**Workshop 13: Scaling up collaborative innovation for ICT in Education**

**#W13-01: Collaborative Problem-Solving Learning Supported by Semantic Diagram Tool: From the View of Technology Orchestrated into Learning Activity**  
*Huiying CAI, Bian WU & Xiaoqing GU*

Collaborative problem-solving learning (CPSL) refers to constructing knowledge and developing problem-solving abilities in the process of solving domain problems in a collaborative manner. Acting as a breakthrough of transforming traditional knowledge-centered instruction, CPSL has received great attention by international researchers in education. Currently, how technology can be used to support and facilitate the process of collaborative problem-solving remains the key research question. Therefore, our research team conducted a field study to investigate how technology can be really orchestrated into CPSL. A semantic diagram tool was integrated in primary school science class in Shanghai. This paper reports our second-round design-based research to answer two research questions: (1) How can the semantic diagram tool be integrated in classroom to support social interaction and collaborative problem solving; and (2) What are the major learning activities in the semantic diagram tool-supported CPSL. Video data collected in the whole CPSL project was analyzed using coding analysis method. The study reveals that, from technological perspective, semantic diagram tool can be combined with other technology to support the process of CPSL and, from instructional perspective, learning goal should extended and learning activities should be redesigned and refined according to the extended learning goal when semantic diagram tool is orchestrated into CPSL. Besides, the style of student activity and teacher’s role can be changed in the semantic diagram tool-supported CPSL.

**#W13-02: Comparative Research of ICT in Elementary Education Development Strategy in Developed and Developing Countries**  
*Chun LU, Sha ZHU & Di WU*

ICT in education development strategy is an important part of educational strategy plan, which promotes the development of ICT in education. Scientific and rational planning of ICT in Education play an important role in promoting sustainable development of ICT in Education and exerting functional benefit of ICT in education. ICT in Elementary Education is an essential part of construction of ICT in Education, which is the core area that reflects the revolutionary impact of ICT on educational development. The paper, taking China, United States and Singapore as examples of developing country and developed countries, discussed the NETP2010 which was launched by U.S. Department of Education, the Master Plan 3 by Singapore Department of Education, and the Elementary Education part of “Ten-year development plan of ICT in Education(2010-2020)” by China Ministry of Education. Combined with the development demands and basic conditions of China, United States and Singapore, the paper compared and analyzed the features, similarities and differences of the three strategic plan of ICT in Elementary Education, and explored the difference of their construction background and development ideas. Finally, the paper proposed several suggestions for the developing countries like China to enhance the construction of ICT in Elementary Education.

**#W13-03: Diffusion of ICT in Education: Behavior Subjects, Dynamic Diffusion Model and Enhance Methods**  
*Jinbao ZHANG*

This study examines the dynamic mechanic in the diffusion process of ICT in education. In this paper, the author analyzes the features of three participants (Innovators, Change Agents and Adopters) in the diffusion process of ICT in Education. The Innovators can also be divided into three types: Primary Innovators without market willingness, Flexible Innovators for special demand, and Integrated Innovators towards the marketplace. Early adopters have strong effect with other’s potential adopters. Although there are many literates on adoption mode, little research is based on motivation analysis. In this paper, the author tries to bring forward a Dynamic Diffusion Model of ICT in education in order to...
explain the internal dynamic rules among these behavior subjects. In the end, we also discuss how to promote the internal forces in the diffusion process.

**Workshop 9: Enhancing Learning through Digital Games & Intelligent Sensor Toys**

**#W09-01: The Effect of Challenging Game on Students’ Motivation and Flow Experience in Multi-touch Game-based Learning**  
**Cheng-Yu HUNG, Chih-Yuan Jerry SUN & Pao-Ta YU**  
Advancements in technology have led to the continuous innovation of learning methods for students. Specifically, the use of multi-touch interfaces applied to game-based learning has been shown to be effective in attracting students’ interest and increasing their desire for participation. In this paper, we used a multi-touch game, an iPad app called Motion Math, to help students learn and put into practice the mathematical concepts of addition and subtraction. Based on findings from a pilot study, we categorized the game’s 18 levels of difficulty into challenging (experimental group) and matching (control group) games. We aimed to investigate whether the challenging games were better able to improve the students’ motivation and flow experience in the experimental group as compared to that of the control group. The findings showed that the students in the experimental group achieved greater improvements in terms of flow learning experience.

**#W09-02: Learning Application with Collaborative Finger-Touch Game-Based Learning - A Study of iPad app in Mathematics Course**  
**Cheng-Yu HUNG, Chih-Yuan Jerry SUN & Poo-Ta YU**  
Constant advancements in technology come innovation and changes in learning methods for students. Specifically, the combination of a multi-touch interface and the game-based learning method has been found to increase the fun experienced by students during the learning process, their motivation to learn, and their willingness to participate. In this paper, we used a finger-touch game, an iPad app called Math Frogger to help students learn and put into practice the mathematical concepts of addition, subtraction, multiplication, and division. Three game scenarios were proposed and investigate whether these scenarios were able to affects the flow experience, motivation, satisfaction, and learning performance of students and to observe whether the aforementioned four variables under the various scenarios would lead to different learning outcomes.

**#W09-03: A Courseware Developed with Toy-like Interactive Interfaces**  
**Ping-Lin FAN, Hsueh-Wu WANG, Su-Ju LU, Chi-Shan YU & Wei-Hsien WU**  
The current study proposes a courseware built on game design and operated with toy-like interactive interfaces, which aims to increase students’ enjoyment, and motivation. The authors developed small scale educational games with sensor-based interfaces and observed children’s learning experiences when using presented novel input interfaces. The participants are 192 fourth- and sixth-grade students in Taiwan. Through the preliminary observations, this study found that toy-like interactive interfaces not only attracts the interest and gain enjoyments of children, but also stimulates their learning motivation. The findings have highlighted the value of the courseware with toy-like interfaces and indicated that the introduction of novel interfaces can be a useful tool for enhancing classroom learning activities.

**#W09-04: Investigating Students’ Sequence of Mathematical Topics in an Educational Game with a Curriculum Map**  
**Hercy N.H. CHENG, Charles Y.C. YEH, Hui-Wen WU, Calvin C.Y. LIAO, Andrew C.-C. LAO & Tak-Wai CHAN**  
Spiral curriculum is suitable for students’ ability development in a teacher-centered learning. In a sense, current textbooks adopt spiral curriculum because teachers need textbooks to teach their students. However, in a learner-centered learning, textbooks leave little space for students to monitor their own learning. For this reason, this study aims to design an educational game, Math Island, in which students may learn mathematics in their own paces according to their own ability. In the game, students play...
as a role of a city manager who needs to choose building plans and build their own building. When they build their city, actually they have to complete various learning tasks, which are designed from simple to complicated concepts. A preliminary finding suggests that students tended to carrying out learning tasks continuously instead of spirally. However, further investigation into students’ learning behaviors on Math Island should be conducted.

#W09-05: Tailored RPG as a Supplementary Reading Pedagogy for Teaching English
Mira Luxita SARI & Cheng-Ting CHEN

Even though English has become the main foreign language in Indonesia, The Ministry of National Education in Indonesia decided to remove English from the main subjects in elementary level due to the difficulties of teaching and learning. Hence, this study investigates the effectiveness of employing computer games as a supplementary pedagogy in English teaching to improve students’ reading ability and to reduce students’ learning anxiety. This study will be expected to shed the light on how to prepare creative reading materials by using computer games for English teachers, private or public schools, cram schools, and researchers. Ninety four students in a private school in west Indonesia were recruited as the participants. A mixed-research design was employed and twelve games were introduced to the students for six weeks. Moreover, a RPG workshop was presented to the English teachers for 4 weeks. Four research questions were developed, and the data were collected through pretest and posttest, classroom observation, teacher interview, and teaching reading strategy questionnaire. The results showed that the p-value of the t-test is < .0001, indicated that the RPG works as an effective supplemental teaching strategy. The students’ English proficiency improved significantly after the RPG intervention. The result also pointed out that RPG helped the students to be more focused on their assignments. Simultaneously, the English teachers perceived that RPG increased the students’ motivation to learn English. Therefore, all teachers agreed that RPG could be an alternative strategy for teaching English. They commented that RPG helped them to prepare the materials by using virtual characters to create meaningful dialogue, so the students could learn English more easily in a more interesting way. Overall, it can be concluded that RPG worked as an effective supplementary reading pedagogy in English teaching.

#W09-06: The Interactive Building Projection on Heritage Based on Game-Based Learning—A Case of “Red Building in National University of Tainan”
Wen-Lin HONG, Yi-Hsin CHANG, Hen-Yi CHEN & Hao-Chiang Koong LIN

Although Taiwan has abundant culture of history and heritage, people seldom be interested in learning the cultures of history. We hope to combine the history with digital technology, so we design Processing programs to implement the Building Projection that contains the technology of Projection Blending and Projection Mapping and combine the App to add immediate interaction. Thus, the user can achieve the Game-based Learning via the interactive game. In this research, by taking the Red Building in National University of Tainan as an example, the users can utilize the Mobile Device to interact with Red Building, and carry on through three stages of interactive game; that is, becoming the defender, designer and eyewitness to experience the past history of Red Building. In the interactive game, the people can learn the history and culture; furthermore, it can inspire the concept of heritage protection and increase the identity about local culture of Taiwan in people. In this research, we use Expert Evaluation Method to improve our system and game mechanics based on the opinion of experts to increase the foundation of Game-based Learning. Besides, we use System Usability Scale (SUS) to analyze the usability and satisfaction of the system. The results of the scale showed that the users give a good evaluation about the usability and satisfaction of the system. We expect that the interactive technology can combine with more culture of heritage to enhance people identification of the culture of history. It’s aimed to keep the meaningful culture of history forever.
#W09-07: The Evaluation Framework for the Group Development Process of Adventure Education Game  
*Chang-Hsin LIN, Ju-Ling SHIH, & Yu-Jen HSU*

It has been implemented for a long time about the development of physical adventure education activities. However, there were no papers to discuss the application in technology. This study uses Tuckman stage of team development to develop a digital games course of adventure education and chooses suitable process evaluative tools. Researchers can investigate the changes of members’ interactive behaviors and group development with the tools. Finally, this study will use questionnaires to explore the learning effectiveness of adventure education and the satisfaction of the digital games course.

#W09-08: The Instructional Application of Augmented Reality in Local History Pervasive Game  
*Jyun-Fong GUO, Ju-Ling SHIH*

Pervasive game is a new type of mobile learning, which adds game mechanism into the traditional mobile learning. It increases the interactions of the players with both the learning environment and mobile technology. In this research, Tainan historical monuments are used to be the activity sites of the game. Markerless augmented reality and social community website are used to sustain gaming collaboration and learning motivation. Pre and post tests, system logs, interviews, and questionnaires are analyzed to investigate the influence and effectiveness of pervasive game in learning Tainan culture.

#W09-09: Designing a Farming Game with Social Design to Support Learning by Reciprocal Questioning and Answering  
*Yih-Ruey JUANG*

Most of learners usually hesitate and tend to keep silence in online discussion for learning in traditional e-Learning platform, but they are enthusiastic about posting messages and playing games in social networking sites. By taking the advantages of social learning games, this article presents an initial study on designing a farming game “The Secret Garden of Angels” with a social interaction strategy which is modeled from an icebreaker game ‘The Little Angel and Master’ in real world. The learning mechanism integrated into the game is learning by reciprocal questioning and answering. Through playing interesting farming game with classmates, the social learning game attempts to raise the learning motivation, interaction between teachers and students and among students, and then the learning achievement.

**Workshop 10: Innovative Design of Learning Space**

#W10-01: The effect of the Mozart music on learning anxiety and reading comprehension on Chinese storybook reading  
*Yen-Ning Su, Chia-Cheng Hsu, Chia-Ju Liu, Yueh-Min Huang & Yu-Lin Jeng*

Reading ability is the basic skill to enhance the competitiveness of the national economy. Through a large number of reading content, students can develop high-level thinking skills. Anxiety is an import factor to affect students’ learning when they are reading materials. Some studies found suitable music can reduce people stress feeling. In order to investigate the effectiveness of music on learning, this study used Mozart music in a reading process with Chinese storybook. The results show that Mozart music has an impact on the improvement of students’ reading comprehension. However, we also found that the Mozart music couldn’t reduced the students’ learning anxiety in our study.

#W10-02: Using Augmented Reality to Assist an Interactive Multi-Language Learning System in an Elementary School  
*Gwo-Haur HWANG, Chen-Yu LEE, Hen-Lin HWANG, Guan-Lin HUANG, Jheng-Yi LIN & Jun-Jie CAI*

Second/foreign language learning has been a sustained concern due to competitiveness and globalization. Commonly, elementary school students in Taiwan learn not only their
native language such as Mandarin but also English and Hokkien. It is not easy to acquaint students with multiple languages at the same time. Therefore, the solution to raise the students’ interests and learning effectiveness during multi-language learning has been a hot issue. Augmented reality (AR) is a technology that blends virtual contents with the real environment, and it supports the context-aware ubiquitous learning. The application of AR is considered helpful to increase the students’ motivations by past researchers. However, most researches focus on bilingual learning including Mandarin and English, and some specific learning objects (such as image cards) are needed to provide. Accordingly, an interactive multi-language learning system is proposed in this study to improve the inadequate parts mentioned above. It is expected to promote students' motivation and learning effectiveness.

#W10-03: A Study of Pragmatics Applied to Teacher – Parent Communication  
Ching-Feng CHEN, Cong-Xun XIE, Shein-Yung CHENG, Wen-Yi Zeng, Wei-Fu Huang & Jia-Sheng HEH

With progress society and increased information, parents cloud participate their children’s learning become easier. And parents’ educational backgrounds are increasing, so they have more and more different opinions on the method of disciplining their children by teacher in school. It is pressing that try to create a efficacious approach of teacher – parents (abbr. as T - P) communication, and how to cause parents participate their children's learning more willing, and how to cause parents interactive with teacher more active is a important question. This study researched the theory of the pragmatics and speech act theory, classified the dialogue between teacher and parents, used the method of association rules in data mining, tried to find a active module of T - P communication, to use helpful in general teaching placement, provide teacher to increase parents participate their children's learning. In this study, we found out 28 rules of association rules from the T - P dialogue on the student homebook in the last year, and checked these rules by the new T - P dialogue in this year. We found the precision form 40% to 100%, and the recall from 4.35% to 69.57%. The result shows the association rules is in line with the different T - P communication, it can be provided to teacher as reference. We proved if the association rules were true, teachers were not soliloquizing any more, and parents reply willing, T - P communication was frequently.

#W10-04: Enhancing Learning Achievement Using Affective Tutoring System in Accounting  
Ya-Ping HSUEH, Hao-Chiang Koong LIN & Meng-Shian OU

This paper shows an affective tutoring system which enforces accounting remedial course and hopes to be useful for student’s learning achievements. In order to make the low-achievement students to be more willing to learn, there are more and more colleges implementing the remedial education to promote student’s learning achievements. Because of the innovation of technology, computer becomes a main tool for e-learning. Besides study and work, there are more and more computer’s developments of the interaction with people. For example, there are some studies about making computer to perceive human’s emotions, express emotions and feedbacks in time. Recently, many studies also show evidences that the emotions is an important factor to affect learning.

Our participants are some low-achievement students who are freshmen in Taiwan. We try to know the usability of the affective tutoring system using in accounting remedial course for learners. We also want to realize whether the accounting remedial course using affective tutoring system affect the learning achievements and motivations. We adapt observational survey in the experiment and make a learning achievement questionnaire at the end on experiment. The questionnaire contains learning achievements, system’s usability, and learning motivation. We also implement focus group to get some feedback and quantitative data to analyze with statistical software. In conclusions, we find learner have good usability and satisfaction at using affective tutoring system to do accounting remedial course. The tutoring agent also has the benefit to enhance learner’s learning motivation. The value of learning achievement is 0.93 and is highly significant.
#W10-05: Evaluating the Users’ Continuance Intention and Learning Achievement Toward Augmented Reality e-Learning with User Experience Perspective
Yu-Ling LIU, Po-Yin CHANG & Chien-Hung LIU

Nevertheless Augmented Reality (AR) has been applied to various e-learning systems, the study related to learning achievement and discontinue using anomalies are still insufficient, former meaning learner’s learning achievement may decline with AR e-learning system, the latter denotes learner discontinue using e-learning after initially accepting it. Emerging design approach: User eXperience Design (UXD) could provide learner with great user experience to alleviate the above issues. This paper synthesizes the Information System Success Model (ISSM) and the Expectation–Confirmation Model (ECM) to established an extension model based-on user experience perspective to discovery what critical factors affected the users’ learning achievement and users’ intentions to continue using e-learning. Preliminary results of this study have shown our questionnaire reached good convergent and discriminate validities. In next steps, the model will be empirically tested with e-learning through various AR designed courses.

#W10-06: Establishing an Innovative Plant Learning Platform with Expandable Learning Materials Using Wiki Software
Shu-Chen Cheng, Chien-Ming Shao

Currently, plant education in elementary schools is an insignificant part of Nature courses, and students learn only the basic knowledge of plants, rather than profound knowledge. This study aims to establish an innovative plant learning platform to help students gain knowledge of plants, as based on the instructional website of a wiki engine. Through the characteristics of wiki, it invites scholars in plant studies to edit plant data and design related tests on the platform. Students can check their knowledge of plants on this system by various platforms, such as computers or mobile phones. The keywords can be the characteristics of leaves, flowers, and names of plants. In the experiment of study, a pretest is conducted on students using the items proposed by scholars, and a posttest is conducted after the students used the proposed system. The results of the two tests were compared. This study anticipates that the proposed system can allow students to have higher interest in learning about plants, thus gaining more knowledge on plants.


#W04-1: How to Construct an Assessment System for Engineering Courses
Yu-Hur CHOU & Hsin-Yih SHYU

Most test items used for engineering courses are application problems with a serial of calculations and logical adjustments. Mistakes of the parent (front) calculations may inherit to their child (rear) calculations. Teachers spend too much time in administering the examination. Therefore, the purpose of this article is to specify how to design and construct an assessment system with partial credit function for the engineering courses. Applying concept-mapping technique along with Petri-Nets and Goldsmith’s closeness index theory, this system can inferential diagnoses in order to investigate examinee’s misconceptions and produce the reasonable scoring for engineering courses.

#W04-2: Adaptive Question Generation for Student Modeling in Probabilistic Domains
Nobila KHODEIR & Nayer WANAS

Problem solving behavior remains to be the most trustable source for modeling student knowledge in intelligent tutoring systems. In this work we focus on diagnostic problem solving, as an essential question type associated with probabilistic domains. Student answer for such questions indicates the knowledge discrepancies between the student and his/her stored model. In this paper we introduce an algorithm that adaptively generates different appropriate follow-up questions to accurately determine the knowledge discrepancies in the student model. Answers to these follow-up questions are used to update the student model. Verification is conducted on the updated model based on the matching between student and generated model answers to the presented questions.
Results suggest that tracking the student knowledge discrepancies using the generated follow-up questions improves the prediction accuracy of the student answers by 20% compared to relying only on the diagnostic questions alone. In addition, approximation of the student model enhanced by 40% relative to that obtained using the diagnostic questions alone.

#W04-3: Facilitating Creative Cognition by Embodied Conversational Agents
Yugo HAYASHI
The study investigated the use of collaborative embodied conversational agents in the facilitation of creative cognition. Based on preliminary studies, two factors were investigated through an experimental design addressing the number of conversational agents (single vs. dual), and method of communication (voice vs. text). 18 participants engaged in a simple interpretation game with embodied conversational agents. Role-playing embodied conversational agents made suggestions on the quality of the participant's interpretations. The study focused on how the two factors enhanced the quality of cognitive process during interactive activities with the agent. Analysis showed that the synergy created by the use of multiple agents along with a voice communication enhanced the cognitive process for the quality of creative interpretations. These results suggest that the number of agents and the method of communication are important factors in designing effective embodied conversational agents in creative activities.

#W04-4: Preliminary Assessment of Online Student-Generated Tests for Learning
Fu-Yun YU
While noting that constructing “tests” is different from constructing questions, its use for learning is yet to be explored. A study involving a total of 54 student teachers was conducted. An online student-generated tests system supporting associated tasks was adopted. Preliminary data on students’ perceptions with regard to its use as an assessment and learning approach, as compared to teacher-generated tests, were collected and analyzed. Several important findings were obtained. First, more than three-quarters of the participants preferred student-generated test as the approach for assessing their learning. Second, the majority of the participants thought student-generated tests promote better learning. Third, based on chi-square goodness of fit tests (X2), students’ preference to and perceptions of student-generated tests and teacher-generated tests were statistically significant at p< .01. Finally, students’ written responses analyzed using the constant comparative method indicated that student-generated tests is a promising assessment and learning approach. Based on the collected data, suggestions for online system developments of similar kinds and instructional implementations are provided.

#W04-5: Empirical Study on Errors of Mathematical Word Problems Posed by Learners
Kazuaki KOJIMA, Kazuhisa MIWA & Tatsunori MATSUI
Problem posing by which learners create problems by themselves has been identified as an important activity in mathematics education. However, problem posing is a heavy task for both learners and teachers because it is a divergent task that has various possible answers. To develop problem posing skill of leaners, it is indispensable to evaluate posed problems, particularly when they include errors in mathematical structures. To provide a basis in designing computational support for addressing errors to improve problem posing skill, this study empirically investigated errors of mathematical word problems posed by novices. Undergraduates were engaged in a problem-posing task where they were asked to pose many, diverse and unique problems from a problem initially given. Posed problems that included errors were analyzed, with the result indicating that when the undergraduates failed to pose problems, their problems mostly had errors regarding setting constraints. We then discussed how to approach errors in problem posing by computational systems.
The Design Principles of the Worked Examples
Chun-Ping WU & Pi-Han LO

Problem-based learning strategy has been frequently adopted to develop students’ problem-solving ability. Despite the fact that its effects have been reasonably argued and empirically tested, its associated learning task may overload the learners, especially the novice. This paper, grounded on the cognitive load theory, argued the potentials of introducing the worked examples into problem-based learning activity. The purpose of this study is to explore the design principles of worked examples and test its effects. The geometric logic problem type was chosen as the main problem for participants to explore during the problem-based learning activity. A series of geometric logic problems was developed and tested in a pilot study to ensure its quality. Furthermore, worked examples and practice session were developed based on the principles suggested in the literature. A web-based learning system was created to engage participants in observing the logical problems, watching the examples and practicing solving the given problems. A pre-and-post experimental design was adopted to test the effect of worked-examples. Twenty-eight university students, matriculated in information-related programs, were recruited. The finding supported the positive effect of the worked examples on enhancing students’ logic problem solving performance.

Workshop 8: The Applications of Information and Communication Technologies in Adult and Continuing Education (W8)

#W08-01: Exploring the Changes in In-service Teachers’ Perceptions of Technological Pedagogical Content Knowledge and Efficacy for ICT Design Thinking
Ching Sing CHAI, Joyce Hwee Ling KOH, Pei-Shan TSAI, Normaliah ISMAIL & Erwin ROHMAN

The present study explores the changes in teachers’ perceptions of technological pedagogical content knowledge (TPACK), and their efficacy for ICT design thinking. The TPACK survey and the Technological Pedagogical Content Design survey (TPCD) were administered to 100 Singaporean in-service teachers who participated in a three-day professional development session for ICT mentors. The TPACK-MLS has seven scales, including content knowledge (CK), pedagogical knowledge (PK), Pedagogical content knowledge (PCK), technological knowledge (TK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPACK). The TPCD has two scales, including design practice (DP), and design disposition (DD). The results shows that through the workshop activities, the teachers had significant positive change in their perceptions of pedagogical knowledge (PK), technological knowledge (TK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPACK). The professional development sessions also enhanced the teachers’ perception about their design practice (DP) and design disposition (DD).

#W08-02: The Relationships between Child-Parent Shared Mobile Augmented Reality Picture Book Reading Behaviors and Children’s cognitive attainment
Kun-Hung CHENG & Chin-Chung TSAI

Augmented reality (AR) books combining the advantages of physical books with digital content including new interaction possibilities are the one of the noticeable AR media. The application of AR book has been documented its effectiveness for learning, however, studies regarding how users learn in the process of AR book reading is limited. This study selected a mobile AR picture book to examine the relationships between child-parent shared reading behaviors and children’s cognitive attainment. The reading behaviors of 33 child-parent pairs participated in this study were video-recorded and the children were interviewed after the activity for understanding their cognitive attainment. Through the correlation analysis, the findings indicated that the more reading and operation (i.e., turning or inspecting the AR book) of the mobile AR picture book the children were involved in, the more cognitive attainment they gained. The parental interaction-oriented behaviors (i.e., commenting, prompting, evaluating, or expanding) were helpful for their
Another noteworthy issue is that the distraction of the children during the shared reading process was negatively related to their cognitive attainment.

#W08-03: Strategies for Leveraging Learning Game Data for Middle School Mathematics Instruction
*Michael A. EVANS & Jordan PRUETT*

Middle school mathematics education is subject to ongoing reform based on advances in instructional technologies, leading to recent calls for investment in learning games. The pertinent issues focus on the device-based data collection potential of these dynamic, innovative learning environments to improve classroom instruction. Through an extensive literature review, we identified three priority areas where data collected from learning games could assist teachers to make informed decisions: providing students with personalized feedback, assessing student learning, and promoting deeper learning. These requirements are used to highlight potential empirical and practical implications for leveraging collected gameplay data to improve instruction, demonstrating how the CandyFactory app could be harnessed to support classroom-based decision-making. Investigators have partnered with a school district in rural southwest Virginia, testing how students (n=306) from two middle schools in six mathematics classrooms benefited from CandyFactory and how it influenced mathematics engagement and achievement. Through a series of three participatory design workshops (occurring from June 2012-June 2013), partnering teachers (n=6) confirmed that having access to data from the three identified priority areas would allow for an integrated adoption of learning games into instruction, potentially leading to achievement gains. We conclude by proposing future research directions in developing targeted learning games to support evidence-supported decision-making, which in turn could benefit how middle school students engage with and achieve in mathematics.

#W08-04: Examining the effects of integrating technological pedagogical content knowledge into the preschool teachers’ professional development regarding science teaching; using digital game-based learning as an example
*Chung-Yuan HSU, Yi-Ching SU & Jyh-Chong LIANG*

A common question emerges while applying the Technological Pedagogical Content Knowledge framework for teachers’ preparation to integrate ICT into classroom teaching and learning: which type of knowledge (e.g., TK, CK, or PK) should be instructed first during the course? This study examined the effects of the technology- and pedagogy-oriented course design on improving the in-service preschool teachers’ Technological Pedagogical Content Knowledge-Games (TPACK-G) as well as their acceptance of digital game-based learning. The participants were 49 in-service preschool teachers. They were assigned into a technology- and a pedagogy-oriented group. The results show that when integrating the TPACK-G framework into the preschool context, instructing game knowledge before pedagogy knowledge tended to raise the in-service teachers’ competencies of game knowledge and game-pedagogical-content knowledge.

#W08-05: Development of the Chinese Pre-service Teachers’ Technological Pedagogical Content Knowledge Scale
*Guoyuan SANG, Yan DONG, Ching Sing CHAI & Ying ZHOU*

In this article the development and validation of the Chinese Pre-service Teachers’ Technological Pedagogical Content Knowledge Scale (CTPCK) are described. The CTPCK is a 42-item scale for assessing pre-service teachers’ knowledge with or without linking educational technology. The sample was split into two subsamples on random basis (n1 = 229, n2 = 207) for having, (1) Exploratory Factor Analysis (EFA) and (2) Confirmatory Factor Analysis (CFA), respectively. After the EFA, the CTPCK scale excluded 4 items and had 8 factors. Reliability and correlations were discussed. The findings revealed that the CTPCK scale was a valid and reliable instrument for measuring TPACK of Chinese pre-service teachers.
Effect of graphic design on E-book reading: A pilot eye-tracking study

Tse-Wen PAN, Yu-Hsuan CHANG, An-Hsuan WUA & Meng-Jung TSAI

This study explored graphical design effects on learner's E-book control, visual behaviors and learning performance by a pilot eye-tracking experiment. Twelve university students with novice experience of Spanish language participated in an e-book reading task to learn basic Spanish vocabularies. All participants were randomly assigned into two groups of reading materials with high-related graphics and low-related graphics. During the experiment, an ASL MobileEye eye tracker was used to track and record the gaze data of learners into video files. After reading 10 sets of text-and- graphic vocabularies in the E-book though an iPad, each participant received an immediately posttest, a three-days and a one-week delayed posttest. Each participant's action controls and visual paths on the e-book were observed and coded. Mann–Whitney U tests, Wilcoxon tests and Pearson's correlation analyses were used to analyze the data. Results showed that the high-related-graphic group had significant higher scores on immediately posttest. In addition, students gained learning retentions in both groups. Regarding e-book control behavior, the high-related-graphic group clicked on sound buttons more than the other group. The learners who had happier prior language learning experience also tended to click more on pronunciation buttons. Besides, the learners who believed that graphic is helpful for learning vocabularies spent less time reading the e-book. This pilot study successfully demonstrated the usability of eye-tracking techniques to investigate students' eye fixations while reading e-books. Future study is suggested explore the effects of e-book content design on students' reading behaviors or learning outcomes.

