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# **Abstracts of Conference Papers**



**- C1 -**

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





# A Two-Layer Reasoning Framework for a Teaching Strategies Engine using SWRL

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**Abstract:** An intelligent tutoring system demands a state-changing reasoning framework. However, emerging rule languages such as Semantic Web Rule Language (SWRL) are designed for knowledge representation only, and deliberately omit state-changing constructs. We describe a two-layer framework for rule-based reasoning that combines a “pure SWRL” reasoning kernel with a non-SWRL outer layer. The outer layer manages a set of facts representing the current state of the system, and provides persistence through external storage, event handling of system inputs, and execution of a library of system actions. On each input event, the outer layer creates a fresh copy of the input fact set, and invokes the “pure SWRL” layer to compute its entailment set, then merges the entailed facts into the persistent fact base. This may modify existing facts, which transitions the system to a new state; hence we implement the outer layer outside the SWRL formalism. We apply this technique to an existing ITS, and explore the degree to which its rule set is separable into stateless “pure SWRL” rules vs. state-changing system services.

**Keywords:** Teaching strategies, rule-based processing, SWRL

# An Ontological Approach to Support Teachers in Designing Instruction Using ICT

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**Abstract:** In this study, we have developed a system called FIMA (Flexible Instructional Design Support Multi-Agent System) which supports teachers dynamically in designing instruction by facilitating their thinking in ways characteristic of expert teachers' thought processes: 1) multiple viewpoints thinking, 2) contextualized thinking and 3) problem framing and reframing strategy. We especially focus on instructional design that integrates the use of information and communication technology (ICT). In this paper, we describe one function of FIMA: to evaluate ICT-use instruction designed by teachers and support them according to results of the evaluation.

**Keywords:** Ontology, Instructional Design, Multi-Agent, ICT Use in Instruction

# Constraint-based Design Critic for Flat-pack Furniture Design

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**Abstract:** This paper reports on the Flat-pack Furniture Design Critic (FFDC). By analyzing the literature of architecture education, we have identified critiquing methods: delivery types (interpretation, introduction, example, demonstration, and evaluation) and communication modalities (written comments, graphical annotations, and images). Our FFDC uses these methods to deliver feedback. This paper also presents how our FFDC system selects particular methods by considering a certain condition such as user's knowledge level and the previously used methods.

**Keywords:** design critiquing, constraint-based tutors, delivery types, modalities

# Does Framing a Problem-Solving Scenario Influence Learning?

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**Abstract:** In this paper, we discuss potential effects of framing, a pedagogical strategy used by some teachers, with the view of implementing it in an intelligent tutoring system. The process of framing a learning activity, in our case problem solving, consists of having the activity in between a pre-action (or priming) phase and a post-action (or reflective) phase. We also describe an evaluation study where the experimental and control groups participated in a framed and non-framed learning session respectively. The pre- and post-action phases were whiteboard group sessions led by an SQL domain expert. The problem-solving phase was done solely on SQL-Tutor, an ITS for database querying. During the problem-solving phase, the experimental group solved the same number of problems in 23% less time than their counterparts in the control group. The type of problems solved and the high-level help used were similar for both groups. Although the learning gains were high, they were similar across groups, questioning the effectiveness of group-based reflection. The experimental group was also more efficient, expending less effort for similar gains. After examining various learning theories and analyzing the study results, we conclude that this is a valid teaching format for the next step of our research: investigating its implementation and evaluation within an ITS

**Keywords:** ITS, Teaching models, Framing learning sessions, Evaluation

# Econie: An Inquisitive Virtual Tutee Prompting Student's Reflection in Tutoring

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**Abstract:** In peer tutoring settings, questions raised by the tutee can be important in enhancing tutor learning. This paper proposes Econie, an inquisitive virtual tutee environment from this perspective. It supports a student tutor to teach by constructing a qualitative map in the domain of economics, and to be guided into reflective tutoring interaction by virtual tutee question prompts. An evaluation that compares mid-tutoring and post-tutoring tutee question prompts is described. The preliminary results provide us some evidence that the simulated tutee questions may have positive effects on students' learning.

**Keywords:** Intelligent Tutee System, Reflective Learning, Question Asking Strategies

# Error Judgment in a Language Education System Oriented for Focus on Form

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**Abstract:** This paper describes how to develop an error judgment component in a language education system oriented for a pedagogical approach called focus on form (FonF). In particular, we discuss how to identify two types of errors (omission of necessary linguistic forms and addition of unnecessary linguistic forms) because identification of those two types constitutes a basis for identifying other types of errors. We implemented the error judgment component, and the evaluation results shows that the component successfully identifies the two types of errors with 95.5% precision and 93.3% recall (f-measure: 0.944).

**Keywords:** Focus on form, foreign language education, dialog system

# Evaluation of a Constraint-Based Homework Assistance System for Logic Programming

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**Abstract:** In this paper, we report on the learning benefits of the system INCOM, a constraint-based tutoring system which assists students doing their homework assignments in logic programming. The system has been evaluated with 35 students as part of a logic programming course. The evaluation indicated that the students using INCOM have improved their programming skills significantly after using the system ( $p < 0.01$ ,  $\alpha = 0.05$ ) and the students who used INCOM outperformed students in a control condition with an effect size of Cohen's  $d = 0.23$ .

**Keywords:** Intelligent tutoring systems, evaluation, constraint-based approach.

# Learning environment for algorithm and programming where learners operate objects in a domain world using GUI

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**Abstract:** We have constructed educational system for algorithm and programming. Our system lets learners externalize their understanding on algorithm by operating objects in a domain world using GUI. With our system, learners can reproduce behavior of algorithm and confirm their understanding on algorithm. In this paper, we describe the architecture of our system, implementation of it, and the result of preliminary experimental evaluation.

**Keywords:** Programming education, Algorithm learning, Externalization



# Promoting Self-Regulated Learning Skills in Agent-based Learning Environments

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**Abstract:** We have developed computer environments that support learning by teaching, concept mapping, scaffolding, and the use of self regulated learning (SRL) skills by social interactions with virtual agents. More specifically, students teach a computer agent, Betty, and can monitor her progress by asking her questions and getting her to take quizzes. The system provides SRL support via dialog-embedded prompts. Our primary goals have been to support learning in complex science domains and facilitate development of self-regulated learning skills. Our analyses have identified actions such as “asking queries” and “tracing explanations” as key self-regulation strategies that promote learning.

**Keywords:** learning by teaching, intelligent pedagogical agents, self regulated learning

# Study on Support of Learning from Examples in Problem Posing as a Production Task

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**Abstract:** Problem posing is identified as an important activity in mathematics education as well as problem solving is. While problem solving is a comprehension task, problem posing is regarded as a production task because it requires diverse thinking and generation of novel ideas in some ways. In problem posing, it is important but difficult for learners to generate diverse problems. In this study, we propose a strategy for learning from examples in problem posing in order to promote diverse problem posing by learners. We introduce an activity of imitation that is widely adopted in domains of creative generation tasks. We also implement a system that supports learning by imitation in a task of posing mathematical word problems. Our system presents a learner with cases of problems and their generation processes, and it then has the learner engage in reproducing cases by following the processes.

**Keywords:** Learning from examples, imitation, problem posing, production task

# Towards a negotiable student model for constraint-based ITSs

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**Abstract:** Much research has been done on open student models within adaptive educational systems. It has been shown that allowing the student to view their student model is useful in the learning process. Open student models help support meta-cognitive process, such as self-reflection. Negotiable student models take this a step further, and allow students to negotiate and potentially modify their model. A few negotiable student models have been implemented, but only in relatively simple systems, and not integrated into a complex ITS. As such, it is not clearly known if negotiable student models pose a significant advantage over the traditional open student models. This research implements a basic negotiable student model into a version of a complex and internationally deployed ITS. Subjective evaluation is performed, and shows promising results. Participants felt the negotiable student model was both useful for learning, and enjoyable to use. With a few improvements, this negotiable student model implementation could be used in a wide-scale objective analysis to help determine the usefulness of negotiable student models.

**Keywords:** Intelligent tutoring systems, negotiable student model, student modelling.

# Towards Better Understanding of Learning/Instructional Design Knowledge with Strategy-centered Structuring

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**Abstract:** Structuring learning/instructional theories suffers from the issue of “paradigms”, which makes it even more challenging. This paper discusses the conceptualization of theories/models and proposes a mechanism to provide perspectives for understanding and utilizing them. Two types of conceptualization proposed in this paper reveal their characteristics from a variety of viewpoints.

**Keywords:** ontology, knowledge modeling, learning/instructional theory

# Tracking the Development of Problem Solving Skills with Learning Trajectories

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**Abstract:** Learning trajectories have been developed for 1650 students who solved a series of online chemistry problem solving simulations using quantitative measures of the efficiency and the effectiveness of their problem solving approaches. These analyses showed that the poorer problem solvers, as determined by item response theory analysis, were modifying their strategic efficiency as rapidly as the better students, but did not converge on effective outcomes. This trend was also observed at the classroom level with the more successful classes simultaneously improving both their problem solving efficiency and effectiveness. A strong teacher effect was observed, with multiple classes of the same teacher showing consistently high or low problem solving performance. The analytic approach was then used to better understand how interventions designed to improve problem solving exerted their effects. Placing students in collaborative groups increased both the efficiency and effectiveness of the problem solving process, while providing pedagogical text messages increased problem solving effectiveness, but at the expense of problem solving efficiency.

**Keywords:** Problem solving; learning trajectories; pedagogical agents; artificial neural networks.

# A Multi-Expert Approach for Developing Testing and Diagnostic Systems

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**Abstract:** In recent years, researchers have attempted to develop computer-assisted testing and diagnostic systems to help students improve their learning performance. In developing a diagnostic system for detecting students' learning problem, it is difficult for the teachers to address the exact relationships between the test items and the concepts. Consequently, it becomes an interesting issue to integrate opinions from teachers. This study proposes a set of weighting rules to elicit and integrate the weightings of test item-concept relationships given by multiple experts. Based on the proposed approach, a testing and diagnostic system has been implemented. In addition, a practical application on a Mathematics course is going to be conducted to demonstrate the effectiveness of this innovative approach.

**Keywords:** Computer-based testing, Computer-assisted learning, Concept-effect relationships

# Automatic Generation of Mini Learning Games based on a Card Game Model

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**Abstract:** In this paper, we propose automatic generation mechanism of learning games based on a card game model that is a structured representation of a set of concepts within a card game and the relationships between those concepts. An authoring system that generates various types of computer-based learning games based on the card game model is also introduced. We confirmed that the system could generate various learning games and they were playable and useful for learning.

**Keywords:** Learning game, design method, automatic generation, model of card game

# Computer Assisted Creation of Items for Scrambled Sentence Tests

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**Abstract.** We apply techniques of natural language processing to support the creation of special scrambled sentences that allow only specific word orders. The scrambled sentences are useful for students to practice their knowledge about grammars. It takes two steps to create a test item for scrambled-sentence tests. We create a set of grammatical alternative sentences from the target sentence, and make sure that students will rebuild the target sentence by pegging some of the words in the target sentence. The proposed methods can automatically and effectively peg words to single out a specific sentence from a set of sentences. We also employ the Stanford parser and propose a practical heuristic principle to help teachers exclude a potentially large number of alternative grammatical orderings of a set of words in the scrambled sentence.

**Keywords:** scrambled sentence tests, computer assisted item generation, grammar learning, natural language processing



# Developing an Authoring Tool for Building Self-Explaining Environment with Learning Companions to Provide Prompts

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**Abstract:** Self-explaining is an effective domain-general learning strategy, but not all students are good explainers. Prompts can promote students to generate more high-quality self-explanations and to attain better learning performance. Prompts can be adaptively provided by analyzing the students' self-explanations to do student modeling or be provided based on some prompting mechanisms without understanding the students' self-explanations. This paper presents an authoring tool for building a self-explaining environment with learning companions to provide prompts without understanding the students' self-explanations. The authoring tool allows teachers to set up different learning companions' prompting mechanisms, including choosing among three prompting strategies and selecting content-free prompts or content-related prompts.

**Keywords:** Self-explaining, prompting, learning companion, authoring tools

# Development and Evaluation of a Web-based Production System for Learning Anywhere

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**Abstract:** In learning cognitive science, students must learn how to handle an actual production system that runs on a computer. We developed a web-based production system for education that can be used from anywhere such as class rooms, offices, and homes. It furnishes students with learning support information for if-clause matching to facilitate learning. We confirmed that the learning support function effectively reduces participant trial-and-error behaviors based on empirical data.

**Keywords:** production system, Ajax, web application, anywhere learning system, educations on cognitive modeling

# Error-Driven Incidental Language Learning: Learning Collocation from Movies

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**Abstract:** In this paper, we propose an error-driven incidental language learning framework and a movie player which is created within such framework. This movie player is designed to offer users a great chance in learning the correct usage of collocations which they previously produced erroneously, i.e., miscollocations. The framework and the movie player include a standard corpus, a learner corpus, an error detection module and an error correction module. Prior experimentation shows the promising performance of the error detection and correction.

**Keywords:** Incidental language learning, collocation, miscollocation

# Explanation Generator based on Themes of Exercises and Learner Model in ITS for High School Chemistry

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**Abstract:** In this paper, we report on development of an explanation generator in our intelligent educational system for high school chemistry. The system generates explanations on problem solving process of exercises, according to educational situations, such as learners' understanding level and themes of the exercises. We discuss what kind of explanation should be added based on the situation and design algorithm to control explanation by the situation. We also evaluate our system experimentally.

Keywords: intelligent educational system, generating explanation, high school chemistry

# J-LATTE: a Constraint-based Tutor for Java

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**Abstract:** We present J-LATTE, a constraint-based intelligent tutoring system that teaches a subset of the Java programming language. J-LATTE supports two modes: *concept* mode, in which the student designs the program without having to specify contents of statements, and *coding* mode, in which the student completes the code. We present the style of interaction with J-LATTE, its interface, domain model and the student modeling approach. We also report the results of a study we conducted in an introductory programming course. Although we did not have enough participants to obtain statistical significance, the results show very promising trends indicating that students learned the constraints.

# Learning Case Adaptation to Support Special Education Teacher Training

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**Abstract:** Both problem-oriented learning and case based learning are believed as effective methods for practical knowledge development. However, automatic development of learning cases for adaptive learning is still an issue. This study presents a learning case adaptation framework and proposes the substitution and removal adaptation techniques to support problem-oriented e-learning based on case learning. In this research, the adaptive learning cases were developed to provide teachers with practical teaching knowledge for teaching students with mild disabilities so as to assist special education teachers in effectively developing practical teaching knowledge.

**Keywords:** Case adaptation, genetic algorithm, practical knowledge

# More than just an inter “face”- the important influence of agent appearance on motivation

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**Abstract:** Interface agents can serve as powerful technological mediators to impact motivational outcomes such as self-efficacy and attitude change. Such anthropomorphic agents can serve as social models in the Bandurian sense to simulate human roles and provide social influence within intelligent systems. Given that agent appearance can have a major impact on motivation and affect regardless of the level of agent functionality, careful consideration must be taken with respect to its design.

