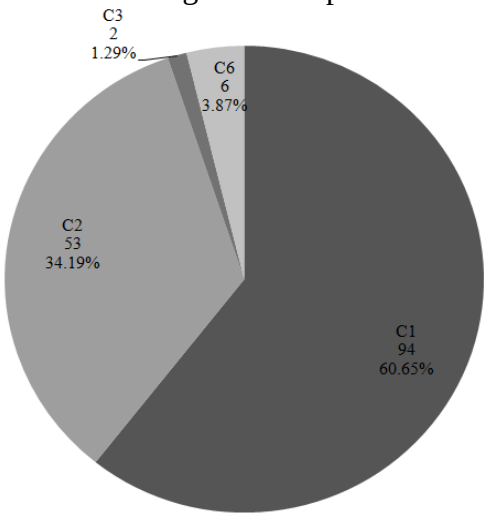

Figure 1 The frequency and proportion of each social knowledge construction code

Acknowledgments

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C3: ICCE Conference on Advanced Learning Technologies, Open Contents, and Standards

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DEVELOPING E-LEARNING SYSTEM OF JAPANESE LANGUAGE FOR FOREIGN STUDENTS IN JAPAN

Masako FURUKAWA*, Asuka ICHIHARA, Shingo IMAI
University of Tsukuba International Student Center, Japan
*furukawa@intersc.tsukuba.ac.jp

Abstract: In this paper, we describe the e-learning system for Japanese language we are developing.Japanese language education for foreign student is the one of the fields that is appropriate for e-learning. However, there are neither sufficient contents nor systems that are successful in sustaining motivation of users.Our project team proposes a content set with various devices to maintain learners' motivation.Such devices produce not a passive study style but an active, autonomous study style using web-based learning.It will provide conversation practice by using avatars, courses with stories and simulating games, and a web-based learners' dictionary.It will also provide a platform for interactions among learners and between learners and Japanese native speaking volunteers through a self-organized SNS and/or web phones.The whole of the content and system will be accessible by all of the higher education institutions in Japan.

Keywords: Japanese language learning, e-learning, SNS, avatar, simulation game

Introduction

"Project on welcoming 100,000 students from overseas" was announced in 1983.The current plan "Project on welcoming 300,000 students from overseas" (MEXT 2008) is stems from above, and in progress.Because of these policies, the need for Japanese language education wasdramatically increased since the early 2000s.In some courses,students are able to obtain a course in English. However, all studentsrequired to attend Japanese class in the end.It is essential to have enough Japanese skill to ensure quality of studying life in Japan.However, in reality, all students do not have equal opportunity to study enough Japanese.

1. The purpose of this project

In University of Tsukuba, foreign students have increased (Fig.1).

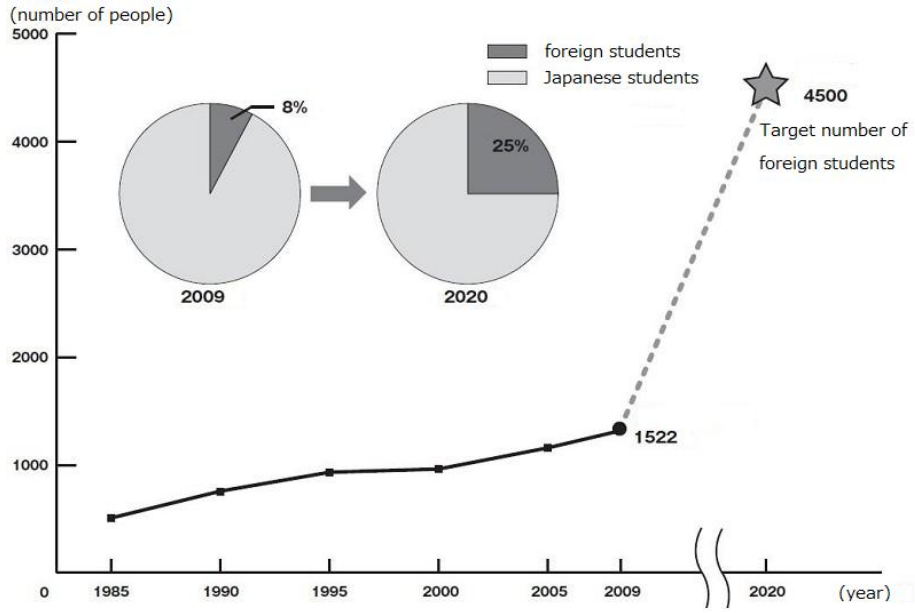

Fig 1. Changes in the number of foreign students

Number of all foreign students, from 2002 to 2006 was about 1,200. But the number from 2008 to 2010increased from 1,337 to 1,944.In International Student Center, about 100 students each semester hopes to take class of Japanese lesson. However, they have to take the major classes of their own majorandcannot take time for Japanese lessons.In order to participate in their experiments, there are many students who have to absentfrom their Japanese lessons. Many Japanese lessons require having previous lesson to understand. That is the reason why many students are tend to drop out and wish to have more opportunity to transfer lessons. In the field study of foreign student in university of Tsukuba(2010), foreign graduate students who major in science said that, in the experiment, they cause many troubles because their lack of understanding of Japanese language and the situation. They also felt alienation because they cannot communicate smoothly with other Japanese students. Even though some students are not required to attendcourses in Japanese, they are in need of Japanese in their life in Japan. This is the reason why we thought the needs for Japanese E-learning.

2. Feature of the e-learning system for Japanese language

2.1 Including systems as self-study type

We are developing of user communities of learning system, simulating game system, the task events system, the agent system as a learning support teacher. These systems will support to motivate student to keep learning, and we aims to reducethe number of students who are drop out from self-study learning due to the feeling of loneliness. For example, we are proposing virtual classroom with other students using avatars, so student will have opportunity to use theirown skill. We also use voice activation to give them opportunity to pronouns in Japanese. The avatar of agent in E-learning system will navigate throughout the lessons. This E-learning system will have feature like RPG to support students to exercise their skill following their lesson. There is also a chance to join SNS from this E-learning system to expand their chance to meet other people and opportunity to use their Japanese.

2.2 Contents of Japanese Lessons

Each Japanese lesson will have the flow chart such as bellow (Fig.2).

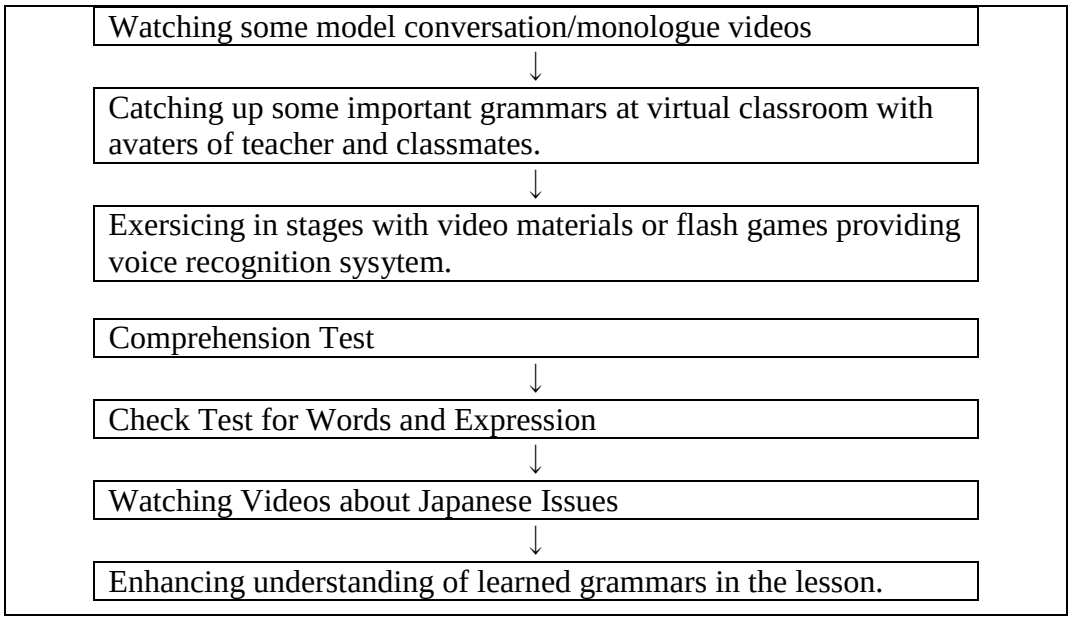

Fig 2. Flow chart of Japanese lesson.

In this Japanese E-learning system, each lessonwill have systematic approach in learning grammar from beginner level through intermediate level.Our fundamentalconcepts of Japanese learning course are bellow.

- Learning grammar systematically&communicative approach:Using learned grammar only at the level to simulatecommunication.
- Focus on grammar form
- Authenticity:Communication skill like native Japanese speaker, including filler and gesture.
- Virtual System
- Awareness Raising:Simulating real classroom scene to help learning Japanese.
- Academic Japanese:Japanese for student such as university.

Acknowledgements

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Development of a New Presentation Tool for Cognitive Enhancement by Controlling the Whole Writing Processes

Akihiro HOSOKI, Hisaharu TANAKA
Kenzi WATANABE, Yasuhisa OKAZAKI
Graduate School of Science and Engineering, Saga University, Japan
hosoki@ai.is.saga-u.ac.jp

Abstract: In this paper, we develop a new presentation tool which aims at learners' promotion of recognition. We assume that showing writing processes has educational rich information. We believe this information includes educational factors which influence learners' recognition of the provided learning contents. Animation functions of popular presentation tools are not enough to represent this information. The advantages of showing writing processes are: (1) learners can learn implicitly by watching and imitating how to write, and (2) learners can recognize connection of the elements composed in step by step. We have implemented functions with showing teachers' writing processes to introduce these advantages. Our presentation tool enables the lesson with a new type of presentation slides which introduces in these advantages.

Keywords: Handwriting process, writing on blackboard, replay, presentation

Introduction

In the field of education, lessons using presentation tools are widely used. Meanwhile, there are not a few teachers and learners who dwell on writing on blackboards. Writing on blackboards has features with showing writing processes. We assume that showing this processes have educational rich information. (1) learners can learn implicitly by watching and imitating how to write. (2) learners can recognize connection of the elements composed in step by step. It is undesirable that slides using popular presentation tools lack these advantages from an educational point of view.

We have developed a new educational presentation tool which introduces the advantages of showing the writing processes.

1. New style of slides

Figure 1 shows an example of a new educational presentation slide we propose. This is for explaining how to solve practical exercises of simultaneous linear equations in junior high school mathematics.

The upper part is explanation of processes which teachers shows in step by step. Teachers can show clearly the processes which write equations from price of apples and oranges by alpha expression. Therefore, learners can recognize relations of individual objects. We believe that this has advantages to promote learners' comprehension.

The lower part shows clearly the model processes of solving equations. Therefore, learners can imitate easily the model. We believe that this have advantages to promote

procedure acquirement. The system of having these features can easily realize the advantages of showing writing processes described in introduction.

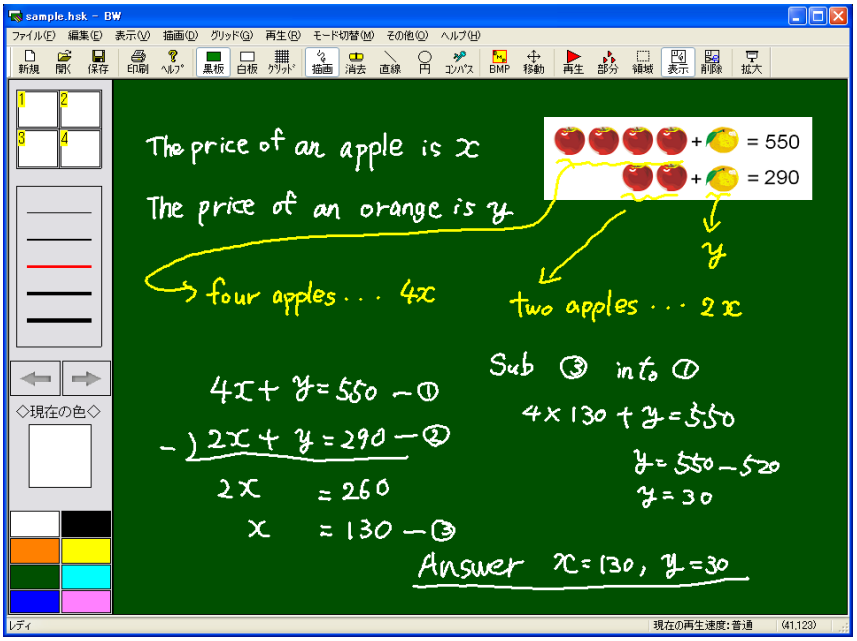

Figure. 1: A sample slide

2. How to use

Figure 2 shows processes of making slides and presenting. These processes are consisted of four processes below.

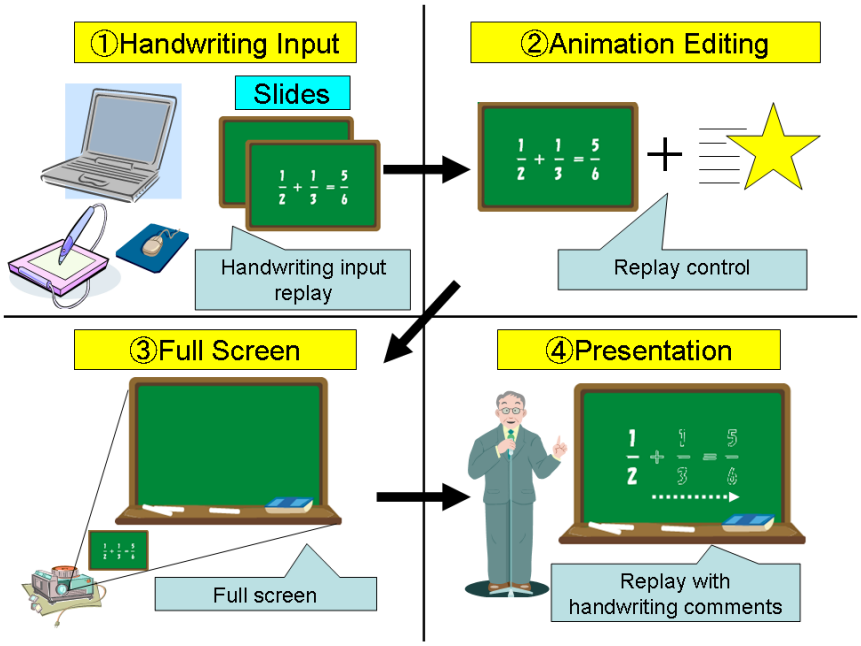

Figure. 2: Usage of system

Teachers easily make hand-written slides by just writing with an electronic pen on handwriting interface as if they are writing on note in step 1. Our system preserves handwritten strokes for handwriting input replay. Teachers can control speed and interspaces with the above-mentioned advantage (2) in step 2. The created slides in step 2 are projected by a full screen function with a liquid-crystal projector in step 3. Teachers give

lessons in coordinate with the replay and handwriting comments in step 4. They can emphasize the points in synchronizing their explanation with controlled replay.