The relationships between master degree students’ online academic information search behaviors and online academic help seeking

Ying-Ju CHIU & Chin-Chung TSAI

The purpose of this study is to explore master degree students’ online academic help seeking (OAHS) via their online academic information search behaviors (OAISB) and to compare their online academic help seeking between different groups. The participants were 386 master degree students in Taiwan, and we divided it into groups of major (science and non-science), including 210 science major samples and 176 non-science major samples. Take advantage of exploratory factor analysis, correlation analysis, and path analysis, this study found that some relationships existing between master degree students’ online academic information search behaviors and their approaches to online academic help seeking. The results showed that the multiple sources as accuracy was a sufficiently reliable tool to assess master degree students’ online academic help seeking. Non-science master degree students' deep as content could predict their using online resources appropriately but not science master degree students, content relevant to the goal might play a role in non-science master degree students' Online academic help seeking.

Graduate students' online academic information search behaviors in Taiwan

Jui-Chi WU & Jyh-Chong LIANG

Previous studies have found out that students’ search evaluating standards and search strategies play an important role in online information searching. Some studies indicated that there are only few studies discuss about graduate students’ online academic information search behaviors. Therefore, this study was conducted to assess these students’ online academic information search behaviors including search evaluating standards and search strategies. The interview findings were as a foundation to develop Online Academic Information Search Behaviors (OAISB) inventory, and then to explore the relationships between search evaluating standards and search strategies. The participants in this study included 296 graduate students in Taiwan. Results showed that the students with elaboration higher-level search strategies expressed multiple sources, deep as content, usefulness as technical and accessing as technical. And match lower-level search strategies attempt authority, surface as content, usefulness as technical and accessing as
technical. In addition, the regression analyses revealed that graduate students’ online academic information search evaluating standards were viewed as predictors to explain their search strategies.

#W08-09: The Relationships between Taiwan University Students’ Internet Attitudes and Their Preferred Teacher Authority toward Internet-based Learning Environments
_Tzung-Jin LIN & Min-Hsien LEE_
Although the issue of teacher authority in the Internet-based learning environments has begun to gain attention recently, the relation with students’ Internet attitudes is still unclear. Since a more appropriate attitude toward the Internet is required for successful Internet-based instruction, this study aimed to initially explore the relationships between students’ Internet attitudes and their preferences of teacher authority in the Internet-based learning environments. A total of 259 Taiwan undergraduates were invited to complete two instruments to assess their preferences of teacher authority in the Internet-based learning environments and Internet attitudes, respectively. Through exploratory and confirmatory factor analysis, the two adopted instruments showed satisfactory validities and reliabilities. Moreover, the path analysis results indicate that, if the students prefer learner-centered process authority, they tend to possess positive Internet attitudes. For example, they may view the Internet more useful, possess higher confidence when using the Internet, and use the Internet more frequently. On the contrary, if the students show their preferences for a teacher-centered content authority, they are prone to use the Internet more often.

#W08-10: Promoting Second Language Writers’ Error Corrections with Corpus: A Case Study
_Hui-Hsien FENG & Ying-Hsueh CHENG_
How corpora can be used to facilitate second language writing has been of great interest. Previous studies have revealed benefits of this application in non-native English students’ writing development. However, how corpora can be used for self error-corrections in essay writing, especially the pattern of corpus consultation, has been little studied. This paper examines the effects of corpus concordancing on error-corrections and student attitudes toward such corpus use in essay writing. Three ESL graduate students enrolled in a US Midwestern university were invited to write three essays that were randomly selected from the TOEFL-iBT essay-question database. The purpose of the essay tasks was three-fold: Essay 1: to assess students’ writing competence before training; Essay 2: to examine students’ application of corpus concordancing to revise Essay 1; Essay 3: to evaluate students’ use of corpus consultation to write another essay after training. The results showed that in Essay 2, the students corrected the most “word choices” and in Essay 3, they tended to prevent poor word choices. In addition, the students perceived the corpus training as beneficial to self error-corrections in essays. This paper concludes with pedagogical and research implications.

#W08-11: Using Internet as Research Tool: An Example of Meta-Analysis Study
_Shih-Hsuan WEI_
In this paper, we describe how internet can be used as a research tool through providing a study conducted by meta-analysis. Student academic success has always been a priority in education and mathematics education has been a major focus over last few decades. The quality of teachers is one of the most significant factors in shaping the growth and learning of students. The purpose of this study was to review the existing empirical studies accumulated to draw conclusions about various aspects of teacher qualifications that were linked with student mathematics achievement. A meta-analysis was used to provide a descriptive analysis of the existing empirical studies.

#W08-12: Development questionnaire about High school students learning science and technology in the 21st century
_Chih-Hui LIN & Jyh-Chong LIANG_
This study revised three surveys. The development of questionnaires was focused on three
major themes: 21st century learning ability, Teacher Authority Survey (TAS), and Self-efficacy. Firstly, 21st century learning ability is the relationships among students’ perceptions for collaborative learning, critical thinking, self-directed learning, creative thinking, meaningful use of Information and communication Technology (ICT), problem solving, knowledge creation efficacy, design disposition, teacher authority, and learning achievements. And, secondly, name Learning in schools and the preferred version of TAS questionnaire, and utilize both of them to elicit high school students’ conceptions of learning and preferences of teacher authority in classroom. The study aims to develop a questionnaire to explore High school students’ learning science and technology in the 21st century.

#W08-13: Exploring the differences of the Internet-specific epistemic beliefs between Taiwanese undergraduates and high school students

Yen-Lin CHIU & Chin-Chung TSAI

This paper aimed to compare the differences of Internet-specific epistemic beliefs (ISEB) between undergraduates and high school students. Furthermore, the influence of age and educational level as well as other variables on the ISEB were also examined. 299 participants including 150 undergraduates and 149 high school students were surveyed with the Inter-specific epistemic questionnaire (ISEQ). The exploratory factor analysis was executed to construct the ISEQ. Four dimensions of ISEB were identified, namely Certainty, Simplicity, Source and Justification. Further, the t-test analysis and regression were administered. The results showed that there were differences of ISEB with regard to Certainty and Justification between undergraduates and high school students. However, the variables of age and educational level cannot significantly predict any dimension of ISEB. Interestingly, the gender and experience in using the Internet for academic information searching were significant predictors of Simplicity, Source and Justification.

Workshop 12: Computer-supported Personalized Learning (W12)

#W12-01: Development and Evaluation of a Problem Solving Oriented Game-Based Learning System

Hsin-Yi LIANG, Song-Yu MEI, Yu-Syuan WANG, Jhih-Liang JIANG, Gwo-Haur HWANG & Chen-Yu LEE

Problem solving is an intellectual skill to achieve effective learning, and it can be widely applied to many domains. In order to improve the problem solving abilities, previous studies had shown the significant effects of game-based learning to promote students’ learning. Besides, previous researches also suggested the cognitive style plays an essential role to affect the usability of game-based learning, which significantly influences the learning effectiveness. Therefore, the differences of cognitive styles on usability evaluation are considered in this study. Two quests are designed in our game-based learning system to improve students’ problem solving abilities. The first quest is helpful to promote the mathematical logic and reasoning abilities, while the second quest is helpful to promote the verbal logical reasoning ability. 49 students from two universities in Taiwan participate in this experiment. According to the analysis of cognitive style questionnaires, there are 9 serialist participants and 28 holist participants for the valid samples. In order to improve the system design, the Nielsen’s heuristic evaluation questionnaires are applied. The major result indicates that the Nielsen’s eighth heuristic (aesthetic and minimalist design) is most satisfied by the participants, while the Nielsen’s sixth heuristic (recognition rather than recall) is most dissatisfied. Even some differences are observed, there are no significant differences of the usability evaluation between serialist participants and holist participants.

#W12-02: Planning and Design of Personalized Dynamic Assessment for Linux Learning

Hsin-Chih LIN & Cheng-Hong LI

This study aims at the development of a personalized dynamic assessment system for Linux learning. The proposed system is divided into three major components, including learning materials, learning resources, and dynamic assessment. After assessing learners’
learning states and performance, the proposed system can instruct learners to use appropriate learning materials and resources as feedbacks to complete the given tasks, so that learners can use correct Linux commands with the right syntax. These feedbacks can improve learners’ operability on Linux, and can enhance learners’ motivation and interests. To well develop the proposed system, the three major components will be reviewed by experts through heuristic evaluation and by users through System Usability Scale (SUS). This paper is to describe the issues of planning and design of our personalized dynamic assessment system. The processes of expert and user evaluation for the proposed system are also discussed.

#W12-03: Personalized Game-based learning and Mobile learning: The app game “The Adventure of The Ch'ingDynasty Treasures”
Sheng-Chih CHEN, Po-Sheng TIEN, Yi-Chin YANG, Fu- Hsin PENG, Kuan-Ying WU, Wei-Lin CHEN, & Yi-Jia HUANG
In this paper, we use images of cultural artifacts on digital content interactive media design and production with research methods as design analysis, user behavior analysis, observation and qualitative research. The process is as follows. The process is as follows. 1. Selecting three to five cultural artifacts for visual element analysis. 2. Transforming and operating images through design thinking. 3. Combining with new communication technologies (mobile device, sensor) to make prototypes.

#W12-04: Learning Experience of Game Poetry: A New Approach for Poetry Education
Hsin-Yi LIANG & Sherry Y. CHEN
Poetry is a creative language which enhances imagination and self-reflection. However, the ambiguity of poetry increased the difficulty in interpretation, which builds students’ negative learning perception and demotivates most students to read poetry. Previous research implied the positive relationship between the ease of interpretation and learning perception. Besides, many studies showed the positive effect of active participation on interpretation. Meanwhile, game is able to improve the interpretation by rich feedback and narratives. Previous research also suggested game-based learning positively improves students’ learning perception and motivation. To the end, this study develops a game-based learning system for students. Both quantitative and qualitative analyses are applied to evaluate the improvements of students’ perception. Besides, Spearman’s correlation was applied to explain the relationships among learning perceptions, such as interpretation, active participation, and playfulness. The results argued active participation was significantly related to interpretation. However, the improved attraction was positively related to students’ participation, interpretation, and learning perception.

#W12-05: Students’ Motivation of Science Learning in Integrated Computer-based Laboratory Environment
Niwat SRIISAWASDI, Rungtiwa MOONSARA & Patcharin PANJABUREE
Absolutely, teaching of science by the way of memorizing of scientific facts, what science is, and how to do science is not work for motivating student into meaningful learning in science and understanding science in the way it is. Currently, computerized technological tool is so commonplace in the practice and advancement of science education community in order to engaging student learning in science by doing, not memorizing it. The tool has been proved its potential support in instructional sciences in science classroom. According to the potential abovementioned, this paper reported an effect of integrated computer-based laboratory environment, a harmonization of hands-on computer-based experiment and interactive computer simulation, on 123 of 11th grade students in three groups: 49 science-major students; 37 technology-focused non-science students; and 37 language-focused non-science students. On a purpose, the study has implemented a series of open-inquiry science learning activity in a unit of science of fluid such as capillary action, surface tension and contact angle phenomena. The Science Motivation Questionnaire II (Glynn et al., 2011), was used to investigate their motivation toward learning of science. Results show the learning environment impacted a movement of the students’ motivation toward learning of science. This implied that the teaching of science by Integrated Computer-
based Laboratory Environment could be used to motivate potentially student learning in science both science and non-science major in secondary education.

#W12-06: Guideline for the Development of Personalized Technology-enhanced Learning in Science, Technology, and Mathematics Education
Patcharin PANJABUREE & Niwat SRISAWASDI
With a rapidly changing world, science, technology, and mathematics (STM) hold the key to achieve a certain level of development. Technology in education is, therefore, a key ingredient to enhance learning as it helps produce creative and lifelong learning individual students. Recent progress in computer and communication technology has encouraged the researchers to demonstrate the pivotal influences of technological personalized learning environments on student learning performance improvement. Many researchers have been investigating the development of such learning environment by basing upon the concept-effect relationship model on student learning performance improvement. Such learning environment has been demonstrated to be useful for helping teachers to diagnose learning problems for individual students according to test answers, and to provide personalized remedial learning guidance for improving students’ learning performance. However, each student has different preferences and needs, which are very important factors, affecting on STM learning ability. Moreover, individualizing the learning experience for each student is an important goal for educational systems. It is very crucial to provide the different styles of learners with different learning environments that are more preferred and more efficient to them. Therefore, this paper proposes a guideline for the development of personalized technology-enhanced learning where the student’s conceptual learning problems and preferences are diagnosed, and then user interfaces are customized in an adaptive manner to accommodate such learning problems and preferences, in order to emphasize on promoting STM education.

#W12-07: Stimulating Self-Regulation for High and Low Achievers in a Self-Directed Learning Environment
Andrew C.-C. LAO, Mark C.-L.HUANG & Tak-Wai CHAN
The forthcoming trend of personalized learning drives the further development of individualization. Studies that relate to individual learning show possibilities for personalized learning in current education. This is because the goal of both individual and personalized learning are focused on how to help students pursue their learning and provide assistance to help students become lifelong learners. From the basis of cognitive theories, we believe that elementary students are able to be responsible for their own learning. However, most studies that related to individual learning were mainly from adult and adolescent education. In addition, as stated in Self-Determination Theory (Deci & Ryan, 1985), Deci & Ryan believed that self-regulation showed possible relation to student’s motivation in learning. Hence, students’ motivation plays an essential role in both individual learning and personalized learning. There needs to explore the factor that affects students’ motivation. In order to help elementary students learn autonomously, there needs to explore the factors that affect student’s motivation in learning. As a result, this study applied Self-Directed Learning (SDL) into math classrooms for exploring differences between high and low achievers in the motivation for learning. In this study, high achievers were more beneficial than the low achievers, where high achievers showed a significant difference with the low achievers on self-efficacy for learning & performance, metacognitive self-regulation, intrinsic goal orientation and resource management strategies: time and study environment.

#W12-08: Cognitive Styles and Hybrid Mobile Systems
Chen-Wei HSIEH & Sherry Y. CHEN
Mobile learning, which has become widespread in educational settings, faces students with diverse background, in terms of knowledge, skills and needs. Two approaches, i.e., Customization and Personalization, can be applied to sort out diversity. However, these two approaches have different advantages and disadvantages. Thus, this study tends to make best use of the advantages of personalization and customization to modeling a
Hybrid Mobile Learning System (HMLS). In addition, Cognitive styles were considered as targets to investigate how cognitive styles affect students’ reactions to the HMLS. The results show that the Holists attempted to use multiple tools, and the Serialists prefer to focus on a single item at a time. In addition, customization was helpful for Holists, while the personalization were useful for Serialists. The implications of these results for the design of Hybrid mobile learning system are discussed.
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<th>Time</th>
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<tr>
<td>09:00</td>
<td>Workshop 7: ICT Trends in Emerging Economies (morning session)</td>
<td>Chien-Sing LEE, Tsung-Chun HO, Ping-Chen CHEN, Tak-Wai CHAN &amp; K. Daniel WONG</td>
<td>The role of epistemic agency and progressive inquiry in the transfer of Mathematical thinking. Instructional design of inquiry-based classrooms need to regard learning as dynamically flexible and adaptive with opportunities for emergent teaching and learning strategies as well as assessments. Consequently, we argue that emergent instructional design and emergent learning systems should focus on the discovery of instructional principles, instructional strategies and technologies that promote the development of inquiry, with teacher beliefs as a key design factor. We scope our study to the inculcation of Mathematical thinking because Mathematical thinking focuses on the identification of similarities among instances, leading to the development of general principles. The ability to formulate principles grows alongside learners' search for abstract problem-solving methods and mental schemata. These serve as analogy-enhancing transfer between different task situations. Consequently, in this exploratory study, we aim to help learners to learn to inquire and to reason, to be able to identify patterns, describe patterns and apply patterns to solve problems. Furthermore, we aim to identify how teacher's beliefs influence the design of teaching-learning practices. Subsequently, we suggest implications to the design of creative inquiry-oriented-based curriculum, pedagogy and technologies for the learning of Mathematical thinking.</td>
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<td>09:30</td>
<td>#W07-05: Factors Affecting ICT Integration among Teachers and Students</td>
<td>Ying GUO</td>
<td>This study was conducted to determine factors that affected teachers and students ICT integration in the classrooms. There were 125 teachers who were randomly selected in elementary schools in Guangdong province of China. 283 problems faced by the teachers were studied. After further analysis of the listed problems, some pertinent issues which kept surfacing were identified. The issues include teachers concern after changing the mode of instruction to a more ICT-based is with the time distribution, the extra readings required, the new instruction model, reading using computers and remarking of students' work. On the other hand, the factor which concerned students after changing the instruction model to an integrated ICT environment was typing using the computers.</td>
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<td>10:00</td>
<td>#W07-03: Do Teacher Related Factors Play a Role in Laptop Use for Teaching-Learning?</td>
<td>Su Luan WONG &amp; Priscilla Moses</td>
<td>Equipping laptops to Malaysian teachers is a much needed step to advance the education system. Central to this, teachers must be recognized as the change agent in the successful use of laptops and ICT innovation in schools. This study was conducted to explore the overall profile of teachers' laptop use and also to investigate if selected teacher related factors (age, gender, teaching experience, laptop experience, attitudes towards laptop use and laptop skills) play a role in laptop use for teaching-learning. A total of 463 teachers participated in this study and the findings indicate that teachers are not using laptops as much as they should in the classrooms. The findings also suggest that four teacher related factors (gender, laptop experience, attitudes towards laptop use and laptop skills) play a significant role in teachers’ laptop use for teaching-learning.</td>
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<td>10:30</td>
<td>#W07-04: Developing Learning System in Pesantren: The Role of ICT</td>
<td>Syafiq ROHIM &amp; Lina YULINDA</td>
<td>The development of information and communication technology has led to many changes, including in the field of education which is established the concept of e-learning. By using e-learning, learning is become more effective and efficient. Information and communication technology is also used in schools, it is possible to produce the concept of e-pesantren. Through the use of ICT, religion teachers and students at the school could be preaching, teaching and learning with greater ease, and the teaching models e-pesantren</td>
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is also very useful, both for students and teachers (religion teacher), even for the managers of pesantren, of which is increasing prestige and institutional accountability. E-pesantren allows creating a system of distance education and virtual school / boarding. The integration of information and communication technology in education in schools is to improve the quality of education in schools and ease of propagation.

Workshop 2: Technology-Transformed Learning: Going Beyond the One-to-One Model?

#W02-01: Bridging the Past and the Future of the Research in Seamless Learning
Lung-Hsiang WONG
This paper centers on an account of the research foci of MSL according to my recent literature scan and analysis. 83 relevant papers published between 2006 and April 2013 were identified for analysis. However, it is not our intention to compile thick and intentionally accurate statistics, and subsequently offer purely data-driven interpretation of the state of the arts. Rather, we are keen on qualitatively outlining and tracing the evolution of MSL research, particularly in how scholars perceive the roles of technology, pedagogy, learning spaces, and learners in the seamless learning practices. This paper will focus on (1) the (re-)scoping of seamless learning; and (2) the conceptual groundings in the past MSL research. Rise-above discussions on the trends will then ensue in order to provide a synoptic picture of how this line of studies have been advancing over the time. Through the analysis, it is further affirmative that seamless learning is much more than a special form of any other learning method. It is a learning approach at its own right and with its own niche – with ‘bridging of cross-space learning efforts’ as its distinctive feature.

#W02-02: Mobile Supported Flipped Instruction and Learning
Wan NG
The discussion of flipped classroom, while not an entirely new concept to the field of teaching, has been very active on blog sites on the Web in recent years while its academic literature to date is scant. This paper presents a review of the literature on the concept, discusses mobile-supported flipped classroom teaching and learning, presents an example of a mobile-supported flipped classroom pedagogy and identify benefits, issues and implications of flipped classroom.

#W02-03: Analysis of Ubiquitous Learning Logs in the Context of Science Communications in a Museum
Hiroaki OGATA, Kousuke MOURI, Mayumi BONO, Ayami JOH, Katsuya TAKANASHI, Akihiro OSAKI, Hiromi OCHIAI, Yuko MORITA
This paper describes how to use a ubiquitous learning log system called SCROLL (System for Capturing and Reusing Of Learning Log) in a museum, especially, in order to support science communicators (SC). Ubiquitous Learning Log (ULL) is defined as a digital record of what you have learned in the daily life using ubiquitous technologies. It allows you to log your learning experiences with photos, audios, videos, location, QR-code, RFID tag, and sensor data, and to share and to reuse ULL with others. Using SCROLL, you can receive personalized quizzes and answers for your questions. This paper describes how to support science communicators in a science museum by using SCROLL, and shows the role of ULL to integrate the quantitative and qualitative analysis.

#W02-04: Developing a Professional Development Model for Science Teachers to Implement a Mobilized Science Curriculum
Daner SUN, Chee-Kit LOOI, Yen Lin Jenny LEE, Jessy Pui Shiong NG
In our work on scaling a mobile technology-facilitated science curriculum called Mobilized 5E Science Curriculum (M5ESC) in a Singapore primary school, great efforts have been devoted to developing a teacher professional development (TPD) model of this curriculum innovation to facilitate teacher enactment of M5ESC in primary schools. In the study, we present the process of professional development for M5ESC and propose a continuing stage-based TPD model for promoting teacher changes on the implementation of M5ESC. Data analysis on a leading teacher’s performance and students’ work suggested that
teacher’s pedagogical belief has been transformed into the constructivist orientation influenced by the long term participation of TPD for M5ESC. This is evidenced by her patterns of interacting with students, her use of technology, and her students’ active involvement in the student-centered activities.

#W02-05: Enhancing outside-class learning using ubiquitous learning log system
Noriko UOSAKI, Hiroaki OGATA, Mengmeng LI, Bin HOU, Kousuke MOURI
In this paper, we have tackled one of the major problems in English education in Japan, the learning time shortage problem. In order to solve this problem, we have used the system called SCROLL (System for Capturing and Reminding Of Learning Log) developed by our team. We conducted an evaluation to examine whether our system could boost up outside-class learning time. We provided the participants, 24 university freshmen, with an e-book application as a reading material together with the system and encouraged them to learn outside-class. The result showed that outside-class learning time dramatically increased only when they read an e-book together with the System even though no statistically significant difference was detected since individual differences were so large. Though we expected that interesting outside-class learning materials would push them to learn more outside class, the result showed that it was the System that pushed them to study outside class. Whether they used e-book or not, the average learning time of without-SCROLL learning was almost the same. Therefore the use of the System could be one of the factors which contributed to the students’ more involvement in outside-class learning. We believe that it will lead to compensation of a lack of learning time.

#W02-06: Teacher Thinking and Affordances of TouchPad Technology: An Ongoing Study of Teacher Adoption of iPads in Higher Education
Daniel CHURCHILL, Jie LU, Tianchong WANG
TouchPad mobile devices (e.g., iPads) are increasingly being used in educational contexts. Growing investment is planned by higher education institutions in Hong Kong and by the HKSAR Education Bureau in relation to educational uses of TouchPad technology. However, current research into educational applications of this technology is limited. This paper reports an ongoing qualitative study that investigates how higher education teachers use iPad technology to facilitate their practice. The emergent study results provide insight into both the educational affordances of iPad technology and the ways in which teachers’ personal or private theories mediate these affordances and transform through the process. The study outcomes will contribute to theoretical understanding of higher education teacher changes through adoption of technology. Furthermore, the outcomes will provide a set of recommendations for applications of TouchPad technology in higher education and ways to support teachers to effectively adopt such technology in their practices.

Workshop 3: Application of Innovative Educational Technologies in STEM Education

#W03-01: Improving Student Engagement through a Blended Teaching Method Using Moodle
Richard LAI, Nurazlina SANUSI
Web-based learning system commonly known as Learning Management System (LMS) which makes use of internet technologies has been widely used by many education institutions around the globe. LMS forms a part of their campus-based and distance teaching. With the wide uses of LMS nowadays, university teaching is often conducted in blended mode: partly through face-to-face teaching and partly through LMS. To date, little research has been carried out to investigate to what extent the uses of LMS contribute to student learning, particularly student engagement. In this paper, we present a blended teaching method for promoting better student engagement and their willingness to participate in the learning activities through better uses of LMS (Moodle in our case), the design of our assessments, and the ways we lead them to learn. To demonstrate the usefulness of our method, we also present in this paper the results of applying it to teaching a third year computer science subject, CSE3MQR.
### W03-02: Embedding Collaboration into a Game with a Self-explanation Design for Science Learning  
**Chung-Yuan HSU, Feng-Chin CHU & Hung-Yuan WANG**  
The purpose of this study was to examine the impacts of embedding collaboration into a game with a self-explanation design on supporting the acquisition of light and shadow concepts. The participants were 184 fourth graders who were randomly assigned to three conditions: a solitary mode of the game with self-explanation, a collaborative mode with self-explanation, or the control condition of a single-user game without integrated self-explanation. Students’ conceptual understanding was measured through an immediate posttest and a retention test with a three-week delay. The findings showed that having students collaboratively or solitarily play science-based games embedded with a self-explanation design is not sufficient to help them learn science concepts. Rather, it was the level of engagement in responding to the self-explanation prompts that mattered.

### W03-03: The Development and Evaluation of a 3D Simulation Game for Chemistry Learning: Exploration of Learners’ Flow, Acceptance, and Sense of Directions  
**Huei-Tse HOU, Shu-Ming WANG & De-Shin TSAI**  
Among various educational technology, computer game could be one of the most popular applications in recent years. Nowadays, computer games can provide a 3-dimensional (3D) immersive virtual world to increase learners’ perception of presence and simulate the real world objects to support learning. The immersive learning environment, visualization of abstract concepts, and high level of interaction could benefit learners’ engagement and learning outcomes. Despite previous studies have investigated the influential factors of educational gaming experience, however, in the 3D virtual world, learners might need other ability, such as sense of directions (SOD), for them to be acquainted with the virtual environment and thus can learn better. This preliminary study developed a 3D educational game to support chemistry learning. In the game, learners were to explore the virtual world to collect components for they can assemble a charcoal battery to achieve the game goal. A case study of 20 participants was conducted to assess the effectiveness of the game. Results suggested that participants gained better knowledge after playing the game. Meanwhile, participants with better SOD can more clearly capture the game goals and feel in control in the game, suggesting they were immersing in the game. Moreover, they also evaluate the game as useful to support their learning. A test of gender difference found that male and female evaluated the game in different way. Implications for the results of this study are to be used as guidance for subsequent game development and design of instructional strategies.

### W03-04: Pre-service teachers’ learning and frustrations during the development of serious educational games (SEGs) for learning biology  
**Mei-En HSU, Meng-Tzu CHENG**  
The purpose of this study is to explore pre-service teachers’ learning and frustrations during the development of serious educational games (SEGs) for learning biology. A two-credit, 18-week-long course, entitled Computers in Teaching and Learning Biology was offered in fall semester of 2012. A total of 12 pre-service teachers registered in this course—and in-depth interviews with every pre-service teacher were conducted after the conclusion of semester. According to their responses, we found that most of them expressed positive attitudes towards this course but still had some difficulties and challenges in taking this course. Pre-service teachers generally reflected that the instructional time of the course was too short causing that they still didn’t really know how to program and code using ActionScript3.0. Discussions regarding the obtained results and suggestions for future work are further provided.

### W03-05: Criteria and Strategies for Applying Concept-Effect Relationship Model in Technological Personalized Learning Environment  
**Patcharin PANJABUREE & Niwat SRISAWASDI**  
Recent progress in computer and communication technology has encouraged the
researchers to demonstrate the pivotal influences of technological personalized learning environments on student learning performance improvement. Many researchers have been investigating the development of such learning environment by basing upon the concept-effect relationship model; nevertheless, the criteria of establishing a technological personalized learning environment based on the concept-effect relationship model have not yet been clearly defined, not to mention the strategies of conducting effective conceptual learning problem diagnosis and effective learning activities. To resolve these problems, this paper presents the basic criteria and strategies of technological personalized learning based on the concept-effect relationship model, and identify the necessary check items as well for the development of such learning environment. Illustrative example of conducting technological personalized learning and the requirements of setting up learning environment are also presented at the end of this paper.

#W03-06: The Development and Evaluation of the Science Reading and Essay Writing System

Li-Jen WANG, Yu-An CHEN, Chen-Min LAI, & Ruo-Han CHEN, Ying-Tien WU
Popular science reading and science essay writing are parts of the science inquiry activities which can facilitate learners to construct their science knowledge and develop science literacy in school. However, there are a great deal of difficulties and challenges for students to learn how to read popular science articles and write essays. Therefore, helping students read and write should be a crucial issue. Previous research has revealed the effectiveness of teacher community on teachers’ professional development. This study developed a “Science Reading and Essay Writing System” (SREWS) as a platform for students to read popular science articles and write essays. After the development of the SREWS, system evaluations were also conducted. A total of 60 senior high school students participated in the system evaluations. The results showed that they expressed satisfactory perceived usefulness and ease of use of the system. Also, they expressed high willingness to use the SREWS. They also appreciated the usefulness and usability of the scaffolding functions of the system. Some suggestions and implications for system design, and future work are also discussed.