**Keywords:** anthropomorphic interface agents, appearance, motivation, self-efficacy

# Teaching in Ill-Defined Domains Using ITS and AI Approaches

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**Abstract:** Ill-defined domains offer many challenges to computer scientists. Developing intelligent tutoring systems (ITSs) in these domains is a very challenging task due to the difficulty in modeling these domains, answers to ill-defined problems are ambiguously identified as right or wrong, and no generally accepted architecture is currently existed. This paper presents general guidelines for the development of ITSs in ill-defined domains, such as Argumentation and Ethics. This is instantiated in the two example systems AEINS and ALES. These systems offer adaptive learning processes and personalized feedback aiming to transfer the required skills to the learners and develop their reasoning.

**Keywords:** Ill-defined domains, argumentation, ethics, intelligent tutoring systems



# Time Representation and Reasoning for a Story-telling Web Tool—the State of the Art

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**Abstract:** We are working on a story-telling web tool for primary-school classes. The tool should allow teachers to create or modify short stories, and elaborate temporal reasoning games that stimulate children to reason on the time dimension of stories. In this paper, we review the major theories and tools for qualitative temporal reasoning, studying two facets of time, relevant for such a tool: representation and reasoning.

**Keywords:** artificial intelligence in education architectures (web-based), interaction design, knowledge modelling and representation.

# A computer-assisted learning system for exploring geometry conjectures online

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**Abstract:** We believe it would be fun and meaningful for students to make geometric conjectures and experience the joy of mathematical inquiry by manipulating dynamic geometry figures in a system we have designed. In order to facilitate the students to explore geometric conjectures, we have designed tools for constructing geometric objects, measurement tools, and tools to construct geometric conjectures. In an experiment, two classes of high school students were compared. One class used our system while the other used a JavaSketchpad environment. The study indicated students produced more and better conjectures with our system.

**Keywords:** Math exploration, conjecture generation, dynamic geometry environment, Geometer's Sketchpad, JavaSketchpad

# A Methodology for Improving Reusability of Educational Materials Using Product Line Software Engineering

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**Abstract:** The educational material which can be used under various situations has multiple variants even for one lecture theme. The lecturer often constructs and manages the variants separately with ad hoc reuse. This scheme of reuse raises a problem of consistency among multiple variants.

To resolve this problem, we introduce concept of software product line engineering into educational material management. Separation of common parts and variable parts in the educational material enable generation of variants depending on reuse scene. We design and implement a generation tool to evaluate the scheme.

**Keywords:** Educational Materials, Reuse, Software Product Line Engineering

# A Study for Exploration of Relationships between Behaviors and Mental States of Learners for an Automatic Estimation System

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**Abstract:** It is an important task to implement an e-learning system that can automatically detect changes of learners' mental states by observing their behaviors in learning activities. In this study, we conducted an experiment to explore relationships between mental states and behaviors of a learner on our experimental tools designed along with an assumption of a learning environment with an e-learning system. We focused on mouse and face movements as the behaviors. The results of the experiment revealed some features about the behaviors and the mental states.

**Keywords:** e-leaning system, automatic estimation, mental states

# A System for Learner-Support Integrated Cooperative Learning Environment

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**Abstract:** Tutoring systems to date have been focusing on learner's concept understanding from a single tutor interaction. Any assessment taken from different tutoring systems of the same domain are not considered and thus, making an overall scholastic assessment difficult to achieve. In this paper, we present our ongoing research in developing a shared learner-centered environment that profiles scholastic performance taken from different tutoring systems of the same domain – learning basic C programming. Few of the challenges we have faced were on finding appropriate structure and representation for the student model component, aligning different terms used from different tutors, their assessments about learners' scholastic performance and how it can be profiled accordingly and be used to benefit learner's concept understanding.

**Keywords:** Intelligent tutoring systems, cooperative learning, learner agents, student model

# Adapting Learning Activities for Teaching Know-How in Adaptive Course Generation System

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**Abstract:** In our previous work, we have built an adaptive course generation system (ACGS) [1] to adapt a learning path for learning goals. In this paper we describe learning activity is represented in the learner model and domain model to teach learners how to get through course content based on learner's knowledge. Therefore, our model aim is to develop Bayesian Network learner model to manage overlay knowledge model and adapt learning activities based on a task model. In addition, an implementation of this model with the course topic about computer science domain for third year students is also described.

**Keywords:** Learning activity, ACGS, Adaptive Hypermedia, Bayesian Network

# ALES: An Innovative Argument Learning Environment

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**Abstract:** The paper presents the development of an intelligent tutoring environment for argument learning (ALES). It uses different mining techniques to manage a highly structured arguments repository. The repository was designed, developed and implemented by us [1,2]. ALES aims to i) guide the students during argument learning, ii) offer an argument classifier agent that retrieves the most relevant results to the subject of search.

# An Adaptive Tutoring System for Calculus

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**Abstract:** Effectively targeting under-prepared students is a challenge in academic courses. In this paper, an adaptive tutoring system for calculus “JCALC” and its mechanism for adaptation are introduced. Then practical experiments using JCALC are conducted and effectiveness of use of JCALC for under-prepared students is shown.

**Keywords:** Tutoring, Educational technology, adaptive system



# An Approach Towards Automatic Testing of Student Programs Using Token Patterns

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**Abstract:** Many universities use software systems to assess student programs by means of automatic testing, but most of these systems suffer from the technical limitation of requiring rigidly defined output formats. As such, a program that implements the correct algorithm is often rejected as incorrect due to minor non-conformance of its output. We propose a new approach to assessing the correctness of students' program outputs based on token patterns.

**Keywords:** automated assessment system, learning system for computer programming, pattern-based program testing, program assessment, software testing, token pattern

# Constructing A Plant Learning System Based On Web 2.0

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**Abstract:** This research has adopted artificial intelligence technology to build up a Plant-Enquiry system to enhance the user's cognition about the plants. The concept of Web 2.0 has been used to construct a share-learning network. Doing on-line and real time editing of the digital multimedia could deliver the message in a more effective and more convenient way, and, by implementing the technology of video-film indexing and marking, it allows the users to more effectively access huge amount of useful information; the technology implementation of GPS and QR-Code has been added to provide the course-editing function of M-Learning. Combining the conveniences mentioned and the fast operations, it achieves plant-retrieving, complete plant-introduction, the building up and collection of plant database, the integrated application of GPS, QR-Code and map information; it has also reduce the development difficulty of digital course design and the cost. The above are the contributions of this research.

**Keywords:** Web2.0, GPS, QR-Code, Annotation for Video

# Design and Development of an Authoring Tool for Pedagogical Relationship Types between Concepts

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**Abstract:** In this paper the design and development approach of an authoring tool for defining pedagogical relationship types is described. Pedagogical relationship types are used to define adaptation strategies which can be exploited by an adaptation engine to create an adaptive course based on user model information. Taking into account domain models consisting of concepts and relationships between concepts, pedagogical relationships can be used to connect concepts of domain models in a pedagogical meaningful way. Each type of these relationships contains adaptation code which formally specifies the meaning of relationships on a technical and a pedagogical level. To support authors in creating these relationship types a tool is being developed which easily allows the authoring process.

**Keywords:** adaptation strategies, concept relationship, authoring tool, adaptive engine

# Inferring Appropriate Feedback Timing from Answering Styles for Open-Ended Questions

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# Modelling Digital Natives in Social Learning Environments

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**Abstract:** How do students learn? It is important to ask this question to know how to help them. Because of the power of the internet and the boom of social networking sites, students of the digital native generation have been able to use these tools to improve and expand their learning. However, not much support is given to students as they learn in these social learning environments. The paper discusses the important features that should be considered in creating a student model which can later be used to identify the appropriate support that should be given to a student as he/she learns in a social learning environment.

**Keywords:** social learning environment, student model, web-based



**- C2 -**

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Collaborative Learning  
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# **A 2×3 Model of Student-Directed Formative Assessment in Collaborative Knowledge Creation**

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**Abstract:** We develop a 2×3 model to guide formative assessment of Bereiter and Scardamalia's knowledge creation. The notion of students as both knowledge creators and assessors of their own learning gives rise to theoretical and methodological issues; we explore these by putting them under a broad array of powerful theoretical perspectives, which involve the contemporary research in CSCL, self-regulated learning (SRL), metacognition, and motivation. The central idea fusing these various perspectives is the notion of human agency in Bandura's social cognitive theory.

**Keywords:** CSCL, collaborative knowledge creation, formative assessment, human agency, self-regulation, metacognition, motivation

# **An Anatomy of a Mobilized English Preposition Lesson: Toward Personalized Learning**

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**Abstract:** With the proliferation of mobile computing devices by the current school generation, significant opportunities have emerged for supporting personalized learning experiences through mobile devices. In our pilot study in introducing mobilized curricula to a class, we observed an inspiring mobilized lesson that made the students moved beyond classroom activities and exploited the affordances of mobile learning to provide multiple learning pathways for elementary grade (primary) 2 students. We analyzed how the affordances of mobile computing enable personalized meaningful learning in the lesson from four aspects: (a) allowing multiple entry points and learning pathways, (b) supporting multi-modality, (c) enabling student improvisation in-situ, and (d) supporting the creation and sharing of student artifacts on the move. A key property of mobile technology that enables these affordances lies with the high degree of portability of these devices which make them non-obtrusive in the students' learning spaces. Through the analysis, we hope to inspire the m-learning field to explore further what the affordances of mobile technology can enable in order to inform the design of more effective mobilized lessons.

**Keywords:** mobile learning, mobilized lesson, personalized learning

# Conceptual, Metacognitive and Collaborative Learning in Computer-Supported Inquiry for Chinese Tertiary Business Students

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**Abstract:** This study aims to design and evaluate a collaborative inquiry learning environment using Knowledge Forum for Chinese business students' project learning and to investigate how collaborative learning takes place. Participants were four intact classes of 102 Year 1 tertiary business students and two tutors. Two classes were experienced in a designed CSCL learning environment and the other two classes were taught in a conventional project-based approach. Data were obtained from surveys, interactions in the forum, writing quality and collaborative learning portfolio. Quantitative analyses indicated that the instructional groups outperformed the comparison groups on approaches to learning, conceptual understanding, and argumentation writing. Students' use of scaffolds on Knowledge Forum was significantly correlated with higher-level performance. Qualitative analyses using contrasting groups illustrate differences in conceptual, metacognitive and collaborative processes in computer-supported collaborative inquiry. The significance and implications of the study are also discussed.

**Keywords:** CSCL, collaborative inquiry, knowledge building, academic literacy, higher education

# Effects of Knowledge-Building on Teacher-Education Students' Epistemological Belief Change

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**Abstract:** Previous research indicates that epistemological beliefs are in relation to learning in various ways and have implications for teaching. This study further investigates whether it is possible to change teacher-education students' epistemological beliefs by engaging them in a constructivist way of collaborative knowledge building and learning in an online environment called Knowledge Forum. Findings indicate that Knowledge Forum as a knowledge-building environment is helpful in (1) engaging students in their online knowledge work; (2) making them more collaborative and reflective in the community; and (3) transforming their epistemological and pedagogical beliefs to become more constructivist-oriented.

**Keywords:** Knowledge building, epistemological beliefs, pedagogical beliefs

# Enhancing educator development through an online simulation

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**Abstract:** This paper presents an approach to educator development through games and simulations. The goal of our project was to help pre-service teachers more effectively bridge the gap, between the theory and practice of teaching. Some criteria for success used were the facilitation a professional dialogue, evidence of an emerging understanding of content delivery and the articulation of workplace culture in the teaching profession. We discuss the theory underpinning of the design, the research approaches used and summarise the findings of our research. In particular, we explain how cognitive load theory was applied to the design of many features of this virtual learning environment. We also briefly summarise six years of research that has consistently found that the virtual learning environment of ClassSim provides an effective way of introducing pre-service teachers to their future work in classrooms.

**Keywords:** cognitive load theory, virtual learning environments, pre-service teacher education, practicum, literacy teaching

# Gender and Computer-Supported Collaborative Learning (CSCL)

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**Abstract:** Very little research in CSCL has pointed to the relationship between students' gender, their learning achievement and their knowledge elaboration process. In this four-year research project, six studies have been conducted to explore this relationship. It has been found that different collaboration patterns may explain the differences in learning achievement between students in single- and mixed-gender dyads.

**Keywords:** CSCL, Gender, Physics, Problem Solving

# GroupScribbles as a Rapid CSCL Tool: Learning Experiences of Pre-service Teachers

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**Abstract:** This study examines two classes of pre-service teachers on their experiences in the use of a rapid CSCL tool called GroupScribbles (GS) to design a lesson plan that supports student knowledge building. Before GS activities, the pre-service teachers used Paper Scribbles to do problem-solving – this was to enculturate them into knowledge building practices. The GS activities adopted the jigsaw design so that each pre-service teacher took responsibility of one part of the task. Our study indicates that GS can be used in the way it is designed for - as an effective rapid CSCL tool that makes the students' work visible and persistent so that everyone in the networked classroom can easily see what has been accomplished by all members. The GS activities encouraged active participation from pre-service teachers, promoted negotiation of meaning among the learners, and facilitated small-group and whole class collaborative learning.

**Keywords:** Collaborative learning, knowledge building, jigsaw design, pre-service teachers

# Identifying Learning Opportunities in Online Collaboration: A variation theory approach

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**Abstract:** The focus of this paper is on the issue of evaluating learning which occurs in the process of online collaboration. The goal of this paper is to demonstrate the utility of a theoretical framework (variation theory) to assess the process of online collaboration. To this end, discourse of six online groups collaborating using wiki was examined. Variation theory made possible the observation that, although the groups differed markedly in their collaboration process, they focused on the same aspects of the object of learning, while ignoring one key aspect. Further analysis suggested that this missed learning opportunity may have led the students to develop a 'misconception' of the topic. These findings point to the value of variation theory as a framework for analysing online discourse to make claims related to students' learning.

**Keywords:** Variation theory, learning opportunity, online collaboration, wiki.



# Learner Control and Support Devices in an Electronic Learning Environment

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**Abstract:** Learning environments often encompass support devices to compensate for learners' lack of knowledge or skills. However, learners are not or sub optimally using these devices when these are non-embedded or segregated [1, 2]. This lack of usage has been related to variables as self regulation and prior knowledge [3,4,5]. From a design-perspective the question can be raised why then not integrate the support devices, so that learners cannot but use them? It can be hypothesized that for some learners this may provide too much support and hence may hamper their learning [6]. In this study we looked into more detail how self-regulation and prior knowledge may in interaction with the amount of learner control influence learning. Fifty-seven university students participated who were randomly assigned to one of two conditions. Based on a prior knowledge test and a self-regulation questionnaire participants were grouped. Results reveal an interaction effect. High prior knowledge learners with low self regulation skills performed better in the learner control condition than in the condition with no learner control. This was also the case for participants with low prior knowledge and high self regulation skills.