We have used Microsoft Windows XP Home Edition SP3, Visual Studio 2008 (Visual C++ 2008) for development. We have used a liquid crystal pen tablet WACOM DTU-710 for handwriting input.

3. System functions

3.1. Handwriting input replay function

For the above-mentioned advantage (1), we have implemented a handwriting input replay function. Our tool obtains handwritten strokes when teachers press the pen, drag with the pen, and release the pen. By handwritten strokes, we can represent directly the writing processes.

3.2. Replay control function

For the above-mentioned advantage (2), we have implemented a “replay control function”. Teachers enable to edit and control objects in slides with controlling replay speed and interspaces by this function.

3.3. Slide design function

We have implemented following five functions for slides design. They are change functions of the pen width, the pen color and background of the tool, insert functions of images and grid lines.

3.4. Slide data storage function

We have also implemented a slide data storage function to save and restore slides' data. By this function, teachers can reuse slides for what it is or in a modified form.

4. Conclusion

In this paper, we have developed a new presentation tool to promote learners’ recognition by controlling the whole handwriting processes in slides. The process in which teachers write has educational rich information. The advantages of showing the writing processes are : (1) learners can learn implicitly by watching and imitating how to write, and (2) learners can recognize connection of the elements composed in step by step.

We have implemented a “replay function” to realize the above-mentioned advantage (1). By this function, teachers can show slides in step by step, and they can replay teacher's writing processes. We also have implemented a “replay control function” to realize the above-mentioned advantage (2). By this function, teachers control speed and interspaces of writing on blackboard and they can optimally replay.

The next tasks we are planning are to implement slides' management function and evaluation experiments. We expect that our tool makes a new slide presentation style.

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Math e-Learning System STACK2.2 and a Prototype of Question Authoring Tool

Yasuyuki NAKAMURA[a*] & Takahiro NAKAHARA[b]
[a]*Graduate School of Information Science, Nagoya University, Japan*
[b]*Sangensha LLC, Japan*
*nakamura@nagoya-u.jp

Abstract: STACK, System for Teaching and Assessment using a Computer algebra Kernel, is a system of a computer aided assessment package for mathematics. STACK can provide questions for an on-line test that inquires an answer as a mathematical expression and assess the answer algebraically. We have been developing Japanese version of STACK as a part of work of internationalization. Recently version 2.2 of STACK was released and it increased processing speed. However, one of the difficulties of STACK is to author questions because the interface is inconvenient. In order to overcome the problem, we have developed a prototype of question authoring tool by the use of VBA of Excel. A question can be written on Excel interface and XML file is produced that can be imported to STACK question bank. Compared to authoring questions on the existing web interface of STACK, it is expected that time spent on authoring questions can be reduced.

Keywords: Mathematics, e-Learning, Computer Algebra System

Introduction

In recent years, infrastructures of information and communication technology (ICT) have been improved in schools. Some schools have computer suites for students to have practical work experience and some schools deploy Wi-Fi network for students to access Internet by their own laptop computers. Portable digital devices such as a smartphone and personal digital assistance (PDA) have been becoming popular and ubiquitous education environment are opened to students nowadays. On the basis of the ICT environment, e-Learning have been becoming popular. One of the most important functions of e-learning system is an on-line test. The level of students' comprehension can be evaluated by the online test. Students enter answers into the online form and the answers are automatically assessed by e-learning system. However, most forms of entering answers on existing on-line tests are only true or false questions test, single- or multiple-choice test, input of numerical value and simple description, and only a few e-learning system can assess true or false of mathematical expression algebraically. Maple T.A.[1] and STACK [2,3] are examples of the few systems. Maple T.A. can be accessed from a wide range of Learning Management System (LMS) such as Blackbord, Moodle and so on and STACK is integrated with Moodle. Maple T.A. is commercial software, whereas STACK is open source software.

Since we have been using Moodle as LMS, we adopted STACK in order to provide on-line test of mathematical expressions in science and math subjects. However there are some problems in STACK. Firstly since it takes times to display questions and assess the students' answer, rhythm of learning might be lost. Secondly, STACK can reply effective feedback to wide variety of students answer, but in order to realize the function, authoring questions is very complicated. First problem is solved by new version of STACK 2.2 with

cash mechanism. In order to overcome the second problem, we would like to suggest a question-authoring tool for STACK in this paper.

1. Brief Review of STACK

STACK, System for Teaching and Assessment using a Computer algebra Kernel, is a system of a computer aided assessment package for mathematics that is developed by Sangwin at the University of Birmingham, UK. Since version 2, STACK is fully integrated with Moodle. Students provide answers as mathematical expressions, for example polynomial and matrix expressions and STACK manipulate students' answer and generates outcomes such as not only true or false result but also some feedbacks. STACK is written by PHP and use Maxima, a computer algebra system, in order to manipulate mathematical expressions provided by students.

Figure 1 is an example of a question of solving a simple differential equation that was provided to students in January 2010 as an online test in our class. The question is quite simple but there are two elements that we should check in order to confirm the students' level of understanding; one is whether or not students make miscalculation and the other is whether or not an arbitrary constant is included. Although the correct answer of the question is C*exp(-2*x), there are two typical incorrect answers. One is C*exp(2*x) that is an example of miscalculation and the other is an answer exp(-2*x) that does not have an arbitrary constant. We can design questions that can provide a feedback "Incorrect answer. Your answer should satisfy the ODE, but does not." for the first type of incorrect answer and a feedback "Your answer is partially correct. The solution should contain a constant but your answer does not." for the second type of incorrect answer (see Figure 2).

If we design a question carefully in order to give a feedback like the above, we can produce significant educational benefit. As we see later, however, it is complicated work to author STACK questions because of the inconvenient authoring interface.

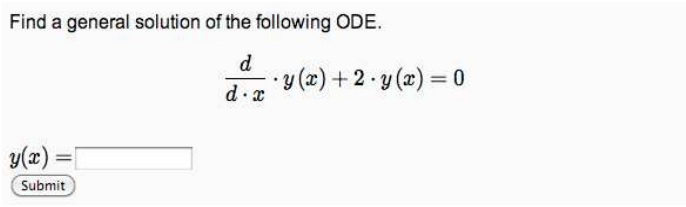

Figure 1. A question of solving a simple differential equation

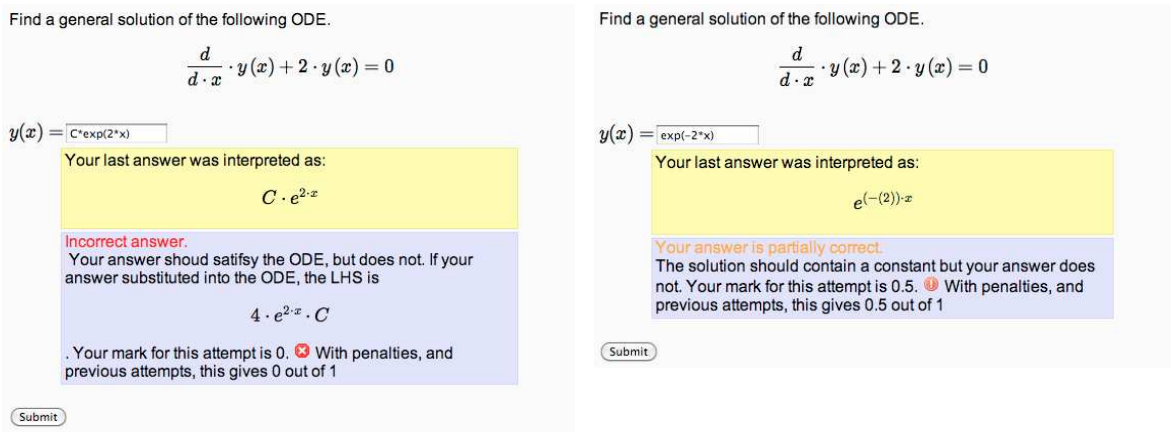

Figure 2. Examples of feedback to incorrect answers.

2. Question Authoring Tool for STACK

As we mentioned above, STACK can provide effective feedbacks to the students' answer and this function is one of the most important one of STACK. However the interface of authoring questions is not convenient. For example, the authoring web page is vertically long, network connection is inevitably required and so on. In order to reduce the stress in authoring questions, we have developed a prototype of question authoring tool for STACK by the use of VBA of Excel (Figure 3).

Although every function is not implemented to our tool, the interface is quite simple and authoring questions can be carried out without network connection. Questions authored by our tool can be exported as XML file with UTF-8 coding. Then the XML file can be imported to STACK question bank.

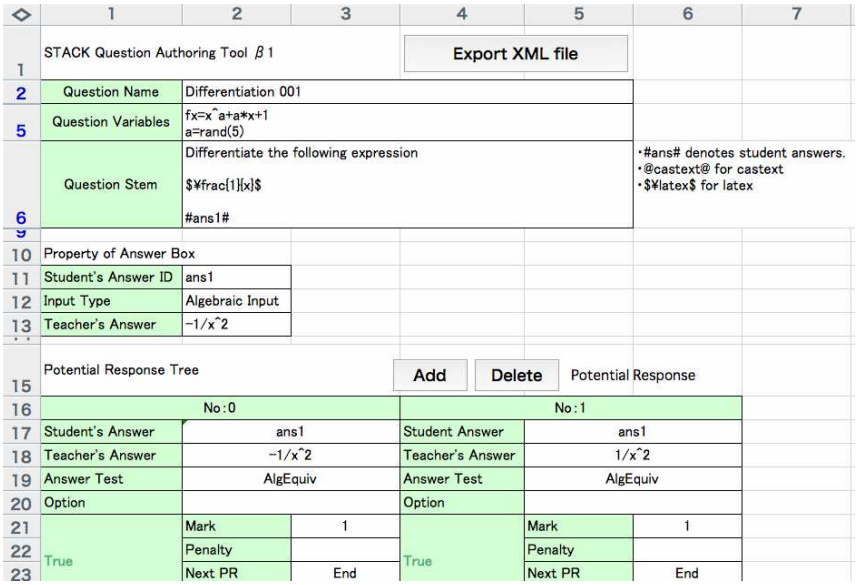

Figure 3. Snapshot of question authoring tool for STACK developed by VBA of Excel.

3. Conclusion

We have developed a prototype of question authoring tool for STACK in order to reduce the stress in authoring questions for STACK. Although every function is not implemented to our tool, the interface is quite simple and authoring questions can be carried out without network connection.

Acknowledgements

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Development of teaching material in tablet computer based on computer graphics by quantum chemistry calculation

– Reaction of $I + H_2 \rightarrow HI + H$ –

Akira IKUO[a]*, Hiroshi NAGASHIMA[a], Yusuke YOSHINAGA[a] & Haruo OGAWA[a]

[a] *Department of Chemistry, Tokyo Gakugei University, Tokyo 184-8501, Japan.*
*ikuo@u-gakugei.ac.jp

Abstract: We developed computer graphics teaching material in tablet computer, which shows rearrangement of diatomic molecule and one atom by collision. The teaching material provides information concerning changes of potential energy and realistic image of intermediate in $I + H_2 \rightarrow HI + H$, which leads to better understanding of reaction profile.

Keywords: Teaching material, CG, Visualization, Tablet computer, Quantum chemistry calculation, HI formation, Potential Energy change, Structure change.

Introduction

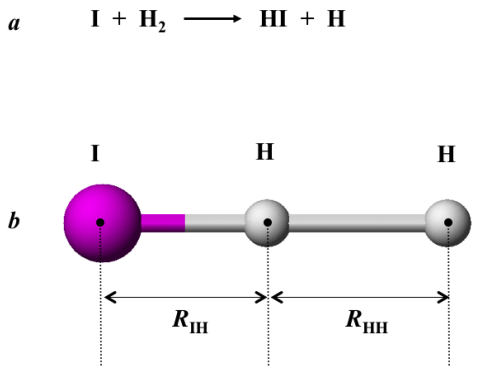
Generally, reaction profile is used to represent relationship between potential energies (PE) and reaction coordinate. The profile is often used in high school chemistry textbooks [1a-e]. It is sometimes difficult for student to realize the meaning of reaction coordinate. Visualization of computer graphics (CG) gives us great help to realize not only images of molecules but also images for dynamical reaction mechanism. Visualization of PE surface in three dimension (3-D) could clearly provide images of reaction coordinate from the standpoint of subject on energy. A diagram of PE in two dimension (2-D) is often used, and limited number of analogues in 3-D is used in physical chemistry textbook of university [2a,b]. It is our aim to produce teaching materials, which provide realizable images of chemical reactions. Recently, CG teaching material of esterification of acetic acid and ethyl alcohol based on quantum chemistry calculations has been reported [3]. The teaching material could demonstrate the reaction profile and structural change of the molecules with ball-and–stick model on screen.

The reaction of "$I + H_2 \rightarrow HI + H$" is often used for explanation of reaction rate and chemical equilibrium in "Chemistry II" of Japanese high school [1d], but the reaction path and the change of PE during reaction are explained by ambiguous expression based on old model [4]. Mechanism of the reaction has been reported that HI formation progressed as following elementary reactions [5]; $I_2 \rightarrow 2I$ (Eq. 1), $I + H_2 \rightarrow HI + H$ (Eq. 2), $H + I \rightarrow HI$ (Eq. 3)

We developed CG teaching material in tablet computer, which shows rearrangement of diatomic molecule and one atom by collision. The teaching material provides information concerning changes of PE and realistic image of intermediate in the Eq. 2, which leads to better understanding of reaction profile.