#W03-07: Effect of Simulation-based Inquiry with Dual-situated Learning Model on Change of Student’s Conception

Niwat SRIASAWADI, Sunisa JUNPHON & Patcharin PANJABUREE
Numerous researches in science education have reported that many students displayed learning difficulties in understanding and hold unscientific conceptions about sound wave although sound is an everyday phenomenon that we constantly observe. Moreover, their common alternative conceptions about wave phenomena of sound are often resistant to change into correct physics of thought. To investigate effect of the teaching method of simulation-based inquiry with dual-situated learning model (SimIn-DSLM) on student’s conceptual understanding of sound wave, 38 of Grade 11 secondary school students participated in learning physics with computer-simulated experiment. Both quantitative and qualitative data of conceptual understanding and conceptual change were collected, and analyzed aiming to understand their conceptual status at before, after, and a month after the use of SimIn-DSLM teaching method. The results showed that the method of SimIn-DSLM explicitly influenced their conceptions in physics of sound wave into correct physics. This finding suggests that the SimIn-DSLM method could be used to induce mechanism of change within students’ conceptual knowledge of sound wave phenomena and the change of their conceptions could place them into meaningful conceptual framework of basic scientific knowledge.

#W03-08: Exploring the Effect of Worked Example Problem-based Learning on Learners’ Web-technology Design Performance

Chun-Ping WU & Hao Jie YONG
The process of creating media products, maximizing the merits of advanced interactive technology is very complex. Media producers are highly demand of their cognitive abilities
to integrate multiple domains of knowledge, which may include graphic design, technology skills, and problem-solving skills. The problem-based learning strategy (PBL), starting learning with a real-world problem, has been frequently adopted to develop the competency of learners with a major in technology or media production. Despite the fact that PBL effects have been reasonably argued and empirically tested, its associated learning tasks may overload the learners. This paper, grounded on the cognitive load theory, aimed to investigate the effects of worked examples on learners’ web-technology design skills. The web-technology design problem was chosen as the main problem for participants to explore during the PBL activity. A series of problems and associated worked examples were developed. Furthermore, a web-based learning system was created to engage participants in observing the problems, watching the examples and practicing solving the given problems. A pre-and-post experimental design was adopted to test the effect of worked-examples. 80 university students, with a major in instructional technology programs, were invited to participate in the study and were randomly assigned to one of the intervention conditions. The finding supported the positive effect of the worked example on enhancing learners’ web-technology design performance.

09:00-10:30

Doctoral Student Consortia: Group 3

#8F (C5): The Creative Process Components: Puzzle Gameplay Experience
Wilawan INCHAMNAN
This paper analyses the relationship between creative behavioral processes that occur in the games and the gameplay experience. The research approach applies a behavioral and verbal protocol to analyze the factors that influence the creative processes used by people as they play computer games from the puzzle genre. Creative processes are measured by examining task motivation and domain-relevant and creativity-relevant skills factors. This paper focuses on the reliability of the factors that are more strongly related to creativity. The findings show the creative components occurred to yield levels of creative performance within puzzle game play activities. Results show that increased engagement in creative processes during gameplay resulted in a better player experience. Task motivation and domain-relevant skill as a component of the creative problem solving processes were particularly influential, as was the use of creativity-relevant skills.

#323F (C5): An Authoring Process for Educational Role Playing Games: From the Paper to the Web
Vanessa MAIKE
Table-top Role Playing Games (RPGs) can be a powerful educational tool, but many teachers either aren’t aware of that, or don’t know how the game works. This problem could be alleviated with an authoring tool that facilitates the process of creating educational table-top RPG adventures and, at the same time, provide an introduction and computer-based support to this game genre. Literature on available authoring tools oriented to the creation of games in educational contexts is still scarce. Therefore, this article presents our efforts towards the design of a web authoring tool that aims at helping both teachers and students in the creation of educational table-top RPG adventures and also in the posterior use of these adventures in the classroom. The goal behind this work is to promote this genre of games and computers in education.

#DSC-C7-04: Exploring Pedagogical Synergy of Peer Assessment and Social Learning Platform for Fostering English Grammar Learning
Wai Ying KWOK
In view of the trends toward the pedagogical goals and the technological integration for English grammar learning in the twenty-first century, this study aims to explore the pedagogical synergy of peer assessment and social learning platform for supporting English as Second Language (ESL) learners at the elementary school level to develop English grammatical knowledge. A technology-mediated pedagogy has been designed to combine the element of guided inquiry with the use of topic-specific e-learning websites and the element of peer assessment with the use of social learning platform for supporting
elementary ESL learners to develop knowledge about English basic tenses through English writing tasks. An empirical research which combines qualitative and quantitative methods is planned to investigate the impact of two settings of the designed technology-mediated pedagogy in a real classroom environment. Two classes of Grade 4 ESL learners will be invited to learn the three target grammatical topics under the two settings during a three-week trial teaching period, respectively. The empirical research will conduct attainment tests, content analysis of student artifacts, questionnaire surveys and semi-structured focus group discussions to investigate the impact of the designed technology-mediated pedagogy on the achievements, processes and perceptions of learners in the development of English grammatical knowledge through peer assessment of writing products. This study will contribute to pedagogical innovations in the use of social learning technology for effective development of high-level linguistic knowledge among ESL learners in elementary school education.

**Doctoral Student Consortia: Group 4**

#DSC-C7-01: Teacher’s Attitudes towards Informational Technology (IT) Immersion in Singapore’s Childcare Classrooms  
*Wen-Si YANG and Pei-Wen TZUO*

Technology immersions are widely adopted in Singapore’s childcare centers. In the last five years, as the flourishing of touch screens such as tablet computers, interactive whiteboards, smart phones, and smart TVs, up-to-date IT devices have become increasingly accessible by young children. In Singapore, the Ministry of Education (MOE) has highlighted the use of technology to support and enhance Early Childhood Education (ECE). Despite up-to-date IT devices’ effectiveness and popularity in ECE, to our knowledge, there has been a lack of researches on examining how childcare teachers think. To address this timely issue, this study adopted a quantitative correlational research design to assess childcare teachers’ attitudes on integrating IT in ECE. The data are to be collected by adopting and modifying from the Computer Attitude Scale (CAS), developed by Selwyn (1997). The sample of this study is Singapore childcare teachers who volunteer to fill the questionnaires. The data will be analyzed by conducting descriptive statistics and inference statistics in order to determine the influence of age, working experience, total training hours received, educators’ qualifications, up-to-date technologies used at home, and teaching median (English/Mandarin) on teachers’ attitudes.

#DSC-C7-02: Predictors of Teacher Trainees’ Satisfaction in Using the Learning Management System in Teacher Training Institutes  
*Mei Lick CHEOK and Su Luan WONG*

E-learning is increasingly becoming an important delivery approach in teacher training institutes. Like with other innovations, there are factors that will affect users’ behavioural intention to accept and adopt it. The purpose of this study is to test and validate a proposed model in predicting teacher trainees’ satisfaction of the learning management system at the teacher training institutes in Malaysia. In measuring the success of an e-learning approach, it is best measured in terms of end-user satisfaction in using a system. Thus, their future behaviours can be predicted. It examines relationships among variables associated with factors that influence satisfaction. Data will be collected from 400 participants using a survey questionnaire. Practical interventions for teacher trainees will be suggested to assist individuals and organisations towards increasing technology usage. The research yields a theoretical framework that outlines the predictive potential of the key factors in explaining satisfaction which then leads to explaining technology acceptance and usage among the trainees. These factors can and should be considered when developing Continuous Professional Development trainings and intervention programmes.

**Workshop 7: ICT Trends in Emerging Economies (afternoon session)**

#W07-02: Exploring Teachers’ Cultural Perception of ICT in Nigerian Schools through a Qualitative Approach
The purpose of this study was to explore teacher’s cultural perception of ICT in Nigerian Schools. The study was guided by three research questions and used the qualitative method, with a case study as a strategy. Interviews were employed to collect data about teacher’s cultural perception of ICT in Nigerian schools. Findings from the interview revealed that teachers are incompetent and blame lack of ICT facilities and access for this inadequacy. All five participants demonstrated that their current ICT status did not match up with global standards. Findings also revealed reservations about software and materials on the internet as being inappropriate to norms and values of the country. Findings of this study are important for policy makers and stakeholders in the Nigerian education system.

#W07-01: Increasing Students’ Mathematical Creative Thinking Abilities through Realistic Mathematics Education Using ICT and Deduction

Mathematics courses should be given to all students especially those in the elementary school. It is vital to equip the students with the ability to think logically, analytically, systematically, critically, and creatively as well as the ability to cooperate. Mathematics learning in the classroom is believed to be less able to increase mathematical creative thinking abilities among students, as shown in the International Student Assessment (PISA) results in 2009. Indonesia’s Mathematics education ranked 59 out of 65 countries. Other results released by the Trends in Mathematics and Science Study (TIMMS) in 2007 showed Indonesian students obtaining an average score of 397, far below Singapore and Malaysia where both countries had both obtained the average scores of 593 and 474 respectively. Due to the above reasons, the need to carry out the research was felt necessary. In realistic mathematics education, students are required to create their own modeling, and develop existing knowledge, thus find new knowledge that will be useful in the learning process. This approach requires students to interact, both with the teacher and other students in order to enable them to exchange ideas and knowledge. In the process of doing that, it is hoped that the mathematical creative thinking abilities will be formed. Learning in this context is supported by the use of ICT as a learning media that displays a real-world context for students. Deductive approach will be used as the comparison group in this study. Based on the results of the processing and analysis of data, it is shown that the mathematical creative thinking abilities of students taught using the ICT-assisted approach to realistic mathematics education is different from students who were taught using the deductive approach. Students taught using the ICT-assisted realistic mathematics education have higher averages. In other words, realistic mathematics education in ICT-assisted is suggested to be better than the deductive approach in improving students’ mathematical creative thinking abilities.

#W07-06: Classroom Action Research: Using Interactive Learning Media to Improve Students’ Colligative Solution Learning Outcome

This research aims to increase the ability of students to understand and improve their learning outcome when studying the subject of colligative solutions in chemistry. It also hopes to improve the ability of teachers to deliver the subject. This research was conducted at SMA Negeri IX Jakarta to the twelfth grade. It was a classroom action research carried out in five months comprising of two cycles. It involved two observers in the school. Based on the result, there is a significant increase of students’ test grades from cycle 1 to cycle 2, which is from 76.5 to 79.7. From the students’ learning effectiveness records, it is suggested that learning with interactive learning media can successfully improve students’ learning outcome, especially in the subject of colligative solution in Chemistry.

Workshop 1: Technology Enhanced Language Learning

#W01-01: From a Perspective on Foreign Language Learning Anxiety to Design an Affective Tutoring System
According to Krashen’s affective filter hypothesis, students who are highly motivated have a strong sense of self, enter a learning context with a low level of anxiety, and are much more likely to become successful language acquirers than those who do not. Affective factors, such as motivation, attitude, and anxiety, have a direct impact on foreign language acquisition. Horwitz et al. (1986) mentioned that many language learners feel anxious when learning foreign languages. Thus, this study recruits 100 college students to fill out the Foreign Language Classroom Anxiety Scale (FLCAS) to investigate language learning anxiety. Then, this study designs and develops an affective tutoring system (ATS) to conduct an empirical study. The study aims to improve students’ learning interest by recognizing their emotional states during their learning processes and provide adequate feedback. It is expected to enhance learners’ motivation and interest via affective instructional design and then improve their learning performance.

#W01-02: Learner Attitude and Satisfaction in Chinese Vocabulary Learning under CALL
Hong-Fa HO & Jing-Jenq WU
In this information age, we try to understand the attitude of native English learners when they adopt technology in Chinese language learning. This paper uses qualitative analysis to investigate the attitude of Chinese language learners before and after the use of computer-assisted language learning (CALL) software in Chinese vocabulary learning. Participants were divided into three groups: one control group (1B, N1=6) and two experimental groups (1A, N2=5 and 2A, N3=13). Questionnaires were handed out to participants before and after the experiment CALL course. This paper discusses the relationship of learning motivation and learning efficiency, vocabulary growth of learners using CALL, and participant satisfaction of using CALL as a supplement to traditional classroom teaching. The main findings are: the average satisfaction for Experimental Group 1A was 4.58 whereas the average satisfaction for Experimental Group 2A was 3.22 (full score 5); The average satisfaction for the experimental groups together (1A + 2A) was 3.60 (full score 5); the top three satisfaction categories are: The 1,033 Chinese vocabularies are appropriate for my present Chinese learning (4.06) > I can recognize and understand more Chinese characters and words (3.89) > I am getting familiar with the four tones of Hanyu (3.89); the bottom three satisfaction categories are: I am satisfied with the effectiveness of the CALL software (3.28) < I am satisfied with the art design of the interface (3.33) < I can understand and memorize more Chinese vocabularies from the simple English/Chinese translations; I think this method is fast and effective (3.39).

#W01-03: The Effect of Learning Community for Game-Based English Learning
Chih-Hung LAI, Wu-Jiun PENG, Wei-Hsuan Chen, Rong-Mu LIN
In recent years, English Vocabulary plays such an important role in the learning arena. However, most students felt boring when they were reciting English words which lead to lower learning motivation or higher dropout rate. Hence, many presently researches emphasized on Game-Based Learning approach, combining video games to learning that makes the learning process more interesting. Therefore, this research is aimed to discuss whether the Learning Community could enhance students’ learning achievement in Game-Based Learning and to probe into different Gaming Methods, Self-Efficacy, as well as the Community Roles influenced learning achievement and learning activities among students. The participants in this research are both senior high and elementary students, divided into two groups for a two month experiment. The result indicated significant difference between the senior high and the elementary students’ learning methods for learning activities. In addition, the Self-Efficacy demonstrates conspicuous dissimilarity to learning achievement. Furthermore, diverse community roles reveal significant difference to learning activities as well.

#W01-04: Effects of the Concept Mapping and Reflection Strategies on Motivations of EFL Learners
Ching-Kun HSU
This study evaluated the learning motivations of the foreign language oral interaction
course integrating Computer-Mediated Communication and Native-Speaker peer-tutoring strategies based on the assessment results of ARCS motivation design. The study found that no matter the students used the reflection strategy or not after the class, they will have confidence in the oral peer-tutoring activities when the students do concept mapping activities every time before they conducted the oral peer-tutoring activity via CMC platform. However, if the students did not used the concept mapping strategy, the students could use the reflection strategy in the post-activity had higher confidence than the students who did not used the reflection strategy when they reviewed after the class. Conversely, the study found that no matter the students used concept mapping strategy or not before the class, they will have confidence in the oral peer-tutoring activities when the students do reflection activities every time they end the oral peer-tutoring. However, if the students did not used reflection strategy, the students using concept mapping strategy in pre-study had higher confidence than the students who did not used concept mapping strategy when they prepared before the class.

#W01-05: Designing a Mobile Chinese Learning System with Speech Recognition for Foreign Students
*Wei-Tung TANG & Shwu-Ching YOUNG*
This study aims to design and implement a micro-learning Chinese vocabulary pronunciation practice system on mobile device for international students from a university in northern Taiwan. Learning a foreign language is difficult, yet using a foreign language to initiate social interaction with native speakers is even harder. In this study, we propose a location-based contextual Chinese learning system which aims to aid the foreign learners to learn daily life vocabulary by repeating practicing vocabulary pronunciation with speech recognition functionality. An immediate feedback will be shown to the learners, allowing them to check their correctness level of vocabulary pronunciation. To ensure the learning takes place in real context, the language learning will be enhanced with location-based service which is provided by Facebook. Location information will be available for the learners to access local tourist attraction information by selecting from nearby point-of-interests via Facebook’s check-in module. An experiment will be conducted to measure students’ language learning performance as well as their language learning motivation. We expect to recruit international students whose Chinese proficiency is at entry level. Participants will be selected from a northern Taiwan university.

#W01-06: Apples and Oranges? Second Life vs. OpenSim for Language Learning
*Mark G. ELWELL, Jean-Christophe TERRILTON, and Steven A. COOK*
Shared virtual environments are used in technology enhanced language learning for their immersion, interactivity, and as a medium for both local and remote communication and contact with authentic speakers and situations. Previous work has shown them to achieve similar language learning outcomes to classroom situational role playing while using less time and other resources. Here we review the comparative suitability of two similar shared virtual environment platforms, Second Life and OpenSim, for language learning, using our SVECTAT (Shared Virtual Environment Complementing Task Achievement Training) model as a reference, and our extensive experience with the two platforms as a source. Features examined include collaborativeness, cost, control, ease of use, scalability, and suitability for diverse learners. We find that while Second Life remains more suitable in certain specialized cases, OpenSim possesses clear advantages with regard to most features and cases.

*Szu-Yun WANG, Yu-Ju LAN, You-Ming YEH, Jen-Shing LIN, Yao-Ting Sung*
This pilot study aimed at examining the effects of a context-aware ubiquitous system on overseas Chinese students’ Mandarin Chinese learning. The research was undertaken on 49 CFL learners of Chinese descent, with whom we conducted interviews regarding their experience using the mobile learning system. It was discovered that the CFL learners found
the new learning system both more interesting and informative than conventional teaching methods, but also pointed out several correctable flaws and technical defects which hampered the learning process.

**Workshop 5: Skill Analysis, Learning or Teaching of Skills, Learning Environments or Training Environments for Skills**

**#W05-01: Design of Tennis Training with Shot-timing Feedback based on Trajectory Prediction of Ball**  
*Naka GOTODA, Kenji MATSUURA, Koji NAKAGAWA & Chikara MIYAJI*  
Tennis has long history as a famous sport and enhanced health promotion of men and women all ages. In many cases, the style of technical teaching has been a long tradition of face-to-face. On another front, recent seamless bio-feedback technologies enable players to be trained in the acquisition of novice skills without the coach. This paper proposes a design and scenario of practice on their own with training system for tennis skills. One of the basic skills for the novices is to make an appropriate contact with the ball. We focus on skill related to judgment of shot-timing. The system provides the timing feedback based on trajectory prediction of ball. Image-processing module with Open CV preliminarily develops the estimated expression for the ball position by analyzing captured video frames. After that, the system gives color change to the ball according to the position with video projection. Therefore, a player can learn the appropriate shot timing easily. We will evaluate the training efficiency among comparison of practice using system with only one without system from the viewpoint of timing accuracy.

**#W05-02: Training-Course Design for General Purpose of Motor-Skill Learners on a Web**  
*Kenji MATSUURA, Hirofumi INUI, Kazuhide KANENISHI & Hiroki MORIGUCHI*  
In this paper, we describe the new proposal whose objective is to present an online environment for physical skill learning. Our target skill is not only an intellectual one but also gross motor skills such as rope-skipping and running. We developed a courseware system that covers wide areas of such skills because its general framework is based on the common taxonomy about the physical skills. With the supporting scenario, the system navigates learners to an appropriate direction from the novice task to the expert one.

**#W05-03: Feedback of Flying Disc Throw with Kinect: Improved Experiment**  
*Yasuhsa TAMURA, Masataka UEHARA, Taro MARUYAMA & Takeshi SHIMA*  
This paper shows an improved experiment result of a feedback system for flying disc learners with use of Kinect device. Compared with conventional 3-D motion capture systems, Kinect has advantages of cost, easy system development and operation. Our formerly proposed system in Yamaoka (2013) captures learners’ specific 20 points in 3-D manner, judges their postures and motions based on criteria defined by a domain expert, and displays feedback messages to improve their motions. An improved experiment increases the time of flying disc throw in pre-test (10 to 30) and test (5 to 10). This change allows testees to be accustomed with disc throwing activity in experimental environment, and also to master given feedback message. As a result, relatively novice testees of the target group showed significant improvement of their throwing motions.

**#W05-04: Electroencephalogram Analysis of Pseudo-Haptic Application for Skill Learning Support System**  
*Hirokazu MIURA, Keijiro SAKAGAMI, Yuki SETO, Shumpei AKO, Hirokazu TAKI, Noriyuki MATSUDA & Masato SOGA*  
This paper describes the brain states analysis of pseudo-haptic application for the skill learning supporting system. The pseudo-haptic is a phenomenon in which the human perceives force by according differences between his/her real motion and its visual...
feedback. It is difficult to evaluate human cognition of haptic state only from the observation of human behavior. Therefore, to measure the biological signal of the brain, we have used electroencephalogram. We have evaluated the brain activity in the sensing tasks in order to make a comparison among the several states of the sensing of pseudo-haptic

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<th>13:30-15:00</th>
<th>Doctoral Student Consortia: Group 1</th>
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<tr>
<td>#DSC-C2-01: Adaptive Question Generation Support in Semantic Open Learning Space</td>
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<td>Corentin JOUAULT</td>
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<td>This research aims to give learners more content-dependent scaffolding in the self-directed learning of history. Learners use a system to build a concept map containing a chronology. The system is able to generate content dependent support adapted to the learners. To enable this support, we built a semantic open learning space using a natural language online encyclopedia and semantic information using the open linked data. The support is provided by the automatically generated questions and documents. The learners request questions when they need and the system will generate the questions depending on the concept map of the learner. The generated questions aim to leads the learners to new knowledge deepening their understanding.</td>
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#DSC-C2-02: Incorporating Anchored Learning in a C# Intelligent Tutoring System

| Budi HARTANTO and Jim REYE |
| Learning programming is known to be difficult. One possible reason why students fail programming is related to the fact that traditional learning in the classroom places more emphasis on lecturing the material instead of applying the material to a real application. For some students, this teaching model may not catch their interest. As a result they may not give their best effort to understand the material given. Seeing how the knowledge can be applied to real life problems can increase student interest in learning. As a consequence, this will increase their effort to learn. Anchored learning that applies knowledge to solve real life problems may be the key to improving student performance. In anchored learning, it is necessary to provide resources that can be accessed by the student as they learn. These resources can be provided by creating an Intelligent Tutoring System (ITS) that can support the student when they need help or experience a problem. Unfortunately, there is no ITS developed for the programming domain that has incorporated anchored learning in its teaching system. Having an ITS that supports anchored learning will not only be able to help the student learn programming effectively but will also make the learning process more enjoyable. This research tries to help students learn C# programming using an anchored learning ITS named CSTutor. Role playing is used in CSTutor to present a real world situation where they develop their skills. A knowledge base using First Order Logic is used to represent the student’s code and to give feedback and assistance accordingly. |

#168S (C2): Mathematical model for collaborative learning: acquiring hierarchic-structured knowledge

| Kohei OGAWA |
| In this paper, time evolutions of students’ knowledge level who are engaged in collaborative learning, is simulated using mathematical model. In this model, students try to acquire hierarchic-structured knowledge. It is found that the structure of the collaborative groups formed by the students influence their achievements. Collaborative learning is said to be useful because one can reach the level where one cannot reach with the traditional teaching approach. We have the result that collaborative learning is especially effective when learning the difficult knowledge and we might be able to say our model successfully described the aspect of collaborative learning. |

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<td>#135F (C4): Acculturation in Context: Knowledge Sharing Through Ubiquitous Technologies</td>
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| Joged Room | Joged Room |
In this paper, we present plans for a retooled ubiquitous computer system that works towards facilitating knowledge acquisition and knowledge dissemination between learners during the process of acculturation. Focused on the foreign population of JAIST (Japan Advanced Institute of Science and Technology - a Japanese post graduate university in Japan), the system provides a platform on which to study the behaviour of participants, and also the process of acculturation dynamically in context. In addition, the study works towards understanding the feasibility of using such ubiquitous systems as possible support mechanisms in the future. In the current global environment, human beings via their own experiences acculturate at different speeds, and with different levels of success. By incorporating ubiquitous technology into the environment in which people are acculturating, we provide a new way to analyse the process of acculturation dynamically, and provide assertions as to how the system may benefit users in the future.

#209F (C4): Mobile Campus Touring System based on AR and GPS: a Case Study of Campus Cultural Activity

Lei-Si PEI

Campus cultural activity is usually propagandized through the Internet, pamphlets and posters. Print media draws more attention in public, but is not environmentally-friendly and economical. Similarly, Internet media is known for its prompt and rich content, but is hardly expected to arouse the interest of learners since it separates information from real-life environment. Augmented reality (AR), a promising technology of bridging virtual and real worlds, has been considered as a better choice for realizing an interactive and boundary-less mobile learning environment, or an even more advanced ubiquitous learning environment based on context-aware technology. In this paper, a novel campus touring system for cultural activity is implemented based on AR technology and smart phones which contains the built-in GPS, camera, WiFi and digital compass. Wikitude, a mobile AR implementation tool, is used for system implementation. Furthermore, two groups of students have been selected for system testing and evaluation. Experimental datum are collected and summarized via an open-ended online questionnaire. Experimental result shows that propagandizing and learning campus cultural activity through this mobile campus touring system is a more satisfying and interactive approach for college and university students.

#C5: Mobile Game Based Learning to Develop Ethical Decision Making Skill of Novice Volunteer in Disaster Response

Didin WAHYUDIN

Many responses of catastrophic natural disaster did not perform properly to an appropriate standard. This often occurred when first responders were involved, especially novice volunteer who did not have the accurate decision making skill. One of the main issues is the lack of regular training to develop such skills. It has been pointed out that exercise of the non-technical abilities, such as decision-making has an enormous impact on effective disaster response. However, some researches show that there are difficulties to conduct live practice for the disaster situation similarly. In addition, the novice volunteer cannot receive maximum advantages from live training due to feedback limitation where reflection from actual circumstances is required to improve those skills. The purpose of this research is to design a mobile game based learning (mobile GBL) for developing such skills. First of all, we conducted a preliminary survey to assess the awareness of the ethical decision-making skill of the novice volunteer from high school and university organizations in Indonesia. We asked these respondents to answer three categories of questions encompassed six components of moral intensity. We also interviewed some experts from the official search and rescue (SAR) organization in Indonesia to confirm first responder requirements. Based on these preliminary surveys and interviews, we have designed a training system called Magnitude which enables the novice volunteer to develop their ethical decision making skill at all times during official disaster management training inside and outside of class, and expect them to improve their performance in disaster response activities.
### 20 November 2013 (Wednesday)

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<th>11:30-12:30</th>
<th>Session 1-A (PTP-1)</th>
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<td>#43F: Complex Interaction Between Technology, Pedagogy and Content Knowledge: Case Study in a Chinese Language Classroom</td>
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<td>Yancy TOH, Lung-Hsiang WONG, Ching Sing CHAI, Jenny Yen Lin LEE, Jessy Pui Shiong NG</td>
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<td>Technological Pedagogical Content Knowledge (TPACK) has been used as a conceptual framework for understanding how teachers harness various domains of knowledge for technology integration. Guided by the research goal of discerning how a teacher’s ICT integration effort can co-evolve with interactions between technology, pedagogy and content knowledge, we examine, in this paper, a Chinese language teacher’s evolving TPACK on seamless learning (continuity of learning moments across locations, time, technologies and social settings) via the complexity constructs of distribution, enaction and emergence. Complexity theory is employed as it foregrounds the interconnectedness of constituents in a learning ecology, paralleling the philosophy that the three TPACK knowledge bases should be studied in totality. The research questions are: (a) How was the knowledge of seamless language learning distributed in the process of knowledge creation? (b) How was the integration of technological, pedagogical and content knowledge enacted during the seamless language lessons? (c) What emerged as a result of the complex interactions between technological, pedagogical and content knowledge? Data is drawn from interview transcripts, student artefacts, meeting minutes, lesson plans as well as fieldnotes collected over two years’ of lesson observations and professional development sessions. Our analysis attenuates two findings that are underplayed in the TPACK literature on language learning: 1) the integration of formal and informal learning activities, which can be enhanced by affordances of technological platforms, is pivotal for encouraging output (artefacts); 2) building a participatory culture offers students more opportunities for sustained and self-organised peer learning. The paper concludes with the discussion on the pedagogical implications of findings and future directions for research.</td>
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|             | #46S: Teacher Enactment in Collaborative Inquiry with a Science Learning Environment |
|             | Daner SUN, Chee-Kit LOOI |
|             | Considering that limited studies have investigated the teacher enactment (TE) of complex ICT-facilitated lessons, a study on exploring the TEs of lessons supported by a science inquiry and collaborative learning environment (Collaborative Science Inquiry, CSI) was conducted. In the study, the topic was “diffusion and osmosis”, and the participants were two teachers with their 43 students (Grade 7) from a secondary school in Singapore. Through examining the two teachers’ characteristics of verbal behaviour and scaffolding for students, as well as comparing students’ learning artefacts and performance, this study uncovers the differences in TEs of CSI lessons and their influence on students’ learning. The findings and implications can inform the effectiveness of assisting TEs with complex science learning environments like the CSI system. |

|             | #41S: ICT in the Australian Curriculum |
|             | Paul NEWHOUSE |
|             | The new Australian Curriculum aims to be suitable for the needs of 21st Century society and as such has explicitly defined a number of key roles to digital technologies. This should provide opportunities for schools and teachers to build on past reforms and prepare for the future. Over the past few years I have had various roles contributing to the development of sections of the Australian Curriculum, specifically the Technologies curriculum area, the Information and Communications Technology (ICT) general capability, and the embedding of ICT use across some of the curriculum areas. In this paper I explain my personal understanding of the place of digital technologies in the Australian Curriculum and the connection between these different roles for ICT. |
#187F: Robot as a Learning Partner for Promoting Proactive Discussion in Peer Groups: A Case Study for Career Development

Toshio MOCHIZUKI, Yoshitaka MITATE, Yoshikazu TATENO, Takehiro WAKIMOTO, Yuko MIYATA, Jun NAKAHARA, Naomi MIYAKE

This paper describes an experiment on peer groups that had a robot as a learning partner, to examine whether the robot could encourage the participants to talk on their own initiative. The authors measured the number of proactive utterances of each participant during the sessions. The authors compared the experimental groups that had robot facilitators, which were manipulated by professional human facilitators, and the control groups, which were also led by professional human facilitators but without a robot. The result showed that the participants in the experimental sessions talked on their own initiative much more than those in the controlled sessions. Finally, the authors qualitatively examined the characteristics of the proactive utterances in the peer group and found that the utterances contained supportive responses, which encouraged the participants to voluntarily join the dialogue promoting the counseling.