**Keywords:** prior knowledge, self regulation, support devices, learner control, instructional design

# Repairing Indexicality in Virtual Math Teams

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**Abstract:** Meaning making in the online collaboration settings of CSCL takes special forms depending on the affordances of the software. Here we analyze how virtual math teams in a synchronous environment combining text chat and shared whiteboard repair problems of chat confusion. We observe the central role of indexicality in establishing common ground and facilitating group cognition.

# Scaffolding Collaboration in Simulated Medical Emergencies

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**Abstract:** Emergency medicine requires physicians to use their knowledge, experience and skills to diagnose life-threatening conditions under conditions of uncertainty. The “deteriorating patient” (DP) simulation was created as a role play activity integrating the cognitive and social dimensions of emergency medicine. This case study of classroom use of the DP simulation examines teacher scaffolding of collaborative problem solving under two conditions: with and without technological support. The teacher was found to use different strategies by playing different roles in different situations. Under the technological support condition the teacher broadened his support by creating scaffolding strategies based on what students recorded and shared while using technology. This investigation has implications for the design of computer-based learning environments to train medical decision-making. The diverse discourse functions and scaffolding strategies associated with the different roles can be used to design environments that are more authentic, compelling, and effective.

**Keywords:** scaffolding, interactive whiteboards, medical education, problem based learning, collaborative learning

# WIRE: Linking Interactive Learning from Inside to Outside of Classroom

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**Abstract:** Learning with technology is one of the essential strategies for improving instruction quality and innovations in universities. However, most university classrooms have just changed the chalk and blackboard to the projector and screen. Instead of increasing learning motivation, attention, and interaction, the teaching methods with a single direction of knowledge delivery are still the general strategies adopted by most teachers. This study attempts to analyze and design a highly interactive learning model which incorporates with a web-based learning system as a medium to integrate Warm-up before class, Interaction in class, and Review and Exercise after class, WIRE model for short. The model was proved that can effectively improve students' learning motivation, attention, and interactions in classroom learning.

**Keywords:** Just-in-Time Teaching, Peer Instruction, Interactive Learning.

# A computer-assisted environment for a learning community of writing with reciprocal editing

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**Abstract:** This paper proposes an online writing system with peer review which provides learners various peer feedbacks as scaffolds for building their writing knowledge. The system focuses not only on the grammatical errors but also on the overall organization of written texts. Revision is emphasized in the system and the Diff engine is used to support the design of revision tools and comparison utilities. We also observe the process of new knowledge construction of each learner with action logs and statistics which are produced by the trace and statistics module in the system.

**Keywords:** Learning community, writing system, peer review, teaching/learning strategies, application of Diff

# Comparison between Blended Classes Which Incorporate E-learning Inside and Outside the Classroom

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**Abstract:** In cases where e-learning is used mainly outside the class, a lecture is given by lecture slide and a small test is given at the end of the class. Students filled out a question from a structured notebook by viewing lecture slide materials in the e-learning after a lecture. Students planned study support systems at the end of the course. Students submitted reports and evaluated them mutually. In cases where e-learning is used during school hours, the outline of class on each day is explained for about 20 minutes using slides. Students then filled out a question from a structured notebook for about 60 minutes while viewing lecture slide materials in the e-learning. Significant differences between the two methods were observed for the average score of the small test. The useful activities for improving students' attitude were found. No significant differences between the two methods were observed for the knowledge degree of technical terms and the students' attitude.

**Keywords:** Blended Learning, E-Learning, Structured Notebook, Peer Estimation.

# Design and Implementation of a Collaborative learning System to Support Software Engineering Tasks

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**Abstract:** Collaborative learning focuses on generation of interaction, discussion and collaboration in the team environment. It serves as the learning approach which involves the collaborative community. In this paper, we design and implement a computer-supported collaborative learning environment called *Zeebo* to address the current limitations of the existing collaborative learning systems to support software engineering tasks. Learners can share the learning contents and involve in the interactive discussion in a user-friendly workspace. Learners are to facilitate the collaboration activities in achieving their learning goals as in to complete the software engineering tasks which include identifying problem statements, diagramming, coding and etc.

**Keywords:** collaborative learning, concept mapping, discussion, interaction, software engineering

# Designing a Learning Community for the Pre-Service Teacher Training Using the Social Networking Service

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**Abstract:** The authors created a learning community using the social networking service (SNS), where pre-service teachers can communicate online by writing diaries and exchanging comments in order to promote students' reflection on the pre-service teacher training, and to provide social support during the training. Classroom evaluation was conducted which confirmed that pre-service teachers did use the SNS to exchange social support among them. Sharing various experiences and opinions, by exchanging diaries or comments, promoted the pre-service teachers' reflection on their daily working experience. Furthermore, practical knowledge from other pre-service teachers who were receiving on-site training at schools served as foresight to pre-service teachers who were yet in earlier stages of preparation, and served as useful information for members training simultaneously but in different locations.

**Keywords:** Pre-service teacher training, social networking service, reflection, social support, learning community



# Effects of Group Argumentation Processes on Level of Grounds

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**Abstract:** This study investigates the affects of interactive processes of argumentation in collaborative learning on the level of grounds. More specifically, it focuses on how discourse moves and participant structures are related to the level of grounds. 136 notes from on-line collaborative learning discourse were collected, coded and analyzed with ordered logit regression via Eviews software. An explanatory model indicates that boys produced more, higher level ground notes, claims, disagreement notes have higher level grounds, extended claim notes in the previous notes lead to lower level ground notes. The study provides an innovative method for understanding group argumentation processes in online collaborative learning contexts.

**Keywords:** argumentation, group processes, grounds, on-line learning, discourse analysis

# Effects of Knowledge-Building Environment on Teacher-Education Students' Conceptions about Theories and Practices in Teaching

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**Abstract:** The purpose of this study is to investigate the effects of two different computer-supported collaborative learning (CSCL) environments on teacher-education students' understanding of theories and practices in teaching. The two environments employed in this study were "Blackboard" and "Knowledge Forum." Blackboard is designed generally based on conventional learning theories. In contrast, Knowledge Forum is designed particularly based on knowledge building theory and pedagogy. Preliminary findings suggest that the participants performed better in the Knowledge Forum environment than in the Blackboard environment. Particularly, the students who engaged in the Knowledge Forum environment tended to demonstrate deeper understanding of the relationship between theories, practice, and expertise in teaching.

**Keywords:** CSCL, teacher-education students, knowledge building, Knowledge Forum, Blackboard

# From Collaborative Learning to Symbiotic e-Learning: Towards Creation of New e-Learning Environment for the Knowledge Society

-- *Symbiotic Learning Environment Based on Occasional Collaboration of Diverse Participants* --

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**Abstract:** For people who live in the knowledge society which have rapidly been changing, learning in the widest sense becomes indispensable in all phases of working, living, and playing. The construction of an environment to meet the demands of people who need to acquire new knowledge and skills as the need arises, and enlighten each other regularly is becoming very important. Thus, we hope to make the best use of the advantages of a rich e-Learning environment which aims at “*anytime, anywhere, anybody*” learning, because participants in lifelong learning for the knowledge society demand to learn at the right place and right time, and with learning content they can select themselves.

In this paper, we present five points as basic requirements for the construction of an e-Learning environment which can satisfy the various learning demands of the knowledge society, and discuss how to realize them. The key point here is the extension of the usual “*strong*” collaborative learning to effective “*Weak Collaborative Learning*”. In addition, the evolution of “*Symbiotic Learning*” for the Knowledge Society, that is, the necessity of “Symbiotic e-Learning environment based on occasional collaborative relation” and its effective realization.

**Keywords:** Knowledge Society, Collaborative Learning, Weak Collaborative Learning, Participatory Learning, Symbiotic Learning

# Knowledge Building in Second Language Learning

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**Abstract:** Little research has examined second language (L2) learning from a Knowledge Building (KB) perspective. Most KB research is conducted in the context of science or mathematics learning which focuses on idea development and refinement. This paper proposes to investigate students' L2 learning using a KB approach, drawing upon our school-based research work which examines how L2 students learn and practice language skills through a Computer Supported Collaborative Learning (CSCL) tool called GroupScribbles. We hope to develop a theoretical framework with empirical evidence from a real classroom context to explore how KB unfolds in L2 learning.

**Keywords:** knowledge building, second language learning, computer-supported collaborative learning, Chinese language learning

# Learning fractions by making patterns – An Ethnomathematics based approach

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**Abstract:** Mathematics is one of the difficult subjects children encounter. This is attributed to the fact that mathematics is taught as an abstract set of symbols and rules. Many innovative approaches have been tried to clear this misconception and make children see the real applications of mathematics. One such approach is using ethnomathematics – the mathematics present in the cultural forms of an ethnic group. In this work, we explore the effectiveness of this approach to teach a difficult mathematics concept – fractions. Fractions have been chosen due to its complexity and the inherent difficulties they pose to children. A tool was developed to teach fractions by engaging the child in two activities – making a bead necklace and tiling an area. The evaluation results indicate that such an approach is very effective in teaching the concept.

**Keywords:** Patterns, fractions, ethnomathematics.

# Log Analysis of Outside Class Study for Cognitive Modeling

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**Abstract:** The present study investigates participant learning processes in a cognitive science introductory class. The participants engaged in three sequential cognitive modeling tasks with a web-based production system that has several functions for helping individual learning of cognitive modeling. We analyzed the requests sent to the system's server during the period of the class (71 days) and confirmed the following: (1) increase of the number of the requests from the first to final tasks; (2) changes of the modeling processes along with the development of learning; and (3) significant correlations between the changes of the modeling processes and subjective evaluations of the achievements of the final task.

**Keywords:** log analysis, social interactions, education on cognitive modeling

# Mechanisms for Collective Knowledge Advancement in Argumentative and Non-Argumentative Discourse

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**Abstract:** Knowledge building as a pedagogical approach focuses on students advancing their collective knowledge through online discourse. This paper examines the mechanisms through which such knowledge advancement may take place in argumentative and non-argumentative discourse. In non-argumentative circumstances, questioning is the major mechanism for knowledge to be advanced. In argumentation, knowledge advancement can be achieved through challenging and rebutting of ideas. Two more specific discourse mechanisms for knowledge advancement are identified in the argumentative discourse analyzed, namely, the “*setting of conditions and delimitation of claims*” and “*comparisons*”.

**Keywords:** Argumentation, knowledge building, knowledge advancement

# Reflective Mapping Software for Supporting Reflection through Comparing with Other Learners' Thinking Process

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**Abstract:** In this paper, we have developed a new concept mapping software with search function and compare function. These functions support reflection on their thinking process through comparing their thinking process with that of other learners. We conducted an experimental evaluation to examine how the function supports easily finding the difference between their own maps and the maps of other learners, which have different thinking process from their own process, and to clarify the subjective evaluation of the effectiveness of compare function. The results showed that the function was effective in supporting reflection.

**Keywords:** Reflection, Concept Mapping Software, Process, Other Learners, Compare



# Students' Difficulties When Solving Physics Problems: Results from an ICT-infused Revision Intervention

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**Abstract:** In this paper, we provide a discussion on students' difficulties when they solve physics problems. First, we establish that students are reluctant to study physics, mainly because solving physics problems is difficult. Next, we review the literature and establish that (i) rich insights into students' thought processes and knowledge bases (including specific difficulties in the process of problem solving) may be gleaned from their computer-mediated discourse during collaborative problem-solving, and (ii) the presence of misconceptions and/or activation of inappropriate p-prims, misreading and/or misinterpretation of the question, and weak mathematical abilities are key impediments to solving physics problems. We then describe our research methods and state that in addition to these established factors, we found that other causes also significantly hindered our students' ability to successfully solve the physics questions that we posed. To explicate our point, we provide protocol data taken directly from our students' computer-mediated peer discussions. Finally, we set out some implications of the research work, and propose some future research directions.

**Keywords:** Physics education research, prescriptive tutoring, learning intervention, peer discussion, students' difficulties, problem-solving, computer-mediated communications

# The Design of 3D Collaborative Learning System with Embedded Broker

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**Abstract:** Recently, the academic community has been giving much attention to Cooperative Learning System, a group learning method combined with pedagogy and social psychology. It allows group members to gain knowledge through collaborations and interactions. Nowadays, most Internet cooperative learning systems are designed to provide students mainly with a convenient online environment to study theoretical courses but rarely with a 3D virtual reality to operate practical instruments. Hence, this paper designed a 3D online collaborative learning system for operating virtual instruments. By integrating with Virtual Reality, Remote Control Parameter Transmission and Embedded Broker techniques, this system gives learners not only a collaborative learning environment via networking to jointly operate the 3D virtual instruments (for example, multi-meters, power supplies and oscilloscopes) but also the functions of instant messages and 3D puzzles to interact with one another. Therefore, learners can effectively improve learning interests and results. Besides, the proposed embedded Broker also provides service capabilities similar to that of a high-end server system, and significantly reduces the system costs.

**Keywords:** Collaborative, embedded broker, virtual reality

# THE ONLINE PROBLEM BASED LEARNING: THE EFFECT OF COLLABORATION TOWARDS THE CONSTRUCTION OF KNOWLEDGE IN THE WIKI

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**Abstract:** This paper reports on the effect of the collaboration on the construction of knowledge in the online Problem Based Learning (PBL). A total of 1,300 students enrolling in the JUJ 103 – ‘Introductory to Distance Education and Computer Literacy’ course was involved in this study. They were divided into groups with an average of 10 students to a group giving the total of 141 groups. The frequency of postings in the forum board was used as a measure of the extent of the collaboration taking place within a group. The Wiki activity tool was used as a work space for the construction of knowledge by the groups. The degree of the construction of knowledge by each group was measured using the evaluative scores given to the completed Wiki based on a pre-determined rubric. The results show that there was a high degree of collaboration taking place within the groups when they undertook the online PBL and that there was a strong relationship between the degree of collaboration and the knowledge being constructed in the Wiki.

**Keywords:** Problem Based Learning (PBL), the Learning Management System (LMS), Wiki, construction of knowledge, collaboration.

# Design for Object-Oriented Modeling Course Blending Individual and Collaborative Learning Activities

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**Abstract:** In this paper, we describe that we have designed an object-oriented modeling course by CMS-based individual learning and face-to-face collaborative learning. In 2008, we conducted classes based on the course design in which students learn in two phases. In the first phase, students learn basic knowledge and concepts in individual learning. In the second phase they apply the knowledge and concepts to the modeling of information systems through a collaborative learning. The results showed that the design was effective for students to reach an adequate level of basic knowledge and to enhance their experience of collaborative development.