1. Procedure

The reaction images of an attack of iodine atom (I) to hydrogen molecule (H_2) in the formula (*a*) and in the ball-and-stick model (*b*), in which diameter of the stick reflects calculated bond order, are shown in scheme 1. Bond angle of I-H-H was set to 180 ° and inter-atomic distances of I-H (R_{IH}) and H-H (R_{HH}) were changed. PE and structures of intermediates of I-H-H on the way of the reaction were calculated by MOPAC with PM3 Hamiltonians [6a-c] as described previously [7].CG movie file was produced by the Flash CS4 software (Adobe, Inc.). The movie file was converted by the Quick Time PRO (ver. 7.66, Apple, Inc.) and was saved on iPad (16GB, IOS4.3.3, Apple, Inc.) by using the iTunes (ver. 10.22, Apple, Inc.).



Scheme 1. Reaction of a) "I + H_2" and b) image of inter-atomic distance

2. Results and discussion

Figure 1 shows CG teaching material in tablet computer. Upper right part of the CG shows PE change in 3-D and lower right part in 2-D. In this way learner can compare two types of presentation easily. In 2-D presentation, inter-atomic distance of I-H (R_{IH}) is drawn as a horizontal axis and that of H-H (R_{HH}) is as a vertical axis; therefore, learner can see relationship between changes in inter-atomic distances of I-H, H-H, and change of PE in color change. Upper right part of the CG clearly shows these changes of PEs with display on PE surface in 3-D, which offers a bird-eye view of the reaction profile. The most probable pathway of the reaction from the reactants of I and H_2 to the products of HI and H *via* the transition state at saddle point can be readily traced. The right part of CG is able to provide images of energy change and reaction path.

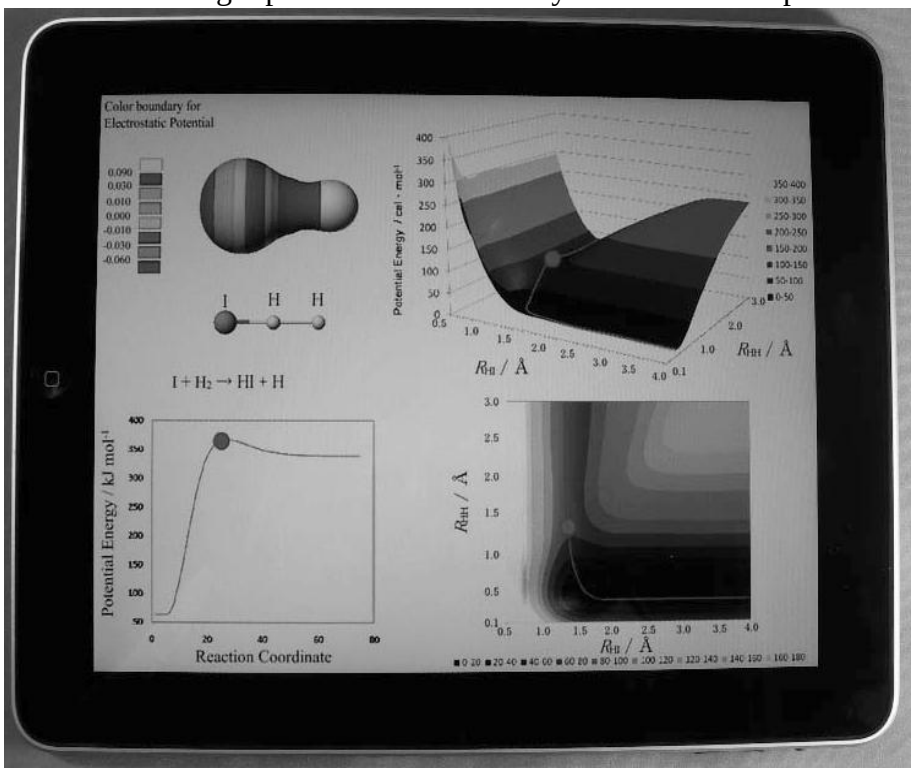


Figure 1. CG teaching material in tablet computer

Electrostatic potential on electron density (EPED) model and ball-and-stick model of the intermediate, I-H-H, and the reaction profile were shown in the left part for easier recognition of those three. The electrostatic potential [8] was calculated based on the coordinates of atoms from the intrinsic reaction coordinate (IRC) calculation and superimposed on to the iso-surface of the electron density at the value of 0.01 e $Å^{-3}$ as shown in the upper left of the CG. Distribution of the electrostatic potential among the

intermediate can be seen by the colors. The model by EPED provides information about electrostatic distribution of the intermediate with realistic shape on the way of the reaction. Lower left part of the CG shows the reaction profile, the most probable pathway of chemical reaction according to the IRC theory [9], demonstrates the degree of the reaction progress by the ball indicating PE *vs.* reaction coordinate. The left part of CG is able to provide information about characteristics of intermediate of molecule in a certain state on the progress of reaction.

This CG teaching material is able to provide information about energy change, reaction path, and characteristics of intermediate of molecule in a certain state on the progress of reaction simultaneously. In this synclonized display of CGs, lerner can see relationship between the reaction path in 3-D and the reaction profile in 2-D. When the CG in the touch-panel is touched by learner, the Quick Time control bar appears and the ball on the profile can be moved by learner's choice. This manual controll feature provides "Hands-on" feeling to learner.

3. Closing

The CG teaching material could provide not only images of energy change during reaction but also images of reaction path of chemical reaction. The teaching material could be used in the high school, of course in the university, as a supplement to the figure of reaction profile often found in the subject of "structure and the chemical equilibrium of the material" in the high school chemistry textbook [2a-e] edited accodingly the Japanese course of study [10] and also in the university textbook [1a,b]. The teaching material in the tablet computer is so handy that it could be used in both regular class and laboratory.

Acknowledgements

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Multi-touch Gesture and User Mental Representation Research

Yu-Ching HUANG[a*] & Jiunde LEE[b]
[a] ***Institute of Communication Studies, National Chiao Tung University, Taiwan***
[b] *Institute of Communication Studies, National Chiao Tung University, Taiwan*
*cooney2547@gmail.com

Abstract: According to the appearance of a conceptually new type of interface, multi-touch gesture technology, it might fundamentally change the interaction mode between user and the system. This study aims to understand the mapping relationships among users' mental representations and operational styles of multi-touch gesture. A total of 30 users were divided into two groups according to their cognitive styles (verbalizer and visualizer). And 23 most common PC system tasks were identified as the experiment tasks. The researcher used wizard-of-Oz form of multi-touch prototype and the retrospective recalled method to collects and analysis users' thoughts qualitatively. The results found significant differences between verbalizer and visualizer.

Keywords: Mental representation, cognitive style, multi-touch interface, multi-touch gesture.

Introduction

In the history of the interaction design between human and digital systems, the user-interface has long been the most important issue for both research and practical field. With the appearance of a conceptually new type of interface, multi-touch gesture technology, it might not only fundamentally change the interaction mode between user and the system but also impact the ways of design thinking in terms of operational and interactional perspectives. However, scholars in the past seemed to put most of their efforts on the technical part of multi-touch gestures but virtually neglected the interaction part especially the mapping issue between Users' mental representation and the task operation. From the user's perspective, questions such as the mappings between users' mental representation and finger-gesture operations as well as what kinds of tasks might be applicable for using the traditional operational mode (Window, Icon, Menu, Pointer) or the multi-touch gesture interface, are largely left unknown and require for further study. Therefore the primary purpose of this study aims to understand the mapping relationships among users' mental representations and operational styles of multi-touch gesture.

1. Literature Review

1.1 Multi-touch gesture

Most gestural interfaces can be categorized as touch-screen and free-form currently. This study focuses on touch-screen interface, as so-called touch user interfaces (TUIs), usually require the user to be touching the device directly. And touch-screen interface like touch panel or touch pad. Although forms of gestural device can vary wildly from massive touch-screen to invisible overlays onto environments, there are at least three general parts in controlling touch gesture device: a sensor, a comparator, and an actuator [1]. As for the

definition of gestures, in a broad sense, gesture is any physical movement that a digital system can sense and respond to without the aid of a traditional pointing device such as stylus or mouse. However, this study applies the narrow definition that using fingertips to do some movements like a wave, a touch or draw a line. For the past of 40 years, we have been using the same human-computer interaction paradigms, the WIMP interface: Windows, Icon, Mouse and Pointers designed by Xerox PARC in the1970s. Although the WIMP conventions will continues, the appeal of touch gestural interface may take users into a new era of interaction design.

1.2 Mental representation

Norman had addressed three models of the concept of user-centered design (UCD): *The designer's model, the system image, and the user's model.* For people to use a system successfully, they must have the same mental model (the user's model) as that of the designer (the designer's model). But the designer only talks to the user via the system itself, so the entire communication must take place through the "system image": the information conveyed by the physical system itself [2].While the challenge toward touch gestural interface design is that without the aid of graphic user interfaces (GUIs), the system images become transparency. It leads a condition that users have to find out how to operate the system by try and error. Therefore, designers should try an overall way to collect and understand the mental representation of users while they are facing to operate a touch gesture.

The nature of mental representation can be presented by different forms of conversion, such as images, pictures, patterns, sentence and mental state and so on. “Representation” as some ideas or something meaningful appears in the brain. In other words, mental representation helps people can make the concept more clear and specific [3]. When users operate the touch gestural interface, the mental representation of users will predict how the gestural system works. So users will create their own gestural operation mode in order to help themselves to explain the interaction between inner world (human brain) and outer world (the system). It calls a process of user mental presentation in operating touch gesture and this study defines three dimensions of the process: Individual difference [4], mental simulation [5] and Parsimonious.

1.3 Cognitive styles: “verbalizer” & “ visualize”

According to the dual code theory, human cognitive systems were divided into two sub-systems- verbal system and visual system. This theory postulates that both visual and verbal information are processed differently and along distinct channels with the human mind creating separate representations for information processed in each channel. Both visual and verbal codes for representing information are used to organize incoming information into knowledge that can be acted upon, stored, and retrieved for subsequent use [6]. Hence, cognitive style can be interpreted as an individual who faces on problem solving, thinking, perception and memory of the pattern mode. Moreover, this study purposes that users are two types of cognitive style: “visualizers” and “verbalizers”. Take “verbalizers” for example, verbalizers usually good at interpreting the semantic stimulus like a word, a sentence and so on. If verbalizers receive some nonverbal stimulus like looking at a picture, verbalizers often have a tendency that using words to interpret an image, even they will ignore the nonverbal stimulus in normal situations. Nevertheless, there are some specific conditions or somehow the characteristics of verbalizers change their usual performances. That is why this study will try to figure out: users who are different types of cognitive style,

who will have some tendency, habit, preference or specific performance toward multi-touch gestural operation.

2. Methodology and Research Procedure

Accordingly, a total of 30 users were recruited and were divided into two groups according to their cognitive styles (verbalizer and visualizer) before participated in this experiment study. And 23 most common PC system tasks were identified as the experiment tasks. The researcher used a wizard-of-Oz form of multi-touch prototype and the retrospective recalled method to collects and analysis users' thoughts qualitatively. And, Methodologies of the experiment are "the internet questionnaire of SOP"[7] , "Wizard-of-Oz prototyping" and "Retrospective Recalled" method. According to the literature review, there are many technical restricts in the real product of multi-touch panels, software, machine and systems. Therefore, in order to avoid these kinds of unimportant restricts, the "Wizard-of-Oz prototyping" may make subjects believe that they are interacting with the real computer system without doubt. Also, it is more realistic than paper prototype [8].Thus, when subjects are doing 23 tasks of multi-touch gesture onto a touch panel; they have no ideas with knowing the panel cannot work. The researchers will display the outcome of the tasks in the other room and record every movement of the multi-touch gestures which subjects just did. After finishing all tasks, the researchers will ask them to watch the recording video. And subjects will explain the reason why they display and what ideas come into their mind at that time. That is, asking subject think aloud their ideas retrospectively.

3. Discover and Results

The study results found significant differences between the verbalizer and the visualizer. From the user's perspective, the tasks that may be not applicable for using multi-touch gesture interface are for instance: Initiate Web explorer, Copy, Paste, Save, Search, Delete, Stop and Minimize. In contrast, the tasks may be applicable are: Select, Zoom-in, Zoom-out, Rotate, Back, Initiate WORD, Undo, Close, Initiate MSN, Initiate FACEBOOK, Initiate Email, Initiate audio/video player, Play and Maximize. The studying findings expect to contribute to the further design references of Touch User Interfaces.

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A Multiple Language Voice Search System for Japanese VOD Lecture using Mobile Tablet PC

Hiromitsu SHIINA[a*], Nobuki KOBAYASHI[b], Yusuke KIMURA[a] & Fumio KITAGAWA[a]
[a]*Faculty of Informatics, Okayama University of Science, Japan*
[b]*Faculty of Human Sciences, Sanyo Gakuen University, Japan*
shiinahiromitsu@gmail.com

Abstract: A mobile tablet PC has had an impact on e-learning system of Internet environment. In this paper, we developed learning system for Japanese VOD lecture using mobile tablet PC. This system has videos, slides and subtitles, and it is able to search by voice to subtitles. Though the voice search system based on Japanese subtitles. By this system has subtitles which were translated into Chinese, we developed voice search system to be available by Chinese.

Keywords: VOD Lecture, Voice Search, Multiple language search, Mobile tablet, e-learning

Introduction

Development of mobile tablet PCs as iPad and Android tablet PC has had an impact on the environment for the usage of computer and Internet. A mobile tourist information system[4] is a kind of Applications using mobile PCs. In many university, improvements on VOD lecture using Internet are studied[2][3]. It was practiced for example in Okayama University of Science[3]. Meanwhile, many changes of environment of VOD lectures are coming. In this study, we are developing e-learning system on mobile tablet PC, particularly on Android tablet PC. This system has videos, slides and subtitles, in addition it is able to search by voice to subtitles. Though the construction of voice search system based on text search to Japanese subtitles. By having translated Japanese subtitles into Chinese, we developed voice search system to be available by multiple languages. The development of a multiple language voice search system is using Google Voice Recognition[1]. In addition to search to translated subtitles, we are attempting to use word lists that were translated from morphemes of Japanese subtitles into Chinese words. The aim of this search system is that international students can find in their native language. Using the voice search in Japanese have low recognition rate, in order to not be using voice recognition engine of native language. In particular, beginners of foreign language in voice recognition rate are significantly low.