#25S: Exploring the Difficulties in Digital Logic Circuit Reading Comprehension via Saccade Analysis

Hong-Fa HO

The purpose of this paper is to explore whether there are differences in the reading process between high-grade and low-grade students by tasking them to find a bug in a digital logic circuit. Based on the pre-test scores, 155 high school students were divided into a high-grade group and a low-grade group. To examine their reading process, both groups were asked to find a bug in a digital circuit, and an infrared eye tracker recorded their eye movement. Correlation coefficient was used to analyze the saccadic data. The findings show 1) the integrative saccades from signal names of the timing diagram to other Regions of Interest (ROI) has the lowest correlation coefficient (0.3345); 2) there is a larger difference in the integrative saccades between the high and low-grade groups from signal names of timing diagram to timing diagram ROIs of RESET, CLOCK, INPUT and OUTPUT. These findings show that the low-grade group had some difficulties in reading comprehension when reading timing diagrams of RESET and OUTPUT, but fewer difficulties when reading CLOCK and INPUT. In addition, difficulties in reading comprehension also appeared when calculating OUTPUT. This paper contributes to the field of learning science by providing evidence of the saccade difference between digital circuit readers with and without difficulties in reading comprehension.

#88S: Educational Practice for Interpretation of Experimental Data Based on a Theory

Hitomi SAITO, Kazuhisa MIWA, Nana KANZAKI, Hitoshi TERAI, Kazuaki KOJIMA, Ryuichi NAKAIKE, Jyunya MORITA

Interpreting experimental data based on a psychological theory requires understanding the mechanisms or factors underlying cognitive processes and acquiring an attitude for interpreting evidence from a theoretical perspective. In this study, we designed and practiced teaching and learning activities using cognitive models to foster both requirements in an introductory course of cognitive science. Fifty-three undergraduate students attended the course. During practice, students constructed a computational model on the process of semantic memory and conducted simulations using their model. We evaluated changes in learner interpretation of experimental data from pretest to posttest. The results of the practice showed that students’ interpretations of experimental results for semantic memory changed from pretest to posttest. However, their interpretations of the results of other experiments did not show much difference between pretest and posttest.
#89F: Exploring Video Deficit Effect in 2-Year-Old Children’s Playing and Learning With an iPad

Gretchen GENG, Leigh DISNEY

This paper examined 2-year-olds’ playing with an iPad and whether there is a video deficit effect, that young children learn less from an iPad than from a live demonstration. Observational case study has been used in this study. This paper made three important contributions, which include a) there was a video deficit effect, which exists at least before the child turned 3 years old and it was found young children’s (2-year-olds’) poorer ability to learn from 2D sources (iPad) to real-life situation, in comparison to their ability to learn from a live demonstration, b) 2-years-olds could not draw a whole cat image, owing to that children’s understanding from playing the iPad game was linked with their thinking, talking and reading from the images and iPad games only provided children with higher task complexity and disrupt their transferring of learning; and c) 2-year-olds needed to develop their experience with multiple representations, such as language cues, to facilitate their transferring of learning. Parents and teachers may find this paper useful to examine the values of using 2D sources, such as an iPad.

#254S: Investigating the Factors of Practice Time and Literacy on Children’s Chinese Typing Skills

Ellen C.C. LIU, Calvin C.Y. LIAO, Tak-Wai CHAN

In generally, most people learn about typing skills by practicing, and emphasizing on learners’ familiarity with the keyboard and position. Chinese input methods are not simply typing by looking, it needs decoding by phonological or character shape in different forms and then the decoded as input keying sequence. In Zhuyin input method, for example, typist knew through literacy pronunciation after saw the character, then decoded and get a “key sequence” to enter by pronunciation decoding. Literacy skills of children are not as good as adults, it is a key about the character can be successfully decoded by pronunciation. In this study, we tried to analyze the process of students’ practice typing. The practice duration may affect the students’ level of typing ability. Most important, there is a significant impact on enhancing children’s typing skills as improving their one of literacy skill.

#356: Learning System for Computational Thinking using Appealing User Interface with Icon-Based Programming Language on Smartphones

Kazunori SAKAMOTO, Koichi TAKANO, Hironori WASHIZAKI & Yoshiaki FUKAZAWA

Computational thinking is one of the most important skills for using computers. Most existing learning systems for computational thinking work only on desktop or laptop computers, although the popularity of smartphones has rapidly been growing. Moreover, most existing programming languages to teach are based on English and most learning systems employ poor user interfaces. Thus, such programming languages and learning systems are not suitable for users who are not familiar with English or who are enchanted to such user interfaces.

We propose a gamified learning system using an appealing user interface with a novel icon-based non-verbal programming language. Our system works on smartphones with which many Japanese teenager students are more familiar than PCs. Our system employs an appealing interface that a female student designs for other female students and icons to motivate university students to learn programming through playing. We conducted an experiment with 16 female students from Waseda University to evaluate our system. We confirmed our system motivated the students to learn programming and helped learn computational thinking concepts.
Vanessa MAIKE, Maria Cecilia BARANAUSKAS

Table-top Role Playing Games (RPGs) can be a powerful educational tool, but many teachers either aren’t aware of that, or don’t know how the game works. This problem could be alleviated with an authoring tool that facilitates the process of creating educational table-top RPG adventures and, at the same time, provide an introduction and computer-based support to this game genre. Literature on available authoring tools oriented to the creation of games in educational contexts is still scarce. Therefore, this article presents our efforts towards the design of a web authoring tool that aims at helping both teachers and students in the creation of educational table-top RPG adventures and also in the posterior use of these adventures in the classroom. The goal behind this work is to promote this genre of games and computers in education.

Leigh DISNEY, Alan BARNES, Janet McDOWALL, Gretchen GENG

This paper investigated 3-4 year old children’s engagement levels while they were playing iPads. Observations were used in this study. Eighty students participated in this study. This paper made three important contributions, which include a) children’s engagement levels were medium to high while playing iPads, which supports the play-based learning theory in early childhood education, b) young children can use touch screen technology and gestural interfaces in their learning, and c) children were having fun, expressed especially in their verbal languages and utterances. Early childhood educators and young children’s parents may find this paper useful in providing access and guidance for young children to use iPads to play and learn.

Tsung-Yen CHUANG, Lan-Yu KUO, I-Ching LEE, Wei-Fang TSENG, Yen-Wei HSU

Therapists have search for a better solution to integrate with sensory integrative therapy for the purpose of multisensory stimulation for children with sensory integration dysfunction (SID). This research designs a digital posture game using in treating SID. Challenges in this game mainly designed to stimulate the vestibular and proprioceptive of SID children. Patients have to transform their postures to accomplish the game task, achieving therapeutic purposes. Researchers hope through this game, we can provide the therapist more treatment information of patients to improve the overall effectiveness of the treatment.

Chih-cheng LIN, Ying-Chieh WU

Multimedia annotations of both definitions and visual aids have been reported to facilitate vocabulary learning based on learners’ performances on word retention. Vocabulary auditory input, however, was overlooked in many studies; listening comprehension, likewise, was seldom assessed as learning outcomes. The purpose of the present study was to explore the effects of vocabulary auditory input and those of learning style preference on vocabulary learning, in general, and on sentential listening comprehension, in particular. English beginners, 423 in total, were recruited from various junior high schools in Taiwan. Five nouns and five verbs, selected as the target words, were embedded in a reading text and annotated by one of the four methods: text-only, text-picture, text-sound, and text-picture-sound. One month before the treatment all participants were required to take a pretest of the target words; and, their learning style preferences, including verbal, visual and auditory, were determined by a questionnaire. In the treatment session every participant was randomly assigned to one of the four annotation groups aforementioned and read the text. Immediately after the reading they took a vocabulary recognition test and a listening comprehension test; the two tests were administered again two weeks later without prior notice. The data was submitted to two-
way repeated measures ANOVA, with annotation type and learning style as between-subject factors, time of measurement as within-subject factor, and scores of the two tests as dependable variable. The results showed that in the recognition tests, none reached significance level but time of measurement, with the immediate higher than the delayed. In the listening tests, only the main effect of annotation type reached significance level, with text-picture-sound group and text-sound group both outperformed text group; no differences were found between the immediate and the delayed posttests. While various annotations had equivalent effects on vocabulary learning, annotations with audio input contributed to the construction of phonological knowledge of new words, facilitating their listening comprehension in sentences. More importantly, the effects of audio input sustained for two weeks. The learning style preference of our English beginners, whether verbal, visual or auditory, played no role in vocabulary recognition and listening comprehension.

#1S: Multimedia Teaching Material with Text-to-Speech (TTS) on English Learning
Yi-Ching HUANG
This study aimed to explore the effects of the multimedia teaching material incorporated with TTS on college students’ English learning. 44 sophomore participants enrolled in the course “English Reading” were selected as volunteers at one selected university in Taiwan. The techniques of data collection in this study included (a) questionnaire, (b) open-ended questions, and (c) pre-test and post-test of vocabulary tests. This study found that the multimedia teaching material (a) enhanced students’ vocabulary learning, (b) facilitated students’ pronunciation and listening, (c) constructed knowledge, and (d) raised learning motivation. The effects of multimedia teaching material found in this study can be linked to students’ autonomous learning and teacher autonomy.

#205S: How to use information technology (IT) wisely for early childhood language education?
Wensi YANG, Peiwen TZUO
To examine the uses of information technology (IT) in early childhood language education, this paper reviews 34 studies to synthesize the current literature. Considerable insights are provided by these conceptual and empirical studies. A synthesis is given of with regards to the different pertinent IT features and how young children’s language development is influenced by these features. These pertinent IT features include digital picture, video, audio clips, website, game, Microsoft office, electronic file, blog and diagram. The findings are then based on literature to underpin how to use IT wisely for the language development of young children. The synthesis would like to highlight that, the nine pertinent IT features are somehow related to young children’s language developmental domains, and ways to use these features. This seems probable to shed lights on future IT research, design, and implications in young children’s language development.

#332S: Automated test assembly tool for Chinese word-segmentation test
Chen-Huei LIAO, Bor-Chen KUO, Kai-Chih PAI, Chih-Ning WU
The purpose of present study is to develop an automated test assembly tool for Chinese word-segmentation test. Word familiarity and word similarity were both controlled in the experiments. The study examined the effectiveness of automated test by comparing its performance with the traditional test, which was developed by linguistic experts. The results of the present study indicated that the children’s performances on traditional Chinese word-segmentation tests and automated Chinese word-segmentation tests were consistent and comparable. Data collected in different age groups and with larger sample size should be investigated for future research.
speech, especially speech that explains relations between two slides (complementary speech). Complementary speech is required between slides whose relations are difficult to understand from their contents, such as texts, figures, and tables. If authors could notice relations between created slides that are recognized by audiences, they would prepare appropriate complementary speech at the right places. To make authors notice slides where complementary speech is needed, our system analyzes relations between slides based on their texts and visualizes them. Four slide relations are defined and the method for detecting these relations from the slide texts is proposed. Then, analyzed relations are arranged in two-dimensional spaces that represent sequential relation and inclusive relation of their topics. The experimental results showed that most detected slide relations were the same as what examinees understood, and visualization of slide relations was useful in creating complementary speech.

#37S: Construction of a Cognitive Simulator for Human Memory Process and Class Practice
Kazuhisa MIWA, Junya MORITA, Hitoshi TERAJ, Nana KANZAKI, Ryuichi NAKAIKE, Kazuaki KOJIMA, Hitomi SAITO
For practice-based science education, the authors developed a cognitive simulator that demonstrates the human memory process and simulates the serial position effect in different experimental situations. Our cognitive simulator as a learning tool is established on the basis of the dual storage model; it visualizes the items stored in the short-term and long-term memories. The participants learn how the model works while confirming which items are rehearsed in the short-term memory, encoded into the long-term memory, or overflowed from the memory. We designed and performed practice-based psychological training through two university class sessions of the author’s cognitive science class. The results of the practice showed that participants’ data interpretation and data prediction were improved through class activities. More specifically, the participants explained the observed data using naive concepts prior to the learning phase, but they subsequently explained them using theoretically defined concepts of the dual storage model. Furthermore, the participants were successfully guided to predict the experimental results more accurately by the learning activities using the cognitive simulator.

#152S: Evaluation of an Improved Dictogloss System Oriented for Focus on Form
Asanori TASHIRO, Yasuhiro NOGUCHI, Satoru KOGURE, Makoto KONDO, Tatsuhiro KONISHI, Yukihiro ITOH
In this paper, we describe how to improve a Japanese language education environment for nonnative speakers (dictogloss system oriented for focus on form) and its evaluation. Our existing dictogloss system already has some functions supporting learners’ self-study with dictogloss activities. However it has not been evaluated in practical situations. To adapt this system to real foreign language education scenes, we improved the system so that it accepts Roman alphabet input without kana-kanji conversion, which some learners actually prefer to input with kana-kanji conversion. We also developed a recording function of a learner’s operations which enables us to analyze activities of actual learners. Preliminary evaluation of our improved dictogloss system with actual learners shows that our improved dictogloss system has better learning effect than a conventional dictation environment.

#183S: Developing Virtual Tutors for online PBL Discussion Board Using Concept Map Scoring
Shein-Yung CHENG, Kuo-chen LI, Zhe-Hao HU, Jia-Sheng HEH, Xun-Cong XIE
With the development of the information technology, digital learning is introduced to construct problem-based learning systems, such as online discussion. This paper investigated on-line PBL processes and designed intelligent tutors with pragmatics and semantic concept map. The tutors interact with students based on the observed concept map and provide guidelines for students’ on-line discussion. A preliminary experiment is carried out to exam the system implementation. The result shows the effectiveness of the proposed method and the possibilities of sharing the burden of instructors for online discussion.
#101F: Calculating Test Item Similarity Using Latent Dirichlet Allocation  
*Teruhiko TAKAGI, Masanori TAKAGI, Yoshimi TESHIGAWARA, Kenji TANAKA*

In previous studies, we proposed methods for calculating similarity between test items to automatically retrieve similar test items in e-testing, and conducted experiments and evaluations of those methods. Test item similarity data is applicable to tasks such as automatically retrieving similar test items, automatically constructing item banks, visualizing structure between test items, optimizing amounts of test information, estimating the difficulty of unanswered test items, conducting computer adaptive testing, and creating test items. To improve the accuracy of retrieving similar test items, we propose a new method for calculating test item similarity that applies latent Dirichlet allocation (LDA), a generative probabilistic document model. We assume that each test item is represented by a vector using topics estimated by LDA, and the similarity between test items is calculated by cosine similarity. Applying LDA to calculate similarity between test items lowers the number of retrieved dissimilar test items, and creates vectors based on the relation between extracted terms. To accurately estimate topics in each test item, we perform preprocessing by identifying where important terms occur and enhancing the co-occurrence relation between terms. We use 250 test items from the Systems Administrator Examination to test the effectiveness of retrieving similar test items. The results indicate the effectiveness of the preprocessing steps, and of applying LDA to calculating test item similarity. We furthermore demonstrate the improvement in accuracy of retrieving similar test items by the proposed method in comparison with existing methods.

#275S: The Design, Development and Preliminary Evaluation of an Online Student-Generated Tests Learning System  
*Fu-Yun YU, Chia-Ling SU*

Currently, more than a dozen online learning systems to support student-generated questions are on the market. In view of the fact that constructing “tests” made of questions generated by students would promote further cognitive processing on the part of the students, but no systems supporting such activities have been developed, this study aimed at developing an online student-generated tests learning system. An evaluation study was conducted to collect preliminary data with regard to the learning support of the developed system. Descriptive data analyzed highlighted two distinct aspects of the thought and learning process mobilized by student-generated tests. First, a global and macro view that highlights the integration and inter-connectedness of the entire study material. Second, technical issues associated with test construction skills. Suggestions for future study are provided.

#76S: Text Organization through Concept Mapping: A Different Aspect on Reading Comprehension  
*Bo-Sheng HSU, Yung-Che CHEN, Cheng-Yu FAN, Liang-Yi LI, Gwo-Dong CHEN*

Reading is an important learning skill. But in Taiwan, the traditional education lead student to study passively when reading. Recently, the organization of text structure is thought to be an effective way on reading. On organizing, learners can comprehend and memorize their ideas by building their own text structure. Concept mapping is an organizing method which is widely used in education. This study designed an E-Book system with concept mapping function. We defined three concept mapping activities with different concept maps supported, Full Map, Partial Map and No Map. This study is to investigate the user behavior of reading through different supported map and see which is better helped on reading.

#193S: Analysis of Writing Data for Cheating Detection in e-Testing  
*Yu YOSHIMURA, Takehiro FURUTA, Takahito TOMOTO, Takako AKAKURA*

e-Testing is effective in relieving time and space limitations for examinations. However, a
drawback is that user authentication employs only login credentials, making cheating easy. We examine variations in personal writing data in e-testing with the aim of detecting cheating. We assume two behaviors: answering questions by oneself and replicating others’ answers. We used the sub-stroke method for data analysis, which allowed confirmation of differences in the change over time in writing speed and pen pressure, and differences in average pen angle and direction.

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<th>15:40-16:00</th>
<th>Poster/Work-in-Progress Poster (WIPP) Exhibition</th>
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<tr>
<td>#174: Code Analyser in CSTutor - a C# Intelligent Tutoring System</td>
<td>Budi HARTANTO, Jim REYE</td>
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<td>This paper describes the process that is performed by CSTutor to analyse each student program. CSTutor is an Intelligent Tutoring System that supports the student’s learning by doing. Built as an integrated part of Visual Studio 2010 or 2012, CSTutor can give assistance to a student writing programs in Visual Studio from the earliest stage. The analysis process starts by capturing the student’s program from the Visual Studio Editor. The program is then parsed and simplified into facts in a knowledge base. This knowledge base also contains rules, actions, constraints, and a goal to be achieved. The goal can be decomposed into several sub-goals to give a finer detail of feedback to the student. So that it can be used as a practical supplement to classroom instruction, CSTutor provides a number of exercises that can be tried by the students. Further, the number of exercises can be increased without having to change CSTutor’s program code. The teacher just needs to add the description of the exercise, the constraints, and the goal that should be achieved in the new exercise. The evaluation of CSTutor is in progress and it is expected that CSTutor will help students learn programming to an improved degree.</td>
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| #208: Design of a Presentation-Based Meta-Learning Environment by Choosing from a Set of Slides | Kazuhisa SETA, Kazuki KISHIMOTO, Mitsuru IKEDA |
| As described in this paper, we propose a slide-selection approach to overcome the problem of realizing a learning environment in which learners can construct presentations by choosing prepared slides. The advantage of this approach from the viewpoint of generating content-dependent guidance messages is that the system can extract the contents of each slide by adding tags that have meanings specified by an ontology, which contributes to enhancement of ontology-based intelligent meta-learning support. |

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| #222: Effective Alignment between the University Education and the Teaching Practice through Automatic Interpretation of Lesson Plans | Toshinobu KASAI, Kazuo NAGANO, Riichiro MIZOGUCHI |
| We have built an instructional design support system called “FIMA-Light” which reasons about teacher’s intentions from his/her lesson plan and automatically produces I_L event decomposition trees. In this paper, we discuss a particular use of I_L event decomposition trees produced by FIMA-Light in a teacher education program. First, we consider effective alignment between teacher education at university and teaching practice in the classroom. We also report on trial use of FIMA-Light in teacher education at university in order to investigate the usability of the information expressed by I_L event decomposition trees. |

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| #305: A Formal Model of Learner’s Annotations Dedicated to Web Services Invocation | Anis KALBOUSSI, Omar MAZHOUD, Ahmed HADJ KACEM, Nizar OMHENI |
| Various models of learner’s annotative activity have been proposed in E-learning domain. This models which try to conceptualize the annotations of learner are used as basis of many annotations systems. In this article, we propose a new formal model of learner’s annotations dedicated to Web services invocation. This conceptual model, composed of ontology and pattern of annotation, tries to present the learner’s annotative activity as a means of invocation of appropriate Web services. Therefore, from a learner’s annotation we interpret a goal implicitly expressed and we try to discover and invoke a Web service which can meet the annotation’s object and consequently assist the learner in his learning |

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activities.

#343: Towards Building Incremental Affect Models in Self-Directed Learning Scenarios
Paul Salvador INVENTADO, Roberto LEGASPI, Ken-ichi FUKUI, Koichi MORIYAMA, Masayuki NUMAO
Self-reflection and self-evaluation are effective processes for identifying good learning behavior. These are essential in self-directed learning scenarios because students have to be responsible for their own learning. Although students benefit from doing fine-grained analysis of their own behavior, which we observed in our previous work, asking them to perform tasks such as analysis and making annotations are tedious and take significant amount of time and effort. In this paper, we present our work on the development of incremental affect models that can be used to minimize effort in analyzing and annotating behavior. Incremental models have an added benefit of adaptability to new information, which can be used by future systems to provide up-to-date affect-related feedback in real time.

#364: Reusing Practical Teaching Strategies in a Community of Teachers - A Case study in a Community of Junior High School Teachers in Japan
Yusuke HAYASHI, Riichiro RIICHIRO
In this paper, we discuss reuse of teaching strategies that schoolteachers employing in practice. One of the significant capabilities of teachers is to blend content knowledge and general pedagogical knowledge within a context. The authors carried on a case study of modeling practical teaching strategy of schoolteachers in order to facilitate reusing them based on an ontological engineering approach. As the result, the teacher could design lesson plans serving his different two intentions.

#49: Ziggy: Very Interactive Trigonometry
Anjo ANJEWIERDEN, Ellen WASSINK-KAMP, Ton DE JONG
In this paper we describe a highly interactive touch-based application to teach the basics of trigonometry to secondary school students. The application, called Ziggy, lets students “touch” and “push” triangles, dynamically modifying the shape and size, and observe the effect on the angles, sides, and the trigonometric ratios. An early version of Ziggy has been tested in small-scale experiments in the classroom.

#73: Application of Puzzles to unpuzzle the programming difficulty through Spoken Tutorial workshops
Kiran L.N. ERANKI, Kannan M. MOUDGALYA
Computer programming is a challenging subject to teach and learn both for students as well as teachers. Cognitive skills such as programming comprehension and debugging are the most important skills necessary for a programmer. Students have a difficulty to build these cognitive skills either due to lack of resources, pedagogy and feedback mechanisms. In order to address some of these challenges spoken tutorial puzzle based approach has been discussed focusing on programming comprehension and debugging skills of the learners. A study has been conducted to analyze the cognitive difficulties of students in programming education through spoken tutorial based workshops. This study comprised of a group of non-CS engineering undergraduates. It is noted that majority of students showed cognitive difficulties related to programming, debugging and program comprehension, irrespective of the programming language used. This paper discusses how puzzles help in building the programming skills of the learners. We also discuss the challenges and benefits of using puzzles to teach programming skills.

#149: Evaluation of AR Learning Equipment for Astronomy Education
Norio SETOZAKI, Tsutomu IWASAKI, Yusuke MORITA
Various fields of education have focused on augmented reality (AR), which can synthetically present virtual objects in real environments. This study examines the effects of utilizing AR learning equipment for synchronized model operation in astronomy education. The findings show that AR enhances the learning experience of students by
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<th>Title</th>
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<tr>
<td>#191: Encouraging Each Other in the Community Site for Habit Development</td>
<td>Yasuo MIYOSHI, Ryo OKAMOTO</td>
<td>We have developed a prototype community site for building up a good habit. A user can join in the prototype site together with a family or a close friend as a partner, and thereby the user and the partner can encourage each other while they receive an alarm of the beginning of the plan to practice the objective activity. In this paper, we discuss the effect of encouragement for habit development from the results of an evaluation experiment. The results of the short-term experiment were not so good. However, it suggested that a user should send an encouragement message to the partner that has low motivation.</td>
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<td>#199: Investigating Possibilities to provide Collaborative Learning Spaces in Libraries for Children with Special Needs</td>
<td>Jaya Laxshmi MEENATCHISUNDARAM, Dayang Norsheila ABANG MOHTAR, Fitri Suraya MOHAMAD</td>
<td>While opportunities for technology-based collaborative learning have reached out to a large majority of the community, not everyone has been able to benefit from the growth of collaborative learning. Computer supported collaborative learning (CSCL), in particular, has great potential for children with special needs in terms of building social interaction and collaborative skills through the use of various information and communication technology (ICT) tools. This paper presents a preliminary investigation on how library spaces could be utilised to encourage collaborative learning skills for children with special needs. Gaps in literature with regards to the usage of library spaces for this purpose as well as the limitations of current tools in terms of language diversity are also explored. Future research directions are also presented to position plausible strategies to use libraries as spaces for collaborative learning for children with special needs, using appropriate tools to support their learning process and experience.</td>
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<td>#219: CSCL Discussion Support with Emphasizing Feature of Main Sentence</td>
<td>Ryo NAKAMURA, Yasuhisa TAMURA</td>
<td>In this paper the authors propose a method and a system to support CSCL discussion with use of a developed function to emphasize the main sentence of each utterance. Generally, CSCL discussion environment has a difficulty to read huge volume of many utterances. The authors propose a function to provide two parts of input text fields, one is for main sentence of conclusion of an utterance, the other is for details or justifications of the utterance. At the time of representation, the proposing system first shows a list of main sentences. When members want to see details of an utterance, he or she clicks a link attached to the target main sentence. With use of the proposed function, a member of CSCL discussion will become easy to grasp a big picture of a discussion. It is expected to provide deep understanding of discussion and prompt to write meaningful utterances on CSCL. In order to verify an effect of the proposing system, the authors conducted a controlled experiment. The result shows that members of a target group tend to use various types of utterance roles rather than ones of a control group. From this result, the proposing system is thought to provides a CSCL environment for deeper understanding of discussion and utterances.</td>
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<td>#236: Review Support System with Visual-Oriented Annotation Method for Presentation Rehearsal</td>
<td>Ryo NAKAMURA, Yuto WATANABE, Akihiro KASHIHARA</td>
<td>The purpose of presentation rehearsal is to enable a presenter to be aware of insufficiency or incompleteness of his/her knowledge and refining the knowledge. In our study, we have proposed a framework of the presentation rehearsal support system to assist the peers to review the presentation in the rehearsal, and have developed a prototype system. In the review work of our system, a reviewer make annotations with text, but it sometimes hiders the peers from giving explicit and practical review comments for a presenter.</td>
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Therefore, we attempt to apply a visual annotation method for computerized presentation rehearsal system. In this paper, we propose the visual-oriented annotation method for review works in our computerized presentation rehearsal support system.

#281: Intercultural competence in web-based student exchange environments  
*Linda BRADLEY*  
In this paper, three case studies of web-based peer interaction with different agendas are investigated. The pedagogical design concerns language learners engaged in intercultural exchanges over blogs and wikis. The data consist of posted online interaction and interviews where the student activities are mapped out in relation to steps in Intercultural Communicative Competence online. The results show that the planning and implementation are specifically important phases in intercultural exchanges.

#11: Development of a User Adaptive Graphical Learning System  
*Kotaro MATSUSHITA, Takuya SAKIYAMA, Yoshihiro FUJISAWA, Takahiro KURUMAGAWA, Hiroaki KOYAMA, Hideo SUZUKI, Kenneth J MACKIN, Eiji NUNOHIRO*  
This paper describes the development of a user-adaptive e-learning system. A user can select e-learning content that he/she desires on this system to make questions automatically at random for the selected content. Computer graphics are used to display e-learning content and messages on this system, which is expected to allow the user to understand much more about content and to arouse the user’s interest in it.