**Keywords:** collaborative learning, individual learning, learning design

# Development and evaluation of a Training Program for Teachers' Competence Using ICT

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**Abstract:** This study aims at proposing a training program to improve teachers' competence using ICT (Information and Communication Technology) on a remote island. It is expected by means of ICT in class, to have students communicate with their peers in other regions, acquire a skill for presentation and reflect on their studies. However there are few opportunities for teachers to learn the use of ICT. Therefore, we investigated the computer anxiety of teachers and evaluated a training program. The training program has two viewpoints: participation and study of teaching materials. On the whole, the evaluation of the training program was affirmative. In particular, the evaluation of study of teaching materials received a high score. Participation was effective for teachers who have social computer anxiety.

**Keywords:** teachers' competence using ICT, training program, participation, study of teaching materials

# Effects of Knowledge Building on College Students' Scientific Epistemological Beliefs

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**Abstract:** The purpose of this study was to help college students develop more informed and sophisticated scientific epistemological beliefs. Forty-two undergraduates who took an introductory course about natural sciences participated in the study. An online collaborative knowledge building environment, enabled by a software program called Knowledge Forum, was provided for students' collective knowledge work. Data mainly gathered from an open-ended survey which concerns with epistemological beliefs in science. Preliminary findings revealed some positive changes in students' beliefs in science.

**Keywords:** scientific epistemological belief, nature of science (NOS), knowledge building

# Focusing-support Interactive Interface in Collaborative Learning Environment

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**Abstract:** In order for learners to study collaboratively with others and progress effective learning, learning environment should provide learner views that reflect focusing intentions for learners. So far, we have constructed the collaborative learning support interface in which learner views are automatically changed according to learners' focusing targets. In this research, we discuss the detection method of focusing utterances for learners and propose the dynamic display method of exchanging utterances. To detect the focusing utterances of each learner, five types of utterance patterns are defined according to target utterance and utterance target information. Utterances move in the virtual learning environment from the utterers to the target learner of utterances. In addition, focusing utterances are represented in the learner view with different color and display time so as to distinguish them from other utterances.

**Keywords:** Round-table interface, CSCL, focusing intention, focusing utterance

# Integrating Paper-based Annotations with Wiki to Support Collaborative Reading

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**Abstract:** The aim of the study was to carry out pre-class activities of collaborative reading on Moodle so that the interaction in the traditional classroom could be stimulated. By using wiki for knowledge sharing, asynchronous collaborative annotations were accomplished on papers while reading articles. It was expected that both collaborative learning and technology enhanced reading could be achieved. After members in a presentation group collaboratively study by sharing their annotation of reading results to each other, other students read the article with annotations a week before the oral report of the presentation group, so as to study in advance. At last, all students except for the members of the presentation group uploaded their preview assignments on Moodle one day before listening to the oral presentation in class. Every group played the role of presentation group in turn every week during the two experimental months. Finally, the questionnaire of Technology Acceptable Model (TAM) was employed into exploring the perceived of usefulness and satisfaction about sharing annotations in the learning activity. The effects of various annotation styles were also discussed. Moreover, the preview assignments were graded and analyzed in the study.

**Keywords:** Knowledge Sharing, Technology Enhanced Reading, Wiki, Collaborative Annotation, Technology Acceptable Model



# Practical Consideration about Video Sharing System for Supporting Collaborative Lesson Improvement

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**Abstract:** We describe the VISCO (Video Sharing System for Supporting Collaborative lesson improvement) which visualize the correspondence between the scene on the movie and comments of the discussion and support collaborative lesson improvement in the dispersion environment. VISCO enables inexperienced teachers to discuss the problem scene which they brought to make a profound study. In this paper, we report the educational practice with 3 inexperienced teachers by using prototype system.

**Keywords:** collaborative lesson improvement, video sharing, visualization of the correspondence between movie and discussion

# The Effectiveness of Teachers' Facilitation in Using Game Elements to Motivate Students' Participation in CSCL discussion

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## Abstract:

This study investigates whether teachers' facilitation was conducive to the effective use of game elements on a CSCL platform in motivating students' participation in CSCL discussion. The 1,112 Grade Five students of Hong Kong and Taipei discussed their project topics on *Learning Villages* (LV), a CSCL platform with game elements, which are mainly based on a reward system responding to and reflecting the quality and quantity of students' online discussions. Throughout the learning process, the teachers facilitated their students' discussion on LV by using various elements of teachers' facilitation. This study found that, in students' perception, effects of game elements in motivating them to discuss did vary significantly with various degrees of teachers' facilitation. Besides, some elements of teachers' facilitation were conducive to the effective use of game elements in motivating students' participation in CSCL discussion.

**Keywords:** Computer-supported Collaborative Learning (CSCL), teachers' facilitation, game elements, participation, online discussion

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and Standards**



# A Concept Based Digital Study Guide and Annotation System on Paper Textbook

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**Abstract:** Concept maps are an effective way of representing a person's understanding of a domain of knowledge. The traditional way of constructing concept maps uses paper and pencil. The concept maps, that time, were not easy to construct incrementally, and there was no such tools to help students to scaffold the concept maps. Although there are lots of tools to help students constructing concept maps recently, students still learning from paper textbook most of time. Additionally they have to context switch between paper and computer to search for the concepts to link and the description for the relationships of two concepts. Therefore, we propose a mechanism, Concept Base Study Guide system, by pen gesture for organizing the computer and the paper textbook to develop concept maps, and scaffold student constructing concept maps easily and incrementally.

**Keywords:** Concept map, Pen gesture, interaction between paper and computer

# A Mixture Item Selection Approach for E-Testing

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**Abstract:** Computerized adaptive testing is a very effective mode in e-testing. It can shorten the time in providing accurate estimate of student ability. In this paper, we will introduce a new item selection method that would allow more flexibility in balancing the two competitive goals of accuracy and item pool utilization in computerized adaptive testing. Moreover, an index for comparing a weighted balance of these two goals is proposed.

**Keywords:** Computerized adaptive testing, item selection, accuracy, item pool utilization

# An Automatic Generation of Multiple-choice Cloze Questions Based on Statistical Learning

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**Abstract:** Since English expressions are different according to the genre, it is important for users to study with questions that are generated from sentences of the target genre. Although various questions are prepared, it is still not enough to satisfy various genres which users want to learn. On the other hand, when producing English questions, enough grammatical knowledge and vocabulary are needed, so it is difficult for inexperts to prepare English questions by themselves. In this paper, we propose an automatic generation system of multiple-choice cloze questions from English texts. Experiential knowledge is necessary to produce appropriate questions, so machine learning is introduced to acquire knowledge from existing questions. To generate the questions from texts automatically, the system (1) extracts appropriate sentences for questions from texts based on Preference Learning, (2) estimates a blank part based on Conditional Random Field, and (3) generates distracters based on statistical patterns of existing questions. Experimental results show our method is available for selecting appropriate sentences and appropriate for estimating the blank part.

**Keywords:** Automatic question generation, multiple-choice cloze question, statistical learning, preference learning, ranking voted perceptron, conditional random field

# Building Portfolio from Learning Plan

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**Abstract:** A portfolio records achievements in the personal growth process. A personal development e-Portfolio assists an individual in planning their development path and reflecting upon their own learning. In this paper, we proposed the construction of personal development portfolio from the learning path perspective and this approach was illustrated via a prototype of learning path oriented e-Portfolio systems.

**Keywords:** Learning paths, e-portfolio systems, whole-person development



# Design and Implementation of Extensible Learner-adaptive Environment

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**Abstract:** This paper describes the design and implementation of a flexible architecture that is capable of extending the functions of a learner-adaptive self-learning environment. A “courseware object”, which is a program module that is used to implement various educational functionalities, has been newly introduced to ensure both function extensibility as well as content reusability. A prototype system was designed and implemented to investigate the feasibility of the proposed architecture and to identify the core behavior and interaction schema of courseware objects. The results from this trial indicated that several learner-adaptive functionalities including the SCORM 2004 standard specifications will be able to be successfully implemented on the proposed architecture.

**Keywords:** e-learning technology standardization, learner adaptation, function extensibility, platform architecture, courseware object, SCORM 2004

# Supporting Acquisition of Knowledge to Personalize Interactive Learning Environments through a Meta-Model

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**Abstract:** Outsourced personalization of Interactive Learning Environments (ILE) requires having knowledge on these ILE: their teaching description (type of activities, parameters for exercises generation...) and their technical description (files location, content of configuration files...). To make possible this personalization, we propose a meta-model to acquire, through an expert, relevant knowledge necessary to personalize an ILE. We combine this meta-model with two processes: the first allows using the meta-model to create a specific model to an ILE, and the second allows using this model to personalize the ILE.

**Keywords:** Meta-model of knowledge, models of knowledge, Interactive Learning Environments (ILE), personalization, externalized configuration

# A Survey of Application of Chinese e-Learning Technology Standards in Distance Education Colleges

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**Abstract:** Many organizations defined e-Learning standards/specifications to improve the effect of teaching and resources management. China defined Chinese e-Learning Technology Standards (CELTS) according to educational need and requirements in China. CELTS also referenced other standards/specifications, such as the Institute of Electrical and Electronics Engineers, Learning Technology Standards Committee, Learning Object Metadata (IEEE LTSC LOM), Advanced Distributed Learning Sharable Content Object Reference Model (ADL SCORM), Instructional Management Systems (IMS), and so on. Chinese e-Learning Technology Standard contains five categories: (1) guidance, (2) learning resources, (3) learner, (4) media and platform, and (5) educational management. Each category is composed by general specification and general specification. We investigated some teachers and developers whose work is related with e-Learning and e-Learning standards. This paper describes the application effect of CELTS by investigation. The investigation shows that learning resource specifications are widely used, and other specifications are gradually accepted by users.

**Keywords:** Standards, e-Learning, learning object metadata

# A Writing Support Tool for Learners of Japanese as a Second Language based on a Web Search Engine

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**Abstract:** In order to provide useful information about writing and learning Japanese, this paper proposes a writing support tool for learners of Japanese as a second language based on a Web search engine. The proposed tool consists of a composition and a learning support module. The composition support module searches for example sentences and word usage on the Web, and verifies given sentences and expressions by the hit count and the statistical analysis on snippets provided by the search engine. It produces a table and a graph based on the hit count of those queries, and provides example sentences based on learner's vocabulary level. Learner's search logs include important information for learning support. Currently, learning support function is being designed.

**Keywords:** Writing support, second language, Japanese, Web search engine

# Development of the Japanese Pronunciation Learning Support System for Nonnative Learners Using Speech Recognition

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**Abstract:** In this paper, we propose and develop a new pronunciation learning support system for nonnative people who want to learn the Japanese pronunciations in daily conversations. Our idea is build onto a speech recognition product as a module separated with teaching module. The speech recognition engine is applied for judging whether the pronunciations of learners are right Japanese or not. This module organization makes it possible to build a simple and an adaptable system. The practices, which we have designed, have the following three features. (1) Learners can learn through learning courses according to the scene of everyday life. (2) Learners can learn without knowledge of Kanji (only knowledge of Hiragana and Roman alphabet). (3) Learners can learn the Japanese pronunciation with hearing adaptable pronunciations of right Japanese of a model. We have developed a prototype system and experimented for evaluation. The experimental results show that our system has not only been welcomed by learners but also they have shown good progress in the improvement of their pronunciations.

**Keywords:** Japanese pronunciation, speech recognition, sample speech, speech practice

# Exploring Effect of Rater on Prediction Error in Automatic Text Grading for Open-ended Question

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**Abstract:** This paper aims to explore the way of evaluating the automatic text grader for open-ended questions by considering the relationships among raters, grade levels, and prediction errors. The open-ended question in this study was about aurora and required knowledge of earth science and physics. Each student's response was graded from 0 to 10 points by three raters. The automatic grading systems were designed as support-vector-machine regression models with linear, quadratic, and RBF kernel respectively. The three kinds of regression models were separately trained through grades by three human raters and the average grades. The preliminary evaluation with 391 students' data shows results as the following: (1) The higher the grade-level is, the larger the prediction error is. (2) The ranks of prediction errors of human-rater-trained models at three grade levels are different. (3) The model trained through the average grades has the best performance at all three grade-levels no matter what the kind of kernel is. These results suggest that examining the prediction errors of models in detail on different grade-levels is worthwhile for finding the best matching between raters' grades and models.

**Keywords:** Rater, prediction error, SVM, automatic grader, testing, science learning

# Specifying Cases for TEL in an SME

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**Abstract:** This paper presents the process of identifying and describing cases for Technology Enhanced Learning (TEL) in a Small/Medium Enterprise (SME), as a part of an ongoing international TEL project. It proposes a template for describing TEL cases in an SME that collaborates with other organizations, notably with a university/research group. An example case description is used to illustrate the template proposed.

**Keywords:** Application case, TEL case, SME, template.

# The Effects of Blended Instruction Utilizing WBT Courseware and their Relationships to the Five-Factor Model of Personality

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**Abstract:** ‘Blended Instruction’, an effective method of instructions utilizing e-Learning materials in English education, consisted mainly of an individual learning part in which students acted out model dialogues in the WBT courseware which incorporated a high quantity of video and sound clips, a collaborative learning part in which students performed the dialogues in pairs and assessed each other’s performance, and a teacher instruction part. Our recent research in a high school showed that the skill of the students’ oral reading was improved in most criteria of assessment through blended instruction. However, it was still not clear what kind of relationship existed between the development of the students’ oral reading skills and their personalities. With this in mind, we have studied the effects of the blended instruction on the junior high school students’ oral reading performance and their relationships to the five-factor model of personality. The result of the research shows that the skill of the students’ oral reading was improved in most criteria of assessment and the blended instruction has more effect on the personality group, ‘Introverted unintelligent person’, than any other personality group in terms of oral reading performance.

**Keywords:** Blended Instruction, Foreign Language Education, Oral Reading Performance, e-Learning, WBT, Five-Factor Model



# Authentication and Authorization exchange for University Federation

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**Abstract:** This paper focuses practical use of Shibboleth and its extension. Shibboleth is the open source framework that has been introduced in recent years for higher education in Europe. Shibboleth facilitates identity federation. However, this framework does not satisfy the all requirements of operational environment. We propose a method of solving the requirement that occur at during operation and perform an assessment of our extension.

**Keywords:** Shibboleth, SAML, Authentication, Authorization, Framework

# Construction of Image Database with Data Hiding Technology for History of Computing

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**Abstract:** This paper concerns with an image database with contents related to the history of computing. There are many relics of tools, instruments and machines for recording characters and calculating numbers, which are stored in computer museums in the world. In order to avoid the multiple-maintenance of images and explanation texts, we adopt the data hiding technology which embeds the related explanation contents into an image. Then, we construct a new image database structure with private tags, which enables the multiuser use and the individual copyright layer corresponding to each user. The constructed image database is applied to the education for the history of computing.