1. Multiple voice search system

1.1 System flow of voice search

System flow of voice search system as follows: (1) user inputs keyword by voice; (2) mobile tablet PC sends voice to Google Voice Recognition through Google Mobile App; (3) Google Voice Recognition translates voice to text and returns text to mobile tablet PC; (4) mobile tablet PC sends text to video search server; (5) movie lists was return to mobile tablet PC; (6) user selects movie segment from movie lists. This system flow was show in Figure 1.

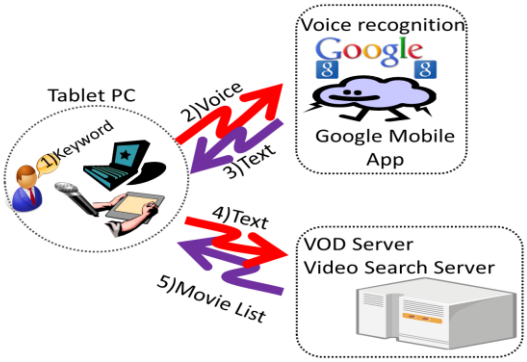

Figure 1 System flow of Voice search

1.2 Voice search to subtitles

Figure 2 shows as an example of voice search by Japanese and Chinese. These are results of search words as "database" in Japanese "データベース" and in Chinese "数据库". Our system displays movie lists on upper right side, and matched words in subtitles by search term are highlighted in red.

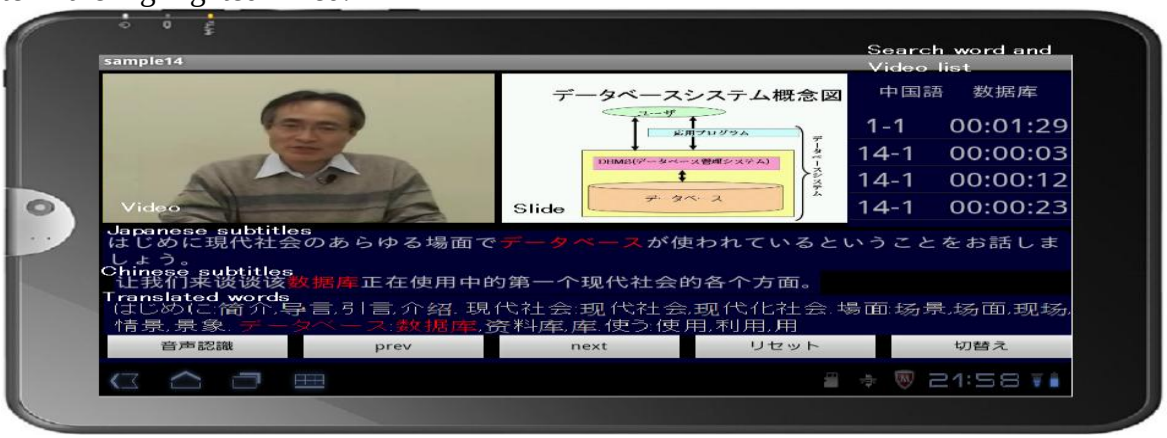

Figure 2 Screen for voice search

2. Voice search by translated words from morphemes of Japanese subtitles

Chinese student translates Japanese subtitles into Chinese in this system. However lack of manpower is concerned. The translations by Software, such as Google translator, are not natural. It is sometimes selected of inappropriate words. Search word is also inappropriate by misconversion of voice recognition and user error. In order to enable inappropriate search, therefore we are attempting to use translated Chinese words from divided morphemes of Japanese subtitles. There are some candidates in morpheme to Chinese word. For example, "検索" in Japanese is translated "搜索", "检索", "搜寻", "查阅" in Chinese. All translated Chinese words of each sentence of subtitles are assigned to its subtitles. In our system, we make movie list by matched assigned Chinese words with search terms. Although ambiguous, we absorb differences between languages.

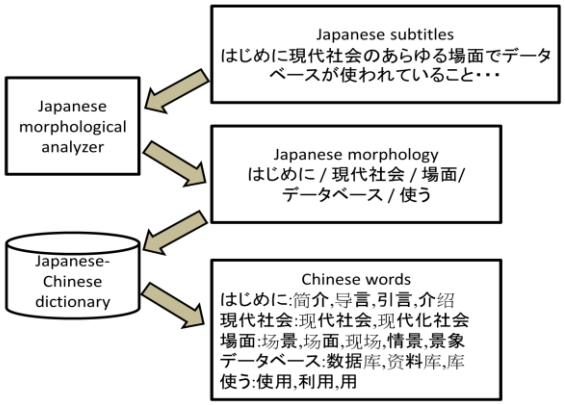

Figure 3 Process of translation from Japanese morpheme to Chinese word

3. Preliminary evaluation

In order to evaluate this voice search system from the viewpoint of user, we used in 14th lecture of the "database" of cyber campus at Okayama University of Science[3]. The subjects were a Japanese student and a Chinese student; the Chinese student came to Japan five months ago. As test words for search words, we used ten most frequent words. Table 1 shows three questionnaire for search words as follows: (a) Ranking of voice recognition. (b) Did you find videos you want by using your native voice? (c) Did you find videos you want by using translated words?

Table 1 Evaluation of a multiple voice search

Search word			Chinese Student				Japanese Student	
Japanese	Chinese (simplified)	English	(a)		(b)	(c)	(a)	(b)
			Voice: Japanese	Voice: Chinese			Voice: Japanese	
広告	广告	advertisement	F	1	N	N	1	Y
キーワード	关键字	keyword	F	F	Y	Y	1	Y
検索エンジン	搜索引擎	search engine	1	1	Y	Y	1	Y
ウェブサイト	网站	website	5	1	Y	Y	3	N
データベース	数据库	database	F	F	Y	Y	1	Y
検索	搜索	search	F	1	Y	Y	1	Y
キーワード広告	关键字广告	keyword advertisement	F	1	Y	Y	1	Y
収入	收入	income	3	1	Y	Y	1	Y
アクセス	访问	access	3	5	Y	Y	1	Y
利用	使用	Use	F	1	N	N	F	N

F: recognition failure, Y:Yes, N:No

4. Conclusion

In this study, we are developing a voice search system on Android Tablet PC. We consider learning to effective for beginners of foreign language. However, the primary goal of the voice search system supports to understand of Japanese VOD lecture rather than is able to attend VOD lectures by their native languages. As a matter of different expressions between Japanese and Chinese language, they match different sentences in subtitles. Therefore movie list also may be different in another language. This solution of the problem may be needed to use for concept dictionary. As future works, we consider developing a search system which reflects user's activity.

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C5: ICCE Conference on Game and Toy Enhanced Learning and Society (GTEL&S)

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Designing a Digital Adventure Game Integrating Instant Feedbacks with Simulation Manipulation to Promote Learners' Knowledge of Computer Hardware

Huei-Tse HOU[a*], Yi-Shiuan CHOU[b]
[a]*Graduate Institute of Applied Science and Technology, National Taiwan University of Science and Technology, Taiwan*
[b]*Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, Taiwan*
*hthou@mail.ntust.edu.tw

Abstract: This study designed and developed an adventure game of room escape -*Boom Room*© integrating feedback of instant guidance and simulation manipulation. Through an empirical evaluation, this paper preliminarily explores learners' perceived usefulness and perceived ease of use toward this game. Also, this paper explores learners' attitudes toward each game element in this game. This paper provides relevant limitations and suggestions for future researches.
Keywords: Game-based learning, Simulation manipulation, Adventure game

1. Introduction

Digital games which are challenging and entertaining [1] help learners have learning motivations [2]. The application of digital games to the instructional strategies and the subject domains is getting more and more diverse. The suitable guidance and prompts provided in the instructional games can help students to learn during playing process (e.g. [3]). Among numerous types of games, adventure games can provide learners the learning situations and highly challengeable tasks. Combining the manipulation features of instructional simulation software [4] in adventure games and providing guiding feedback to allow learners to reach the learning objectives by repeatedly manipulating composing objects, it will be expected to produce more effectively meaningful learning and it will be suitable to the instruction of procedural knowledge. The present relevant studies and development of the instructional games combining simulation manipulation and guiding feedback are still limited. Therefore, the main purpose of this study is to design and develop an adventure game of room escape-*Boom Room*© (shown in Figure 1 & 2) integrating feedback on instant cues and the situations of simulation manipulation to instruct the concepts of computer hardware and procedural knowledge of PC DIY. The situations and mechanism in this game are: the learners are trapped in a room which is locked on the other side and there's a time bomb in it. The players have to pause the bomb timer in 10 minutes. The decoding codes are stored in a portable USB disc, but no computer can read the information in it. The players need to repeatedly look for the computer components (e.g., mainboard and graphic card etc.) hidden in the room and then assemble correctly to pause the bomb timer. If the players have wrong sequence of action and components search, the system will provide instant guidance cues which help students to reflect and retrospect their prior knowledge and assembling strategies and help them learn the computer hardware knowledge. This game provided with the challenging elements (i.e., time limitation and objects search), guidance cues (instant feedback), and simulation manipulation (assembling a computer) can be expected to help learners learn computer knowledge during the game.

Fig. 1 The screenshot of Boom Room: Simulation manipulation and Feedbacks

Fig. 2 The screenshot of Boom Room: Search for the environment and cues

The other purpose of this study is going to explore learners' perceived usefulness and perceived ease of use toward this game. Also, this paper explored learners' attitudes toward game elements in this game.

2. Method

20 college students participated in this study, including 7 males and 13 females. The average age of the participants was 23 years old. All students majored in the same core course related to basic computer literacy. To evaluate the adventure games, this paper referred to the literature, that is, the technology acceptance model [5] and the elements of digital instructional games ([1][4]) to make a preliminary evaluation of learners' attitudes toward perceived usefulness of this game (e.g., if they can reach the learning objectives), perceived ease of use (e.g., if it is easy to operate), and each game element (e.g., challenge and entertainment etc.) in this game. The questionnaire was shown in Table 1. Each dimension, its references, and items were provided. Each item was scored on a 4-point Likert scale (1= strongly disagree, 2=disagree, 3=agree and 4=strongly agree). The students were asked to play *Boom Room*© (10 minutes) once, and then fill out the questionnaire. We analyzed and discussed the questionnaires finished by the students.

Table 1 Evaluation questionnaire on the technology acceptance and game elements

Dimension	Item#	Item	References
Perceived usefulness	Q1	This game can help you understand the structure of the computer hardware more.	Davis (1989)
	Q2	This game can help you understand the procedures of assembling computers.	
	Q3	Compared with the paper textbooks, you think this game helps you understand the structure of the computers more.	
Perceived ease of use	Q4	The operation of this game is easy.	
	Q5	The logic of the game plots is easy to understand.	
	Q6	The operating process of this game is smooth without any errors.	
Game elements	Q7	This game is entertaining.	Prensky & Thiagarajan (2007) Alessi & Trollip(2001)
	Q8	This game is challenging.	
	Q9	When you play the game, you feel the uncertainty of adventure and fantasy.	
	Q10	The design of the mechanism of the interactive rules in this game is appropriate.	

3. Results and discussions

This study was a preliminary evaluation, so we simply conducted a preliminary descriptive statistical analysis based on the data. Regarding the perceived usefulness, we discover that 85% (n=17) of the students agree or strongly agree that this game can help them understand the structure of the computer hardware more; 90% (n=18) of the students agree or strongly agree that this game can help them to understand the procedures of assembling computers; also, 90% (n=18) of the students agree or strongly agree that this game helps them

understand the structure of the computers comparing to the paper textbooks. The findings demonstrate that learners give a high evaluation on the perceived usefulness of this game, indicating that the combination of instant feedback and adventure games with the feature of manipulation help them learn the concept and procedural knowledge of computer hardware to a certain degree. Regarding the perceived ease of use, 70% (n=14) of the students agree or strongly agree that the operation of this game is easy; 85% (n=17) of the students agree or strongly agree that the logic of the game plots is easy to understand; also, 75% (n=15) of the students agree or strongly agree that the operating process of this game is smooth without any errors. Based on the results, we know that roughly over 70% of the students have positive attitudes toward the perceived usefulness. However, there is still room for improvement, particularly the operation and the smoothness of this game. Regarding the evaluation of each game element, 85% (n=17) of the students agree or strongly agree that this game is amusing; 90% (n=18) of the students agree or strongly agree that this game is challenging; 70% (n=14) of the students agree or strongly agree that they can feel a sense of adventure and fantasy during the game; also, 75% (n=15) of the students agree or strongly agree that the mechanism of the interactive rules in this game is designed well. The results here indicate that this game has higher challenge and entertainment; students have 70% positive attitudes toward the design of fantasy and interaction mechanism, but the limitations are still existed. The reasons are: although the adventure of bomb threats is provided in this game, a higher realistic display makes the fantasy of the game limited. On the other hand, users need to move to and fro between the *tool box* and *main scene window* during the process of simulation manipulation and objects search, which may make the smoothness of the perceived ease of use restricted.

4. Conclusion and suggestions

Our research team designed and developed an adventure game integrating feedback of instant guidance with strategies for simulation manipulation and conducted a preliminarily empirical evaluation. The findings in this study indicate that this game has potential to promote the learning of computer hardware knowledge to a certain degree. Regarding the perceived ease of use in this game, there is still room for improvement. We suggest this game should have a more friendly design of the operating mechanism; besides, to understand the features and limitations of this game more deeply, the analysis of behavior logs and the exploration of flow experience are also suggested in the future.

Acknowledgments

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Study of Virtual Button Design in a Vision Based Interface

Hsueh-Wu WANG[a], Chi-Shan YU[a], Wei-Hsien WU[b], Wei-Zhen ZHANG[b], Ping-Lin FAN[a*], Jau-Fu TSAI[a]
[a]*Department of Digital Technology Design, National Taipei University of Education, Taiwan*
[b]*Department of Computer Science, National Taipei University of Education, Taiwan*
* plfan@tea.ntue.edu.tw

Abstract: The current study aims to improve the operating performance on vision based interface. Its main objective is to evaluate the virtual button design in a vision based interface by verifying the interface elements which are trigger time, button size, and button position of the virtual buttons. This study developed a vision based interface with virtual button menu to examine the differences in operating time and error rate when adjusting the interface elements. The participants are 30 college students aged between 21 and 29 in Taiwan. The results showed trigger time, button size, and button position has significant impact on operation time and error rate. To adjust trigger delay time appropriately, the error rate can be effectively reduced.