#47: Development of a Kanji Handwriting Learning Support System with Differentiated Instruction to Dysgraphia Children  
*Tomomi INOUE, Rimi NAKAMURA, Noriko NAKASHIMA, Takaaki SONODA, Hisaharu TANAKA, Kenzi WATANABE, Yasuhisa OKAZAKI*  
In this study, we have developed a handwriting learning system using the LCD pen tablet in order to help dysgraphia children to learn Kanji. Teaching materials with a handwriting interface are available on the market. However, these materials have been developed for healthy people. The degree of the writing difficulty is different for each child. Therefore, the guidance adapted for each child is necessary to teaching materials. In this research, in order to perform detailed guidance in accordance with the degree of writing difficulties, we have realized functions of handwriting learning support, as described below. Firstly, we have realized the function of practicing the character, while looking at the model. For children unable to write correctly only by looking at the form of the final character, our system includes a function to display the model along the stroke order sequentially depending on the process of handwriting. Secondly, we have realized the function of tracing a model for children who can not transcribe it. These two functions are able to use at the same time. Furthermore, our system also have a function to support handwriting learning by evaluating each written stroke automatically whether it is right order or a shape of stroke and giving feedback. Currently, we are evaluating our system in using for instruction to dysgraphia children at a special support classroom of a primary school.

#69: Using Music Notation for Teaching Computer Programming  
*Eunjeong KO, Kyogu LEE*  
Despite the wealth of educational programming languages, many novice programmers face difficulties and give up in the early stages, just because they are not familiar with the programming syntax and semantics. In this paper, we propose a method for programming language education using music notation with an aim to entice novice programmers to write their own programs. There are two key aspects in our proposed approach: first, we use music notation as an analogy to programming, based on the observation that there are similar attributes between the two; second, we provide users with on-line auditory feedback to immediately notify potential errors in a pleasant way. We find several key concepts in programming language syntax and semantics, and translate them into music notation to help beginner programmers learn them with ease and intuition. In addition,
we design examples and a learning support environment, allowing users to learn to program by themselves.

#145: The Madsci Network: Direct Communication of Science from Scientist to Layperson
Ricky SETHI, Lynn BRY
Internet-based volunteer communities collaboratively contribute to the expansion of human knowledge and cognition. Their popularity is evidenced not only by reference sites like Wikipedia but also by niche communities designed to help people answer complex queries, especially in relation to highly technical or scientific subjects that are beyond the ability of their peers to answer. Ask-A-Scientist sites like The Madsci Network are a subset of Ask-An-Expert sites that rely upon expert volunteers to disseminate information directly from the expert or scientist to the layperson.

#271: Integration of Blender 3D in Basic Computer Graphics Course
Kapil KADAM, Sameer SAHASRABUDHE, Sridhar IYER, Venkatesh KAMAT
Students find Computer Graphics concepts of transformations difficult to visualize. Using Blender 3D, we developed a three-hour training module on solving transformations problems. We used think-aloud method and conducted interviews for data collection. Analysis of results suggests that, students found training module beneficial to visualize and solve transformations.

#319: Interruption-response visualization using click stream analysis
Arimitsu SHIKODA, Kazuo KATO
In a large practical engineering class, it is difficult for the instructor to give learners additional instructions while they are doing their work. Therefore, it is useful for instructors to be able to track the responses of learners after they give instructions. To accomplish this, a click-stream visualization technique based on Web access log analysis can help instructors examine the extent to which learners have received the information they were given. In this paper, we propose an interruption-response visualization method for a large practical engineering class, using log analysis.

#198: Analyzing Online Quiz Responses to Support One-to-One Instruction in the Classroom
Toshiyasu KATO, Takashi ISHIKAWA
In this paper, we propose a method to detect failure of learning to support one-to-one instruction in the classroom, using quiz responses in Moodle, a course management system. Failure of learning is defined as a situation in which the correct answer rate of a particular learning topic in a quiz is significantly lower than the correct answer rate of other topics answered by students in the same quiz. In this study, the researchers identified the presence or absence of failure of learning in actual classes to evaluate the usefulness of the proposed method. The results revealed that more instruction was given to the experimental group.

#204: Development and Evaluation of Twitter based Social Response System
Youji OCHI
Twitter is a very famous communication tool. We focused on Twitter as a platform of a response system to collect comments of audience about a presentation. We have developed a system that automatically generates a responsive environment about the presentation using various input and output interface. In this paper, we describe the outline of our system and the performance validation of our system.

#353: Towards a Descriptive View of Context Usage in Context-Aware U-Learning System
Raoudha SOUABNI, Ines BAYOUDH SAADI, KINSHUK, Henda BEN GHEZALA
Research in ubiquitous learning (U-learning) has gained attention of a large number of researchers and a number of ubiquitous learning systems are now available in the literature. Majority of these systems have been developed to resolve a specific problem in a given context; their development approaches do not dictate ubiquitous context usage
requirements to fill in. U-learning systems developers need to have a clear and a general view of how their intended systems make use of the ubiquitous context. This paper introduces a comprehensive view of context usage through three different view-points inspired from Dowson’s work (Dowson, 1993) each one capturing a particular aspect of context handling. Then a set of facets is associated to each given aspect in order to study, understand and appropriately describe it. The findings of this research are aimed to provide context-aware u-learning system developers a clear understanding of the context usage in such systems and help in underlining the requirements of the u-learning environment. This research is also aimed to help in comparing and evaluating context-aware u-learning systems according to the descriptive system views.

#59: Which one works better? Testing Outcomes of Using a Somatosensory Game Intervention and a Chair-Based Exercise Program on Elderly

I-Tsun CHIANG, Mao LIU, Hsin-Chin WU, Chi-Yao CHANG, Hsiu-Chi FU, Shang-Ti CHEN, Chien-Hsin YEH

The purpose of the study is to understand the outcomes of using a somatosensory game intervention and a chair-based exercise program on elderly. Forty older adults aged more than 65 were recruited from Yung Shin nursing home and divided into two groups, a somatosensory video game and chair-based exercise group. All participants were required to complete 30-minute somatosensory video game or 30-minute sedentary activity interventions three times a week of 8 weeks. Pre- and post-tests were administrated before and after the interventions and utilized to assess the benefits and outcomes. Soda Pop test for eye hand coordination and grasping ruler test are two measurement tools were used to measure their reaction time. The results identified that the "Fruit Ninja" game intervention did not successfully created positive impacts on their reaction through a 30-minute sessions three times a week for 8 weeks. However, 8-week chair-based exercise program did have significant impact on their reaction time. In terms of eye hand coordination, both somatosensory game and chair-based exercise programs were effective to enhance their performance.

#66: Evaluation of the ‘ePocket Plant Guide’ to Support Learning about Plants in Vegetation Succession

Keita MARATSU, Fusako Kusunoki, Yoshiaki Takeda, Haruka Inoue, Hideo Funooi, Etsuji Yamaguchi, Shigenori INAGAKI, Hiroshi MIZOGUCHI, Masanori SUGIMOTO

The purpose of this study was to investigate the ‘Pocket Plant Guide’ qualitatively through interviews. We allowed Japanese sixth-grade elementary school students to use the ‘Pocket Plant Guide’ in order to identify and observe plants. We interviewed the students to investigate their subjective impressions of using this guide. The results indicated that this guide was effective in supporting the identification and observation of indicator plants.

#185: GameAgressionAnger

Fahrul ROZI, Nafisah MUHYIDDIN

Several studies have shown that playing violent video games can increase aggression and frustration and anger. This study uses an instrument that is used by Williams (2005) and the aggression questionnaire Buss-Perry Scale (1992) in order to determine whether violent video games, frustration and difficulty influential games simultaneously against aggression and anger. The participants of this research were 60 students (33 undergraduate student and 27 senior high school students). The results of this research indicated that the level of game difficulty, frustration and violent video game played simultaneously will effect to the aggression and anger. This study also showed relationship between respondents who play games on the warnet (game station) with a tendency to play violent video games and aggression.

#226: Promotion on Science and Technology for Children using Human Following Robot

Masahito OTA, Hiroshi HISAHARA, Yuki ISHII, Takeki OGITSU, Hiroshi TAKEMURA, Hiroshi MIZOGUCHI
The authors perform promotion activity on science and technology for primary school children with human following robot. This robot can follow a particular person as target. In our activity, the children enjoy interaction with robot by being followed as the target. Enjoying with the robot, they are interested in the science and technology. In this paper, we present framework about the human following robot. Also we demonstrate the interaction with the robot in our promotion activity.

#249: Development of a Management Game for English Vocabulary Learning
Zhi-Hong CHEN
In this paper, we describe the development of a management game, My-Pet-Shop, to support incidental learning for English vocabulary. The design rationale of the system lies in the fact that vocabulary learning should learn from meaningful context rather than abstract description. In addition, a management game could help students regulate their learning in a joyful way. Based on the two rationales, we develop the My-Pet-Shop, which consists of three components, including self-representation, self-management, and social interaction. In addition to the introduction of the three components, their underlying thoughts are also described. In the near future, the system usability and its influences on student learning would be conducted.

#297: Full-body Interaction Digital Game of Vegetation Succession for Children
Takayuki ADACHI, Keita MURATSU, Hiroshi MIZOGUCHI, Miki NAMATAME, Masanori SUGIMOTO, Kusunoki FUSAKO, Etsuji YAMAGUCHI, Shigenori INAGAKI, Yoshiaki TAKEDA
We developed a full-body interaction digital game “Human SUGOROKU”. This game enables elementary school students to enjoy and learn vegetation succession by playing simulation game with their body movement. We conducted this game to elementary school students and effects of the system were investigated with questionnaires. The result showed that the full-body interaction promotes a sense of immersion in the game. This paper describes the structure of this game and the questionnaire results.

#29: Using automatic keyword, concept map, and score to support students’ summarization
Yu-Fen YANG
The purpose of this study was to develop automatic keyword, three-layer concept map, and scoring for supporting and measuring college students’ summaries in reading academic texts. The three layers represent: (1) the central idea of a text, (2) the main idea of each paragraph, and (3) the supporting ideas of each paragraph. A sample of 52 college students who study English as a Foreign Language (EFL) was grouped into the experimental and control groups, 28 and 24 students in each. The results of this study indicate that the students of the experimental group made more significant improvement on reading comprehension and summarization after receiving the explicit and strategic feedback of automatic keywords, three-layer concept maps, and scores than students in the control group. The automatic keywords, three-layer concept maps and scores not only become reliable predictors to evaluate the students’ summarization but also serve as scaffolds to improve their reading comprehension and summarization as they actively engage in self-regulated learning.

#95: Using Concept Maps to Enhance EFL Students’ Collaborative Writing: Paper-based and computer-mediated approaches
Wan-Yu Irene LIU, Yu-Chuan Joni CHAO, Wen-Chi Vivian WU
This study investigates the effectiveness of concept mapping (CM) at the pre-writing stage by using it in collaborative writing, and by comparing paper-based and computer-mediated modalities. The research questions address (1) students’ perceptions of concept maps in both paper-based and computer-mediated modalities, and (2) the extent to which CM facilitates students’ writing in a collaborative writing setting ACCORDING TO WHAT STANDARDS?. The participants were eighteen non-English majors enrolled in a writing class in a university in central Taiwan, and were divided into six collaborative writing
groups. The individual interview method was used to elucidate students’ perceptions of paper-based and computer-mediated based CM in collaborative writing. Student writing samples from before and after the experimental treatment were collected compared to ascertain impact. Students satisfaction with and perceptions of the two modalities of CM writing were mixed. The paper-based modality was deemed more convenient from drawing maps, and seemed to be more conducive to generating more ideas. The computer-mediated modality was more convenient in that it could be used at any time and any place, and through the Internet, students could invite more people to help with generate ideas. It was implied that the primary benefit of the computer-mediated modality was its accessibility to the internet. The implications of this study are (1) CM is an effective tool for collaborative writing, and (2) writing teachers can adapt either the paper-based or the computer-based modality of CM to best meet their students’ convenience.

#116: The Impact of Technology Use on Student Satisfaction in English Classes
Lisa HSU
This study aimed to find out if students’ satisfaction in English classes is associated with the frequency of teachers using technology teaching support, such as E-learning or web-based learning resources. The participants for this study were students who enrolled in the author’s classes and therefore were considered as convenient samples (n = 151). They were given extra credits to complete the questionnaire that was designed for the purpose of this study. This study found that student satisfaction for English classes is significantly positively associated with the frequency of teachers using technology teaching support (r = .742, p < .01). Furthermore, after conducting Chi-square test, Pearson value showed that there were four items (Q 1, 2, 7, 17) student’s satisfaction was significant different among three different programs (four-year program, two-year program, and five-year program.) In addition, six items (Q 1, 3, 5, 7, 8, 17) student’s satisfaction appeared significantly different among freshmen, sophomores, juniors, and seniors. Lastly, limitation, implications and suggestions for further research are addressed.

Satoru MATSUNAGA, Hisaharu TANAKA, Kenzi WATANABE, Yasuhisa OKAZAKI
In this research, we have developed a system which supports Japanese pronunciation learning for foreign students by using speech recognition software named Julius. We have realized automatic evaluation of learner’s pronunciation by using speech recognition software. In our system, beginners can check their pronunciation without depending on a teacher. We have also implemented learning courses which meet the needs of learners. The learner can learn according to the level of own Japanese by the pronunciation learning course that corresponds to the level of the Japanese-Language Proficiency Test. In addition, the learner can learn one’s weak pronunciation selectively by learning course according to the country in consideration of the native language interference.

#155: MyEVA mobile: A mixed-modality vocabulary learning and offline-supported mobile system for English learning
Fang-Chuan OU YANG, Wen-chi Vivian WU, Yu-Chuan Joni CHAO, Jhih-Wei LIU
In recent years, many studies have examined the effectiveness of MALL (Mobile-Assisted Language Learning); however, little research has been conducted to discuss the usage of VLSs (Vocabulary Learning Strategies) for mobile language learning. In this study, the researchers proposed a mixed-modality vocabulary learning and offline-supported mobile system for EFL (English as a Foreign Language) students to improve their English vocabulary learning. An empirical experiment was conducted, accordingly, to evaluate the effects of the proposed system for vocabulary learning. The experimental results indicated the proposed system enhanced student vocabulary acquisition in general, and also benefited the participating students with four different learning styles, which are visual, auditory, kinesthetic, and tactile, respectively.
Investigating EFL Learners’ Reading Processes of Cognitive Activities in an English Reading Remedial Program

Hui-Chin YEH, Yu-Fen YANG, Kuang-Che CHANG

Reading comprehension is fundamental for EFL (English as a Foreign Language) college students; nevertheless, many EFL students struggle with reading. This study aims to (1) equip students with reading strategies through completing a series of reading tasks in a learning system, and to (2) explore students’ reading processes. Students’ reading processes have been put into six categories: remembering, understanding, applying, analyzing, evaluating, and creating. After completion of the remedial English reading program, the EFL college students were able to apply reading strategies and competently engage in reading activity.

Aligning Teaching and Learning of Foreign Languages through an Integrated Learning Environment of Feature Film Clips

Yu-Chuan Joni CHAO, Mark KAISER, Wen-Chi Vivian WU

In this paper, we report on a database of feature film clips for foreign language learning and describe constructive alignment of teaching with the learning of English as a foreign language (EFL). The constructive alignment is threefold: (1) Film clips provide intrinsic motivation and learning contents for reflective-active knowledge construction of language and culture; (2) Output tasks through collaborative learning to involve EFL learners’ active engagement; and (3) Task directions to serve as the structure of observable learning outcomes for performance-based assessment and a formative goal of enhancing students’ learning of language and culture. A total of 60 English majors in the required writing course of Freshman Composition in a university in Taiwan carried out four assignments, each of which involved the writing of a synopsis of the clip content, a description of observed cultural differences, and a list of new vocabulary and expressions. The preliminary results from students’ writing samples and post-test of vocabulary knowledge suggest that students can benefit from the constructive alignment of the feature film clips. In conclusion, the proposed approach of performance-based learning and assessment constitutes a role change for instructors and learners. The constructive alignment of the study demonstrates an EFL case that potentially transforms teaching and learning via the integrated learning environment of feature film clips.

To Develop Outstanding English Teachers

Chun-Lin LUO

The purpose of the paper is to enhance the effects of the course of Teaching English Grammar and Vocabulary in order to improve the students’ English grammar and lexical knowledge and their teaching skills as well. The characteristics of the project are student-centered learning, scaffolding instruction, problem-based learning, and project-based learning. Through the process and reflections, this project equips the students with professional and occupational abilities: Students not only learn the professional knowledge of grammar and vocabulary teaching but also apply the theory and methods to lesson plan writing and teaching practice with computer and digital files.

An e-Learning Tool for Blended Reciprocal Teaching on English Textbook for EFL Technology-majored Students

Chihcheng HSU, Fang-Chuan OU YANG, Vivian Wen-Chi WU

An e-learning tool (called myERT, “my English Reciprocal Teacher”) was developed to provide a blended learning environment where reciprocal teaching of an English textbook, targeted at EFL technology-majored students, was employed as the main purpose. A pilot study was conducted to test myERT and the result showed positive feedback. The basic functions and the observed benefits in the pilot study run are reported in this paper.

Online Cartoon in Mandarin Chinese: A Case Study in Yogyakarta’s school, Indonesia

Nuning Catur Sri WILUJENG, Yu Ju LAN

This research aims to 1) describe the use of technology in Budi Utama Multi-lingual School in Yogyakarta, Indonesia, 2) investigate the development of students’ Chinese vocabulary.
used in creating a story on online cartoon, and 3) identify students’ attitude towards the application of collaborative learning in Mandarin language learning. The research design is based on a quasi-experiment using both qualitative and quantitative approaches to collect and analyze data. Three classes participated in this study: one class acting as the control group using text-based instruction where students work individually on a cartoon without online resources; the other two classes being the experimental groups 1 and 2. In experimental group 1, students worked individually on an online cartoon whereas in experimental group 2, students worked collaboratively to an online cartoon. All participants are Grade 5 students of Budi Utama Multi-lingual School in Yogyakarta, Indonesia. The collected and analyzed data include performances on Chinese vocabulary, notes, and video recordings of lessons. It is anticipated that experimental group 2 outperforms the other two groups and that experimental group 1 performs better than the control group.

#264: The role of the “meaningful other” in online learners’ self-regulation
Liliana CUESTA, Wen-chi Vivian WU
Social standards nurture individual self-efficacy beliefs. Such models influence learners’ performance in so that they can learn to recognize in others, alternate means to think, act, and do. One of these models is the meaningful other, whose role is explained in the present paper. Together with the implications that are unveiled through its discovery and recognition instances in online environments and the analysis of learners’ actions along this process, this paper attempts at examining how useful might such recognition process be in the self-regulatory actions of learners. It is expected that instructors and researchers raise awareness on the recognition of meaningful others in online settings, in order to establish sound pedagogical proposals that might assist learners and teachers towards the appraisal of more efficient self-regulatory actions and successful academic performances.

#280: EFL learners’ perception of synchronously collaborative translation-annotation system by utilizing the Google Document platform
YiChun LIU, Yong-Ming HUANG
Many students have difficulty in translating from English to Chinese and Chinese to English, particularly long and complicated sentences, and errors in their organizing information often result in wrong interpretation of the intended meaning in the context. Few papers offer a comprehensive guide to teaching translation in practice, especially embedding technology into a translation class rather than simply searching for vocabulary items online. The study explores the effectiveness of online collaborative translation activity. The instruments used included a pretest, a posttest, and a UTAUT survey. The results are discussed in terms of the effectiveness of the online translation tasks and suggestions are provided for future task design.

#355: Single-Correct Answer (SCA) and Multiple-Correct Answer (MCA) in Multiple-Choice Computer Assisted Language Testing (CALT) Program
Herri MULYONO, Gunawan SURYOPUTRO, Tri Wintolo APOKO
This paper describes the use of single-correct answer (SCA) and multiple-correct answer (MCA) in assessing secondary school students’ grammar proficiency in Indonesia. There were 154 students from year 1 aged 15 year old that participated in the study. From the total 154 students; 98 students participated in the SCA test session, 103 students complete the MCA test, and 84 students filled in the survey. In addition, 52 students were recorded to attend the three sessions from the study: SCA, MCA and survey. Result of the study has shown that the design of SCA and MCA in multiple-choice the computer assisted language testing (CALT) program corresponds the main principle of language testing similar to the paper-based testing format. Although the design of both SCA and MCA tests fulfilled the requirement of CALL environment such as interactivity, flexibility, content appropriateness as well as performance; as the nature of test the application of SCA and MCA test in delivering the grammar test was believed to suggest stressful environment. The authenticity setting of both SCA and MCA test which was proposed to promote the originality of students’ work was identified to drive uncomfortable testing situation.
Within comparison between the SCA and MCA tests, result of the study has shown that students preferred to SCA test than the MCA test. The SCA test was believed to serve practicality for the students to complete the grammar task for the sake of number of correct answer available. Although students were challenged to complete the grammar test carried within the MCA test format, students preferred not to have such testing as it created more uncomfortable testing environment for them.

#15: Case Study of the Lesson Study Activity for Primary School Science Supported by Web-based Evaluation Assistance System in the Undergraduate Teacher Training Course (1)
Hayashi NAKAYAMA, Tomokazu YAMAMOTO
In this paper, we describe an approach to lesson study activity for primary school science instructors supported by a web-based education assistance system; we test it in an undergraduate-level teacher-training course at our university and present its effects on students. Five trial lessons were conducted with one group of student teachers teaching the class and the others acting as schoolchildren; lesson study was held after each trial lesson. After every trial lesson, students input responses to the questionnaire and comments on the lesson using their own mobile phone or computer; results were displayed on a big screen in the classroom and on each student’s mobile. Then, the class discussed the science lesson with reference to these results. After that, we administered another questionnaire about the students’ views of science lessons before and after a series of lesson studies. As a result, the students’ views changed on many points regarding how children learn, for example, “Children change their own ideas’, ‘Children become aware of their own ideas,” “Children explain natural events and phenomena in words,” and “Children persuade other children holding different ideas.” We therefore find that this approach is effective for teacher training, helping student teachers develop metacognitive views of science education.

#98: PRE-SERVICE TEACHERS’ BELIEFS IN UTILIZING FILM AND ROLE-PLAY IN EFL CLASSROOM PRACTICES
Suciana WIJIRAHAYU
Film is one form of information and technology that is rich of sources of content for language courses. It is beneficial for classes that is often limited to provide visual support for other text-based and language content activities. The idea of using students’ selected films related to students’ themes preferences combining with collaborative learning and role play is the focus of this research.

#220: A Case Study of a Course including Wikipedia Editing Activity for Undergraduate Students
Yuki MORI, Hironori EGI, Shigeto OZAWA
Editing Wikipedia can increase participants’ understandings of subjects, while making valuable contributions to the information society. In this study, we designed an online course for undergraduate students that included a Wikipedia editing activity. The result of a content analysis of the term papers revealed that the suggestions made by the e-mentor and the teacher were highly supportive for the students in our case study, and it is important for Japanese students to check Wikipedia in English before making their edits in Japanese.

#359: The Effect of Internet “Blog” as a Learning Media towards the Learning Outcome of Science on Elementary School Students
Mimin NINAWATI, Maulana YUSUF
For some students, science is not an interesting subject, this thing impacts on students science comprehension and their studying result that less than the required standard. It is caused by teachers less precise of giving the learning, the teachers only use the lecture method without using the media as an instrument that can support the students science subject comprehension, and the teachers still use themselves as the information source center for their students, so that what happen in the class is Teacher Center. As the rapid
progress of science and technology the teachers required to constantly innovate in developing quality learning and meaningful. Weblog as a media that can be used by teachers in teaching has greatly contributed to the improvement of student understanding in science teaching. The results prove that there is an influence of the internet as a learning science media to the learning result of the students. This is evidenced by the t-test at significance level $\alpha=0.05$ and degrees of freedom $(df) = 58$ obtained value of $t = 8.933$ and the table $= 2.002$. $t$ count > $t$ table, then $H_0$ is rejected. Application of the Internet as a learning media can help student in improving their learning result.

WIPP-C1-01: Note-Rebuilding Based on Lecture Structure and Application in a Learning Support System
Takahito TOMOTO & Tsukasa HIRASHIMA
In the presentation-type lectures which is performed using presentation software, learners are provided well-structured slides which are useful to understand the structure of the lecture. They, however, don’t need to construct their note because of the given slides. In this paper, we propose a task called “note-rebuilding” which is based on a kit-build method. We also report a learning support system with note-rebuilding and its experimental evaluation.

WIPP-C1-03: Initial Use of a Flexible Open Learner Model
Matthew D. JOHNSON, Susan BULL, Barbara WASSON, Cecilie HANSEN, Gabriele CIERNIAK, Koji DEBUS, Carmen BIEN
This paper gives an overview of the Next-TELL open learner model and initial levels of student use of this competency-based open learner model. It is sufficiently flexible to allow use in different ways, taking data from a range of sources. Levels of use suggest that the approach would be taken up by students, if adopted by their teachers.

WIPP-C2-01: Designing Collaborative Learning Activity for the Abstract Knowledge Creation
Hiroyuki MASUKAWA, Ikuo ENDO
This study demonstrates that collaborative learning for the abstract knowledge creation involves three conditions: (1) the sharing of various representations, (2) the discussion of solutions, and (3) the absence of teacher interventions. We found that when these conditions are embedded in the design of a lesson, students are able to gain knowledge, even if they do not find solutions. Our research design involved two classes of sixth-grade students. In mathematics lessons, a teacher asked students to come up with the number of games of a round-robin football tournament. One classroom used a Jigsaw method and the other did not. One or five months later, students were required to write what they remembered of specific lessons on a retrospective test. Students in the non-Jigsaw classroom included those who retained knowledge and those who did not. However, students in the Jigsaw classroom recalled what they had learned, except for a certain group. Through a dialogue analysis of each group with KBDeX, we found that certain types of discourse were promoted by lesson designs. In the first type, students shared various representations (e.g., concrete scenes, symbols, computations, diagrams or tables) and discussed solutions. In the second type, they pooled single representation and only discussed answers. In the third type, students shared various representations but only discussed answers. In the Jigsaw classrooms, in which most of the first type of group was located, students with different ideas discussed solutions. In contrast, in the non-Jigsaw classrooms, with the first and second types of groups, those with differing ideas did not discuss solutions. In addition, we found that the third type of group did not consider solutions with a teacher’s intervention. In order to enhance activities of sharing representations, now we are designing the activities that students use tablet devices.

WIPP-C2-02: Development of a New Smart Learning Project- Rainbow Fun
Fang-Chen CHUANG, Bert CHEN, Chia-Heng CHEN, Min-Tsuei CHENa, & I-Chang TSAI
This paper proposes a new smart learning project- “Rainbow Fun” for K-12 education system. The framework of “Rainbow Fun” is composed of four parts: 1) “Learning Lab” is designed for learners to better understand their own learning styles; 2) “Teaching Lab”
enables teachers to apply interactive technologies to create more effective ways of teaching; 3) “Integrative Pedagogy” helps teachers develop their role as facilitators to lead their students to explore their potentials; and 4) “Education Cloud” generates a learner’s learning record instantly, continues to maintain his/her e-portfolio, and creates a ubiquitous learning environment for everyone. The goal of this project is to equip the next generation with the ability to learn actively and solve problem.

WIPP-C3-01: Survey on Utilization Status of SCORM Specification in Japanese e-Learning Industry
Kiyoshi NAKABAYASHI
We present the result of a questionnaire survey concerning the dissemination status of SCORM specification in Japanese e-learning industry. The survey targets are employees of e-learning vendor companies and e-learning users. The focus is the type of e-learning content, authoring tools, and LMSs. The survey results indicate that the SCORM specification provides benefits as a result of the ‘bandwagon effect’.

WIPP-C3-02: Graphical Tool for Formative Assessment with the Moodle Quiz Module
Kahori OGASHIWA, Yoshihiko HAMAMOTO, Yue WANG, Joji KARIYA & Kakuji OGAWARA
In this paper, we present a graphical tool that we have developed for the visualization of quiz results in Moodle; it is intended to assist in effective formative assessment. This tool helps to conduct cluster analysis and displays the results in the form of a line graph. In traditional classes, students attempt quizzes, and in each case, the teachers will, using formative assessment, analyze the quiz results and subsequently use the knowledge thus gained to improve their teaching. Although this approach is highly effective, it substantially increases the workload of a teacher. The graphical tool developed on Moodle enables a teacher to form views on a student’s comprehension of the material covered, by visualizing the quiz results.

WIPP-C4-01: Character Development Through Mobile Integration Into Teaching and Learning
Saida ULFA
The use of ICT in teaching and learning for developing the students’ characters is an innovative way in this era. The research objective is to develop the students’ characters by integrating mobile technology into the learning process in the classroom. The mobile technology is used as a learning tool. The mobile learning system and the learning procedure of mobile technology integration into teaching and learning is developed as well. The repetition of this procedure is expected to generate the characters of discipline, honest, hard working, independent, creative and responsible. This learning procedure will generate individual and collaborative learning. It is an ongoing research project that takes place at the Educational Technology Department, Faculty of Education, State University of Malang, Indonesia.