**Keywords:** Image database, teaching/learning material, history of computing, data hiding

# Design and Implementation of scrapbook function for e-Portfolio

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**Abstract:** Recently, Online user generated systems offers diversified services like as Blog, Wiki, SNS. We focus on e-Portfolio system that was closely connected with LMS that was noticed as a learning system of them all. In this paper, we propose a scrapbook function in the e-Portfolio. We think that scrapping from enormous quantity of Web is a kind of learning. Scrapping that is stored web images to the e-Portfolio is utilized thinking back. We think that sharing of scrapped data generates new awakening. We build a prototype e-Portfolio that has Scrapbook function.

**Keywords:** e-Portfolio, scrapbook, LMS, e-Learning, thinking back

# Development of an Arabic Language Learning Support System

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**Abstract:** The Arabic language isn't a one-country language. That made the concern for English-language acquisition rising very much currently in Japan. However, Arabic language students can't find a learning system for the Arabic language acquisition easily, that's if they can find such system at all. Therefore, we are developing an Arabic language learning supporting system.

**Keywords:** language-learning, Arabic language, e-Learning

# Development of Instruction Analysis Tool for Microprocessor Design Education

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**Abstract:** We developed an instruction analysis tool for acquiring the design skill to think of the specification for implementing the instruction. The instruction is split into semantic divisions and function divisions, and the correspondences of the semantic and functional divisions are visually analyzed. Since each function division indicates each hardware operation, the user can clearly understand the relationship between the instruction specification and the hardware operation that implements it. This instruction analysis tool gives the design skill that thinks of the specification for implementing instructions.

**Keywords:** Instruction analysis, Microprocessor design education

# Hiragana Learning Support System with On-line Stroke Detection

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**Abstract:** In this paper, we describe a Hiragana learning support system with on-line stroke detection. We introduce new methods of detecting stroke ends such as “Tome, Hane and Harai”. Our system makes use of detection results to score and guide written characters. Our system supports three learning styles. The first style is watching animation of Hiragana writing. The second style is tracing thin mark of characters. The last style is writing characters without thin mark. The system evaluates the characters based on the recognition results of the characters and the detection results of Tome, Hane and Harai.

**Keywords:** Handwriting, Hiragana, Character Recognition, On-line Handwriting

# Supporting System of Japanese Accent Learning for Foreign Students

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**Abstract:** Many foreign students come to Japanese universities, and they have a problem on Japanese pronunciation in university life. In this study, we propose a new Japanese accent learning supporting system for foreign students. We analyze rhythms and accents of foreign students' pronunciation. Further, we compare the accents of foreign student and Japanese standard. Then, we develop a supporting system of Japanese accent learning for foreign students, which contains the feedback mechanism of the visualized accent differences.

**Keywords:** Japanese Learning, Supporting System, Japanese Accent.

# The Development and Evaluation of the Metadata Attaching System with LOM Database

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**Abstract:** NICER—the National Information Center for Educational Resources in Japan—is a central website providing all kinds of information about educational resources in Japan. NICER currently has 280,000 resources. The aim of this study is to develop and evaluate a Web system that attaches metadata to educational resources, especially images, in the database. This system deals with LOM (Learning Object Metadata). The user can attach metadata by searching for the images on the Web, along with the same metadata of similar images by using a similarity engine. This system also has three modes: package-images mode, one-image mode, and modification mode. This system has been evaluated and inspected by subjects, and is being put to practical use at NICER in Japan. A large number of digital images are stored on the Internet. From an educational perspective, it is very helpful that a vast number of images on a number of topics are readily available and are in some cases free.

**Keywords:** LOM, Educational Resources, Images Database, NICER



# Using Interactive Platforms to Enhance Course Sustainability

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**Abstract:** This study analyzed three platforms—the “interactive platform for faculty development (IPFID)”, “Tsai’s wonder art world”, and “interactive platform of Cloud Gate(IPCG)”. The participants of the first platform, IPFID, are eight faculty members who won the Award of Teaching Excellent at National Central University (NCU), Taiwan. The participant for the second platform is a winner of the National Weaving Arts Award. The participants in third platform, IPCG, are 14 modern dancers who are members of Cloud Gate Dance Theatre. The study employs qualitative research methods, including classroom observations, individual interviews, focus group interviews, and document analysis. The main purpose of this study is data preservation, sharing, and interaction and to accomplish three majors: (1) Preserve the films, photos, and articles of instruction, weaving, and modern dance. (2) Share and distribute this information to faculty and students, and collect their feedback. (3) Allow browsers, instructors and learners, to interact with content or other users to enhance course sustainability.

**Keywords:** Interactive Platform, Course Sustainability, data preservation, data sharing



**- C4 -**

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



# A Cognitive Load-based Framework for Integrating PDAs into Outdoor Observations

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**Abstract:** The purpose of this study is to propose a three-layer scaffold design for integrating personal digital assistants (PDAs) to support ecology inquiry for 6<sup>th</sup> graders. The three-layer scaffold design is based upon the cognitive load theory. The worksheets embedded in the observation activities focus on constraint observation, independent observation, and personal reflection, sequentially. This three-layer learning framework is used to guide, but not to limit, students' outdoor inquiry. The corresponding scoring rubrics for observation skills with PDAs were also implemented. Twenty-five students participated in the inquiry activities in a mangrove wetland. The results of this study suggest that PDAs are an effective cognitive tool, especially for engaging, enriching, and extending outdoor observation learning. The preliminary results also reveal that the three-layer framework and the observation skill scoring rubrics proposed in this study are applicable and productive resources for researchers when integrating PDAs into their outdoor learning design.

**Keywords:** Personal digital assistant, mobile learning, science inquiry, cognitive load, observation skill assessment

# A mobile and context-aware adaptive learning schedule framework from a usability perspective – a ‘diary: diary-questionnaire’ study

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**Abstract:** Effective evaluation of mobile learning applications includes consideration of them from three different important perspectives – technical, usability and pedagogical. Our literature review revealed three different types of context-aware mobile learning applications – *location-dependent*, *location-independent* and *situated learning*. Our theoretical framework – mobile and context-aware adaptive learning schedule (mCALS) was constructed. This uses a proactive approach – the learner’s schedule (i.e. an electronic organizer) to retrieve the location and time available contexts. Other contexts are also considered – learning styles, knowledge level, concentration level and frequency of interruption. Thereafter, appropriate learning materials will be recommended to students based on this information. Our pedagogical interview study formed the first part of our evaluation study. For our usability feasibility study, we utilized a ‘*diary: diary-questionnaire*’ research methodology, which together with the preliminary data analysis, forms the focus of this paper. 32 undergraduate and postgraduate university students participated in our study. The results gained from this study have helped us further refine the final requirements of our framework.

**Keywords:** context-based, usability study, ‘*diary: diary-questionnaire*’ study, mobile learning

# Adaptive Kanji Learning Using Mobile-based Email

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**Abstract:** This paper describes an adaptive learning system based on mobile phone email to support the study of Japanese Kanji. In this study, the main emphasis is put on using the adaptive learning to resolve one common problem of the mobile-based email or SMS language learning systems. To achieve this goal, our main efforts are made on three aspects: sending the contents following learners' interests, adjusting the difficulty level of the tests to suit each learner's cognitive level and adapting the system to their learning styles. Additionally, our system has already been evaluated by the learners and the results show that most of them benefited from our system and would like to continue using it.

**Keywords:** Mobile learning, mobile-based email, learning Kanji, adaptive learning system

# Contributing, Exchanging and Linking for Learning: Supporting Web Co-Discovery in One-to-One Environments

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**Abstract:** There have been little studies on providing collaborative discovery on the web search results contributed by peers in one-to-one environments. This study therefore proposes an integrative groupware, CELL (Contributing, Exchanging, and Linking for Learning), which utilizes both personal mobile computers and a shared display in support of one-to-one Web co-discovery. Through gathering small group activity, facilitated by CELL groupware, it was found that this design was indeed useful in supporting students in their efforts to search the Web autonomously while simultaneously engaging in joint discussion of the emerging web search results. In addition, this study identified three collaborative discovery patterns of student groups in the use of the CELL groupware: iterative envisioning discovery, fixed framework discovery, and framework development impediment. Most student groups demonstrated the iterative envisioning discovery pattern which indicates that the CELL groupware did help students to integrate their findings on the Web and thus gradually to broaden their understanding toward the open-ended problem.

**Keywords:** Collaborative learning, discovery, groupware, one-to-one, web resource



# Learning Experiences on Mobile Social Media

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**Abstract:** This paper focuses on a pilot study in which a social video application, MoViE, was used to teach basic HCI concepts in bachelor -level education. The aim of the study was to examine the problem space of educational mobile video blogging in order to determine the next phase research settings and future expectations in more details. The learning activities in this experiment were analyzed using SEAF framework that was used to design the MoViE application. The results indicated that video blogging can be effective method in HCI education, but some of the students need support and more strict tagging rules to get best out of this kind instructional method. Furthermore, blogging turned out to be much more effective method to evaluate students' level of understanding than traditional paper-pencil tests. In the future, we will especially focus on the remixing feature of MoViE that makes possible for example to create personalized mobile video books, learning diaries and portfolios.

**Keywords:** Social media, mobile learning, activity theory, design, user experience

# Using PDA to Enhance Social Science Learning with Inquiry-based Strategies

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

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

# Visualization of Social Knowledge Awareness Map for Computer Supported Ubiquitous Learning

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**Abstract:** This paper introduces a social knowledge awareness map in a ubiquitous computing environment in order to support the learners while doing tasks. The exploration of social networks is essential for finding capable cooperators, who can help to solve problems. This system allows the learner to find a peer helper, share knowledge, interact, collaborate, and exchange individual experiences. This paper proposes Knowledge Awareness (KA) map which visualizes the learners surrounding environmental objects, peer helpers and strength of relation in a social network perspective. In this paper KA map is dynamically designed and displayed for every individual learner.

**Keywords:** Ubiquitous computing, RFID, PDA, social interaction, knowledge awareness map, peer helper, mediator.

# **A conceptual map-oriented Mindtool for conducting collaborative ubiquitous learning activities**

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**Abstract:** Recent progress in wireless communications, mobile computing and sensor technology has attracted researchers to investigate the development and applications of context-aware ubiquitous learning environments, in which the learning systems can detect the behaviors of students and guide them to learn in the real world. Meanwhile, scholars also indicate that, it is important to provide computer Mindtools, with which the students can learn in a more meaningful way. In this study, we present a Taiwan e-learning project that aims to develop a concept map-oriented Mindtool for context-aware ubiquitous learning. In addition, new situated learning models, assessment models, learning diagnosis models and reflection strategies are developed accordingly.

**Keywords:** Concept map, context awareness, ubiquitous learning, Mindtools, computer-assisted instructions.

# Beyond Rationality: Affective and motional Effects on External Representations in Seamless Learning

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**Abstract:** In this paper, we re-visit different theoretical and conceptual issues that have been influencing the design of educational technology artifacts. In particular, we take into consideration recent perspectives in cognitive science that acknowledge the important effects of external representations in learning and discuss the challenges regarding the applicability of these ideas in connection to seamless learning environments. Extending the previous work revised here, the current paper suggests that in order to further understand the nature of learning in these novel contexts, research needs to investigate how socio-affective factors come to the fore and influence the co-construction and use of external representations “in the wild”.

**Keywords:** External representations, collaborative learning, seamless learning, ubiquitous systems, affects, emotions, group dynamics

# Building a Participation Simulation Mobile Learning Environment through Scaffolding Technique

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**Abstract:** In traditional education, most of them are one-way that the teacher teaches and the students listen. In the process of improving the motivation of the traditional education and increasing learning opportunities, we propose building a participatory simulation mobile learning environment using the fundamental concepts in scaffolding and fading, called SPMLE (Scaffolding Participation simulation Mobile Learning). SPMLE can be seen as an extension of the traditional education. Using SPMLE, students learn the knowledge through participation in a mobile simulation and they are brought through a scaffolded process. Making use of SPMLE, we implemented and evaluated two prototype systems, one is ALGOS and the other is JAPELAS. The result proved the effectiveness of SPMLE, and it showed that SPMLE can improve the motivation of the traditional education. From the evaluation, we found that these two systems strongly effect the improvement of the traditional education.

**Keywords:** Mobile learning, CSCL, Participation simulation, Scaffolding and fading

# Context-Aware Delivery of Contents for Niche-Learning

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**Abstract:** We have been engaged in a project of Niche-Learning that provides a spot of knowledge by delivering short learning materials from the monitor placed in the lounge area on campus. To provide the more informative contents for the majority of the viewers this paper proposes a method to estimates the students who are likely to be around the lounge area considering their presence to the classes and registration status in the classrooms around the lounge area. From the degrees of interest, understanding and relevance between the classes and the learning contents, the most informative content for the projected viewer students is decided.

**Keywords:** e-Learning, content delivery control, RFID, context-aware

# Development and Evaluation of Web-based Mobile Contents for Logical Thinking by Teaching Students “How to Think”

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**Abstract:** The system described in this paper offered the combination of different media like notebook paper and the built-in camera of mobile phones. Learners' comments on notebook were saved as texts by mobile phone comment card database system and diagrams were saved as pictures database automatically. It was intended to make a seamless learning solution for sharing knowledge and learners' collaboration. Web-based mobile contents for learning syllogism were developed by using this system to aid the teaching of cyber-safety by teaching students how to think. Learners were asked to submit their logic diagrams through this mobile database system and to engage in mutual discussions. This facilitated the exchange of thoughts and viewpoints, and therefore, it has been indicated that these activities could help stimulate collaborative learning.

**Keywords:** Smart use of the built-in camera of mobile phones, Flexibility of mobile media production, Web-based Mobile contents, Logical Thinking, Database for Mobile



# Effects on Cognitive Styles in Student Achievement for Context-Aware Ubiquitous Learning

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**Abstract:** In recent years, with the steady development of mobile and sensor technologies, the method of e-learning has gradually migrated to mobile learning, and even to context-aware ubiquitous learning. However, few evidence to show that all students can benefit from this new type of ubiquitous learning. This could therefore be an issue worth discussing further. Meanwhile, cognitive styles have often been regarded in much of the research as a factor which could impact learners' efficacy in the e-learning environment. Hence, a butterfly-identification learning activity was designed to lead students to identify butterflies in an authentic environment embedded with sensors and wireless technology. Based on the purpose of the study, we attempt to investigate what differences there are among the distinct cognitive styles of the learners. As the experimental results shown, field-independent learners have superior learning achievement to field-dependent learners. Thus, a proper learning activity needs to be designed for field-dependent learners once a context-aware ubiquitous learning environment is introduced.

**Keywords:** cognitive style, field independence, field dependence, mobile learning, context-aware ubiquitous learning

# Interacting with the Virtual and with the Real in Mobile Learning

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**Abstract:** KEI-Time Traveler is a kind of *virtual time machine*, which needs only commercially available GPS phones. In reality, KEI-Time Traveler just shows graphical images of a past scene within a given area, viewing from the current location and with arbitrary viewing angles. Users can virtually explore the past world with this system. We applied it to junior high school students, twice. They virtually visited a world of 1938, when a severe landslide disaster occurred, but the designs of interaction with the virtual past world were different between the two fieldwork trials. By comparing the results, we discuss the interaction design and its effects on the fieldwork.