Keywords: virtual button, vision based interface, performance

Introduction

By vision-based interactive techniques, some limitations with a keyboard/mouse that are used for input could be avoided. With vision based interface (VBI), users would interact with a computer in an intuitive way and not constrained by wires or space[2].
There are considerable differences between operating VBI and traditional inputs (keyboard/mouse)[1]. The way of operating VBI is by user's hand movements and gestures, so the requirement of user's muscle extensibility, limb sensitivity, and body control ability is different from those by keyboard / mouse which user simply sitting in front of a computer to operate[3]. Therefore, unique interface elements must be taken into consideration in VBI design.
This study developed a VBI with virtual button menu to evaluate user's operating performance which included operating time and error rate by adjusting the trigger time, button size, and button position of the virtual buttons.

1. Methodology

1.1 Participants

The participants are 30 college students aged between 21 years old and 29 years old, the average age was 23 years old. They were from National Taipei University of Education and National Taiwan University.

1.2 Experimental design

To examine the differences in operating time and error rate when adjusting the trigger time, button size, and button position of the virtual buttons in VBI, the experiment was within-subjects with three factors.
The VBI system developed in this study introduced motion-based approach. Using motion detection technique, the VBI system could sense user's hands movements. Participant stood in front of the projection screen, moved their hands to trigger the virtual buttons (Figure 1). There are 9 buttons maintained same distance around participant on system screen, and button design with three different trigger times (0 sec., 0.5 sec., 1 sec.). Participants trigger three different sizes of the buttons at 9 positions (Figure 2) to determine the operating time and error rate. Every participant was requested to finish 81 (3 trigger times * 3 sizes * 9 positions) trigger tasks.

1.3 Data collection and analysis

Once participants touched the start button the software and the operation time is recorded until all tasks were done. The error rate was the error button triggers in one experiment process. The operation time and error rate examined from this experiment were analyzed by three-way ANOVA.

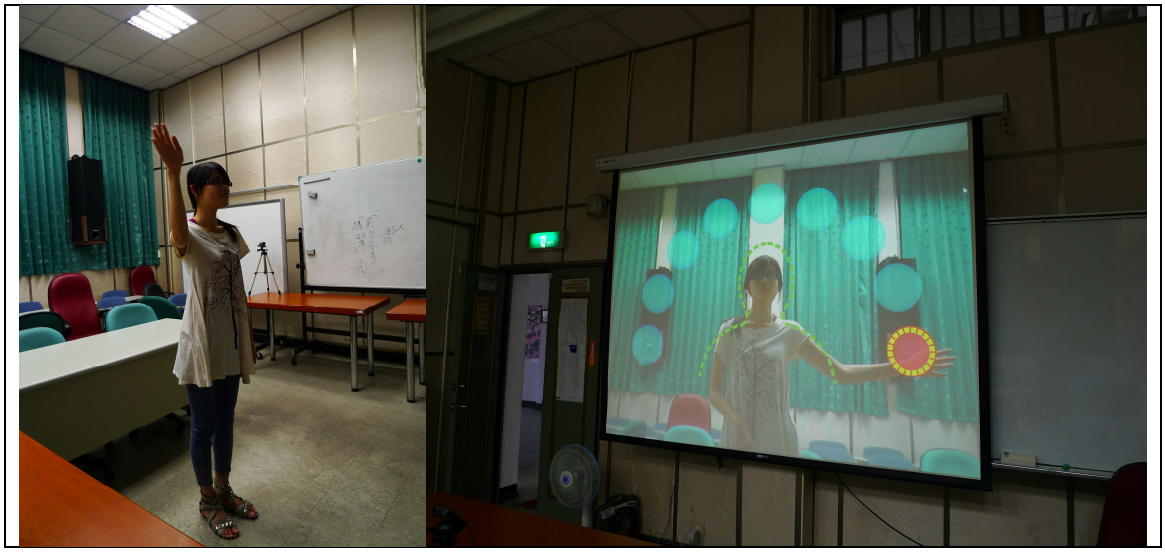

Figure 1. Screenshots of the participant's manipulation.

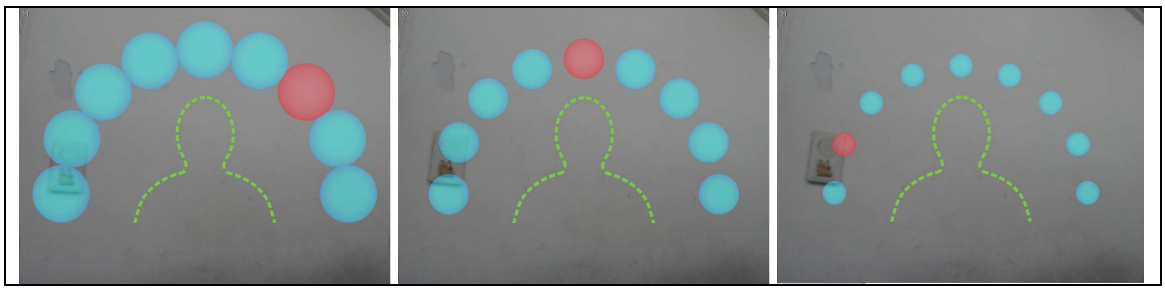

Figure 2. Screenshots of the button's positions and sizes.

2. Results and discussion

2.1 Trigger time

The trigger delay times are 1 sec., 0.5 sec., and 0 sec. in this experiment. The error rate of 0 sec. trigger delay time was the highest one. No significant differences were noted between the 1 sec. trigger delay time and 0.5 sec. trigger delay time. To adjust trigger delay time appropriately, the error rate can be effectively reduced.

2.2 Button size

The operating time with biggest button's size was significantly higher than the medium and small ones. Speculated that the reason causing this result may be the button's interval, there were minimum interval between the biggest buttons. This also results in which the biggest button operating case with the highest error rate.

2.3 Button position

The operating time of the buttons operated at the right side was significantly less than that at the left side, due to the participants in this experiment are all right dominant hand, the result shows that the button's position falls on the same side of the dominant hand can reduce the operating time.

3. Conclusions

The results indicate that trigger time, button size, and button position has significant impact on operation time and error rate. To adjust trigger delay time appropriately, the error rate can be effectively reduced. The bigger buttons size can reduce operation time and error rate, but button's interval should be considered when setting the buttons. The buttons position located on same side of user's dominant hand can reduce operation time and error rate.

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The Factors Affecting Players' Problem-solving Performances and Knowledge Acquisitions in a Role-playing Game Environment

Jiunde LEE*, Yu-Ching HUANG
National Chiao Tung University, Taiwan
jiulee@mail.nctu.edu.tw

Abstract: Problem-solving as the core concept, the computer games have thus been proposed to couple the ever increasing interest in using such type of interactive technology in training as well as knowledge construction. The major focus of the present study intends to explore how players' learning styles and quest types might affect their emotional responses, and how the above three issues might in turn impact their knowledge acquisitions and problem-solving performances.

Keywords: Learning Styles, Quest Types, Emotion, Problem-solving

Introduction

With the widespread use of the internet, computer games have deeply impacted the life of new generation users with the forms of cultural symbols, economy, and technologies Today, online games have thrived to become one of the primary gateways to the virtual world. With attributes rooted in facilitating communication, information sharing, and problem solving, this new media has aroused people to take interest in applying its advanced technologies to solve problems faced by divisions of governments, corporations, schools, the military, and other social groups

Theoretical Framework

1. Game Quests and Problem-solving

By using playful and vividness elements, computer games first capture players' perceptional attentions then further flow them into the completely concentration level through an appropriate arrangement of quest challenges [1]. A game quest can be viewed as a problem space. By trial and error and hypothesis testing, players constantly search for solutions and construct knowledge of goals, rules, and concepts (operators) through this inductive discovery process (Greenfield et al., 1994). By recognizing the differences, users might start to adopt specific strategies or approaches with hope of achieving the set goals. Such a series of goal-directed cognitive activities is called problem solving [2]. The process of problem solving requires users to make good use of their previous knowledge and skills in order to find out appropriate solutions. That is, users' mental models will possess new experiences and skills after solving the problems [3]. Csikszentmihalyi's [4] flow experience reflect the similar concept. Players' skills and knowledge will be gradually enhanced as they conquer challenges of difficult levels from easy to hard. The primary part of the game challenges are embedded inside the game quests. The present study will adopt Dicky's quest category [5] to divide game quests into four types: *Bounty & collection quest*, *Escort quest, goodwill quests*, *Messenger quests*, to be the main experiment tasks.

2. Players' learning styles

Learning style refers to the manifest reflection of an individual's preferred and habitual learning mode in perception, imagery, organization, and elaboration during knowledge acquisition or problem solving processes [6]. Kolb's learning style model [7] is selected for this study because its usefulness and validity have been extensively testified [8, 9, 10]. This model is based on two preference dimensions (concrete experience / abstract conceptualization; active experimentation / reflective observation). As a result, these two dimensions frame four types of learning styles: *Divergers*, *Convergers*, *Accomodators*, *Assimilators*. The present study will adopt Kolb's style model and together with the game quest types as the independent variables to observe how these two variables might affect players' emotion and problem-solving performances.

In sum, the present study mainly tries to explore how players' learning styles (*Divergers*, *Convergers*, *Accomodators*, *Assimilators*) and quest types (*Bounty* and *collection quest* / *Escort quest* / *goodwill quests* / *Messenger quests*) might affect their emotional responses (*arouse / valance*), knowledge acquisitions (*declarative / procedural knowledge*), and problem solving performances (*Identifying and defining the problem / Exploring problem & mental representation / Planning proceed & strategy selection / Executing the solution plan / Evaluating performance / reflection to feedback*) in an role-playing game environment.

Methodology

1. Research questions

Five research questions are generated accordingly to test out study hypotheses.

Q1. How might the player's learning styles affect his/her emotion in a role-playing game environment?
Q2. How might the player's learning styles affect his/her problem-solving performances and knowledge acquisitions?
Q3. How might the game quest types affect the player's emotion in a role-playing game environment?
Q4. How might the game quest types affect the player's problem-solving performances and knowledge acquisitions?
Q5. How might the interaction effects among player's learning styles, the game quest types, and emotion affect the player's problem-solving performances and knowledge acquisitions?

2. Study Design

The experiment environment, *Fulade Online* (http://cb.fulade.com.tw), is chosen to be based on two reasons. First, the content of this game environment should be as unfamiliar as possible to most players to increase the possibility of showing signs of change in subjects' knowledge acquisitions. Secondary, the beginner-level quests should closely fit with the operational definitions of four game quest types by this study. The present study is planning to recruit at least 72 subjects to participate in this experiment. The Kolb Learning Style Inventory (v.3.1)[11] will be used to identify subjects' learning styles. There will be a total of four game quest groups. Each group included approximate numbers of learning style participants. Subjects' emotional responses will be collected and analyzed by using the following two instruments: Noldus FaceReader™ to collect valance data and MindMedia NeXus-4 to collect arousal data.

After completing the required 4 quests of each group, subjects will move on to answer the *Declarative Knowledge Test* developed based on the framework of Ju & Wagner [12] and the *Procedural Knowledge Test* developed based on the framework of McClure, Sonak and Suen [13]. Subjects' experiment processes will be video taped and a retrospective approach

(stimulated recall) together with a deep interview will be followed right after the completion of the game quest experiment to collect subjects' oral data. The qualitative rubric method will be used to identify subjects' six steps of problem-solving.

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Innovative Pedagogy for Enhancing Web-based Collaborative Learning in Tertiary Teacher Education Using Wikis

Wing-Shui NG
Teaching Fellow, The Hong Kong Institute of Education, Hong Kong
ngws@ied.edu.hk

Abstract: This paper describes an innovative pedagogy to enhance collaborative learning in four classes of pre-service early childhood student teachers using wiki technology. Learning activities supported by Vygotsky's socio-cultural perspective were designed across twelve weeks. Outcomes of activities were collected as data source. The findings showed that this innovative teaching strategy enhanced students' collaboration learning.

Keywords: CSCL, wiki, Web 2.0, higher education

Introduction

New wave, new ways. New technologies incline to offer new opportunities to enhance the quality of education. In particular, the rapid advancement of web technologies has raised attention to academics in the field of education. Web 2.0 is characterized as a cyberspace which facilitates collective intelligence, social networking and collaboration (O'Reilly, 2005). Thanks to Vygotsky (1978), social aspect of learning and collaboration has been recognized as a process of learning. This rationale closely aligns with the collaborative features of Web 2.0. This paper elaborates an innovative pedagogy for collaborative learning among pre-service kindergarten teachers in tertiary education facilitated by wiki which is a key element of Web 2.0 technologies.

1. Theoretical Background

1.1 Socio-cultural Perspective of Learning

Based on the work of Vygotsky (1978), researchers regarded education and cognitive development as cultural processes with knowledge shared amongst members of communities. People jointly construct understandings by their involvement and interactions (Drummond & Mercer, 2003). From the socio-cultural perspective, learning occurs in the mental process of social interaction and dialogue. Students thereby can learn by negotiating and collaborating with others (McLoughlin & Marshall, 2000).

1.2 Zone of Proximal Development (ZPD) & Intermental Development Zone (IDZ)

Vygotsky (1978) recognized the ZPD as the development zone which can be brought by more capable peers by interactions. Moreover, Fernandez et al. (2001) defined IDZ as a

characteristic of dialogical phenomenon, created and maintained between people of similar levels in interaction for jointly construction of meaning for mutual learning. It follows that if students are intentionally brought together to work collaboratively, it is expected that students' learning can be enhanced by either proceeding to ZPD or IDZ.

1.3 Collaborative Learning Using Wiki

Collaboration learning includes the co-construction of meaning through interaction with others and a joint commitment to a shared goal (Roschelle & Teasley, 1995; Littleton & Hakkinen, 1999). Among Web 2.0 technologies, wikis are web technologies to facilitate generation, collaboration and distribution of contents in a quick and easy way (O'Leary, 2008). In fact, researchers have recognized the power of wikis to foster collaborative learning (Mak & Coniam, 2008). However, there are still only a handful of researches which work on web-based collaborative learning in tertiary teacher education for reference. In this connection, this paper aims to introduce an innovative pedagogy for enhancing web-based collaborative learning in tertiary teacher education using wikis.