WIPP-C4-02: Development of Teaching Material in Tablet PC for Experiment of Nitration of Benzene Based on Computer Graphics by Quantum Chemical Calculation
Akira IKUO, Kodai SAITO, Yusuke YOSHINAGA, & Haruo OGAWA
The change in the structure of reactants about the transition state after the π-complex in nitration of benzene was visualized by CG based on the semi-empirical molecular orbital calculation. Teaching material could demonstrate the structural change of reactants with both space filling and ball-and-stick models along with the reaction profile, which can provide image of energy change during the reaction. The teaching material was tried to integrate with an electronic textbook of chemical experiment for the student’s laboratory.

WIPP-C5-01: The development of a role-playing game for history instruction and the evaluation of flow state and learning performance
Han-Ya HSU, Yi-Shiuan CHOU, Huei-Tse HOU
This study developed a historical educational game- Romance at Dadaocheng©, combining a love story with a role-playing problem-solving plot. This game used authentic
geographical space as the scene and adopted historical knowledge as problem-solving hints in the game exploration to enhance learners' knowledge of Taiwan's historical monument Dadaocheng. Through an empirical evaluation, this study preliminarily explored learners' flow in this game and used pre-and post-tests to understand their learning effectiveness. The results indicated that learners have a certain degree of flow during the game; also, this game helps them learn the historical knowledge of Dadaocheng and its geographical location.

WIPP-C6-01: Linguistic Rules Based Chinese Error Detection for Second Language Learning
Lung-Hao LEE, Li-Ping CHANG, Kuei-Ching LEE, Yuen-Hsien TSENG, & Hsin-Hsi CHEN
In this paper, we handcraft a set of linguistic rules with syntactic information to detect errors occurred in Chinese sentences written by SLL. Experimental results come the similar conclusions with well-known ALEK system used by ETS for English Learning. Our developed Chinese sentence error detection system will be helpful for Chinese self-learners.

### 21 November 2013 (Thursday)

#### Session 3-A (PTP-2)

**#368F: Practical Use of Kit-Build Concept Map System for Formative Assessment of Learners' Comprehension in a Lecture**
Kan YOSHIDA, Kota SUGIHARA, Yoshiaki NINO, Masakuni SHIDA, Tsukasa HIRASHIMA
This paper described a practical use of kit-build concept map (KBCM) in science learning class in an elementary school in order to evaluate learners' understanding ongoing the teaching. The responsible teacher of the class reported that the information provided from KBCM is useful to decide complementary teaching ongoing class and improve his lesson plan of the next class. We have confirmed that the map scores in KBCM have significant correlation with the scores of standard test of science learning. This case study suggests that KBCM is a promising tool to estimate learners' understanding in classroom.

**#355: Views and experiences of Information and Communication Technology coordinators towards the implementation of a Virtual Learning Environment in Primary Education in England**
Richard WAGGOTT
All primary school children in England and Wales are expected to have access to a personal online learning space, commonly referred to as a Virtual Learning Environment (VLE). However, since their introduction evidence suggests primary schools are experiencing difficulties with the use of VLEs on a whole school level. A qualitative case study approach was used to identify the views and experiences of six ICT coordinators towards the implementation and continued use of VLEs in primary schools in England. Data was collected using semi-structured interviews. There were four key themes and various subthemes identified. The main themes included methods of implementation, barriers towards the use of a VLE, increasing the uptake of the VLE and benefits of a VLE. This study identified how to integrate the VLE, the main barriers teachers face and possible suggestions to overcome these barriers. The study provides some consideration and possible debate as to whether the introduction of a VLE into primary schools in England has been successful.

**#340S: A Method of Sharing the Intention of Reviewing in Writing-Training for Nurses**
Hideyuki KANOU, Noriyuki MATSUDA, Cui LIANG, Mituru IKEDA, Yuu OKAMURO, Kazuhisa SETA, Hirokazu TAKI
The Problem Oriented System (POS), SOAP, and Focus Charting are popular methods of recording nursing activities as a way to improve collaborative nursing practices. However, explicit training methods for what and how nurses should write these recording systems for their nursing have not been sufficiently established. In regard to such trainings, we consider that a tutor's thinking process is more important than the actual thinking result (e.g., a comment document). Our approach is to express tutor’s intention of teaching as a map in order to develop an educational tool that can be used in trainings on what and how to think in recording their activities. This paper presents an overview of the reviewing tool we developed, which provides tags as criteria of a tutor’s judgment. We have confirmed that, at least, the proposed method does not hinder a tutor’s review of a nurse’s case writing.

### Session 3-B (AIED-2)

**#445: An Analysis and Detection of the Opportunities for Learning Activities within Automatically Generated Educational Games**  
*Takanobu UMETSU, Kenta HAMADA, Tsukasa HIRASHIMA, Akira TAKEUCHI*

We proposed a design method to automatically generate an educational game by substituting the cards of an existing card game for new cards that have practice problems written on them. However, several games in which most players rarely solved problems were created by the method. Therefore, this study examines the reasons why they rarely solved problems. We conducted an experiment that asked test subjects to play useful and useless educational games and their reactions were videotaped. The video recordings and interviews suggest that few subjects solved problem in playing the educational games had no opportunities for solving problems to predict the future game state that would result from each choice to make a favorable choice. On the other hand, all subjects solved problems in playing the educational game had opportunities for the prediction. On the basis of the results, this study also organizes the rules that provides the prediction, and develops a system that detects useless educational games. The results of experimental evaluations of the system suggest that the detection system can detect useless educational game by the detection of the rules for the prediction.

**#97S: Aim-Math: an audio-based interactive media for learning mathematics (C1)**  
*Wararat WONGKIA, Kanlaya NARUEDOMKUL*

We propose, Aim-Math, an alternative approach to develop an interactive-enhanced mathematics learning system for blind and visually impaired (VI) students. By integrating the text-to-speech technology with the educational process, Aim-Math is able to read aloud the math expressions in Thai and to provide the interactive features that allow the students to study and practice on their own. With this interactive mathematics learning system, the blind and VI students can conveniently learn mathematics.

**#224S: Applying Augmented Reality to Assisting Children in Solving Tangram Puzzle**  
*Chih-Yueh CHOU, Chang-Ching YANG, Zhi-Hong CHEN*

This paper presents an augmented reality supported Tangram game system, named ARTangram. The ARTangram system allows children to use physical Tangram pieces to solve Tangram puzzles, detects children solving status by recognizing the locations of the pieces, and dynamically provides children with digital augmented outputs, including information, feedbacks, and prompts, to assist children in solving Tangram puzzles. The digital augmented information includes game progress, elapsed time, a shadow outline of the specific shape, and colored shapes to indicate correctly-placed pieces. The prompts include text information to inform of the piece to place, audio hints to imply the correct location of the piece, and visual shape hints upon the correct location of the piece. An evaluation was conducted to ask 20 kindergarten children to use Tangram puzzles to form a house shape with the assistance of the ARTangram system. The results reveal that children might encounter difficulties in solving Tangram puzzle and the ARTangram system helped children correctly place pieces when they encountered difficulties.
#262S: Using Inquiry-based Augmented Reality Tool to Explore Chemistry Micro Worlds
**Xu WANG, Su CAI, Feng-Kuang CHIANG**

In this paper, an inquiry-based Augmented Reality learning tool was implemented. Students could control, combine and interact with the 3D model of micro particles using markers, and conduct a series of inquiry-based experiments. The AR tool developed was tested in practice at a junior high school. Experiment result shows that the AR tool has significant supplemental learning effect as a computer-assisted learning tool and students generally have a positive attitude towards this software.

**Session 3-C (ALT-2)**

#56S: MOOCs' Structure and Knowledge Management
**Olga VIBERG, Giulia Messina DAHLBERG**

This is a reflection paper that discusses the notion of knowledge management in massive online open courses (MOOCs). We explain MOOCs' structure in terms of representations of participants’ minds (both designers and learners), where knowing is understood as a process and a result of sociotechnical construction, rather than purely social construction mediated by users and learning tools. By applying Walsham’s human-centered view of knowledge (2001) we problematise the nature of MOOCs in relation to individuals’ knowledge management. Such a view emphasises issues of representations in relation to humans’ knowledge construction. This paper is organised as follows: firstly, pedagogical assumptions of MOOCs are discussed; secondly, the notion of sense making in a MOOC context is focused; thirdly, social learning analytics (SLA) is suggested as a key institutional asset to approach individuals’ knowledge management. Our analysis suggests that the distributed and fragmented nature of MOOCs sets the scene for a number of challenges in regard to assessment, knowledge management and pedagogy in MOOCs. Due to the diverse social contexts and learners’ cultural backgrounds, we believe that it is a rather problematic enterprise for MOOCs’ designers and learners to attempt to find a unified pedagogical model. Consequently MOOCs are understood as a part of embryonic and emerging open, social learning, which focuses learner activity in a social setting. Finally we conclude by arguing that the sense making in MOOCs is likely to take place in a liminal space, between individuals’ sense giving and sense reading processes.

#284S: WebELS: Enabling e-Learning in Higher Education over Low Bandwidth Environment
**Arjulie John BERENA, Sila CHUNWIJITRA, Mohamed OSAMNIA, Hitoshi OKADA, Haruki UENO**

As information and communication technology (ICT) becomes more robust and widely used, there is an increasing number of higher educational institutions (HEI) adopting e-Learning system for delivering various educational programs. However, there is still an underlying challenges in the successful implementation of e-Learning approach in higher education, such as the lack of IT skills for most instructors, the complexity of e-Learning platforms, technical limitation of users' environment like the network bandwidth and computer hardware, among others. In this paper, we present the design and implementation of the Web-based e-Learning System (WebELS) for enabling the globalization of higher education in science and technology particularly in low bandwidth environment. The system supports asynchronous and synchronous e-Learning approaches, such as on-demand learning for self-learning, online meeting for multi-location group discussion and online lecture for real-time remote lecture distribution. The system has been designed to address the difficulty of creating and maintaining an e-learning course to non-IT users by providing an easy-to-use course authoring tool. Additionally, it supports archiving and dissemination of multimedia contents on the Internet by its contents management system. Usage in low bandwidth environment such as a dial-up line has been the design goal in order to reach a wider range of users especially in developing countries.

#153S: Evaluation of an Algorithm and Programming Learning Support Environment based
**#298S: Paradoxes in LET standardisation – towards an improved process**

*Tore HOEL*

This paper is motivated by paradoxes and frustrations in the practice of learning technology standardisation. Case studies and participatory observations suggest that stakeholder engagement is key to an improved process. As industry involvement is hard to achieve in a fragmented market, the author suggests that government interests should step up their engagement to speed up the development cycle of idea formation, specification and implementation.

**#112F: enPoly: Workbench for Understanding Polymorphism in Strong Typed Object-Oriented Language (BTDPN)**

*Yoshiaki MATSUZAWA, Yukiko ISHIKAWA, Sanshiro SAKAI*

Polymorphism is a crucial concept in creating programs using object-oriented languages. Although understanding polymorphism requires learners to capture dynamic (behavioral) aspects of objects, current tools provide only static (structural) aspects. To address this limitation, we developed a workbench tool called “enPoly” that is a redesign of the “Anchor Garden” proposed by Miura et al. (2009). Our tool has the following two key features: (1) it shows learners behavioral aspects of objects in an animated fashion and (2) it shows the distinction between the definition and implementation of methods through visualization, thereby promoting the understanding of the Interface concept in Java. An experimental study was conducted in which 12 students were divided into two six-student groups, one of which was the control group. All six students in the experimental group succeeded in solving the given programming task using polymorphism even though they did not succeed in their initial state. In contrast, the six students in the control group made no improvements.

**#154F: Monitoring System for the Semi-Automatic Evaluation of Programs Written During Classroom Lectures Information Environment**

*Satoru KOGURE, Riki NAKAMURA, Kanae MAKINO, Koichi YAMASHITA, Tatsuhiro KONISHI, Yukihiro ITOH*

In this study, we developed a programming practice monitoring system to facilitate teachers’ giving appropriate instructions to students at the right time during classroom lectures. To help teachers to provide appropriate instruction to learners, we identified parameters that would be useful for teachers during programming practice in classroom lecture. We constructed a programming practice monitoring system with five functions. The system automatically acquired the programs written by students to evaluate their performance using the five functions. We allowed four subjects to test our proposed monitoring system during a simulation of a classroom lecture.

**#304S: Understanding Software Ecosystems for Technology-Enhanced Learning – a Case Study**

*Oskar PETTERSON, Jesper ANDERSSON, Marcelo MILRAD*

The increased use of information and communication technologies (ICT) in schools...
promises up-to-date, interactive and collaborative learning content, However, this has proved difficult to fulfill as the requirements from students and teachers combined with devices in a variety of contexts are expensive to meet. Software reuse is a proven way to decrease development time. This paper explores the characteristics of a software ecosystem approach to cater for a new digital school and presents an enhanced reference model developed for the field of technology-enhanced learning (TEL).

10:50 - 11:30

Session 4-B (TELL-2)

#82S: Mobile Assisted Language Learning: Overview of Literature from 2008 to 2012
Ya-Fei YANG, Ching-Ju CHAO, Chih-Kai CHANG
This paper provides a content analysis of studies in Mobile Assisted Language Learning (MALL) that were published in ten Social Science Citation Index (SSCI) journals, including ReCALL, Computers & Education, and Computer Assisted Language Learning so on. Only papers that were identified as MALL-related, full-length paper, and published during 2008 to 2012 were analyzed. After comprehensive review, 44 articles were used for this study to answer the following questions: (1) what is the status of those MALL articles published in these selected journals from 2008 to 2012, (2) what research sample groups related to MALL were selected in these articles from 2008 to 2012, and (3) what language learning topics related to MALL were adopted in these articles from 2008 to 2012? According the analysis results, the distribution of articles is 12, 6, 7, 10, and 9 from 2008 to 2012. It was found that research samples in higher education were selected most (31). We can find that the elementary school students (3), high school students (5), and teachers (1) are seldom used in MALL activities. Hence, we may claim one of the trends shaping the MALL studies from 2008 to 2012 is to exploit college student as convenience sample. On the other hand, the results implied that MALL researchers should pay more attention on applying MALL to elementary, high school, and others because it becomes popular for K-12 students using mobile devices to access digital information. Overall, the analysis results provide insights and patterns of MALL research trends for language instructors and researchers. Consequently, this study contributes to clarify the route of pass five years and indicate a feasible roadmap for MALL research.

#125S: Paperless Korean Language Learning Support System with a Tree-type Network of Android Devices
Yuki MORI, Euijin KIM, Masataka SUZUKI, Hyejin KIM
This paper describes a new paperless Korean learning support system for teachers and students who are preparing for Korean proficiency exams. The proposed system uses a Bluetooth network and learning applications based on the SQLite Database in Android devices. Experimental results show that the proposed system is useful for providing learning materials without network infrastructure.

#263S: Attempt of Audioblog Use on English Speaking Confidence for After-School Speaking Practice
MeiJen Audrey SHIH, Jie Chi YANG
The study was conducted to advance EFL speaking instructional design that endeavored to not only provide students alternative opportunities for oral practice after class but also affect their perception of English speaking confidence. In order to encourage the students to engage with a continual learning immersion on English speaking practice, the use of audioblog was taken as facilitation to aid out-of-class learning. To this end, the study aimed to discover two fold perspectives: (1) whether the EFL students’ English speaking confidence would vary before and after the facilitation engaged in the instruction; (2) if so, whether and how the number of recording uploads on audioblogs influence their English speaking confidence accordingly. The participants were 574 senior night school students attending the required English speaking class for one semester. They were tutored to accomplish one theme-related oral recording and post it on their audioblogs after each in-class instruction. Pre/post-surveys were given to the students to collect responses of their English speaking confidence, as well as the amount of oral recording
uploads were gathered for data analysis. The findings of this study showed that a significant difference of improvement on the students’ English speaking confidence by the assistance of oral recording practice. Additionally, regarding different number of oral recording uploads, it displayed that those who accomplished at least four oral recording uploads had a significant difference on English speaking confidence while comparing to those who did none. Although the outperformance on students’ English speaking confidence was appeared only if they uploaded a minimum of four oral recordings, an ascent of English speaking confidence was illustrated via those who did more oral recording uploads on their audioblogs. In sum, the findings of this study highlighted that in terms of ‘more practice’ on EFL speaking, the instructor should be cautious about adapting the English speaking instructional design as well as a systematic extent of speaking practice.

#274S: iBookTalker: An Approach to Facilitate Students' Language Learning from Reading to Creating and Sharing
Chang-Yen LIAO, Tak-Wai CHAN
In this paper, we proposed a practical model of language learning which combined 3 kinds of activities: reading, creating, and sharing. Students need to read some books, create their own products, and share them. In particularly, this model incorporates voluminous reading and sustained creating into substantial sharing in order to develop the students’ competence of language. Based on this model, we developed a learning environment, entitled iBookTalker. In iBookTalker environment, students play the role of booktalkers; they can recommend their favorable book freely through richly varied expressions, such as drawing form, written form, and oral form. That is, students will be transformed from a reader into a creator.

11:30-12:30 Session 4-C (PTP-3)

#133S: Factors influence the acceptance of m-Learning in Malaysia: Perceived Usefulness, Perceived Ease of Use and Attitude
Jazihan MAHAT, Ahmad Fauzi MOHD AYUB, Su Luan WONG
This paper explores the relationship between the three factors that influence the acceptance of m-Learning. A sample of 210 respondents was selected whereby the respondents have to be m-Learning users to be included in the survey. A structured, self-administered questionnaire was used to elicit responses from these respondents. The findings indicate that perceived ease of use (β= 0.490, p < 0.001) and perceived usefulness (β= 0.474, p < 0.001) were positively related to positive attitude to use m-Learning. Furthermore, perceived ease of use (β= 0.936, p < 0.001) was found to be a significant predictor of perceived usefulness. This goes to show that perceived ease of use, perceived usefulness and attitude are the three main drivers of m-Learning acceptance. Implications of the findings for developers are discussed further.

#102S: Inculcating Mathematical Thinking through Epistemic Agency
Chien-Sing LEE, Ping-Chen CHEN, Tsung-Chun HO, Tak-Wai CHAN
The ability to formulate and apply principles are crucial 21st Century skills. These skills are inherent in Mathematical thinking processes, which require learners to search for abstract problem-solving methods that would serve as analogy-enhancing bridges enabling transfer between different task situations. Consequently, two component skills that need to be mastered are pattern recognition and reasoning. In this exploratory study, we adopted an inquiry-based approach to design technological scaffolds. We aimed to investigate the relation between the teacher’s beliefs, his design of instructional practices, the design of technology and students’ learning outcomes. We discovered that epistemic agency can be used as the core design factor, redefining earlier definitions of context. Furthermore, teachers’ beliefs clearly influenced how he sequenced the classroom curriculum, how he relates Mathematical problems with real life, how he identifies, interprets and addresses students’ misconceptions (especially with regards to the lower-performing students) and how students should be motivated to learn. From
the students’ perspective, based on the Technology Acceptance Model, the highest score was for satisfaction when using the system, followed by usefulness (i.e., the system helped them to reason and think), ease of use and opportunities to practice. We inferred from this high score that students liked being challenged by diverse problems of increasing difficulty. Comparisons between their pattern recognition and fill in the blanks answers showed that our system was able to identify implicitly how students actually think, areas students need further help with and most importantly, may be able to utilize students’ thinking strategies to implicitly predict student performance in Mathematics. Based on these findings, we suggest implications to teacher professional development/TPACK.

#237S: Developing Digital Technologies for Undergraduate University Mathematics: Challenges, Issues and Perspectives
Evangelia TRIANTAFYLOU, Olga TIMCENKO
Our research effort presented in this paper relates with developing digital tools for mathematics education at undergraduate university level. It focuses specifically on studies where mathematics is not a core subject but it is very important in order to cope with core subjects. For our design, we adopt a participatory design method, involving collaboration with students and teachers. As a first step in our design, we developed in collaboration with teachers a set of visualization applets using GeoGebra for the “Mathematics for Multimedia Applications” course taught for Media Technology students at Aalborg University Copenhagen. Then we conducted focus groups with students where they reflected on the introduction of these applets and proposed ways to improve them or alternative ways to present the specific part of the curriculum. At the same time, we conducted observations of teachers and students during lectures and exercise time. During these observations we were able to investigate how the applets were used in practice but also to get insight in the challenges that the students face during mathematics learning. These findings together with student feedback inspire the next round of design requirements for the development of digital tools that support mathematics teaching and learning at university level.

#272S: A Pilot Study on the Technology Readiness for 1:1 Mathematics Intervention
Andrew C.-C. LAO, Mark C.-L. HUANG, Hercy N.-H. CHENG, Tak-Wai CHAN
With the advance of technology, the price drop and the increasing reliance of personal computers showed possibilities on transforming our current education. As mentioned in Bloom’s 2-sigma problem (Bloom, 1984), one-to-one classroom learning proved a significant learning outcome compared to the conventional. Therefore, with the assist of technology, applying 1:1 learning in the regular practice might be the ultimate goal for the educational transform. In this study, we explored the experiences and showed encountered problems for 1:1 learning in Taiwan. The experience was categorized into users and technology, followed by the analysis of criteria that based on empirical observations. As a result, the observation provided a guideline for the technology readiness, which consisted of the perception of users (teachers & administrators, students & parents) and the stability of pedagogical and hardware integration (pedagogy/software and devices). The result of this study also suggested that further attention should be addressed on the hardware infrastructure and the teacher’s professional training, because there were over 50% of encountered problems that were mainly the problems for stability of computer hardware (54.41%). Most problems encountered by teachers & administrators could be solved by effective professional trainings and flexible school assessments (31.00%). Nevertheless, neither students nor parents showed a high participation ratio in this study (14.59%).
The creation of language learning materials is very labor-intensive, but a lot of learning content gets lost at every change due to its inability to adapt to new technologies, products, services, pedagogical models and educational demands. For the educational publishing sector, this low reusability or lack of sustainability, combined with the high authoring cost, certainly for a small market like Flanders, seriously hampers the profitability, if not already the viability, of the activity. Learning content, on the other hand, is vital for the quality of education and, indirectly, for society in general.

The objective of our current research is to deliver an ontological specification of an authoring interface for creating sustainable language learning content based on the identification of psychological requirements on the one hand, and on solving technological issues on the other. It is based on our object model for software architecture and database structuring: a model which is the result of more than 20 years of research and development in the field, and which has been thoroughly validated theoretically and empirically over the last couple of years.

The result should be an ontological specification for publishers: the entire project should yield a significant reduction of production cost on the one hand, and an increase in sales on the other by opening up both their product range and their markets.

#23S: The Application of the Problem-Based Learning Approach to Teaching English Grammar through the Internet
Lu-Fang LIN
The purpose of this study was to identify the effects of problem-based learning (PBL) instruction on Chinese-speaking university students’ English grammar learning by means of the Internet. To achieve this purpose, this study examined whether or not the PBL approach can improve students’ knowledge of verb complements by comparing the data collected from two types of instruction: (1) PBL instruction with 26 participants and (2) non-PBL instruction with 30 participants. All participants attended a course that used the same textbook and the same Internet resources. The grammar pre- and post-tests were administered at the beginning and end of the study. The findings showed that there were significant differences between the two groups in the total score on the post-test and the sub-test score on the blank-filling section in the post-test. By comparing the scores on the pre- and post-tests for each treatment group, the statistical results show that the PBL group achieved significantly higher post-test mean scores than its pre-test mean score. The study implies that PBL in university English courses has the potential to enhance acquisition of grammar knowledge.

#75S: The effects of StyleWriter towards Student Motivation in English Writing Assessments
Sunita PRVINCHANDAR, Ahmad Fauzi MOHD AYUB
This research studies the consequence of using open-source software, which is known as the StyleWriter, on learners’ motivation in learning of English Writing. 60 primary students (30 in the treatment group, 30 in the control group) from a Malaysia primary school were engaged in this study. An ANCOVA analysis that was carried out in this research explained that there was a significantly better score on the group of students who accessed to StyleWriter compared to the group of learners who made used of the MS Words learning technique. Students from the treatment group were also found to be more motivated in learning of the English language. Most of the learners were paid special attention and showed extra self-confidence in learning the English writing method. Though, there was significant difference in the terms of ‘satisfaction’ in learning English involving the both groups. The consequences of this research propose that the combination of computer technology in the teaching and learning of English essay writing in common was helpful.

#85S: The Implement of 3D Situational English Learning Under a Task-based Approach
Yu-Ting HSIAO, Jun-He LI, Stephen YANG, Yu-Ju LAN, Jeff HUANG
The purpose of this thesis is to implement a 3D situational English learning process which is based on Task-based approach. To achieve this goal, we created situational setting on
Second Life and combined the framework of Task-Based Learning approach proposed by Jane Willis in 1996 to design a three-stage teaching process. Under the topic of daily basis English, we have designed an online 3D virtual English program for students to carry out situational English learning in the future.

#248S: Using Eye-Tracking as a Means to Evaluate Visual and Content Design Choices in Web 2.0 - An Initial Finding from Livemocha  
Gloria Shu-Mei CHWO, Hong-Fa HO, Brian Chien Yi LIU, Sylvia Wen Lin CHIU  
In the evaluation of Web 2.0 language learning websites, various aspects to be evaluated are often distinguished, such as the visual design, the pedagogical content, and the involvement of multiple technologies (Liu et al., 2011). In order to make the evaluative judgments, the methods commonly used include expert judgment by inspection of the website, or user judgment obtained from surveys of learner attitude (Chwo, 2013). This study aims to add to this range of evaluation methods by exploiting a relatively new research tool, eyetracking (Reichle et. al, 2013), to help establish what options are in fact better. We took as an example the instructions presented on screen for various tasks and, based on the types given in the Livemocha website (Chwo et al., 2012), devised webpages allowing us to measure how four eye movement related effects differ with nine binary webpage choices ranging from visual design (e.g. dark or light background) to pedagogical content (e.g. presence or absence of a picture). Six Taiwanese learners of English major student participated. Results show that the titles, background colors and highlighted prints will increase our EFL (English as Foreign Language) learners’ fixation frequency and the focal browsing time. However, the opposite result goes to the illustration relevant to the reading text. Moreover, the increasing number of the word count in the text will shorten the fixation frequency and focal browsing time. Lastly, the location of the illustration will not affect the browsing behaviors. The interpretation and the potential factors contributed to the findings will be discussed.

Session 5-B (ALT-4)

#150F: A Resource Organization System for Self-directed & Community-based Learning with A Case Study (BSPN)  
Hangyu LI, Shinobu HASEGAWA, Akihiro KASHIHARA  
The main issue addressed in this paper is how to improve the learning situation of self-directed learning on resource finding and organization from the Word Wide Web. In this paper, we have firstly proposed a multi-layer map model that visualizes basic learning behaviors when using the internet for locating and organizing learning resources. It provides learners with the structures of the found resources, the tools for their semantic management, and also an easy way to share the resources via the map representation. A system based on the proposed model has also been developed, that enables individual learners to easily locate suitable learning resources from the Web by referring resource maps and also to organize them as personal topic maps. By referring to a community topic map which merges all the personal topic maps created by individual self-directed learners, the learners can share their own resources and collect those of other learners into their learning topics. As a result, the learners re-organize their personal topic maps by taking the resource from the community topic map, and at the same time contribute to the community topic map through their personal topic maps. A case study conducted to evaluate the effectiveness of the system produced several positive results which validated our hypothesis.

#233F: Revealing the Learning Effectiveness of Social Tagging in an On-line Reading Learning Environment  
Jun-Ming CHEN, Meng Chang CHEN, Yeali SUN  
With the emergence of Web 2.0, social tagging provides an opportunity to help learners to share, organize, and manage the learning information from reading materials. Moreover, a tag-based learning system can enable them to complete their learning activities in an effective and efficient way through the use of web 2.0 social tagging.
technologies. However, few studies have directly discussed why social tagging can benefit from user-generated tags in reading learning. Therefore, this paper first explores the use of effective social tagging learning to help students not only improve their understanding of the English material that they read, but also develop their ability to read well. We then investigate how to apply tag-based learning to help learners focus on studying the resources and make sense of the material and remember it more easily. The experimental results showed that tag-based learning can improve users’ efficiency in reading learning.

#299F: Supporting the Formation of Informal Learning Groups in a Heterogeneous Information Environment
Adam GIEMZA, Sven MANSKE, H. Ulrich HOPPE
University freshmen have to cope with complex and heterogeneous information infrastructures typically found in nowadays universities. Usually learning management systems like Moodle or Blackboard are applied for lectures. Additionally, Cloud Services like Google Drive, Brainstormer, and Doodle are meanwhile frequently used as tools for learning in various contexts. They support storage, content production and particularly also coordination. The management of these heterogeneous tools is a challenge for the individual users as well as for the usage in groups. This paper presents a mobile application to support the learners in the formation of informal learning groups and integrates heterogeneous cloud services to support group formation and further group work in a campus environment.

#128S: An SNS-based Literature Review System for conducting a Research Survey
Chengjiu YIN
It is necessary to perform a literature review before starting a new research project. However, many students do not know the procedures of performing a literature review. In this paper, based on the professional experiences and opinions of expert researchers, we describe an SNS-based literature review system to help students conduct research surveys. This system includes two search engines, one is an article search engine, which can help students conduct research surveys, and the other is a logging search engine, which allows students to learn from each other via their logs and share experience with other students. User models of the system as well as its functions are presented.