**Keywords:** Interaction Design, Mobile Phones, Fieldwork, Virtual World, History

# **JAMIOLAS 3.0: Supporting Japanese Mimicry and Onomatopoeia Learning Using Sensor Data**

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**Abstract:** In this paper, we propose an improved context-aware system for supporting to learning Japanese mimicry and onomatopoeia (MIO) using sensor data. In our two previous studies, we proposed context-aware language learning assistant systems named JAMIOLAS (Japanese MImicry and Onomatopoeia Learning Assistant System). We have used wearable sensors and sensor network respectively to support learning Japanese MIO. On the disadvantage of previous systems, we propose a new learning model that can support learning MIO with the sensor network to carry out context-aware learning mainly in ways of creating context initiatively and detecting context automatically.

**Keywords:** mimicry, onomatopoeia, sensor, language learning, context-aware learning, ubiquitous learning

# Mobile Devices Help Learners in Acquiring Factual Content and Conceptual Structural Knowledge

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**Abstract:** This paper reports on the knowledge test results of three groups of junior high school students participating in this project. Many researchers argue whether mobile devices can help learners acquire knowledge, particularly in an informal learning setting. This paper uses an exploratory quasi-experimental study with pre-tests and post-tests in comparing the test scores of students in the MO-bile group (with the mobile setting and online setting) and the Online group (with only online setting). Data is collected through a series of knowledge tests (one with factual content and six conceptual structural knowledge tests). Based on the findings, it is found that the use of mobile devices helps learners acquire both the factual content knowledge and the conceptual structural knowledge of a specific topic.

**Keywords:** exploratory quasi-experimental study, factual content knowledge, conceptual structural knowledge, mobile setting, online setting

# Mobile Phone-based Quiz System for Learning Foreign Culture

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**Abstract:** For the foreign language learning, it is important to understand the cultural context in which the language is spoken. Understanding different cultures is indispensable to learn foreign languages. It helps to generate interest in learning the language. We propose a quiz system to help students to understand the foreign culture in a mobile-learning environment. This is a mobile phone based system which supports the students answering the questions about the foreign culture anywhere, anytime. Utilizing this system, students can understand the culture of the target language. We present the design and implement of the system.

**Keywords:** Language Learning, Mobile Learning, Foreign Cultures, Quiz

# Practical Study of Portable Learning Assistance Tools using PDAs in Elementary Science Field Activity

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**Abstract:** Portable learning assistance tools that display learning information (learning assistance tool) by holding a non-contact IC card over a PDA with an attached non-contact IC card reader/writer was developed. In this practical study, a field observation activity was conducted using the portable learning assistance tools in the "earth structure" unit of elementary school. Results indicated that the students' level of comprehension was significantly increased after the field activity, and a survey of student attitudes revealed that motivation for learning field observation increased.

**Keywords:** Science Education, Field Activity, Mobile Tool, RFID

# Sharing Experience from Three Initiatives in Mobile Learning: Lessons Learned

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**Abstract:** Incorporating knowledge from past experiences is an important part of any development process, as one has to know what worked and what did not in order to avoid repeating the same mistakes. However, many published results in the field of mobile learning focus on isolated technologies or a specific trial rather than to reflect on the overall work practice and outcome. Such reflections can offer maturity to this emerging field of research. This paper presents reflections gained from three mobile learning initiatives that are presented in the form of lessons learned. These lessons learned can serve as considerations for researchers when developing new initiatives.

**Keywords:** Development Process, Experience, Lessons Learned, Mobile Learning, Reflections

# Supporting Skill Awareness for Runners through Wireless Sensor Network

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**Abstract:** Running is regarded as effective sports in promoting health under heightened concerns about health. An opportunity of group pace-training among runners is increasing around their daily training field. In the past some of existing researches about skill science treat individuals and ideal space for reasons involving some technical constraint. However there is now an increasing possibility that resolves those kinds of constraint through the use of modern micro display and sensor devices embedded ad-hoc wireless communication. This paper describes a training-support environment for runners with wearable support equipments of the awareness and mobile sensor network. The proposed system provides feedback to runners by providing information using kinetic feature and ambient change from sensors in the real-time. To investigate the characteristic wave form generated by repeats of arm swing during running, we conduct some trial study.

**Keywords:** Group training, awareness, physical skill, wireless sensor network, running



# A Mobile Mini-Game-Based Platform for Arithmetic Practice in One-to-one Classroom

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**Abstract:** The arithmetic is an important skill in daily live, not only developing insight into the number system but also promoting success in later written calculations. In order to enhance a student's arithmetic ability, most teachers always ask students to do plenty of math exercises on a sheet of paper. It may make students feel anxious and destroy their interests in mathematics. This study described a mobile mini-game-based learning platform for supporting individual arithmetic practicing in one-to-one classroom environment. The teacher can easily combine his or her lecturing with game-based learning activity and make students more engage in their learning.

**Keywords:** a mobile mini-game-based learning, arithmetic, one-to-one

# Are You Listening? -- The Development of Online Peer Assessment System for English Oral Reading

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**Abstract:** Peer assessment is a common used strategy in EFL reading class in Taiwan to help EFL teacher “ensure” that all students are paying attention to others’ oral reading. In this study we develop an online peer assessment system for EFL oral reading activities to overcome the potential drawbacks of traditional peer assessment.

**Keywords:** Peer assessment, oral reading, EFL, online peer assessment

# Classification of Children's Group Activity from Acceleration Data by Wavelet Transformation

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**Abstract:** We are developing the system that analyzes friendship relation from the acceleration data that represents children's activities. This system observes the children's group activities and identifies their groups. In this paper, we propose a method that analyzes children's group activity from acceleration data that represents children's activity. Our method consists of the automatic segmentation step and classification step. The automatic segmentation step detects the specific time when the group activity changes and divides time series into group activities. The classification step distinguishes the group activity of the divided acceleration data. We conducted an experiment in the kindergarten to evaluate the method and shows that the method has high accuracy.

**Keywords:** group activity, classification, wavelet transformation

# Enhancing students computational estimation ability in GS-based computer-supported collaborative learning environment

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**Abstract:** This research is informed by the theory of CSCL as a foundation of the mathematics design for the mathematical operations estimate ability and strategies. This study is implemented in a computer-supported collaboration to promote the sixth grade elementary students. The results demonstrated that this study can effectively promote the mathematics estimate examination of students. This also enhances the students' interest in mathematics and enhances group collaboration, discussion and the interaction amongst their classmates.

**Keywords:** CSCL, mathematics, estimate ability

# Mission Dolores – Designing a Situated Simulation for the iPhone

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**Abstract:** This paper present a prototyped nonhybrid augmented reality subgenre for the iPhone – a situated simulation – designed for learning and tourism. The main multimodal elements of the prototype, a simulation of San Francisco's oldest building – The Mission Dolores – are described and discussed. An informal testing of the system has been conducted and the main problems related to its use are identified.

**Keywords:** Situated simulation, augmented reality, multimodality, iPhone, genre design

# Web-based Lecture System using Slide Sharing for Questions and Answers in the Classroom

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**Abstract:** One of today's hot topics in the field of education is lecture support systems. Learning management systems (LMS) have introduced communication tools such as chat and bulletin boards into the classroom. In this paper, we describe a lecture system that encourages communication by sharing slides that the teacher and students draw with digital ink among them in ensemble learning.

**Keywords:** lecture system, slide sharing, Ajax, digital-ink

**- C5 -**

**ICCE Conference on Digital Game and  
Intelligent Toy Enhanced Learning  
(DIGITEL)**





# Digital Game as a Learning Approach to Enhance Practice Lesson in Software Engineering Course

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**Abstract:** Constructing an authentic environment for a practice lesson is expensive and time-consuming, though it brings more impact on students by operating real-world objects. It might be a feasible way of converting physical practice to cyber one if the practice attributes can be retained. In this study, we investigate the possibility by constructing a game-based learning environment for the software engineering course. For developing the environment, we have not only made efforts on designing animations to draw learners' attention but also reflecting real-world attributes through the game. To investigate the efficacy of this cyber practice, we conducted the experiment with 21 participants. Surprisingly the experimental result showed those students did not perform in the test as well as we expected. Even we were little disappointed by their testing result. Subsequently, we proceeded an interview for all of them and unveiled two issues often ignored by most game-based learning designers, priori domain knowledge and just-in-time reactions. It is believed that these will be the challenges in the research field. Nevertheless, all learners agree that the environment stimulated increasingly their motivation of learning the course and also inspired them what prior knowledge should be learned.

**Keywords:** Practice lesson, digital game-based learning, experiential learning, situated learning

# Exploring the Acceptance of Video Games in the Classroom by Secondary School Students

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**Abstract:** In this study, a path-model to examine and predict student acceptance of videogames, based on the technology acceptance model, is proposed, discussed and empirically tested. Special attention is given to the gender and experience issues. According to this model, the intention of students to use video games in the classroom is affected directly by a number of factors: the relative ease to use video games, the perceived possibilities of video games to create useful learning experiences, the perceived usefulness to gain better school results and by experience with video games in general. It is argued that gender does influence behavioral intention, although only indirectly through ease of use and experience. Survey results of 858 Flemish secondary school students revealed a good fit between the data and the proposed model.

**Keywords:** game-based learning, video games, secondary school students, educational beliefs, digital natives

# Game-based Learning as a Vehicle for Developing Science Inquiry Skills using the Centauri 7 Learning Program

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**Abstract:** In this paper, we describe how game-based learning can be used as a vehicle for developing students' science inquiry skills. Based on the theoretical foundation of the Play–Dialog–Performance model of game-based learning, we outline the Centauri 7 learning program and the learning processes that are entailed. Drawing upon a sample of post-intervention student reflections as a data source, we illustrate how enactment of the learning program challenges students' conceptions of what it means to learn physics. We also show how student disciplinary and epistemic understandings are fundamentally transformed. Student learning is no longer just conceptual but also developmental. Learning is authentic as students imbibe the attitudes, values, and beliefs of scientists.

**Keywords:** Game-based learning, science inquiry skills, Centauri 7 learning program, Play–Dialog–Performance model

# Pervading binaries, disrupting boundaries: Investigating youth's negotiation of the dialectical interplay of offline and online identities

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**Abstract:** This paper investigates the digital migration of Singapore youth to virtual worlds so as to better understand the dialectical interplay between living in the real and the digitally-mediated worlds on how youth construct their identity and sense of self, negotiate meaning, and make sense of their social experiences online. Situating this study within a context of the immensely popular MMORPG, World of Warcraft (WoW), this paper proposes the notion of a *performing cyborg* as a theoretical lens of looking at the interplay between the everyday, situated lives of digital youth gamers and their activities in WoW. The findings suggest a recurrent theme that challenges ascribed dichotomies between youth's presence in the real world and virtual world in terms of their identities in play, their sense of embodiment, and their orientation toward work, play, and the spirit of *communitas* within WoW. We posit that exploration of such a phenomenon that indicates a more intimately enmeshed and dialectically coupled experience of youths' online and offline worlds provides a fundamental framework for educators to better understand the impact of youths' exodus to the virtual worlds and its implications for 21<sup>st</sup> century pedagogy. To this end, this work will strengthen current efforts in augmenting an understanding of the broader learning ecologies within which youth learning activities are situated, illuminating the interplay between youth living in the real and the digitally-mediated virtual world.

**Keywords:** youth, virtual worlds, online worlds, identity

# Playing Games to Learn – Does it actually work?

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**Abstract:** Although the advantages of digital game based learning are widespread praised empirical evidence is rare. This paper presents a quasi-experimental study (n=79) comparing two groups of high school students, one (experimental group) played a learning adventure game while the other one was presented the learning sessions out of the same game only (control group). Contrary to expectations, the results do not indicate advantages for the gaming group, instead the control group performed better on comprehension and transfer.

**Keywords:** digital game based learning, empirical study, cognitive load, motivation

# **RAPUNSEL: Improving Self-Efficacy and Self-Esteem With an Educational Computer Game**

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**Abstract:** This paper reports assessment results of a four-year interdisciplinary research project with the goal to design and test a web-based software environment for real-time, applied programming for underrepresented students' early literacy (RAPUNSEL). The study presented here assessed the impact of the resulting computer game environment called *Peeps*, which was designed to afford girls with opportunities to develop computer programming skills in a setting where programming was not an end in itself but a means to achieve goals that were relevant and meaningful to the players and facilitate safe ways to learn through error. A pre-post survey study with 59 participants found increases in students' general self-efficacy, self-esteem, computer self-efficacy, and programming self-efficacy. Implications for educators and game designers and future development plans will be discussed during the presentation.

**Keywords:** Educational Games, Programming, Self-Efficacy, Self-Esteem, Gender Issues

# Topobo in kindergarten: educational robotics promoting dedicated learning

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**Abstract:** It was by studying how children interact with educational robotics that we were able to draw conclusions about the extent to which educational robotics is effective in promoting learning. The purpose of this study was to explore what happened during these encounters between children and robotics, and to deduce from those interactions how educational robotics for children is evolving. We arranged a series of technology workshops in which six Finnish kindergarten children between the ages of four and five years old were given opportunities to interact with Topobo, a 3D assembly system with kinetic memory. We approached this research by making use of the qualitative research paradigm of Grounded Theory (GT) as our method of inquiry. The research outcomes indicated that Topobo offers children unique opportunities for stimulating, creative and satisfying encounters. The article describes how the particular features of Topobo were able to elicit *physical, imaginative, cognitive*, and *affective* reactions in the children. It was also noted that the children were stimulated to conduct various kinds of dialogue with Topobo. We categorized these dialogues in terms of *phonology, morphology, syntax*, and *semantics*. We identified a number of key elements, such as access, imaginative and cognitive evolution, various forms of communication with the robot, and a sense of affective ownership in the encounters, that were able to promote dedicated learning.

**Keywords:** educational robotics, Topobo, dedicated learning, early childhood education, kindergarten

# Analyzing learning games in second life

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**Abstract:** Effectiveness of usage of game has been proven in many perspectives however; within actual class applying game into curriculum is very unlike. There could be various reasons why the game could not be implemented within a class environment but, by looking at the perspective of game only, there are several elements that are origin to this issue such as: un-educational elements, being unrealistic, lack of interaction, and passive environment to play game. 3D Virtual World could be considered as possible solution to those missing element in class environment. One of the most recognize program of Virtual World “Second Life” could be very much alike to the real class and even be possible to have the subject matter to teach with in the Second Life with features like, look, listen, act, and interact with one others. This research is trying to distinguish different genre of games offered in general by Second Life and to configure the usage of educational purpose of the Second Life games.