2. Project Background and Purposes

The course "Information Technology in Education" taught by the researcher was offered to 4 classes of first year pre-service kindergarten teachers in semester 1 of 2010 – 2011 academic year with class size of about 40 and a total of 152 students. The researcher intended to enable student teachers to equip knowledge on the application of Web 2.0 technologies in education by involving them into an online learning environment facilitated by Web 2.0 technologies. Moreover, by engaging them in knowledge construction processes with collaborative learning activities using the wiki platform, student teachers were expected to develop knowledge on some controversial issues concerning the usage of information and communication technology (ICT) in early childhood education.

3. Methods

The following three controversial issues were given to students for critical discussion.

1. Childs' development on creative thinking capability is inhibited by using ICT.
2. Childs' development on social communication ability is inhibited by using ICT.
3. Childs are not secured to use the Internet.

Students in each class were further divided into 6 groups by themselves with 6-7 students in each group. Two groups were assigned to discuss an issue as illustrated in Figure 1. Students were required to construct their works collaboratively on the wiki platform. By the end of the project, each group had to compile a report to elaborate their critical comments on the controversial issue. The project last for 12 weeks. Activities were designed by researcher on weekly or bi-weekly basis to enhance their collaborative learning as shown in Table 1. Outcomes of activities were collected as data sources for analysis.

Figure 1 : Groups and discussion issues allocation in each class.

Week 1	Students form groups and choose discussion issue. Students write their initial understanding of the issue in the wiki platform.

Week 2-3	Students enter their group members' information and group name into the wiki platform. Students brainstorm keywords and search relevant websites for sharing in wiki platform.
Week 4-5	Students read two given reference papers and write 100 – 200 words summary on the wiki platform for sharing with other group members.
Week 6-8	Students read more related papers and write short summary to share their understanding on the readings.
Week 9-10	Each group writes the first draft of group report concerning their comments on the controversial issue.
Week 11	Students were invited to feedback on the report of same discussion issue in another class with arrangement illustrated in Figure 2. Each student has to provide feedbacks.
Week 12	Each group finalizes their group report according to comments received from classmates.

Table 1 : Weekly or bi-weekly activities

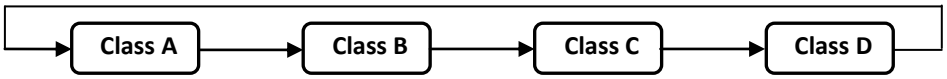

Figure 2 : Arrangement of peer feedback on group reports.

4. Results & Conclusion

At the early stage, students still required accommodating on the collaborative learning process. However, after a few weeks, it was happy to notice that some active students in each group started to organize contents in a systematic manner and began some meaningful discussions. At the end, all students were found to have their input and feedbacks in the wiki platform and they managed to finish the group report with good quality. Evidences showed that this new teaching strategy enhanced web-based collaborative learning among student teachers in tertiary education. However, since the research involved large numbers of participants and many learning outcomes, extensive efforts was required for analysis. It was also difficult to provide timely feedback for individual students. These practical challenges will be major research directions in the future.

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The Framework of Online Writing System

Yu-Ting LAN[a]*, Jen-Hang Wang[b], Tak-Wai Chan[a]
[a]*Graduate Institute of Network Learning Technology, National Central University, Taiwan*
[b]*Department of Computer Science and Information Engineering, National Central University, Taiwan*
*jenny@cl.ncu.edu.tw

Abstract: The research provides a design framework for online writing system. In the system, six different activities are designed which include two key features: peer feedback and "feedback of feedback." Through the online writing system, we hope there would be writer and reader interaction between students to procure excellent writing and feedback culture. The two important features designed in the system help improving students' language skills while developing their creativity and critical thinking ability.

Keywords: Peer feedback; Feedback of feedback; Peer writer; Peer readers

Introduction

In writing activities, many teachers often have difficulties in reviewing and giving scores to students' essays (Hsieh, 1995). Moreover, the feedback is often based on the teachers' viewpoints. Thus, it is hard for students to improve their writing quality and they may lose interest in writing. The above reasons cause students' poor writing ability and affect individual creativity and critical thinking ability developments. According to the flaws of writing activities described above, many researchers have applied peer feedback in writing systems (Hu, 2005), for example, students comment each other's work. Therefore, the aim of the research is to provide students an online writing system which integrates peer feedback in writing activities to help students write their essays.

1. Definition of Peer Feedback and Relative Research

Peer feedback used to be defined as the feedback process where readers give comments to the author. The process in which a group of students evaluate each other's work, in verbal expression or oral interaction, is qualitative; whereas giving scores or ranks is quantitative (Topping, 1998). The interaction is the communication between writer and readers which encourages creative conversation and trains both parties' communication skills (Villamil & Guerrero, 1996). It gives peer students a chance to learn how to give comments to their peers; it also provides the advantage of understanding the comments given by peers (Mendonca &Johnson, 1994). Students are each other's teacher and essay sharer. They would develop their own standard for the evaluation of essay quality and know by experience which essays are the good ones and in turn seek better quality essays of their own. According to many peer feedback research, the results show: Students are active and positive toward peer feedback activity which in turn increases their learning motivation and

enhances the development of high-level language skills (Davies, 2000; Searby & Ewers, 1997; Topping, 1998).

The online writing system designed in the research allows students to give comments to help peer students in essay writing through peer feedback activity. In addition, as the research mentioned above lacks an evaluation mechanism that is used after peer feedback, it is designed in the writing system. The system has a "feedback of feedback" evaluation mechanism which allows peer writers to evaluate the comments given by peer readers to increase the quality of peer feedback. Hence, in terms of the online writing system, not only students are the writers, they are also the readers and the constructive reviewers.

2. The Design of Online Writing System

The system consists of six steps (see Fig. 1). Step 1: All students complete their essay drafts in the system. Step 2: This activity is where peer readers read peer writers' essays and give comments and scores in the system. Step 3: Peer writers read and evaluate the comments given by peer readers. Step 2 and Step 3 is key features of the system. We will be described in detail later. Step 4: Peer writers can modify their essay in compliance with peer readers' comments or write more of their own opinions. Step 5: Students share their essays online and observe and learn from the comments given by peer students. The system provides the ratio of how many of the comments each peer reader gives is accepted. Evaluating the ratio of "Agreed with the comment" encourages peer readers to devote in giving good comments and every peer reader is able to clearly identify and understand other peer readers' opinions. Step 6: The essays are made public and good ones are published in the class journal. It is a sub-activity of Step 2: According to the ranking agreement of group peer feedback, the number 1 and 2 essays from each group is selected and published in the class journal.

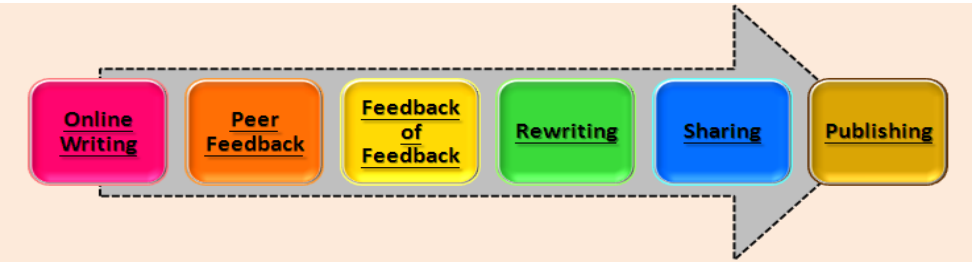

Figure 1. Six activities in the online writing system

In order to promote the interaction between peers, peer feedback is subdivided into two parts: Individual peer reader feedback and Group peer feedback. Individual peer reader feedback is where students independently give peer writers comments and scores for their essays. After a score is given, the system would integrate the result of this sub-activity and calculate the scores peer readers give to the same essay in order to obtain the rank of peer writers' essay scores. In group peer feedback, members in each group discuss the rank of some essays. Moreover, as group members have different personal opinions to the scores they give to the essays during individual peer reader feedback, they must discuss the rank of these essays and obtain a ranking agreement in the end before sending the result to the system. Giving quantitative scoring and comments may help writing activities' processing. This is also providing frame of reference with students. Through peer feedback, peers' comments are more suitable for peers to understand and improve their essays.

After peer feedback, "feedback of feedback" is also the key feature of the system. Peer writers play the reader and the reviewer roles at the same time. The evaluation contents in

the system are divided into three options: "Agreed with the comment, I am willing to modify the essay," "Agreed with the comment, I am not willing to modify the essay" and "Disagreed with the comment." In this procedure, peer writers read peer readers' comments and find good feedback from them to review the improvement direction of their essays. Then it will be able to inspire new ideas. In a feedback process, sometimes peer writers may not fully understand feedback from reviewers and want to clarify them. The activity also provides a section with peer writers. They can elaborate rationale on why they disagree with comments and what they are not willing to modify the essay. From the options in the evaluation, they give feedback to encourage excellent peer readers and stimulate readers to give more detailed comments.

3. Conclusion

This research provides the design framework for online writing system which is an excellent cycle between peer readers and peer writers. Students would put more efforts in making their comments more convincing for peer writers to accept. They are able to understand their strong points and shortcomings from writing in order to increase the ownership toward their essays (Richards & Rodgers, 2001). Therefore, we hope that the peer feedback online writing system may increase students' interaction and writing motivation. The key features, peer feedback and "feedback of feedback" activities, may help students to become excellent writers, readers and reviewers in the future. At present, the system is still under construction and it will include all six activities mentioned above. In addition to helping students improve their writing ability, the long-term goal of the research is to train students' individual creativity and critical thinking ability through peer evaluation mechanism.

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A practice of anti-BOT education for high school students

Kazumitsu MASUYAMA[a*,b], Naoshi SATO[a]
[a] *INSTITUTE of INFORMATION SECURITY, Japan*
[b]*Kanagawa sogo sangyo high school, Japan*
*dgs104102@iisec.ac.jp

Abstract: Recently, BOT has caused many security incidents and given us serious damage. Information security incidents often occur based on computer user's lack of knowledge and/or false recognition on BOT, and anti-BOT education is essential especially for young generation. This paper shows our experience of practical anti-BOT education for high school students, and describes how to improve their information security capabilities.

Keywords: anti-BOT education, Information security education, BOT

Introduction

When BOT, a kind of malicious software, infects a user computer, the computer could be controlled remotely through the Internet. The computers infected by BOT cooperatively configure a BOT network, and are employed to practice systematically information security attacks such as sending spam mails, DDoS(Distributed Denial of Service) and password exploitation. Even if a computer is infected by BOT, no symptom of the infection appears generally. So the user can't find the infection until the above attacks get realized and the user recognizes his own assistance to the attacks. In particular, most of high school students have never experienced the threat of BOT and don't have sufficient knowledge about BOT.

Considering the situation, we discussed anti-BOT education scheme in a high school; Kanagawa sogo sangyo high school and put it into practice as a special lesson program. That is, the anti-BOT education scheme is deployed as a school setting subject "Information Security" at Kanagawa sogo sangyo high school. The following in this paper outlines and evaluates effect of the anti-BOT education.

1. School setting subject "Information Security"

Kanagawa sogo sangyo high school developed the school setting subject "Information Security". The school setting subject is specially arranged by the school itself, which is different from the usual subjects designated by official education authorities. According to the government course guidelines in Japan [1], school setting subject is defined to be set up with the purpose to contribute formation of unique curriculum that features regionality and reflects reality of concerned schools and students.

Objectives of "Information Security" are "Acquiring the basic knowledge of information security, to enable implementation and analysis of information systems security policy." Curriculum of the school setting subject "Information Security" is constructed from anti-malware measures, incident response, encryption, authentication and management.

2. Practice of anti-BOT education

This chapter describes anti-BOT education in the school setting subject "Information Security". The lesson includes 56 students at second grade and third grade. The lesson for the anti-BOT education was executed on November 18 and 26, 2010. The content of this lesson is shown in Table 1. First, BOT's operation for DDoS attacks and mail spamming was presented for discussion in the lesson. It seems difficult for high school students to understand details of BOT because most of them are beginners in terms of information security. Therefore, we promoted understanding of the outline of BOT activities, rather than its technical configuration. Concretely, a representative operation of BOT was explained graphically, which consists of herder, control server and the PC infected by BOT. Chain of commands used for BOT was also shown to assist further understanding.

Preceding to learning of BOT threats, the students studied computer viruses and their countermeasures. Based on the study, we asked if the students can control infection of BOT. As a result, many students answered effective measures were antivirus software. Actually it is hard to detect BOT infection by the antivirus software. So, we illustrated some methods to check the infection. Investigation of hosts file, as the first method, is introduced [2]. That is, content of hosts file in C:\WINDOWS\system32\drivers\etc (for Windows XP) is examined to detect an illegal connection. This method is thought a simple way for student, and can prevent the threat of BOT reliably. The second method is usage of CCC (Cyber Clean Center) cleaner, a tool developed by just to remove BOT [3]. Here, CCC is anti-BOT organization running in cooperation with the Ministry of Internal Affairs and Communications, Ministry of Economy, Trade and Industry. CCC monitors BOT operations in the Internet and distributes the CCC cleaner to the PC users supposed to be infected. We instructed the students how to use the CCC cleaner.

Table1 Contents on BOT lesson.

Item	Contents
Previous survey	- Survey for BOT awareness
Overall understanding of BOT	- Overview of BOT - Behavior features of BOT - BOT network configuration - Examples of threats caused by BOT
Measures of BOT	- measures to prevent BOT infection - method to detect BOT infection Investigation of hosts file Use of CCC Cleaner
Posterior survey	- Survey with a questionnaire

3. Result of posterior survey

At the end of lesson we conducted a survey by using a questionnaire. Table2 contains the six survey items from Q1 to Q6. The answer for each question is ranked from 1 to 5 and their average rank are shown in the table. As for Q1 and Q2, it can be said that the comprehension about lesson contents and threats to BOT are good.

For Q3, it can understand that the students cannot practice measures to BOT very much. And for Q4, It is clear that the students do not recognize direct or indirect damage from BOT. These responses have been brought about by features of BOT. Therefore, it is necessary to practice effective measures to BOT for the students. In concrete terms, we instructed the students to practice an investigation method for BOT infection presented in

this lesson. At result, it is reported from the students that approximately 74% of them carried out the investigation methods. This fact shows that most of students were concerned about BOT. As further reports, it is shown that approximately 8% of students (three) were infected. For a concrete investigation method, three students checked hosts file, and one student of those used CCC cleaner.