14:10-15:40 Session 5-C (AIED-3)
#328F: How do students’ learning behaviors evolve in Scaffolded Open-Ended Learning Environments? (BOPN)
Gautam BISWAS, John KINNEBREW, Daniel MACK
Metacognition and self-regulation are important components for developing effective learning in the classroom and beyond, but novice learners often lack these skills. Betty’s Brain, an open-ended computer-based learning environment, helps students develop metacognitive strategies as they learn science topics. In order to better understand and improve the effect of adaptive scaffolding on students’ cognitive and metacognitive skills, we investigate students’ activities in Betty’s Brain from a study comparing different forms of adaptive scaffolding. We measure students’ cognitive and metacognitive processes from students’ action sequences by (i) interpreting and characterizing behavior patterns using a cognitive/metacognitive model of the task, (ii) mapping students’ frequently observed cognitive and metacognitive process patterns back into their overall activity sequences and measuring their effectiveness, and (iii) employing a binning method with clustering and visualization techniques to characterize the temporal evolution of these processes. Our experimental studies illustrate that the effectiveness and temporal changes in students’ behaviors were generally consistent with the scaffolding provided, suggesting that these metacognitive strategies can be taught to middle school students in computer-based learning environments.
#121F: Do novices and advanced students benefit differently from worked examples and ITS? (BSPN)

Amir Shareghi NAJAR, Antonija MITROVIC

Prior research shows that novices learn more from examples than unsupported problem solving. Intelligent Tutoring Systems (ITS) support problem solving in many ways, adaptive feedback being one of them. However, when students repeatedly request hints from ITSs, problem solving is eventually replaced with worked examples when students request solutions to the current step or the whole problem. We conducted a study to observe the difference in learning outcomes when novices and advanced students learn from examples or with an ITS. The study had three conditions: Examples Only (EO), Problems Only (PO) and Alternating Examples and Problems (AEP). After each example/problem, students received Self-Explanation (SE) prompts. The result shows that novices learnt significantly more conceptual knowledge in the AEP compared to the PO condition. Moreover, novices in the AEP and PO conditions performed significantly better on SE prompts than students in the EO condition. Advanced students who learnt from examples only did not significantly improve in the study. Overall, the study suggests using AEP for novices and either AEP or PO for advanced students. The results clearly reveal that using examples alone is not an effective approach for novices and advanced students in comparison with ITSs.

#124F: Understanding Student Interactions with Tutorial Dialogues in EER-Tutor

Myse ELMADANI, Antonija MITROVIC, Amali WEERASINGHE

Eye-movement tracking is a potential source of real-time adaptation in a learning environment. In order to have a more comprehensive and accurate picture of a user’s interactions with a learning environment, we need to know which interface features he/she visually inspected, what strategies they used and what cognitive efforts they made to complete tasks. Such knowledge allows intelligent systems to be proactive, rather than reactive, to users’ actions. Tutorial dialogues is one of the strategies used by Intelligent Tutoring Systems (ITSs) and has been empirically shown to significantly improve learning. EER-Tutor is a constraint-based ITS used to teach conceptual database design. This paper presents the preliminary results of a project that investigates how students interact with the tutorial dialogues in EER-Tutor using both eye-gaze data and student-system interaction logs. Our findings indicate that advanced students are selective of the interface areas they visually focus on whereas novices waste time by paying attention to interface areas that are inappropriate for the task at hand. Novices are also unaware that they require help with the tutorial dialogues.

#192S: Predicting Students’ Performance and Problem Solving Behavior from iList Log Data

Omar ALZOUBI, Davide FOSSATI, Barbara DI EUGENIO, Nick GREEN, Lin CHEN

In this paper, we analyze data gathered from students’ interactions with iList, an intelligent tutoring system that teaches linked lists to computer science (CS) undergraduates. A number of features have been extracted from the log files which were used to; a) build predictive models of students’ performance, b) analyze temporal aspects of students’ problem solving behavior. Our results suggest that it is possible to build predictive models of performance with an accuracy of 87% by using logistic regression. The results also show that it is more likely a student will perform a step correctly if s/he spends more time on it.

13:30-14:10 Session 5-D (PTP-4)

#9F: Skilling Students in ICT using Long-Distance Controlled Robots over the Internet in a Blended Learning Setting (BTDPN)

Megan HASTIE, Akiyuki MINAMIDE, Kazuya TAKEMATA, Nian-Shing CHEN, Richard SMITH

This paper is about the use of a long-distance controlled robot system (LDCR) by learners working in a blended learning setting. We describe an interactive robotic project that was the result of an international collaboration between an Australian school of distance learning and an Asian school. The project involved the use of a robot system that allowed students to remotely interact with each other and with teachers. The system was designed to support collaborative learning and problem solving, and was used in a course on computer science. The results of the study showed that students who used the LDCR system performed significantly better than those who did not.
education and a Japanese technical college. After citing research findings about the use of the system across multiple curriculum areas we identify the technological and pedagogical challenges encountered during the project and quantify significant gains for students, teachers and the wider school community. The paper concludes that long-distance controlled robot systems can be successfully integrated into blended teaching and learning paradigms and that this is a potential educational imperative for 21st Century students and teachers.

#12F: Digital Representation of Visual Artworks for High-Stakes Assessment
Paul NEWHOUSE
The collection and marking of student artwork across a large jurisdiction such as Western Australia is challenging where the work is submitted to a central location to be marked by experts and returned to students. An alternative approach would be to submit digital representations of the artworks online for marking. However, to give a valid and reliable measure the representations would need to be of adequate quality. Further, judgements of artworks are necessarily subjective giving concern about the reliability of marking for high-stakes assessment. The comparative pairs method of marking lends itself to addressing this problem and is feasible where the work to be marked is in digital form. This paper reports on one component of a three-year study to investigate the representation of student practical work in digital forms for the purpose of summative assessment. This study set out to determine whether the digital approach was feasible and adequate fidelity could be achieved in order to use the comparative pairs method of marking. The first phase of the project involved the researchers creating digital representations of the artwork submitted at the end of secondary schooling by a sample of students in the Visual Arts course and comparing the results of marking these with the physical forms. The second phase involved a sample of students creating digital representations of their own work and submitting them through an online system for marking. The study found this process was feasible, and the results were acceptable, but it lacked support from teachers and students who wanted the original artworks to be assessed.

#31F: The Relationships among College Students’ Use of and Attitudes toward CMS’s Interactive Functions and Their Online Learning Performance
Huei-Chuan WEI, Chien CHOU
For over a decade, online courses have grown in higher education on both a percentage and numeric basis. With the increase of online learning in higher education, there are increasing numbers of discussions about factors concerning successful online learning or students’ achievement. This study examines the relationships among learners’ use of course management system (CMS) interactive functions, attitudes toward CMS, and online learning performance. Data was drawn from 407 undergraduate students who enrolled in a general education online course from three universities in Taiwan. The results suggest that a relationship between learners’ attitudes toward CMS and use of CMS interactive functions, but not with online learning performance. In addition, the results indicated that learners’ use of learner-self and learner-instructor/learner interactive functions are related to online discussion participation scores, and learners’ use of learner-content interactive functions is related to exam scores. Implications and future research directions are provided and discussed in an integral manner.

#354S: A Model for Active Learning in Synchronous Remote Classrooms: Evidence from a Large-Scale Implementation
Jayakrishnan WARRIEM, Sahana MURTHY, Sridhar IYER
Teach 10000 Teachers is a project supported by the Government of India for training large numbers college instructors through distance education. The mode used is Synchronous Remote Classrooms (SRC), in which lectures are transmitted from a single location and participants attend them synchronously in their respective classrooms. In this paper we present a model for adapting well-known active learning (AL) strategies from face-to-face classrooms to the SRC mode, so as to enable effective learning. Our model identifies three
levels of interactions – student-content, student-student and student-instructor – and then adapts these interactions to the SRC mode, using the affordances of the technology. We implemented this model with five AL strategies, in a 1-week workshop. We validated the model by examining participants' perception of the effectiveness of the AL strategies for their learning and engagement. We found that 86% of 1287 participants found our adapted AL strategies to be useful in learning. We also found that there is a high correlation (γ=0.75) between the perceptions of overall satisfaction and usefulness of AL strategies.

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<th>Time</th>
<th>Session 6-A (GTEL-2)</th>
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| 16:00-18:00 | #8F: The Creative Process Components: Puzzle Gameplay Experience  
Wilowan INCHAMNAN |
| 16:45-17:40 | #58S: Impacts of a One-Month Somatosensory Game Intervention on Reaction and Health-Related Quality of Life on Elderly  
Mao LIU, Alex J. Y. LEE, Chi-Yao CHANG, Hsin-Chin WU, Hsiu-Chi FU, Shang-Ti CHEN, I-Tsun CHIANG |
| 17:45-18:40 | #324S: Cognitive Style Affected Students’ Frustration Tolerance and Achievement on Group Face-to-Face Competitive Game  
Ben CHANG, Sin-Ni JHAN, Yu-Xuan WEI |

This paper analyses the relationship between creative behavioral processes that occur in the games and the gameplay experience. The research approach applies a behavioral and verbal protocol to analyze the factors that influence the creative processes used by people as they play computer games from the puzzle genre. Creative processes are measured by examining task motivation and domain-relevant and creativity-relevant skills factors. This paper focuses on the reliability of the factors that are more strongly related to creativity. The findings show the creative components occurred to yield levels of creative performance within puzzle game play activities. Results show that increased engagement in creative processes during gameplay resulted in a better player experience. Task motivation and domain-relevant skill as a component of the creative problem solving processes were particularly influential, as was the use of creativity-relevant skills.

Because of advancement of health technology, life expectancy has extended and has made global population aging dramatically. Interventions to improve health-related quality of life and social opportunity of older adults are strongly needed. In this paper, we proposed to a somatosensory video game and sedentary activity group to improve older adults’ reaction and health-related quality in nursing homes. Forty older adults aged more then 65 were recruited from a nursing home and divided into two groups, a somatosensory video game and a sedentary activity group. Participants completed 30-minute somatosensory video game or 30-minute sedentary activity interventions three times a week for 4 weeks. Grasping ruler test and SF-8 were two assessment tools used to measure their progress in reaction time and health-related quality of life and to assess the benefits and outcomes of the interventions. The findings identified that the somatosensory video game intervention successfully created positive impacts on their reaction time performance and the sedentary activity intervention can improve their health-related quality of life significantly through a 30-minute sessions three times a week for 4 weeks.

In classroom, group competitive game is widely believed to be a motivation-enriching strategy, and has been suggested as a way to stimulate participants’ engagement. However, different students perceive the same competitive activity with different feelings. The more we understand students’ characteristics, the more adaptive support we can provide students. This study aimed to explore the different cognitive styles causing to the influences on the frustration tolerance and achievement through a tablet group competitive board game. In the aspect of cognitive style, the differences between field dependence and field independence were explored, and in the aspect of group
A face-to-face group competitive board game named “Multiple-Choice Practice Island” as the classroom setting was implemented on tablet as an APP. A pilot study was conducted in which twenty-three 3rd grade students were involved. The results demonstrated that group competitive game can increase the students' frustration tolerance whether they are field dependent or field independent cognitive style students, and the low-achieving field independent students perceive more learning achievement in the group competitive game.

Session 6-B (CSCL-2)

#45F: Design and Evaluation of a Collaborative Inquiry Environment to Enhance Science Learning (BOPN, BTDPN)
Daner SUN, Chee-Kit LOOI, Yin Chiun PHUA
The CSI (Collaborative Science Inquiry) learning environment is designed to help secondary school students understand scientific concepts, and develop scientific inquiry knowledge and skills through collaborative inquiry-based learning activities. This paper presents the design rationale and architecture of the system to support the shape of CSI learning environment. A pilot study that evaluates the effectiveness of the learning design is then reported. The findings attest to the positive role that CSI plays in enhancing students' conceptual understanding, learning interest and engagement in collaborative inquiry activities.

#205: Social Network Analysis of Collective Knowledge Advancement
Jun OSHIMA, Ritsuko OSHIMA
This study aims at applying social network analysis (SNA) to establishing indicators for collective knowledge advancement. To do so, a SNA application, Knowledge Building Discourse Explorer (KBoDeX), was developed and the effectiveness of several indicators was examined by applying them to an evaluation of students’ discourse identified in another study as somewhat advanced in their state of collective knowledge. Results indicated that SNA with our proposed indicators quantitatively captured the collective knowledge advancement. We discussed the mixed-method approach with descriptive studies of cases and quantitative SNA.

#625: Collaborative Knowledge Building Research of Web-based Teaching Discussion In the QQ Environment
Jiong GUO, Xiushuang HUO, Yuhui MA
On the base of systematically analysing and summarizing the web-based learning of the domestic and international research, by combining the research actuality of web-based learning and teaching as well as the purpose and characteristic of this study, the article designed the interaction analysis system based on the collaborative knowledge constructing in the environment of QQ Group, and analysed the teachers’ chat record of three times of online discussion in the QQ group from topic space, social relations and the process of collaborative knowledge constructing by content analysis and social network analysis, finding out the problems during the teachers' online discussion which organized for promoting research project and the resistant factor which influence the interactive quality of online discussion, put forward a series of strategies for improving the quality of interaction and the effects of collaborative knowledge constructing. Such as make discussion topic clear and definite before online discussion, pose questions for further consideration in order to keep the discussion gradual in-depth; appoint someone as the organizer of the discussion; formulate the intervention system; carry out teacher training with the help of functional characteristics and technical characteristics of QQ group.

#168S: Mathematical model for collaborative learning: acquiring hierarchic-structured knowledge
Kohei OGAWA, Yasuyuki NAKAMURA, Koichi YASUTAKE, Osamu YAMAKAWA
In this paper, time evolutions of students' knowledge level who are engaged in collaborative learning, is simulated using mathematical model. In this model, students try
to acquire hierarchic-structured knowledge. It is found that the structure of the collaborative groups formed by the students influence their achievements. Collaborative learning is said to be useful because one can reach the level where one cannot reach with the traditional teaching approach. We have the result that collaborative learning is especially effective when learning the difficult knowledge and we might be able to say our model successfully described the aspect of collaborative learning.

#275S: Relation between Behavior and Result in Pair Programming: Chat and Work Leads to a Success
Tomoo INOUYE
Pair programming, a programming technique conducted by two programmers work together at one work station, has been adopted for learning programming. Although it is known to be effective in various aspects, micro observation of the learning activity, collaboration, has yet to be conducted in relation to the outcome. In this study, behavior in pair programming learning was investigated in terms of verbal communication and programming action, and was compared in relation to the success of problem-solving. Findings are that, in the successful cases, 1) the learners took programming actions more frequently, and 2) the learners took more programming actions immediately after the dialogue. From this, it is suggested that closely-knit dialogue and action can be an indicator of successful problem-solving, and the findings can be applied to a collaborative learning support systems.

#373S: Impact of group norms in eliciting response in a goal driven virtual community
Sumeet JAIN, Tanmay SINHA, Achal SHAH, Chandramouli SHARMA, Carolyn ROSE
With the proliferation of social media into our daily lives, online communities have become an important platform for collaborative learning and education. To connect users with varying knowledge levels and increase the net learning throughput, these communities often follow a question-answer based approach. Understanding what drives attention to help-seeking questions can reduce the amount of questions that go unnoticed or remain unanswered by the community. In this paper we discuss an important feature that affects the activity of the community, namely the community norms. We present a machine learning based trigger-driven feedback model that functions by (i) differentiating between help-seeking questions and follow-up posts – i.e. posts that are part of an ongoing discussion, and (ii) a dynamic intervention scheme to help improve question formulation. Our findings show that adhering to the community norms significantly increases the chance of eliciting a response.

#175S: Identifying Issues of a Web Accessibility Service through Examining Its Online Learning Activities
Ruey-Shyie SHIEH, Yao-Ming YEH, Kuo-Ming HUNG
In Taiwan, a Web Accessibility Service was established in 2004, which provides online courses for adult learners with disabilities to acquire job-oriented skills, particularly computer skills. Although a large number of learners have registered for the courses, the percentage of learners who complete their study is rather low. The purpose of this study is to identify issues related to the current services through examining the online learning activities of its participants in the 2012 term. Data sources consist of discussion statements posted online, discourse of online meetings, and self-reported questionnaires. The results indicate that the Service support team was rather dedicated to maintaining the system and courses offered. The learners who submitted the online questionnaires also appeared rather satisfied with the overall services provided. It seems that the low study completion rate, 5.4% in 2012, may not be due to the services per se. Other factors causing the low completion rate must be further explored. Suggestions of future directions for improving the services are provided.

15:40-16:00 Session 6-C (CUMTEL-2)
#209F: Mobile Campus Touring System based on AR and GPS: a Case Study of Campus Pendet Room Joged
Cultural Activity (BOPN, BSPN)
Lei-Si PEI, Su CAI, Peng-Fei SHI

Campus cultural activity is usually propagandized through the Internet, pamphlets and posters. Print media draws more attention in public, but is not environmentally-friendly and economical. Similarly, Internet media is known for its prompt and rich content, but is hardly expected to arouse the interest of learners since it separates information from real-life environment. Augmented reality (AR), a promising technology of bridging virtual and real worlds, has been considered as a better choice for realizing an interactive and boundary-less mobile learning environment, or an even more advanced ubiquitous learning environment based on context-aware technology. In this paper, a novel campus touring system for cultural activity is implemented based on AR technology and smart phones which contains the built-in GPS, camera, WiFi and digital compass. Wikitude, a mobile AR implementation tool, is used for system implementation. Furthermore, two groups of students have been selected for system testing and evaluation. Experimental datum are collected and summarized via an open-ended online questionnaire. Experimental result shows that propagandizing and learning campus cultural activity through this mobile campus touring system is a more satisfying and interactive approach for college and university students.

#96S: Facilitating EFL with Storytelling on Tablet PCs
Kuo-Ping LIU, Chen-Chung LIU

Previous studies show that storytelling is a powerful approach in EFL (English as Foreign Language) elementary classroom because it can facilitate young EFL students to engage in acquisition, provide a rich source of materials, and open communication and interaction possibilities by telling their own stories. In recent years, digital storytelling in a classroom further provides a strategy for teachers to effectively move beyond the print-based texts and engage students in working with digital multimodal texts. Digital storytelling requires students to bring together various modes such as written words, images, and sounds into their own multimodal representations. Recently, many forms of electronic books such as tablet PCs have become available to facilitate English learning and may be applied to implement storytelling activities. Although theories and research support the significance and education value of using digital storytelling, however, empirical studies of using digital storytelling in EFL elementary context is scant because teachers are often overwhelmed by difficulties such as students’ English limited English proficiency, teacher’s pressure of existed curriculum and the lacking pedagogy of using digital storytelling. This study develops digital storytelling pedagogy with iPads to overcome the difficulties and conducts a five-month quasi-experimental study to determine whether digital storytelling pedagogy has the intended effect on participants’ motivation and achievement. Two intact classes (N=32) were randomly assigned as the digital storytelling group and traditional teacher-centered group. Participants’ achievement will be discussed.

#126S: Designing Overseas Fieldwork Using a Mobile Device for Enhancing Students’ Reflective Learning
Makiko KISHI, Takayuki KONNO, Masayuki MURAKAMI

In this research, the authors attempted to clarify how mobile devices are best utilized in overseas fieldwork in higher education to enhance reflective learning, especially in developing countries where wireless connectivity is NOT stable. Mobile devices can be used to promote reflective learning in fieldwork from the following two aspects, (1) to promote personalized and collaborative reflective learning and (2) to help students create conceptual perspectives based on the data collected from various resources such as field notes. However, in many cases, students do fieldwork where wireless connectivity is NOT stable. Students may develop skills to use mobile devices effectively to reflect upon their learning and develop conceptual perspectives about another culture.

#164S: Meta-Documentation: The Dissemination of the Tacit Knowledge Inherently Attached to Organisational Documents
Steven COOK, Hiroaki OGATA, Mark ELWELL
In this paper, we discuss the addition of technologically supported informal social networks for the exchange of previously implicit information attached to documentation within formal organisational frameworks. Focusing on the implementation of technologies to support this social interaction, we first look at why social networks are a topic discussed in recent times, then we put forward plans for a new system developed for this purpose.

#260S: Research on mobile and web 2.0 learning: A comparative review approach
Ming-Chi LIU, Yueh-Min HUANG, Yu-Lin JENG
Contemporary E-learning research tends to separately evaluate the effectiveness of mobile learning or web 2.0-based learning. Although the independent use of these technologies in the short term reveals substantial research value, in the long run, if we can integrate the various technologies according to their tool-specific features, this combination will be able to bring students greater learning benefits than their individual use. By means of reviewing and comparing both aspects of research articles published in six major SSCI journals from 2006 to 2010, this study primarily aimed to understand the individual current mobile and Web 2.0-based learning research. The results should be helpful for researchers in identifying interesting topics for further exploration. A comparative analysis of both literature tracts could then predict the potential benefits of integrated use of different technologies, suggest practical recommendations for implementation, guide the direction of educational applications, and provide effective instruments for evaluation.

#261S: A Conceptual Framework of the Use of Mobile Augmented Reality in Peer Assessment
Kuo-Hung CHAO, Chung-Hsien LAN, KINSHUK, Kuo-En CHANG, Yao-Ting SUNG, Stefan CHAO, Kai-Hsin CHANG
This study presents a conceptual framework of applying mobile augmented reality technology on peer assessment to reduce the bounds of work reviews and assessment. According to mobile technology and augmented reality, students can show their design in various ways at different places or in different situations. This paper proposes a novel mobile peer-assessment system which combines augmented reality with the reviewing and assessing processes. This framework enables students to enhance work interpretation, frequently interact with peers, represent their thinking and reflect upon their own works. Furthermore, the mobile AR technique provides personalized and location-based adaptive contents that enable individual students to interact with the mixed reality environment and to observe how works are possibly applied to the real world in the future. The whole process assists students in reviewing works based on various dimensions, gaining proper knowledge, cultivating critical thinking skills and reflection as well as promoting meaningful learning.
#203F: Promoting students’ cultural context acquisition through Web-based inquiry

Esther STOCKWELL

Since the term intercultural communication was introduced by Edward T. Hall in his book (1959), The Silent Language, issues about intercultural communication have been not only been dealt with in the field of Humanities but also in any area related to human interaction. Moreover, recent researchers have devoted systematic attention to developing “cultural fluency”, “cultural literacy” or “intercultural competence”. The methods through which culture is acquired also have changed from a traditional information acquisition approach to a process-oriented constructivist approach. That is, there has been a movement from approaches where learners are largely simply told about the target culture by the teacher to students’ active participation in construction of understanding about the target culture along with reflecting on their own culture. Using technology as a means to acquire culture is no longer particularly new, but, as Goodyear (2005) argues, the use of technology holds particular promise for the creation of learning settings that can interest and motivate learners. In order to promote students’ active participation in learning culture and to help students’ understanding and reflection on various cultural contexts—including their own—this study adapted an inquiry-based activity using WebQuests. One of the attractive sides of WebQuests is that students are able to use various resources actively to do a task through organizing information and applying the knowledge acquired to real-life situations. The aim of this study is to help students enrolled in an intercultural communication class to understand various cultural contexts through a systematic inquiry-based approach using WebQuests, and with the goal of eventually improving their intercultural competence. The study used concurrent quantitative and qualitative data. The quantitative data were collected through pre- and post-surveys and an adapted version of the GENE (Generalized Ethnocentrism) scale questionnaires during the course. The analyses of students’ reflection during class discussion and essays written on completion of the WebQuests were measured as the qualitative data. The results of the study show students’ positive improvement qualitatively and quantitatively.

#221F: The Project-based Movie-presentation Course for Japanese EFL learners

Yuichi ONO, Manabu ISHIHARA, Mitsuo YAMASHIRO

This paper describes an implementation of technology-mediated, task-based multiliteracy project involving digital-storytelling as a foreign language instruction in Japan and validates the effect of digital storytelling on learner’s awareness on the foreign language anxiety and PBL skills. Blended into presentation course on the basis of Ono, Ishihara and Yamashiro (2012), the tasks of digital story-telling provides the learners with the opportunities to reflect themselves on each process from brainstorming to complete the movie. The project reduces foreign language anxiety for low-level students. This study compares such students with students with high proficiency level in order to investigate how these two groups are different. The result suggests that our project had an effect on foreign language anxiety for low-level learners and on PBL skills on high-level learners. This study further examines how the themes of the presentation affect their PBL awareness. It will be shown that the “too personal” theme does not motivate learners for PBL, but that the theme “favorite things” motivated the most among the three topics carried out in our project.

#94S: Phenomena of the Use of Written Language in the Virtual World

Dede HASANUDIN

The development of technology is so fast and tremendous that humans find ways on how to communicate fast, cheap, and practical. Several ways can be done to communicate in writing in the virtual world, for instance by using electronic mail and social media such as Facebook, Twitter, and Friendster. Such habits apparently flourished to several layers of society, even though it was started by teenagers and youngsters who always appear progressive and innovative. It is not rare to find abbreviations such as gw (I/me), mo...
In this research, there are three things that can be classified, such as (1) written communication with mobile phone media (short message), (2) written communication in social media (Facebook), and (3) written communication in chatting such as in MIG 33. Written communication with short messages, can be further classified to be (1) short message that uses abbreviations (2) combination of the use of letters, abbreviations, and numbers. These two classifications are elaborated in the concept of discourse to find the series of complete communication from the beginning until finish. Written communication in short message, social media (Facebook), and in chatting, actually possess similar patterns, which are abbreviating the word, using a variation of numbers and letters, using unnecessary punctuation mark in a series of sentences, writing uppercase and lowercase letters in one sentence.

Enhancing Reading Comprehension and Writing Skills among Taiwanese Young EFL Learners Using Digital Storytelling Technique

Wan-Ting CHUANG, Feng-Lan KUO, Heien-Kun CHIANG, Hui-Ying SU, Yu-Hui CHANG

Few studies have examined the effect of Digital Storytelling technique (DST) on EFL young learners’ reading and writing performance. This study thus aims to investigate the effects of DST on vocabulary learning, reading comprehension and writing skill development of 27 EFL sixth graders in Taiwan. In a three-period instruction, the participants were first required to read two self-created digital storybooks on the theme “Christmas” on the Storybird platform; next, they were given a pretest for vocabulary and reading comprehension based on the two instructional storybooks. Through the explanation of vocabulary and the use of a question-and-answer approach to facilitate comprehension, the participants received subsequent reading instruction focusing on examining the logical sequences of the two storybooks. The posttest was held at the end of the reading instruction. In the second session, they created one storybook on the theme of Christmas on Storybird through teacher-student and student-student collaboration. The results of a repeated measure t-test showed that the students improved their vocabulary and reading comprehension significantly after receiving the instruction using digital storybooks. Further analysis of the audio and video recording revealed that the students developed their writing skills through their prior reading experience of the two storybooks, the teacher-student collaboration and even the student-student interaction.

Exploring the Capability of Second Grade Students in Peer Response on Writing Revision

Siou-Lan WANG, Yi-Tai HSIEH, Calvin C. Y. LIAO, Chih-Yuan SHIH, Tak-Wai CHAN

The research of peer response has been majorly focused on older age students. However, we argue that young age students obtain the possibility of doing peer response under the context of writing revision. In this paper, we develop a peer response experiment in the classroom for second-grade students in order to facilitate their story revision. The result indicated that second-grade students were able to revise their writing through the two peer response experiments. In addition, students’ preference on certain kind of comment types was also discovered. That is, second-grade students preferred using praise and reminding comments. Meanwhile, students tended to directly adapt given prompt example sentences and create personalized comments. One special revision behavior was found that second-grade students revised their writing beyond the scope of received comments. This is an ongoing research and further analysis and studies will be continuously processed.


Nattapol KRITSUTHIKUL, Shinobu HASEGAWA, Cholwich NATTEE, Thepchai SUPNITHI

In order to assist EFL students with low English proficiency in learning writing skill, we propose a framework of a virtual environment to evaluate common errors that the students often conduct in writing essay. The system is a service applied in platform linked
with other NLP services to help with language analysis. The system mainly focuses on finding the writing errors related to semantic meaning selection, incorrect structure to indicate the intended meaning, non-smoothing sentence in topic, and etc. The system improves the students' writing skill by providing questions relating to the matters they are writing.