**Keywords:** virtual world, Second life, game genre



# Creating Educational Game by Authoring Simulations

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**Abstract:** The high level of engagement students have with games has motivated many researches to study various aspect of games-based learning. The approach taken in most of the studies is bringing instruction element implicitly in games. Adapting instructional content for creating games is a viable alternative approach to create interactive virtual learning environment development. Pedagogical support in the form of simulation exercises have been shown to be more effective in learning context. In this paper we argue the simulation exercises can be combined to produce games using an authoring tool. We illustrate our idea with an exemplar in the form of a 3D virtual physics game authoring tool. The results of evaluation of our exemplar indicate that use of subject-related terminology can help participants relate virtual game context with theoretical and real world phenomenon; however, games by themselves may not serve to be an effective way to learn new concepts.

**Keywords:** Authoring tool, design, simulation, educational games, graphics

# Development of a VR-based Motor Learning Support System for Large Motion of Upper Extremity

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**Abstract:** A virtual motor training environment for large motion of upper extremity is proposed. In this system, the user cognizes a position of stylus pointer through visual and force feedback, and moves user's upper extremity to a target position modifying motion trajectory. The cube type environment and the three dimensional maze environment included in this system enable the user to train motion planning, implementing and modifying of motion, and identify problem muscle. The result of evaluation by university students showed that user can train and acquire the target motion by using this system.

**Keywords:** Virtual Training Environment, Motor Skill Learning, Reaching Motion, Large-Size Force Feedback Device

# Equal Opportunity Tactic: Balancing Winning Probabilities in a Competitive Classroom Game

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**Abstract:** The outcome of competition is heavily ability dependent—the more-able students always win while the less-able lose. However, individual abilities are different. Students who consistently demonstrate lower performance than their peers may feel discouraged and frustrated. These lower-performance students hardly have the same winning probabilities as more-able students. In this study the authors design *equal opportunity tactic* to moderate the difference in performance between more-able and less-able students. The tactic is incorporated into a competitive learning game, AnswerMatching, by assigning every student an opponent with similar ability. A preliminary experiment was also conducted to investigate the effects of the tactic. Results showed that the tactic could balance the performance as well as the belief about how well students could achieve. That is, less-able students could have similar winning probabilities to more-able students.

**Keywords:** Equal opportunity, competitive games, performance, winning probabilities

# Exploring Variables affecting Player's Intrinsic Motivation in Educational Games

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**Abstract:** This paper outlines variables needed to develop educational games, to specially enhance player's intrinsic motivation. The variables integrated in motivating entertainments games are outlined so they can be applied to the design of educational games that are based on prescribed learning objectives. The aim of this paper is to synthesize a number of competing theories into a framework that can guide not only further theorizing, but also the design of instructional environments.

**Keywords:** Educational game, intrinsic motivation, challenge, curiosity, control, fantasy

# Icons and Exploration: How Interactions Between Learner Characteristics and Instructional Design Features Affect Learning in Chemistry Simulations

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**Abstract:** What type of instruction and representational formats are most effective for different learners when using computer-based simulations? This was examined in an experiment with high-school chemistry students ( $N = 67$ ) randomly assigned to receive a simulation that varied by instructional format (guided exploration vs. worked examples). Learners' prior chemistry knowledge and executive functions were also examined. Pretest and Posttest data were compared to assess student learning at multiple levels of learning (i.e., Recall, Comprehension & Transfer). Executive functions were found to interacted significantly with instructional format to affect both recall and transfer. Implications of the results are discussed in relation to effective use of animations and simulations for education.

**Keywords:** Cognitive Load, Simulations, Expertise Reversal, Executive Functions, Chemistry Education

# LE-Story: An Intelligent Storytelling Environment for Chinese Learning

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**Abstract:** A story is a narrative structure with a high cause and effect context which enables the story to make an enduring impression on people. For this purpose, many language learning environments use storytelling as foundation to increase degree of understanding and learning interest. However, most current storytelling systems in language learning have little flexibility in the connection between the course content and the storytelling resources. In this paper, we have developed an intelligent storytelling system which is used to adapt the ‘after school practice’ concept for Chinese language learning called *LE-Story*. This system uses lively events (LEs), which are derived as an empirical result of our project survey, as basic course units. The students can choose these events and produce their discourse about daily life. In this system, we focus on the process of storytelling by the students. Students can compose a sentence from phrases for language exercise. The system uses the ‘drag and drop’ method to prevent the improper usage of the phrases in the storytelling process. The system uses web ontology language (OWL) to present our LEs and students’ stories.

**Keywords:** Storytelling system, narrative, ontology, lively event, Chinese learning

# My-Pet-My-Quest: Utilizing Game Quests to Scaffold Students' Goal Setting for Learning

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**Abstract:** In this paper, we describe a My-Pet-My-Quest system to help students establish their learning goals. Digital games often provide students with more controls and clear goals. Therefore, when learning tasks can be integrated with a game structure as a motivating educational environment, students might learn better and with more joyfulness. The My-Pet-My-Quest system that adopts quests to integrate a game structure with a series of learning tasks is proposed to this end. A preliminary experiment was conducted in two elementary classes to assess the quest design. The result reveals that game quest had a positive perception in terms of enjoyment, goal content, goal intensity, and feedbacks. Meanwhile, game quest also stimulated students to attempt more learning tasks..

**Keywords:** Educational games, goal setting, game quest, scaffolding

# System design of an animation making system for drawing dynamic phenomenon

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**Abstract:** We develop an animation making system called "Scherzo" for students to understand about phenomenon in the science education by expressing dynamic models. To express the dynamic phenomenon, students can easily make animations by using scherzo. Through the animation making process, students think compared with the objects moving in the animation and understand the phenomenon. We explain the system design based on the needs analysis in this paper.

**Keywords:** Drawings, Science education, Repeat-playable-drawing system, Animation making, Scherzo



# **The Comparison of Motivation and Interaction between Virtual characters and Robots in Mixed Reality**

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**Abstract:** This paper discusses the sensorial perceptions of students through interactions with virtual characters and robots converged into mixed reality games, with primary focus on the following topics: whether the robotic collaboration generates greater motivation in learning, students' preferences between interface with virtual characters versus robots as well as the differences in interactivity. We designed a mixed reality game with multiple sensor-enabled robots and asked experiment testers, students, to provide assessments based on comparison against traditional computer games integrated with virtual characters. Results of student evaluations proved that the mixed reality game enabled users to comfortably immerse into the established environment, ergo increased motivation in student learning.

**Keywords:** Robot, mixed reality game, virtual character, interactivity, motivation

# Character-Driven Learning: Facilitating Students' Learning by Educational Virtual Characters

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**Abstract:** Virtual characters (including educational pedagogy agents and NPCs in games) are significant endeavors to benefit students' learning in technology-enhanced learning. In this paper, we propose a concept of character-driven learning, to address two related issues: how to establish close relationship with virtual characters and how to enhance students' learning opportunities based on such relationship. A game-based learning system, named My-Pet-My-Quest, is further implemented to support this concept.

**Keywords:** Virtual character design, game-based learning, virtual pets

# Implementing a Vocabulary Acquisition System with Minigames

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**Abstract:** This work investigated a networked learning system for deliberate vocabulary study, including: multimedia learning content; and activities and games to scaffold learning and engage learners. Students who used the system were engaged and scores on productive and receptive tests increased significantly by 28% and 33%, respectively.

**Keywords:** Adaptive systems, education, memory, vocabulary, minigames.

# Pilot Study of Relationship between Gaming Scale and Overall Reading Fixation Numbers

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**Abstract:** The study aimed to explore the relationship between gaming scale and overall reading fixation numbers by using eye-tracking technology. Seven undergraduate students were involved. A set of materials covering Chinese, Math, and graphic spots identification were applied. The preliminary result indicated that the gaming scale of the subjects was positively correlated with the overall fixation numbers in Chinese and Math materials, and negatively correlated in graphical spots identification materials, but the correlations are not significant. Since it is a pilot study, a further detailed experiment based on the observation is developing.

**Keywords:** Online gaming scale, overall fixation numbers, eye tracking

# Shared Virtual Environment Complementing Task Achievement Training

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**Abstract:** In this paper, we present a method for implementing and evaluating the use of shared virtual environments to complement training for achievement of specified tasks as part of English language learning. We present results of controlled testing of this method using Second Life, and discuss implications.

**Keywords:** Shared virtual environment, task achievement training, language learning, Second Life

# Students' Perception on Educational Games: Usefulness and Fun

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**Abstract:** Two important features of educational games are usefulness and fun. Therefore, the main purpose of this research is to determine the variables used to measure usefulness and fun in educational game. A questionnaire is used to obtain the students' perception on the importance of usefulness and fun factors in educational games. Questionnaires were distributed and there were 44 valid respondents of this survey. Based on the data analysis, usefulness is characterized by constructive, valuable, supportive, helpful and guide learning. On the other hand, fun is characterized by pleasurable, entertaining, interesting, craving and stimulate desire to play. It is observed that the students perceive usefulness and fun as important factors in educational games.

**Keywords:** Educational games, usefulness, fun

# Use of Digital Console Game for Children with Attention Deficit Hyperactivity Disorder

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**Abstract:** Attention Deficit/Hyperactivity Disorder (ADHD or ADD) is one of the most frequently diagnosed mental and behavioral disorders of children. Children with ADHD are characterized by poor attention and distractibility and/or hyperactive and impulsive behaviors. Although there is no “cure” for ADHD, there are accepted treatments that specifically target its symptoms. The most common standard treatments include medication, psychological or behavioral modification, and educational approaches. However, more and more parents began to worry about the side effects of medication. For this reason, this study proposed a new treatment by using digital console games to assist children who suffer from ADD to improve their attention condition. With the advantages of gaming apparatus, this study intends to improve the effect of behavioral intervention and cognitive remediation therapy for ADD children.

**Keywords:** Digital Game, ADHD, game-based Learning, attention





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# “E-book Flood” for Changing EFL Learners’ Reading Attitudes

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**Abstract:** This paper was intended to investigate the effects of using e-books (or texts with multimedia support) in an extensive reading program (ERP) on EFL learners’ attitudes toward reading in English. In a junior high school in northern Taiwan, 109 students from three intact classes were recruited in the ten-week ERP of e-books. Each class was introduced to a list of 140 selected e-books for the reading program; each student was then encouraged to read e-books after school, with the target of reading four e-books every week. The degree of changes in reading attitudes was assessed by using the reading attitudes scale (Stokmans, 1999) before and after the e-book ERP. In addition, the teacher’s class notes of the students’ reading behaviors and reactions as well as their spontaneous oral or written feedback were analyzed to be triangulated with the quantitative data. The results showed that the e-books had positive effects on the students’ attitudinal changes in all dimensions of reading attitudes, namely, utility, development, enjoyment and escape, as well as in all the cognitive, affective and conative components. The results also showed that the features of the e-books, especially oral reading, highlighting, animations and music/sound effects, were considered important to change attitudes. The implementation of interaction and learner control in the e-books guaranteed positive attitudinal changes as well.

**Keywords:** E-books; EFL reading; extensive reading program; reading attitudes

# Being an Opportunist or a Hard Worker: Comparison of Computer-based Input Types for Arithmetical Word Problems

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**Abstract:** The digital content has been considered as a core part of classroom learning. The way to input answers may influence student learning behaviors. This paper focuses on three computer-based input types—choice buttons, drag-and-drop, and text boxes—that are used frequently in arithmetical word problems of elementary schools. The experiment was conducted to examine how students input answers in computers and how they are engaged in learning. The results showed that the students had high accuracy when they had to type their answers; they were willing to spend time on studying the questions and creating the answers. When students were allowed to choosing or dragging-and-dropping, some of students would guess the answer by the “advantage” of computers—instant feedbacks. This paper suggests that the interface should facilitate a student to be a hard worker rather than an opportunist.

**Keywords:** Digital content, computer based input types, arithmetical word problems

# Determinants of the Intention to Use Technology: Comparison between Malaysian and Singaporean Female Student Teachers

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**Abstract:** As we progress into a technology-based society, it is imperative that teaching experiences with computers as effective pedagogical tools are made available to teachers [3]. Given the rapid development of computer technology in Malaysia and Singapore, cross-cultural comparisons are indeed needed to understand the determinants of technology acceptance by female student teachers from two diverse cultures. Based on the Technology Acceptance Model (TAM), a sample of 183 Malaysian students was compared with a similar sample of 175 Singaporean students. The variables that were tested included perceived usefulness (PU), perceived ease of use (PEU), computer attitudes (CA), and behavioural intentions to use the computer (BI). This study provides evidence that PEU and PU are two important predictors of BI. It also reveals the cultural differences in the application of TAM where CA is not significant towards BI for the Singaporean female student teachers but is significant for the Malaysian counterparts.

**Keywords:** Predictors, computer acceptance, student teachers

# Enhancing Students' Understanding of Regression Concepts

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**Abstract:** Some commercial e-Learning packages on regression have failed to realise their claims of facilitating students' understanding of regression concepts, because the concern of knowledge-building rationale has not been addressed. Thus, an e-Learning package for regression concepts was designed by the authors in a direction towards a more hierarchical pattern of knowledge construction. The package was undergone in three phases of evaluation by educational designers, teachers and students. Positive feedback was received from educational designers as well as teachers. Also, the students found that within the environment of the package their learning process was enhanced and fostered through peer learning and teacher assistance, thus providing a better understanding of the regression concepts.

**Keywords:** Regression concepts, peer collaboration, teacher guidance, educational design

# Factors Influencing Knowledge Sharing Among University Students

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**Abstract:** The objective of this study is to investigate the factors that influence knowledge sharing among students. The factors covered individual, classroom, and technological aspects. A questionnaire was used for collecting data. There were 207 students from a university in Bangkok, Thailand participated in this study. It was found that technology support, student's ability to share, and degree of competition with the classmates significantly influence knowledge sharing of students respectively. In contrast, student's willingness to share, instructor support, and technology availability have no influence on knowledge sharing of students.

**Keywords:** Knowledge sharing, information sharing, information technology

# Factors support or prevent teachers from integrating ICT into classroom teaching: A Chinese perspective

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**Abstract:** Researchers have been making efforts to examine barriers blocking ICT use in the classroom. However, less attention has been paid on the impact of “internal barriers” on ICT class use. This study centres on influences of teachers’ thinking processes (traditional teaching, constructivist teaching, general computer attitudes, attitudes toward computer in education, computer motivation, and perception on ICT-related policy), and assisted educational ICT use on ICT integration in the classroom. For this purpose, a questionnaire survey was conducted among 820 primary school teachers in China. Results showed that ICT integration significantly correlated with all of the independent variables. Building on a path analysis, ICT class use could be directly predicted on the base of assisted ICT use variables and indirectly by teacher thinking variables.

**Keywords:** Primary education; ICT integration; Teachers’ thought; Quantitative research



# From Scalable Concept Maps to Scalable Open Student Models

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**Abstract:** This paper presents the mechanisms implemented in a Concept Mapping editor to deal with scalability when drawing and inspecting Concept Maps (CMs) in order to ensure that big CMs are efficient and practical graphical representation medium. These scalability mechanisms have been applied to real Concept Mapping situations, concretely Open Student Models and Open Group Models.