On the other hand, as for Q5, a pessimistic answer is conspicuous about social measures of BOT. And for Q6, it is made a low reply for the question about whether the problem for BOT is solved in the near future. From such situation, students feel that malware measures including the computer viruses do not advance as whole society.

From these results, the students were able to understand information security incident measures of BOT through this lesson.

Table2 A result of posterior survey.

Survey item	Average Rank
Q1.Were you able to understand lesson contents?	4.24
Q2.Do you feel information security threats to BOT?	4.50
Q3.Do you practice BOT measures?	3.01
Q4.Have you encountered damage by BOT?	1.56
Q5.Do you think that social measures of BOT will advance?	3.29
Q6.Do you think that the problem for BOT will be solved in the near future?	2.70

4. Issue

The school setting subject "Information Security" is thought effective to let the student be aware of BOT threats as one of the information security incidents. However, an inappropriately interested student for BOT may appear and misuse the knowledge obtained in the lesson. Such a dilemma accompanies the practice of the information security education. This is because the consideration for both of the defense side and the attack side is indispensable to understand information security. Therefore, in the practical lesson of “Information Security”, it becomes the issue to instruct the students that they would observe information ethics.

5. Conclusion

In this paper, we described about lesson practice about BOT as the school setting subject "Information Security" in Kanagawa sogo sangyo high school and its education effect. We hope that we would realize the lesson jointly with security vendors as an industry-academia collaboration, and want to expand information security education.

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A Web2.0 High Interactive Platform for Composition Teaching

Hsueh-Wu Wang [a], Chi-Shan Yu [a], Wei-Zhen Zhang[b], Ping-Lin Fan [a], Wei-Hsien Wu [b*], Hui-Ling Liang[c] & Jau-Fu Tsai [a]

[a]*Department of Digital Technology Design, National Taipei University of Education, Taiwan*
[b]*Department of Computer Science, National Taipei University of Education, Taiwan*
[c]*Affiliated Experimental Elementary School of Taipei Municipal University of Education*
* wswu@tea.ntue.edu.tw

Abstract: This paper presents an ongoing project developing a Web2.0 platform which provides a real-classroom-like environment for composition teaching. The platform is designed based on annotation technology to comply with the needs for high interactive, for increasing the use of figure and picture for discussion, and intuitive operating interface. Users' behavior is also to be observed and recorded for further analysis.

Keywords: Web2.0 platform, composition teaching, annotation

Introduction

Writing ability is a kernel learning subject of Mandarin courses in Taiwan. Many teachers adopt the presentation mode of four instruction modes identified by Hillocks to proceed composition teaching activity [4]. Hillocks found that the environmental mode was the most effective one for raising the quality of student writing [4]. He also found that the practice of building more complex sentence is effective. In the environmental mode, small group problem-centered learning activities lead to high interaction among students and high level of student involvement. In era of Web2.0, technologies that can be used for education applications over network have been developed. Soumplis et al., tabulated technologies used by 43 e-learning platforms [5]. Where Wiki provides high interactive allowing users modify, remix, combine other's articles and generate new matters. Blog, Forum and Conference provide a channel for sharing information or for discussion. All the technologies stress interaction among learners.

Alexander et al, suggested Web2.0 storytelling for composition platform in creative writing class [1]. Frossand et al, disclosed a new learning scenario to facilitate language learning and writing skill in Span, which is called "collaborative storytelling with Wiki" involving several distant schools in co-writing a story [3].

Teacher who teaches composition course in Taiwan has to face 20 to 30 students in his/her classroom. There is no enough time for teaching activities such as group learning activity, sentence combining training, and face to face teaching. Remedial teaching via network is an alternative option to raise student writing ability. Although using ready available platforms for storytelling is a good way to practice writing, there are still inadequate for composition teaching. Consider the situation when members of a group discuss a specific topic. After member A expressed his/her opinions, member B is agree with most of his/her point of view except for one point. B will express his/her own view on the specific point only. If the discussion is made on the current Web2.0 platform, B may

have to quotes what A had said to make sure every member knows with which point he/she concerns. The same situation comes out while teacher wants to modify or makes suggestions on some sentences of student's article. The platform is lack of an efficient and simple way to mark the specific question issue. Another scenario comes from discussing on a specific area of a picture or a graph. It is a difficult to make sure if every member focus on the area while discussing on line over internet.

In the last decade, annotation technology has been applied to education field. The advantage of annotation is that user can markup words, or sentences in an article without ambiguous. The markup operation is more efficient than quoting contents of article. The authors' previous work has developed an annotation-based on line collaborative learning platform with text and figure (or picture) annotation functions [2]. The platform, with its revised version, would provide solution to the aforementioned requirements, and facilitate on line composition teaching.

In this paper, an ongoing composition teaching project is presented. The objects of the project are as follows:

- Develop a Web2.0 platform for composition teaching. The platform provides a real-classroom-like environment.
- Observe and analysis the collaborative activities on the platform.
- Assess the effectiveness of raising writing ability after learning activities on the platform.

1. Platform That Comply With Needs of Composition Teaching

1.1 Activities in the Classroom

The environmental mode will be used in the project. "environmental mode is characterized by (1) clear and specific objectives, such as to increase the use of specific detail and figurative language: (2) materials and problems selected to engage students with each other in specifiable processes important to some particular aspect of writing: and (3) activities, such as small group problem-centered discussions, conductive to high levels of peer interaction concerning specific tasks. [4]" According to the three needs, the platform is designed and developed.

1.2 The Platform

The platform allows uploading of picture, graph, image, and audio file as well as text. Teacher can easily organize courseware for each group via a WYSIWY (What-You-See-Is-What-You-Get) interface. He/She may also annotate texts or a specific area on picture, make a new topic and ask students to comment. Students login with an assigned group account, and start discussion by a forum-style process except that they can markup and annotate either texts or picture to make a comment in a pup-up editor form. Others can click the annotated text or area on the picture to read the comment, and annotate the comment for further discussion. The high interactive platform provides a real-classroom like environment and an efficient way to comply with the needs of composition teaching on the Web. All activities are recorded in a log file.

2. Course Activities

2.1 Activities

At the end of the experimental course, students are asked to complete an article titled "One Day Tour along Taipei MRT." The researcher first upload a map of Taipei MRT, and ask students choice part of stations they are interesting in to organize the tour and introduce the details to the public. The student should collect touring information around these stations. Then they would start discussion over the network with group members. During the process, they may upload the collected information to the platform. Finally, they will complete the article collaboratively on the platform.

2.2 Observation and Analysis

All the contents of discussion are saved as webpages. The researchers observe/peer the process during the whole experiment. Questionnaire is also conducted at the end of the course. Log file analysis as well as the operating experience feedback from students will be the reference for improvement.

3. Conclusions

Writing ability is an important object of Mandarin course. However, there are other topics share the course time. Thus, many teachers adopt presentational instruction mode in their class. The effectiveness in raising writing ability by presentational mode is not satisfactory as Hllocks found [4]. Applying new technology could assist teacher move his/her teaching activities from classroom to internet. Teacher plays minimum role in the environmental instruction mode, so additional teaching load will not significant increase.

Acknowledgements

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Laptop Initiative in Malaysia: Exploring Mathematics and Science Teachers' Laptop Use

Priscilla MOSES*, Su Luan WONG, Kamariah ABU BAKAR, & Rosnaini MAHMUD
Faculty of Educational Studies, Universiti Putra Malaysia, Malaysia
*prismo6@yahoo.com

Abstract: Since 2003, when the medium of instruction was switched from Malay to English, every teacher teaching Mathematics or Science has been provided with a laptop by the Malaysian Ministry of Education to facilitate the teaching-learning of these two subjects. It has been nine years since the laptop initiative was introduced. How are the laptops being used by these teachers in the classroom? Is there a significant difference in the usage of laptops by Mathematics teachers compared with Science teachers? This quantitative study was carried out to test whether a significant difference exists in the usage of laptops among the Mathematics and Science teachers. Survey questionnaires were completed by 354 secondary school teachers from the state of Selangor, Malaysia. An independent t-test was conducted. Based on the finding, there was a significant difference ($t(354) = -12.16$, $p = .0001$) between the mean scores for Mathematics teachers (M = 2.18, S.D. = 0.830) and Science teachers (M = 3.32, S.D. = 0.921). It can be concluded that Science teachers use the laptops in teaching-learning process more than the Mathematics teachers. Therefore, appropriate steps should be taken by the government to understand why Mathematics teachers are making less use of laptop computers. More training sessions and more suitable courseware could be provided so that the full benefits of the laptop can be exploited to enhance the teaching-learning of Mathematics.

Keywords: Laptop Use, Mathematics, Science, Teachers

Introduction

The medium of instruction for Mathematics and Science was reverted from Malay to English in 2003. As these two subjects had been taught in the Malay language for about two decades previously, the Ministry of Education felt that the software for Mathematics and Science lessons in English would help both teachers and pupils cope with the new medium of instruction. Hence, teachers of the two subjects were provided with laptop with relevant software [1, 2]. This initiative by the Education Ministry was integrated with the government's Information and Communications Technology (ICT) blueprint for the use of technology to help the country progress at a more rapid pace.

The usefulness of embracing ICT in the classroom has been a topic of much debate. Studies have shown a difference in the usage of ICT among Mathematics and Science teachers [3, 4]. However, thus far there has not been any such study in Malaysia, specifically on the use of laptops in the teaching-learning of Mathematics and Science. Hence the main objective of this study was to ascertain whether there was a significant difference between Mathematics and Science teachers in their use of the laptops in the classroom.

1. Methodology

The data for this study were collected via questionnaires completed by teachers of Mathematics and Science regarding the use of laptops in the classroom. Eleven items were developed by the researchers based on a comprehensive review of relevant literature. These items used a five-point Likert scale to rate the use of the laptop for various functions in the classroom. The respondents were asked to rate their current usage of laptop in teaching-learning of Mathematics or Science. The responses were selected from "Never" (score = 1), "Once in a while" (score = 2), "Sometimes" (score = 3), "Often" (score = 4) and "Very Often" (score = 5). The content validity was established by a panel of four experts in the field of evaluation. Subsequently, a pilot test was conducted among 38 teachers; the overall reliability obtained was high and acceptable (Cronbach's alpha coefficient = 0.928).

For the purpose of the study, an independent t-test was conducted to compare the mean scores between the Mathematics teachers and Science teachers. The respondents were 354 secondary school teachers (169 Mathematics teachers; 185 Science teachers) from the state of Selangor. Thirty nine of them were male teachers (11.0%) and the rest were females (89.0%). Their ages ranged from 22 to 56 years (M = 36.26; S.D. = 9.045).

2. Results and Discussion

Table 1: Laptop Use among Mathematics and Science Teachers in the Teaching-Learning Process

Item	Mathematics		Science	
	M	**S. D.**	**M**	**S. D.**
I use the laptop in the teaching-learning process.	2.38	0.944	3.84	1.095
I use the laptop to aid the usage of CD-ROM during the teaching-learning process.	2.28	0.971	3.65	1.083
I use the laptop to facilitate the various pedagogical approaches (e.g.: collaborative learning, problem-based learning etc.).	2.37	1.090	3.50	1.084
I use the laptop as a tool for multimedia presentation during the teaching-learning process.	2.30	0.986	3.64	1.134
I use the laptop to provide detailed explanations (e.g.: visual aids etc.) during the teaching-learning process.	2.25	1.018	3.75	1.125
I use the laptop in class to provide notes to the students.	2.01	1.044	3.19	1.245
I use the laptop to show examples (e.g.: pictures, animation, audio, video etc.) to enhance the students' learning.	2.34	1.023	3.84	1.044
I use the laptop to facilitate the use of relevant Internet resources during the teaching-learning process.	2.14	1.093	2.72	1.204
I use the laptop to carry out classroom activities.	2.08	1.006	2.90	1.159
I use the laptop to carry out assessments in class.	1.93	1.003	2.60	1.185
I create a conducive learning environment (e.g.:	1.95	0.950	2.89	1.132

educational flash, jokes, music etc.) using the laptop to motivate the students to learn.

Table 1 illustrates the mean scores of laptop use among the Mathematics and Science teachers in the teaching-learning process. The item in the questionnaire received the highest mean score (M = 2.38, S.D. = 0.944) by the Mathematics teachers was: "I use the laptop in the teaching-learning process". As for the Science teachers, the two items which scored the highest mean with a mean value of 3.84 were: "I use the laptop in the teaching-learning process" (S.D. = 1.095) and "I use the laptop to show examples (e.g.: pictures, animation, audio, video etc.) to enhance the students' learning" (S.D. = 1.044). The item "I use the laptop to carry out assessments in class" item scored the lowest mean for both the Mathematics (M = 2.08, S.D. = 1.006) and Science (M = 2.90, S.D. = 1.159) teachers. The mean scores of laptop use for Science teachers were higher than those for Mathematics teachers for all the items.

Based on an independent t-test conducted, there was a significant difference ($t(354) = -12.16$, $p = .0001$) in the mean scores concerning the use of laptops between Mathematics teachers (M = 2.18, SD = 0.830) and Science teachers (M = 3.32, SD = 0.921) in Malaysian secondary schools. The magnitude of the differences was very large, $\eta^2=0.296$ [5]. These results show that Science teachers favour the use of laptops for teaching-learning process more than Mathematics teachers.

3. Conclusion

From the quantitative analysis of the data gathered from questionnaires, it can be concluded that teachers of Mathematics and Science have different views regarding the benefits of the laptop as a teaching-learning tool. This study found that Science teachers were more in favour of the integration of the laptop into their lessons compared with the Mathematics teachers. Therefore, appropriate steps should be taken by the Education Ministry to understand why Mathematics teachers are making relatively less use of laptop computers, compared to Science teachers. In addition, it is important to increase Mathematics teachers' awareness of the versatility of the laptop as teaching-learning tool. Perhaps the provision of more training sessions and suitable courseware would ensure that the full benefits of the laptop be exploited to enhance the teaching-learning of Mathematics.

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Technology Enhanced Self-Monitoring for Warm-up before Class

Yih-Ruey JUANG[a], Chih-Yueh CHOU[b] & James CHAN[c]
[ac]*Dept. of Information Management, Jinwen University of Science and Technology, Taiwan*
[b]*Department of Computer Science & Engineering, Yuan Ze University, Taiwan*
yrjuang@just.edu.tw

Abstract: Most teachers and students are convinced of the preparing lessons before class is important and effective to engage in classroom activities, but the unknown state of preparation usually discourages both teachers and students to sustain this good learning strategy. From literature survey, JiTT and WIRE model provided effective warm-up strategies but also found some challenges in implementation. This work-in-progress research applied self-explanation theory and reading comprehension strategies to design a lesson warm-up mechanism. A correspondent supporting system was constructed to implement the mechanism to improve the effect of warm-up. This study is currently being experimented using quasi-experiment method for computer science students. Both quantitative and qualitative data will be collected, analyzed, and shared in the future.