#331S: Choosing sides: student preferences for peer vs. expert feedback

Emily PETIT, Wen-Chi Vivian WU

This qualitative study examined two issues with regard to English as Foreign Language (EFL) writing by analyzing the contents of student online writing as well as the feedback and suggestions provided by both the experts and their peers. Twenty seven university students majoring in English participated in a one-semester-long study carried out across two private four-year institutions in central Taiwan. The students wrote essays based on news articles read and discussed in class, then submitted their essays for review by a group of semi-anonymous peers and experts. Students then were encouraged to adopt suggestions of their reviewers in creating a second draft of their essay. The experts consisted of the two instructors at the two institutions, as well as qualified colleagues and graduate students. The peers in this study were not classmates but rather students at the other participating institution. The two issues this study focused on were the numbers of adopted suggestions from peers and experts, as well as the accuracy of those suggestions, in an attempt to draw useful conclusions about how students value their various sources of feedback. Results show that students prefer expert to peer suggestions, but the data regarding suggestion accuracy is inconclusive.
## Session 7-A (AIED-4)

### #118F: An Evaluation of a Customizable Ontology-driven Language Learning Support System

**Jingyun WANG, Takahiko MENDORI**

In this paper, we investigate, from learning style perspective, the main factors that affect the learning performance of the learner while using learning support systems. An experiment was conducted to evaluate two different modes of a customizable language learning support system. Students in experimental group A, who were provided with both visual and verbal learning objects, had more difficulty to focus on study compared to those in experimental group B, who were provided with only the learning objects matching their learning style while both using the system. Moreover, 53.3% of students in experimental group A believed the type of LOs, which they preferred more and felt more comfortable with, was not the type of LOs which was more effective for their learning.

### #241S: Ontological Organization of Academic Emotions toward Knowledge Description and Management about Learners Mental States

**Keiichi MURAMATSU, Kazuaki KOJIMA, Tatsunori MATSUI**

Recently, the research in intelligent educational systems has much interest in exploring data from academic settings to understand learners behavior and mental states. We have been developing IMS (Intelligent Mentoring System) which performs automatic mentoring by using an ITS (Intelligent Tutoring System) to scaffold learning activities and an ontology to provide a specification of learner’s models. To provide learner’s models in mentoring, the ontology describes qualities and quality values on awareness which are conceptualization of subjective evaluation. To specify relationships among qualities on awareness in academic settings, this study organized academic emotions in the psychological research and proposed their ontological descriptions.

### #202S: Competence Analyser: A portable GUI tool for modelling domain and learner knowledge

**Simone KOPEINIK, Michael BEDEK, Georg ÖTTL, Dietrich ALBERT**

Learner models form the basis of adaptive learning systems, representing what the system knows about a learner. Knowledge about a learner’s expertise within a learning domain plays an essential role when recommending learning objects as well as when supporting a learner’s reflection and awareness. In this paper we present the Competence Analyser tool to construct knowledge structures as a foundation for learner models in accordance with a psychologically sound framework, the Competence based Knowledge Space Theory (CbKST), which supports performance assessment in user-adaptive learning systems. The tool enables the learner to actively influence the learning profile creation by setting learning goals and defining prior knowledge in the context of learning domains. A first prototype has been developed and evaluated within the frame of the EC-funded TARGET project that provides a game-based learning environment with adaptive story recommendation. The paper outlines how to foster awareness and self-regulation while building learner and domain models for adaptive learning systems using a graph-based GUI tool.

## Session 7-B (CSCL-3)

### #38S: Face to Face Group Discussion Exercise Support System

**Shigeru SASAKI, Hiroyoshi WATANABE, Kumiko TAKAI, Fumihito FURUKAWA**

To help students solve exercise problems on information modeling systems, we introduced face-to-face group discussions during which each group member explains his or her own solution, and then all members explore a solution as a group. Improved motivation levels, and other beneficial effects, were observed in participants following their completion of discussion exercises. In this paper, we describe a system to support such face-to-face
group discussion exercises. The results of the system’s in-class trial suggested that it had several benefits.

#158S: A Case of Equipping Malaysian ESL Undergraduates with 21st Century Skills via Digital Storytelling
Siew Ming THANG, Najihah MAHMUD

Today’s advanced economies and innovative industries have created a demand for knowledge workers with 21st century skills. Recent research studies have shown that the current mode of teaching and learning have not managed to adequately equip undergraduates with the desired 21st Century skills. Thus, there is a need to introduce more appropriate methods into the pedagogy. In recent studies, digital storytelling (DST) has been found to be effective in inculcating ICT literacy, inventive thinking and problem solving skills among students through involvement in simulated working environment. The process of creating DST which includes organize ideas, express opinions and construct narratives is also believed to be able to enhance students’ communicative and collaborative skills. However, the extent this technology benefits students is still rarely examined in many Asian contexts, particularly in Malaysia. Hence, this study intends to address this gap in knowledge by investigating the effects of DST on 198 students undertaking an English for Academic Purpose course at a public university in Malaysia. A quantitative approach involving the use using a 30-item is used for collecting data in this study designed to explore the effectiveness of DST from the students’ perspectives. The findings revealed that students in general were receptive towards DST despite facing some problems and challenges throughout the project. The findings and the implications of the study will be discussed in this paper.

#159S: Computer-supported training of the mental number line
Korbinian MOELLER, Hans-Christoph NUERK, Ulrike CRESS

The human representation of number magnitude is often described by the metaphor of a mental number line. Recent studies repeatedly found the accuracy of children’s mental number line representation to be associated with more general arithmetic and mathematic achievement. Therefore, specific number line trainings have been developed. A growing number of intervention studies indicates significantly positive training effect with improvements generalizing from number line accuracy to other numerical (e.g., magnitude comparison) and arithmetical tasks (e.g., mental addition). This holds for both paper-pencil as well as first computer-supported number line trainings. However, with computer technology progressing rapidly it provides increasingly sophisticated possibilities for training the mental number line. In this article we specifically elaborate on the issues of interactive learning environments as well as embodied interactions. With respect to interactivity we discuss its necessity for the adaptivity of the learning environment required to guarantee balanced success rates in multi-learner trainings. As regards embodied interaction we elaborate on new possibilities to develop trainings allowing for bodily experiences of numerical concepts such as the mental number line offered by new digital media. We conclude that the latest development in computer technology opens up new directions for the successful training of numerical competencies that should be pursued as they may be particularly beneficial for those with special needs in numerical / mathematical learning.

Session 7-C (ALT-5)

#33s: Eye tracker gaze analysis of learners watching the writing process
Yasuhisa OKAZAKI, Senju NOGUCHI, Hisaharu TANAKA, Kenzi WATANABE, Atsushi YOSHIKAWA

We used an eye tracker to record and analyze the gaze of learners watching text and drawings being written, as in the case of a teacher writing on a blackboard. Many teachers and learners understand the benefit of using blackboards, but there remains insufficient scientific evaluation of their use. Course content presentation that includes in-process writing of text is highly characterized by the sequential presentation of the writing
processes. We believe that this presents a visualization of the thought process, and is thus far richer in educational information than simple presentation of completed forms. We focus on gaze during the presentation of graphs and equations as fundamental research to elucidate the benefit of presenting the writing process.

#106S: A Private Cloud Environment for Teaching Search Engine Construction
eisuke iTO, Brendan FLANAGAN, Chengjiu YIN, Tetsuya NAKATOH, Sachio HIROKAWA
Kyushu University installed a private cloud system, named “campus cloud system”, using VCL and CloudStack. For a graduate school exercise course on web search engine, the authors prepared a virtual machine on VCL, which had apache web server and GETA indexer preinstalled. This paper introduces an outline of the cloud system, the exercise, and also reports advantages and disadvantages of cloud based education.

#243S: The Accessibility of Learning Management Systems from Teachers’ Perspective
weiqin CHEN, Norun SANDERSON, Siri KESSEL
The study presented in this paper focuses on the accessibility of Learning Management Systems (LMSs) from teachers’ perspective. We seek to identify accessibility issues and propose possible improvements. Based on universal design principles and guidelines, this study adopts heuristic evaluation method and collects qualitative data on the accessibility of one popular open source LMS, Moodle. Data analysis shows that although Moodle has paid much attention to accessibility, the level of conformance to the ATAG guidelines is still low and many accessibility issues remain unsolved. These issues must be addressed in order for teachers with physical disabilities to be able to use the system efficiently.

#334S: How gesture-based technology is used in education to support teaching and learning: a content analysis
Feng-Ru SHEU, Wei-Chieh FANG, Nian-Shing CHEN
This article reviews the 43 research articles of the past decade on gesture-based computing in education. The focus is on the primary question: how is GBC used pedagogically in education? Content analysis is used as primary method. A comparison of instructional intervention (of GBC) in different sub-education domains is reported.

Session 8-A (PTP-5)

#194F: Bring Your Own Device (BYOD) for Mobile-assisted Seamless Science Inquiry in a Primary School (BOPN)
Yanjie SONG, Cheuk Lun Alvin MA
This paper reports an on-going case study on the project of “Bring Your Own Device (BYOD) for seamless science inquiry” in a primary school in Hong Kong. The study aims at investigating how the students advanced their content knowledge in science inquiry in a seamless learning environment supported by their own mobile devices. The topic of inquiry was “The Anatomy of Fish”. Data collection included pre- and post-domain tests, student artifacts, class observations and field notes. Content analysis and a triological approach were adopted in the data analysis to trace the students’ knowledge advancement. The work of one group of students was used as an example. The research findings show that the students advanced their understanding of the anatomy of fish well beyond what was available in the textbook.

Chaohua GONG
Electronic textbook has significantly potential to change the traditional ways of teaching and learning. In this paper, we conducted a research to examine the change from paper textbook class in Technology Rich Classroom (pTRC) to electronic textbook class in Technology Rich Classroom (eTRC) from the perspective of effective learning, by using a mix-method design of interview, questionnaire and on-site observation. There were 209 students and 12 teachers from six classes equipped with iPads from two primary schools
were taken part in the study, and each class conducted 4 eTextbook sessions and 4 paper textbook sessions. We compared the 24 eTextbook sessions and 24 paper textbook sessions by analyzing class activity capacity, classroom behaviors and technology roles. The comparison shows: (1) There are significant differences in class activity capacity between eTRC and pTRC. The ratio of classes which effectively completed the learning activities as planned in eTRC is higher than in pTRC, and Learner Engagement Indicator (LEI) in eTRC is significantly higher than in pTRC. (2) There are significant changes in classroom behaviors between eTRC and pTRC. The allocated time for teachers in eTRC is significantly lower than in pTRC and engaged time for students in eTRC is significantly higher than in pTRC. Students participate in classroom learning activities significantly initiatively and positively in eTRC compared to in pTRC. (3) Students attitudes to technology and satisfaction in eTRC are significantly higher than in pTRC.

#341F: Online Learning Community for Teacher Professional Development in Indonesia

Eunice SARI, Adi TEDJASAPUTRA

In this paper, we describe the innovation to enhance the way Indonesian teachers conduct their professional learning and development. Using an ICT-based community named OLC4TPD (Online Learning Community for Teacher Professional Development), a group of educators across Indonesian archipelago participated in this grassroots initiative to develop their professional competencies on ongoing basis. This paper presents three learning journeys of three educators, i.e. a teacher, a teacher educator and a school leader, with different education, socio-cultural backgrounds and ICT literacy from this community. The emphasis on learning experience, challenges and impacts in their professional learning development is the focus of this paper.

#345: Territory-wide Readiness for IT Integration into Curriculum Delivery for Learner-centered Learning: The Current State in Hong Kong

Siu Cheung KONG

The goal of this study was to forward information technology (IT) in education among secondary schools for promoting the paradigm shift to learner-centered learning. This study investigated the readiness of secondary schools in Hong Kong for IT integration into curriculum delivery. All 463 secondary schools in Hong Kong were invited for a territory-wide survey. With the response rate of 72.79%, the feedback from 337 schools indicated that most of the secondary school teachers confidently and habitually used IT for curriculum delivery. The teachers were adapted to integrate the use of digital resources, especially the free-of-charge ones, into students’ in-class learning process and after-school learning tasks. The teachers were also willing to try the pedagogical use of Web 2.0 technologies for supporting subject learning and teaching. This study revealed that secondary schools in Hong Kong are ready to forward IT integration into curriculum delivery for learner-centered learning. It also revealed the need of sustainable and scalable teacher development to help teachers enhance pedagogical competency in promoting learner-centered learning along with the trend of digital classrooms.

#100S: Using ICT in the teaching of Visual Arts. A situational analysis at secondary level in Mauritius

Mridula BEEHARRY-KONGLAR

This paper seeks to report on the use of ICT in secondary Visual Arts classrooms in Mauritius. Using data from questionnaire, focused group discussion and classroom observations, the paper discusses three key issues: ICT tools used in teaching Visual Arts, how ICT tools are used in the teaching of Visual Arts and scope and barriers in using ICT in the teaching of Visual Arts. The participants were 70 secondary Visual Arts teachers. Chief among the findings is that there exists a huge disparity among schools in terms of availability and use of ICT resources in Visual Arts classes. Other barriers in the use of ICT also exist. Findings indicate that the most commonly used tools are the computer and projectors and the most frequently utilized applications are Microsoft Word and PowerPoint. These are used mainly for preparation of lessons and instruction in class. The findings suggest that the creative possibilities of ICT are not fully tapped, often due to
teachers’ lack of manipulative skills in handling tools and softwares. The study also shows that the use of ICT depends on teachers’ attitudes towards its use. While some teachers acknowledge the contribution of ICT in teaching and embrace new technologies, many find dissonance between art and ICT and continue to use ICT in a limited manner. The paper argues strongly for considerations by policy makers for further provision of ICT tools in schools as a possible remedy to the present situation. Moreover, the paper discusses the need for support to teachers in the form of professional development, dialogue among Visual Arts teachers and creation of networks which can also be a potent vehicle for encouraging integration of ICT in Visual Arts classrooms. Finally, the author suggests that a genuine effort to support Visual Arts teachers would also necessitate an acknowledgement and understanding of their beliefs, values and concerns.

#189S: Media Usage by Filipino Students – An Empirical Survey
Ma. Mercedes RODRIGO, Michael GROSCH, Juan Miguel ANDRES
Between the different traditional learning tools and the rapid rise of technology and ease of access to them, students are presented with a multitude of avenues for learning. With so many resources available, students have to learn to be selective. By finding out what tools and services students use the most, this research aims to determine how students avoid information overload and getting lost in cyberspace. To do this, a survey was carried out at the Ateneo de Manila University in Manila, Philippines. Using a print questionnaire, 942 students were asked 145 questions about their media usage for learning and related topics. Analysis of the data included analysis of variance and comparing mean values by creating rankings of the different media services. It was aimed to find out what services are used the most, and to what extent. The results showed that students are more inclined to use online resources such as Google, online course material and literature, though there is still great appreciation for traditional learning media such as books and printed handouts from teachers. Filipino students seem to prefer self-learning, whether through traditional or non-traditional means, rather than learning through social media.

#197S: Integrating ICT in classrooms – a collaboration between a municipality and a university built on an open learning process
Niklas KARLSSON, Torbjörn OTT, Anna-Lena GODHE, Berner LINDSTRÖM
In this paper, we describe a collaboration project between a municipality and a university in Sweden where the aim has been to integrate ICT in classrooms through an open process of collaboration at different levels. Teachers, process managers from the municipality and researchers from the university have met regularly over a two-year period of time in Collaborative Development Groups (CDG). In these groups the participants have discussed and worked progressively with issues generated when implementing new technology in educational practices. The collaboration was designed as an open process over an extended period of time in order to enable a reflexive process between participants at different levels. Some salient aspects of how the collaboration has contributed to school development in general are accounted for in this paper. Furthermore, how the collaboration has aided in developing the use of ICT in classroom practices is explicated. One conclusion that can be drawn is that new competences have evolved from the work in the CDGs and the extended dialogue on how to use technology pedagogically. The teachers pedagogical knowledge has during the process been merged with their technological knowledge as well as the content knowledge of the subjects they teach (Mishra & Koehler, 2006). For researchers and teachers to work together under a longer period of time has enabled the development of a reflective pedagogical use of ICT.

13:00-15:10 Session 8-B (AIED-5)

#206F: Building a Semantic Open Learning Space with Adaptive Question Generation Support Corentin JOUAULT, Kazuhisa SETA
This research aims to give learners more content-dependent scaffolding in the self-directed learning of history. Learners use a system to build a concept map containing a chronology. The system is able to generate content dependent support adapted to the
learners. To enable this support, we built a semantic open learning space using a natural language online encyclopedia and semantic information using the open linked data. The support is provided by the automatically generated questions and documents. The learners request questions when they need and the system will generate the questions depending on the concept map of the learner. The generated questions aim to leads the learners to new knowledge deepening their understanding.

#244F: Interactive Environment for Learning by Problem-Posing of Arithmetic Word Problems Solved by One-step Multiplication
Sho YAMAMOTO, Takuya HASHIMOTO, Takehiro KANBE, Yuta YOSHIDA, Kazushige MAEDA, Tsukasa HIRASHIMA
In this paper, an interactive environment for learning by problem-posing targeting arithmetic word problems that are solved by one-step multiplication is described. Its practical use in an elementary school is also reported. We had already developed an interactive environment for learning by posing arithmetic word problems that can be solved by one-step addition or subtraction. Then, a practical use by the first grade students of an elementary school had been performed. The results suggested that the learning by using the environment was effective to improve the student's problem solving performance. As the next step of this previous research, we have developed another learning environment where a learner poses the multiplication word problems. In order to design the environment, we categorize word problems that can be solved by one-step multiplication based on the sorts of quantities consisting of the multiplication. Then, based on the categorization, we have built a task model of the problem-posing. The learning environment is used by a class of the second grade students for 9 class times, and we have confirmed that the scores of problem-posing and problem-solving were improved in the group of students who obtained low scores in the pre-test.

#112S: Fraction Block as a Tool for Learning & Teaching Fraction and Its Experimental Use in an Elementary School
Akimitsu JOYA, Kazushige MAEDA, Tsukasa HIRASHIMA
This paper proposes “fraction block” as an educational reifications of fraction. Fraction block reifies characteristics of “ratio fraction” as a pair of numerator block and denominator block. The length of the blocks can be changed by keeping the ratio of numerator block to denominator block. By using the fraction block, a quantity represented as a length of tape is derived from another quantity represented as another length of tape. This deriving operation is a reification of multiplication or division with a fraction. We have implemented a learning environment where a learner is able to directly operate the fraction block in order to derive a quantity from a quantity. Experimental use of this environment in an elementary school is also reported in this paper.

#81S: A Hybrid Recommender System based on Material Concepts with Difficulty Levels
Guibing GUO, Mojisola Helen ERDT, Bu Sung LEE
Recommending learning materials for e-learning systems often encounters two issues: how to classify and organize learning materials and how to make effective recommendations. In this paper, we propose a new algorithm to handle these two problems. Specifically, we compile each learning material to concepts according to their relevance which is modeled as the length of a term-weight vector. Then recommendations are generated by taking into account the document’s similarity with some good learning material, the personalized time-aware usefulness of the learning material, the concepts of the learning material as well as their difficulty levels. Experimental results based on a small sample demonstrate the effectiveness of our method in terms of knowledge gain obtained.

#157S: Designing Effective Feedback for Cognitive Diagnostic Assessment in Web-based Learning Environment
Yuan SUN, Masayuki SUZUKI, Tetsuya TOYOTA
Assessment is useful for students to improve their learning and for teachers to adjust their
teaching practice. However, most traditional assessments do not provide useful information to improve learning and teaching. Recently, cognitive diagnostic assessment (CDA) which is designed to measure specific knowledge structures and processing skills in students has attracted a great deal of attentions. In this paper, we apply a CDA approach in fraction problems to 144 sixth grade students in an elementary school in Japan. We show how CDA can provide detailed information about learners’ strengths and weaknesses and discuss the applicability of web-based CDA for providing effective feedback.

#61S: Teacher Approaches to Adopting a Competency-Based Open Learner Model
Matthew JOHNSON, Gabriele CIERNIAK, Cecilie HANSEN, Susan BULL, Barbara WASSON, Carmen BIEL, Kolja DEBUS
This paper considers teacher adoption of an open learner model (OLM) constructed from automated and manual data. It shows OLM visualisations; how teachers, students and peers can provide data to an individual’s model; and an overview of how such manually-provided information is combined with automated data. Teacher experiences reveal the potential for OLMS of this type in classrooms, as well as some of the barriers to achieving this.

13:00-13:50
Session 8-D (CUMTEL-3)

#57F: Mobilogue: Creating and Conducting Mobile Learning Scenarios in Informal Settings (BTDPN)
Adam GIEMZA, Nils MALZAHN, H. Ulrich HOPPE
Mobilogue is a tool to support educators and students in authoring and deploying learning support with location awareness and guidance to mobile devices. The application area of the framework covers informal learning settings like field trips, museum visits as well as formal classroom settings. The focus of the framework is on the simplicity and flexibility of the domain independent content authoring and content deployment. We present an authoring tool that uses a workflow-related, graph-based paradigm to model and author a path across different locations. Locations relate to physical places or artifacts through QR codes and provide supportive information. The guidance takes place by identifying the user’s location by scanning the QR codes and visualizing the appropriate information on the smartphone. Finally we describe possible scenarios for such informal learning settings and report on an evaluation of one scenario authored by students for a museum.

#135F: Acculturation in Context: Knowledge Sharing Through Ubiquitous Technologies
Steven COOK, Hiroaki OGATA, Mark ELWELL, Mitsuru IKEDA
In this paper, we present plans for a retooled ubiquitous computer system that works towards facilitating knowledge acquisition and knowledge dissemination between learners during the process of acculturation. Focused on the foreign population of JAIST (Japan Advanced Institute of Science and Technology - a Japanese post graduate university in Japan), the system provides a platform on which to study the behaviour of participants, and also the process of acculturation dynamically in context. In addition, the study works towards understanding the feasibility of using such ubiquitous systems as possible support mechanisms in the future. In the current global environment, human beings via their own experiences acculturate at different speeds, and with different levels of success. By incorporating ubiquitous technology into the environment in which people are acculturating, we provide a new way to analyse the process of acculturation dynamically, and provide assertions as to how the system may benefit users in the future.
**Session 8-G (GTEL-3)**

**#51F: Mobile Game Based Learning to Develop Ethical Decision Making Skill of Novice Volunteer in Disaster Response**

_Didin WAHYUDIN, Shinobu HASEGAWA, Tina DAHLAN_

Many responses of catastrophic natural disaster did not perform properly to an appropriate standard. This often occurred when first responders were involved, especially novice volunteer who did not have the accurate decision making skill. One of the main issues is the lack of regular training to develop such skills. It has been pointed out that exercise of the non-technical abilities, such as decision-making, has an enormous impact on effective disaster response. However, some researches show that there are difficulties to conduct live practice for the disaster situation similarly. In addition, the novice volunteer cannot receive maximum advantages from live training due to feedback limitation where reflection from actual circumstances is required to improve those skills. The purpose of this research is to design a mobile game based learning (mobile GBL) for developing such skills. First of all, we conducted a preliminary survey to assess the awareness of the ethical decision-making skill of the novice volunteer from high school and university organizations in Indonesia. We asked these respondents to answer three categories of questions encompassed six components of moral intensity. We also interviewed some experts from the official search and rescue (SAR) organization in Indonesia to confirm first responder requirements. Based on these preliminary surveys and interviews, we have designed a training system called Magnitude which enables the novice volunteer to develop their ethical decision making skill at all times during official disaster management training inside and outside of class, and expect them to improve their performance in disaster response activities.

**#232S: Half-full or Half-empty: Digital Entertainment Games for 21st Century Education**

_Mark ELWELL, Steven COOK, Michael GUENTER, Makoto ELWELL_

21st century education has to be self-generating and self-sustaining, freely accessible to anyone, anytime, anywhere, and characterized by collaborative, two-way applied acquisition and mastery of productive and metacognitive knowledge, skills, and attitudes. As a medium of delivery, a digital entertainment game requires an integrated continuum of achievable roles including consumer, producer, and manager of content and activities in gameplay, community, management, and development. This paper identifies a variety of digital entertainment games which demonstrate some of these features, evaluates their potential value using our Game Regulated Applied Integrated Learning model, and discusses implications for selection and design of game systems intended for education.

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**Session 8-E (CSCL-4)**

**#282F: Program visualization: Effect of viewing vs. responding on student learning**

_Gargi BANERJEE, Sahana MURTHY, Sridhar IYER_

Visualizations in computer science topics are known to have several benefits such as promoting conceptual and procedural understanding, improving prediction and reasoning abilities and helping learners construct mental models. This learning effectiveness has been found to be a function of students' engagement level with visualization. In the current study, we did a controlled field experiment to determine the effect of two different instructional strategies with visualization on procedural understanding of the topic of pointers in a 1st year programming classroom. These instructional strategies, operationalizing different engagement levels, were: prediction activity interleaved with instructor feedback using visualization (experimental), and simply viewing the visualization with parallel instructor commentary (control). We found significant difference in the relative rate of correct solution of the procedural questions on the post-test. However, there was no significant difference on the post-test scores. We also found a significant difference in classroom behavioral engagement between the two groups. We propose that...
there may be conditions, other than engagement level with visualization, such as learner characteristics or challenge level of assessment questions that may play a role in the determining learning effectiveness of visualizations.

#42S: Bridging Campus Courses and Field Experiences in University-based Teacher Education Program Using Online Diaries

_Takeshi KITAZAWA, Toshio MOCHIZUKI_

New teachers who are shocked by real-world classroom situations - such as rules of the local school, human relationships in a shielded environment, and the reality of teaching children - tend to leave the workforce within a few years, and it has become necessary to educate student teachers in the universities with a focus on adaptive professional socialization of teachers (Zeichner & Gore 1990) to overcome this problem. We have provided a weblog community where pre-service teachers can have a dialogue based on their report of experiences during their practice teaching. However, in order to promote the professional socialization of teachers, we have designed a new weblog community where experienced teachers can participate. Through comparative analysis, we have pursued the effectiveness of this change in design. In this study, we referred to Hong (2010) and categorized their diaries and comments within the weblog community into nine factors, and analyzed the features of their communication. We revised the design of the pre-teaching from the year 2010, and altered the lesson design of the pre-teaching for the year 2012 so that pre-service teachers could exchange their opinions focusing more on the ways of schools and teachers. The class design was changed so that experienced teachers provided hints during pre-teaching to motivate pre-service teachers to think about the issues, and the pre-service teachers were made to take the initiative in using the weblog. From the results, we found that the number of entries of diaries and comments into the weblog community differed between the years 2010 and 2012. Moreover, it became relevant that the ratio of the diary entries about “commitment towards work,” “value and standpoint as teachers” and the like increased.

#242S: Comparing self-learning behavior of low and high scorers with EDIV

_Madhuri MAVINKURVE, Sahana MURTHY_

Computer based interactive visualizations have been shown to be effective learning resources in science and engineering for improved conceptual understanding, reasoning and prediction abilities, and experimentation skills. In a prior study, we reported the development of Engineering Design Interactive Visualizations (EDIV), and showed their effectiveness as self-study material in improving students’ engineering design competencies. Here, we investigate students’ interaction with the EDIVs in order to gain insight into what makes the EDIVs effective. We conducted a qualitative study using screen capture logs to identify behavioural differences between high and low scoring learners as they interact with the EDIV. We found that the high scoring group spent more learning time on interactive activities such as variable manipulation and decision making tasks, while the low scoring group spent more time on reading and concept clarification tasks.

14:00-15:00
Session 8-F (ALT-6)

#225F: Empowering argumentation in the science classroom with a complex CSCL environment

_Wenli CHEN, Chee-Kit LOOI, Wenting XIE, Yun WEN_

Understanding the significance of argumentation in the learning and doing of science, the community of computer-supported collaborative learning has developed an increasing interest in argumentation. To empower the teaching and learning of science in real classrooms, a collaborative argumentation tool (called AppleTree) embedding three scaffolding mechanisms, namely, dual representational and interactional spaces, automated assessment for learning, and staged-based collaboration scripts, has been designed and developed using a design research approach. This paper presents the design rationale of the system and its realized prototype. A pilot study in a secondary science
grade 1 class is also reported. Preliminary data analysis results point towards validation of the effectiveness of the system on empowering learning and its usability.

#148S: Inorganic Chemistry Learning Support System using AR-based Virtual Environment and Question Recommendation Method
Masaru OKAMOTO, Ryoya SUMIDA, Yukihiro MATSUBARA

In this paper, we proposed AR-based learning support system for inorganic chemistry that uses the historical information of each participant. To perform experiments in a virtual environment, markers and a USB camera are utilized as the input interface. By using this interface, a learner can perform chemical experiments in the virtual environment. Our proposed system presents the learner with a number of questions, which are selected on the basis of the learner’s historical information within the system. This selection algorithm helps a learner perform experiments that correspond to questions suitable for his/her level of understanding. Each learner’s historical information is obtained from his/her examination results by paper tests. By this selection method, a learner can repeatedly learn about inorganic chemistry in the virtual environment.

#156S: Virtual Environment for Pulley Experiment using Tablet-PC and Portable Haptic Device
Naoki HIDANI, Masaru OKAMOTO, Yukihiro MATSUBARA

In this study, a virtual experiment environment for pulley learning using a tablet-PC and portable haptic device (SPIDAR-tablet) is developed. A learner drags pulleys on a tablet-PC by finger to construct a pulley system. Then, the learner can experience weight corresponding to the constructed virtual pulley system by dragging a string on the display. The learner can conduct virtual experiments by various pulley systems to recognize the difference between weights through the haptic device by reconstructing the system. Additionally, a SPIDAR-tablet is added to the base for portability; thus, the developed system can be used as a single device. To verify the developed system, an experiment was conducted to confirm that the subject can freely construct the pulley system.