Keywords: Self-explanation, Reading comprehension, self-monitoring, WIRE learning model, Just-in-Time Teaching

Introduction

Preparing lessons before class is generally acknowledged as an effective method that can enhance motivation of classroom activities and learning outcome. Most teachers and students are convinced of the preparing lessons before class is important and effective to engage in classroom activities, but the unknown state of preparation usually discourage both teachers and students to sustain this good learning strategy. Most teachers feel hard to know what students have known and unknown and what problems are confronted, and most students feel hard to be conscious of what they are reading in learning materials and what prerequisite knowledge they need to review to learn the new lessons.

Just-in-Time Teaching (JiTT) [3] was proposed to collect learners' preliminary understanding of the new lesson from the review of their individual submissions of web-based preparatory assignments, and then to adjust and organize the classroom lessons. However, some challenges were found in literature. First, the teachers have a big challenge to review all submissions of warm-up assignments and prepare teaching content in only two hours. Besides, after classroom activities the instructors need to prepare short quiz for the next lesson in a short time [4, 5, 6]. Second, the students usually are speculated to read materials only for solving the warm-up quiz, so that they may "choose to simply skim the selection to find the detail that answers the multiple choice questions and provide a minimal response to the short-answer question [5]." Shallow warm-up will contribute small effect for classroom learning. Last, it is a non-easy skill for teachers to write an appropriate quiz that can "generate significant thought without discouraging students from even addressing the questions [4]."

Based on JiTT, Juang [1] proposed a highly interactive learning model, WIRE, for blended learning, which integrates *Warm-up* before class, *Interaction* in class, and *Review* and

Exercise after class into a coherent learning experience. In the case study [2], the warm-up strategy of WIRE model changes questioner from teacher to student, that is the students are demanded to ask at least three questions in warm-up. Although the results represented significant improvement on teacher's heavy burden and the difficulty of asking good questions, students' shallow warm-up still exists. Since the students can easily post any questions for the preparatory assignment, they may not really read the whole material or just pick up some ideas and post shallow questions to make perfunctory attempts.

This work-in-progress research applied self-explanation theory [7-9] and reading comprehension strategies [10, 11] to design a lesson warm-up mechanism that students can self-monitor their comprehension, self-explain what they read and questioning what they do not understand in learning materials. A correspondent supporting system was constructed to implement the mechanism for facilitating students' awareness on metacognition of learning management, so that we hope the effect of warm-up, learning motivation, and interaction between teacher and students can be improved.

1. Warm-up Strategy Design

The basic idea of self-explanation theory, which emphasizes on the restatement or explanation of learning material, attempts to help individual knowledge construction [7]. By self-explaining personal understanding about the reading texts under a natural process or someone's prompt, the learners can construct better mental model [10]. Through the discipline of self-explanation, the high-order thinking of learners also can be raised to bridge both old and new knowledge [8]. McNamara [8] introduced a serial reading strategy to provide students a self-explanation method including comprehension monitoring, paraphrasing, bridging inference, elaboration, using logic, and prediction. Through the process, students' reading skill were improved through self-explaining and review their understanding of the materials. However, when is the best timing for using self-explanation? Chi & Vanlehn [9] suggested by reading examples students can generate more distinct pieces of constituent knowledge from self-explanation. The process can also generate new general knowledge to complement incomplete principle and concept of the domain knowledge.

In reading comprehension strategy, Robinson [10] introduced a study method SQ3R, which indicates the survey, questioning, reading, reciting, and review, to raise reading comprehension. The previous three strategies are the important components for the warm-up that can be used in our work. Besides, Blachowicz and Ogle [11] also used self-monitoring concept to propose some similar reading strategies that used prior, in, and after reading process. The preview, prediction, questioning, checking understanding, monitoring understanding, and summarizing are helpful strategies for warm-up practices.

By applying the self-explanation theory and reading comprehension strategy, this work-in-progress research attempts to design a warm-up strategy that can improve students' learning attitude, motivation, and learning effect to get ready for classroom activities. The process, which comprises four stages with teacher's guiding messages and warm-up questions, is detailed as below.

- *Overview*. The students are asked to write abstract within 100-150 words to give an overview description and to predict the major concept of the material after reading the text outline or introduction.
- *Review prior knowledge*. The teacher prompts the past concepts related to the new material, even provides related learning resources, for students reviewing prior knowledge and then rating the level of recalling to mind from five levels.
- *Reading and comprehension monitoring*. The students read either the digital or printed

material. After reading, they are asked to write a short brief within 200-300 words of the their self-explanation or ask questions, and then rating the level of comprehension from five levels.

- *Summary*. The students are asked to answer a quiz that comprises 3-5 warm-up multiple-choice questions provided by teachers for the summary and evaluation of their preliminary understanding of the material. In order to comprehensively evaluate the state of warm-up, the students are asked to answer a last question about their estimation of time on the warm-up assignment.

2. System Design

All activities of the above stages will be conducted on the web for efficient interaction before classroom activities. Although teachers can adopt any conventional course management system, such as Blackboard, a specially designed system will be an appropriate solution to completely fit in the requirement. Thus, the authors have designed a web-based warm-up procedure according to the above strategy into their previous system, BBLS (Blog-Based Learning System). The warm-up is launched by the teacher's notice that comprises title of lesson, pages in text, learning resources of prior knowledge, warm-up quiz, and due date. Then, students will see the notice and click to open the following four webpages for filling up overview, self-explanation, and questions, rating the level of comprehension, quiz, and estimation of time on warm-up. Besides, all posted messages and uploaded documents in the warm-up procedure will be reorganized into personal blogs as learning records for further review and discussion.

3. Future Study

The proposed warm-up strategy is currently being experimented using quasi-experiment method for computer science students. Both quantitative and qualitative data will be collected, analyzed, and shared in the future.

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The e-Learning Project of Distance Learning Television in Thailand

Pornchai TUMMARATTANANONT[a*], Narasak APITIWONGMANIT[a], Neetiwit BUASROUNG[a], Sub Lt. Pukkapol TANTIKITIPISUT[a], Thatsanee CHAROENPORN[a], Yaowalak KHONKLONG[b], Manutchol HIRUNRUT[b], Nopporn MUANGRAYA[b], Sayam CHUNWIJITRA[b]

[a]*National Electronics and Computer Technology Center, Thailand*

[b]*National Science and Technology Development Agency, Thailand*

*pornchai.tummarattananont@nectec.or.th

Abstract: Creating learning opportunity for people of all ages to access alternative sources of knowledge, and developing learning habit together with promoting the use of medias as a source of creative learning to all groups are the attempts to promote human resource developing and lifelong learning society. The e-Learning Distance Learning Television Project is a solution to establish the alternative route and media for all to access online learning material. The project adapts web technology to enhance the broadcast of instruction media to rural areas. The project also provides learning management system for independent use.

Keywords: e-Learning, Distance Learning, Primary, Secondary, Vocational

Introduction

Schools in rural areas are less modernized than urban schools because there is a lack of expert teachers in specific field. To solve this problem, distance learning via satellite was offered to many schools. However, the subjects for distance learning are not varied. Instruction medias such as video, worksheet, etc. are still required to apply for the teaching.

e-Learning distance learning television (eDLTV) was live broadcast from Wangklaikangwol school and was stored in the e-Learning system. The eDLTV can be applied in rural schools as an alternative material for learning. The teachers can apply the eDLTV for a review of teaching and retest for the purpose of learning. By using the eDLTV, distance learning problems can be solved. Consequently, learning opportunities for rural students can be increased.

1. e-Learning Distance Learning Television (eDLTV)

1.1 Project Overview

eDLTV was established under the collaboration of Her Royal Highness Princess Maha Chakri Sirindhorn: Royal IT Projects and Distance Learning Foundation for the celebrations on the auspicious occasion of his majesty the King's 80th birthday anniversary. Being launched in May 2007, the content of the project was provided for secondary school. The first service on http://edltv.thai.net has been started and it received appositive response and support. As for the vocational contents of eDLTV system in 2010, it helped enhance the opportunity of work. The Office of Vocational Education Commission (VEC) has participated in this project and publicized the system via

http://edltv.vec.go.th. The operation can not only be worked on website but also applied in offline school server. The operation of eDLTV has expanded through 35 Rajabhat universities and 415 vocational colleges network nationwide. The network is still useful for teaching and learning in potential schools.

According to the 2011 action plan, the eDLTV vocational system will be boosted up to online learning in 415 vocational colleges. The improvement of medium to high quality is acceptable. The final plan is to implement eDLTV system in elementary education. The elementary students have more challenge to develop a suitable system for younger learners. The educational psychologists were also taken into account in system development.

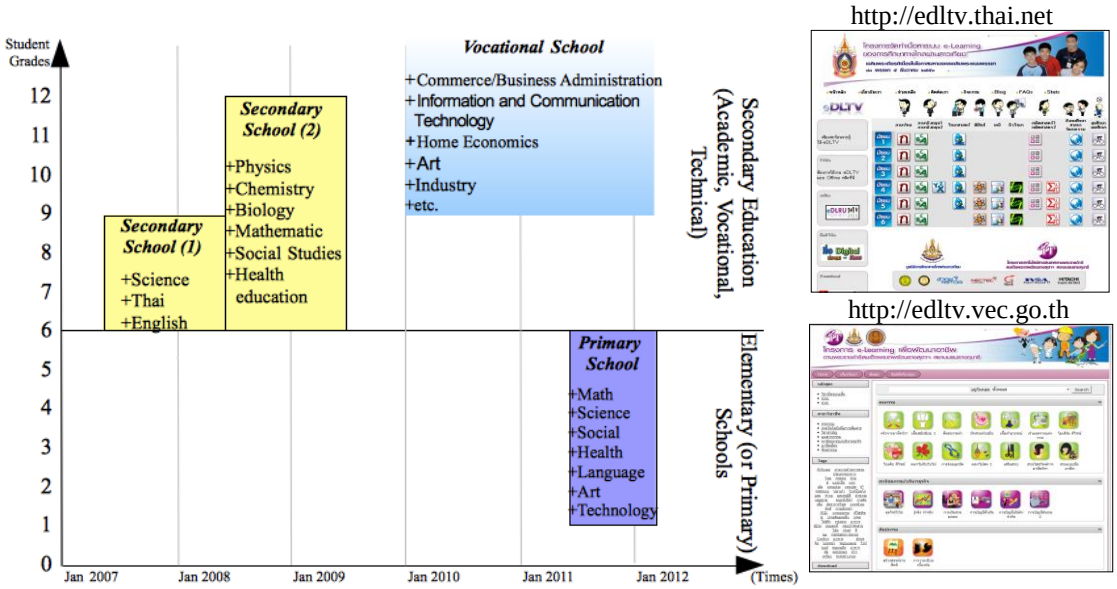

Figure 1. Timeline of content development and eDLTV website

1.2 eDLTV Contents

The eDLTV secondary school systems consist of instruction media being broadcast from distance learning television via satellite. There are 30,302 instruction medias in 6 main subjects including 15,827 videos (4,675 hours), 4,738 slides, 5,727 knowledge sheets, 2,369 worksheet and 1,302 tests. The eDLTV vocational systems consists of 1,365 teaching materials for more than 70 occupations such as chef, beautician, tailor, thai massage therapist, etc.[2]

1.3 Copyright of the License

The public is allowed to use eDLTV system for educational purpose only. It is not allowed for commercial use. Distance Learning Foundation, which owns the copyright of the content available under the creative commons for attribution, is neither used for commercial purposes nor alter content or BY-NC-ND. NECTEC, NSTDA are the copyright owner of a learning management system which was published to use open source[1].

2. eDLTV Overall Result

2.1 The online eDLTV secondary system

The eDLTV secondary system are available on http://edltv.thai.net. The figure 2 shows the statistic from January 2009 to June 2011presented by Truehits[3]. The statistics show the site in the order 410 of 11,622 websites in Thailand, 27 of 1,313 are educational websites, 5 of 67 are e-Learning websites in Thailand.

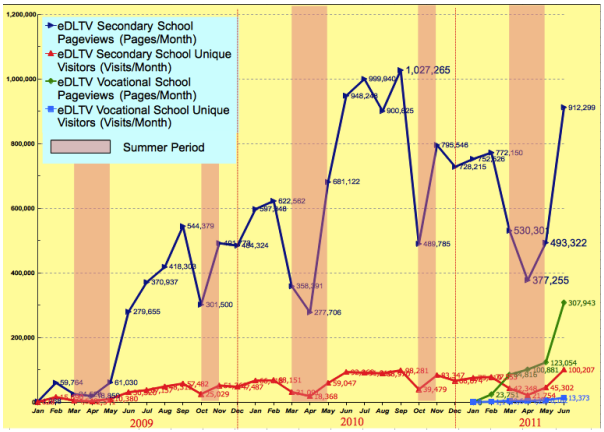

Figure 2. eDLTV Web Statistics

2.2 The offline eDLTV secondary system

In the early stages of implementation, offline eDLTV system are offered in 76 rural schools. As for other schools all over the country, a copy of the offline eDLTV system is available on the network of rajabhat universities nationwide. There are numerous schools implementing more than 1,272 locations[2].

2.3 The online eDLTV vocational system

The eDLTV vocational system is available on http://edltv.vec.go.th. The figure 2 shows the statistic from January 2011 to June 2011 presented by Truehits[3]. The statistics show the site in the order 1,280 of 11,622 websites in Thailand, 105 of 1,313 are educational websites, 7 of 67 are e-Learning websites in Thailand. Statistical information from the google statistic gained higher popularity. The vocational system that is the most popular is beautician, chef respectively.

3. Conclusion and Future Work

This project offers a eDLTV system for distance learning as an instruction media for rural schools. Teaching material was collected for the largest student group. The system can be used online and offline depending on the restrictions of the use. In addition, teachers who participated in eDLTV system will gain the skills to create instructional media for their schools.

In the future, we plan to measure the quality of the students. The standard of contents must be also taken into consideration.

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