**Keywords:** Concept Maps, scalability, Open Student Models, Open Group Models

# Innovative Technologies in Education: Creating Dynamic and Interactive Tests

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**Abstract:** Teachers have always desired to have at their disposal various tests to train or assess their students. To create such tests, large bases of exercises must be available and searching in these bases must be in accordance with usual criteria that teachers use. We have defined such bases of template exercises in which criteria of searching are described by a domain taxonomy enriched by a graph of competencies and sub-competencies. Then, we offer to teachers tools to create dynamic tests, i.e. the sequence of exercises displayed to a student is not set beforehand. Moreover to allow more people to use these tests, those are defined using a standard IMS-QTI v2.1 to make them played on multiple LMS. Tools to play these tests on various servers have been designed and implemented. We present in this paper our reflections about tests and their implementation.

**Keywords:** dynamic test, authoring tool, exercise templates, search for relevant exercises, IMS-QTI v2.1 specification.

# Learning Effectiveness in a Desktop Virtual Reality-Based Learning Environment

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**Abstract:** The purpose of this study was to compare the effectiveness of a desktop virtual reality-based learning environment with a conventional classroom learning practice. The learning effectiveness was measured through academic performance, perceived learning and satisfaction. A quasi pretest-posttest experimental design was employed for this study. A total of 431 students participated in this study; however, only 370 samples could be analyzed due to incomplete instruments answered. The students were randomly assigned to either experimental or control groups based on intact classes. There was a significant difference in the academic performance, perceived learning and satisfaction between the two groups. It was concluded that the desktop virtual reality instructional program positively affects the students' academic achievement and their perceived learning quality and satisfaction.

**Keywords:** desktop virtual reality, academic performance, perceived learning, satisfaction

# The Design of Active Learning Environment with the Integration of 3D animation

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**Abstract:** This study aims to create the active learning environment with the integration of 3D animation. By using ADDIE instructional design, the active learning environment consists of 5 components which are Simulation, Problem Solving, Game, Animation, and Assessment. The evaluation of the learning environment was conducted for four aspects – overall satisfaction, encouragement to learn, interesting to learn, and enjoyment. The results indicated the high level of student's belief at all aspects.

**Keywords:** Active learning, learning environment, 3D animation

# The effect of a pedagogy model integrated with weblogs on critical thinking skills of students

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**Abstract:** This study uses quantitative data to examine whether or not a social constructivist theory-driven pedagogical model integrated with weblogs is associated with improved critical thinking skills. Forty secondary school students completed a series of extra-curricular activities within ten months. These activities included writing assignments on questions requiring higher-order thinking skills, which are then submitted either as traditional, hard copy papers, or as weblog entries (Paper and Weblog Groups). They also completed a pre-test and a post-test of the Critical Thinking Test – Level 1 (CTT-1) prior to and upon completion of the learning activities, respectively. The analysis revealed that both groups demonstrated gains in Critical Thinking scores in the post-test. Moreover, a significant gain was observed in the Weblog group as well as in the class of general ability. No significant gender difference was detected.

**Keywords:** Critical Thinking Skill, Weblog and Learning, Technology and Pedagogy, Information and Communication Technology, Information Technology in Education

# The Learning Effects of Simultaneous Dual-Screen Instructional Presentation in Programming Language Instruction

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**Abstract:** Some researches of multi-image presentation have empirically documented the link between linear and simultaneous presentations. However, there are few studies of using multi-image presentation to lecture programming language with related software in a dual-screen environment. In a traditional classroom, it is used to present different media and materials linearly in a single screen or projection. Therefore, we propose a dual-screen learning environment to present multiple learning contents simultaneously and to investigate the differences between single-screen and dual-screen instructional environments in this study. That is, we use two kinds of learning environments with a single-screen and dual-screens for lecturing to compare the difference of learning effects in lecture programming language instruction. Results of this study showed that there were significant differences of learning perception, clear degree and difficult degree of materials in both of two learning environments.

**Keywords:** Multi-image presentation, split attention effect, worked example effect, programming language instruction

# Using Simulations to Enhance Learning and Motivation in Machining Technology

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**Abstract:** Recent advances in technology have introduced new tools to enhance learning. In the context of polytechnic education, simulation based learning (SBL) has been used to improve learning and motivation of engineering students studying Machining Technology in the Mechatronics course. This study investigates the effect of SBL on students' learning and motivation in a practice-oriented topic. In the study, students in the control group received conventional instructions and workshop practices while students in the experimental group had an additional component on SBL in the laboratory. Both groups, however, received an equal amount of time on the subject. A post intervention test followed by a survey was administered at the end of the study. This paper highlights the findings from both instruments, showing that SBL can improve student learning outcomes as well as the motivation to learn.

**Keywords:** simulation-based learning, learning from digital media, motivation, engineering

# Value of Blogs in Preservice Teacher Education

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**Abstract:** Accompanying the popularity of blog technology as a dominant online publishing paradigm is a growing interest in its educational benefits. This paper sets out to understand the role of blogs in supporting a dispersed community of preservice teachers through content analysis of their blogs and comments. A model of the educational affordances of blogs is proposed to examine how blogs can support self-expression, self-reflection, social interaction, and reflective dialogue on the part of student teachers. This paper revealed that the salient value of blogs centered on emotion-laden and social-oriented individual expressions and reflection. The interactive functionality of blogs was used mostly for exchanging social support rather than reflective dialogue.

**Keywords:** Weblogs, blogs, preservice teacher education, reflection



# “Computer” in ICT-monitors: a valid proxy?

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**Abstract:** Information and communication technology (ICT) has attracted a lot of interest from policy makers and researchers. These monitors and research studies often raise questions on ICT-usage, perceptions and competences of learners and teachers. Measurement through survey instruments, often use the word ‘computer’ as a proxy for ICT. The answers of students or teachers on “computer”-question are assumed to also count for other information and communication technologies. Research on survey wording reveals that the wording of an item can have a large impact on the results. Hence, this contribution tries to gain insight in the understanding of the words computer and ICT. The results of this study in Belgium, Finland, Germany, Ghana and South-Africa should help to better formulate items for survey instruments measuring ICT-integration in education.

**Keywords:** ICT-monitors, cultural differences, word-association task

# A Conceptual Model of Personal Learning Environment Based On Shanghai Lifelong Learning System

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**Abstract:** Personal Learning Environment (PLE) is helpful in meeting different learners' learning requirements and managements, especially for lifelong learners. In this paper, we first introduce the meanings of PLE and its main functions, then we design and development a conceptual model of PLE based on Shanghai Lifelong Learning System, finally we introduce typical learning supported technologies.

**Keywords:** Personal learning environment, conceptual model, learning technologies

# A Model of Pedagogy in an IT Environment

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**Abstract:** Many people are under the illusion that the use of Information Technology facilitates student learning without exploring the mechanism of human learning. In fact, IT offers capabilities beyond educational delivery of teaching and learning materials. Within a social context, IT can organise an environment that engages students in active, constructive, intentional, authentic and collaborative learning (Scrimshaw, 1993). In the statistics profession, IT has changed the underlying strategy of data analysis (Young & Lubinsky, 1995) relating to statistical thinking and statistical graphing skills. Because of this, statistics education should keep pace with the development of IT to strengthen students' capacity to understand statistical processes and conduct statistical investigations. It is therefore necessary to propose a model of pedagogy in an IT environment aiming at quality teaching and learning of statistics to address the significance of teacher guidance and peer collaboration. This paper elucidates how the model can facilitate statistics learning.

**Keywords:** Sociocultural perspective, peer collaboration, teacher guidance, statistics classroom

# A Quantitative Study of Practical Use of Social Networking Service in e-Learning

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**Abstract:** In this paper, we describe the practice use of social networking service to support communication among social students in an e-learning program. The click numbers in functions of hitting number of footprint, new diary, ranking, and the amount of communication in functions of diary, message, and comment in the SNS were extracted and analyzed. The results show that students prefer to communicate in private message function than in public diary and comment functions. And students show more feelings expressions in messages function than in diary function. Further studies should focus on what lead to different communication in private and public communication functions.

**Keywords:** SNS, e-learning, communication, text mining

# Building a Humorous Virtual Human to Enhance Student's Motivation and Performance in E-Learning Environment

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**Abstract:** Humor has a great influence on students' cognition, emotion and motivation when they're learning. There are many researchers studying how humor can be used in the classroom to increase students' performance, while few researching on how to design a humorous virtual human to better students' learning performance in e-learning environment. In this paper, some humorous strategies were adapted and expressed by virtual human to affect students' learning at proper moments. Preliminary experiment was conducted and the results showed that the virtual human with humorous strategies can ease students' emotions and motivate them.

**Keywords:** Humor, Virtual Human, e-Learning, Animated Tutor

# Design and Implementation of Synchronous Cyber Assessment and Its Potential Issues

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**Abstract:** Teaching and learning with cyber face-to-face feature has become a new trend for improving the quality of online courses. We argue that the synchronous cyber classroom can be used not only for conducting synchronous teaching and learning but also for synchronous cyber assessments. However, there are very few practices really adopting the synchronous cyber assessment. A guideline of how to effectively design and implement synchronous cyber assessments is definitely needed. Four different methods have been designed for conducting synchronous cyber assessments based on the commonly adopted assessment principles. These four types of synchronous cyber assessments are synchronous quiz test, synchronous written test, synchronous oral test and synchronous practice test. We have implemented these designs in a real online credit course and got very positive feedbacks from the learners. Some potential challenges and issues while conducting synchronous cyber assessments are discussed. The possible solutions are also proposed according to interviews and feedbacks of participants.

**Keywords:** Online assessment, synchronous cyber assessment, cyber face-to-face, synchronous cyber classroom

# Designing Issues of Instructional Online Note-taking Systems in Practical Approach

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**Abstract:** Related studies have shown that note-taking is an effect strategy which can enhance learning or reading comprehension. However, most annotation platforms which support learners to learn or to read concentrate on the system design issues, and rarely focus on strategy teaching practice issues. Thus this study based on the practical teaching pedagogy, analyzing the students' notes, and then design the instructions to teach students how to properly use note-taking strategy. Through field observation, we would propose the essentials of designing a note-taking system to assist elementary school students in learning note-taking strategy and then to enhance their reading comprehension and learning effects.

**Keywords:** annotation, note-taking, practical approach, reading comprehension

# Effectiveness of constructed responses and multiple-choice questions on recall and recognition in a web-based language learning environment

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**Abstract:** The present study investigated the effect of constructed responses and multiple-choice item types with cueing in students' vocabulary learning in a self-guided web-based language learning environment. 70 sixth grade students participated in this study and were assigned to one of the four conditions: (1) MC (multiple-choice only), (2) MC-C (multiple-choice with cueing), (3) CR (constructed responses only), and (4) CR-C (constructed responses with cueing). The results of this study suggest that constructed responses items had greater effect than the multiple-choice items on students' posttests (recall and recognition). The interaction effect between item types with cueing was not significant. Students reported higher cognitive load when receiving multiple-choice items than constructed responses. The present study supports the findings of other research in vocabulary learning; however, future research should explore the interaction of cognitive load and learning tasks to enhance the merit of online learning using different item types.

**Keywords:** Web-based instruction, constructed responses, multiple-choice questions, cognitive load theory



# Incorporating Learner Modeling and Design History in a Design e-Portfolio

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**Abstract:** A design e-portfolio can provide a sharable collection of digitalized learning processes, works, and results for designers. We discuss the development of a design e-portfolio by incorporating learner modeling aspects into an existing system for design process visualization. Reviewers add critiquing and assessment elements to each design history, using diverse ontology-based representations for critiquing and assessment strategies. The designers' design process histories and reviewers' critiquing elements evolve to create a design e-portfolio.

**Keywords:** Design process, e-Portfolio, Higher Education, Learner Modeling, Teaching Strategy

# Learning to Program in KPL through Guided Collaboration

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**Abstract:** Sixty-six six graders of two intact classes learned to program in KPL for 18 weeks during the experiment. One class was randomly assigned to the control (i.e., free-collaboration) group and the other to the experimental (i.e., guided-collaboration) group. Students in both groups formed heterogeneous teams of three persons. The guided-collaboration teams were provided with a worksheet for every programming task. The worksheet contained a set of task-specific guiding questions to guide students through the problem-solving process in a systematic and disciplined manner. An analysis of test scores showed that the experimental group significantly outperformed the control group in the achievement tests, suggesting that the guiding questions were useful in enhancing students' comprehension of programming concepts and developing their programming skills. With the help of the guiding questions, students in the experimental group were also more able to conduct meaningful discussions.

**Keywords:** Collaborative Learning, KPL Programming, Programming Instruction

# Multimedia e-Learning which was based on the simulator teaching materials for the globalization

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**Abstract:** We are developing a learning support tool called the simulator teaching materials. The simulator teaching materials are basic theoretical learning support tools in the field of acoustic. And the simulator teaching materials contributed to the scholastic ability improvement of the student, and it was recognized in UNESCO. As a result, we will offer the simulator teaching materials to the various countries in the world. As the means, we develop an e-Learning system now. We are aimed for an offer of the education environment that used the simulator teaching materials.

**Keywords:** simulator, multimedia, e-Learning, internationalization, contents

# Pedagogical strategies in a multimedia learning environment: Constructing understanding of animal classification

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**Abstract:** This research aims to study how pedagogical strategies in multimedia learning environment helps primary students develop better understanding of animal classification. Research methodology includes lesson observation, interviews and analysis of student worksheets, to examine the pedagogical strategies employed by different teachers in 5 primary classes. The findings indicated that integrated use of multimedia resources, teacher scaffolding and provocative questions focusing on classification criteria, as well as students' collaborative learning have impacted on students' learning. The paper suggested that practical pedagogical strategies in a multimedia learning environment could enhance students' understanding of animal classification

**Keywords:** pedagogical strategies, multimedia learning environment, animal classification

# Reading Annotator: A Web-based Annotation System for Reading Support

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**Abstract:** By integrating the online annotation system, Reading Annotator, a web-based annotation system for reading support, is developed to help students know how to read to enhance their reading abilities. Reading Annotator is expected to efficiently and effectively help students visual interactively make summaries to guide students analyze text structure by highlighting key elements of articles. Three different color highlight buttons, *Topic sentence*, *Controlling idea*, and *Supporting detail*, are developed to help students identify key elements of each paragraph so that students can get the gist of the text more easily and achieve better understanding toward the article. In addition to the three different color highlight buttons which are developed to help students identify key elements of each paragraph, the system also includes a supportive reading strategy button, *Dictionary*. By highlighting unknown words and click *Dictionary* button, students can look up these unknown words with the Yahoo online dictionary. Reading Annotator accommodates not only text structure, visual representations, and summarization reading comprehension strategies but also “reading to summarize”. Moreover, by using the reading support to guide students to analyze article organizations by highlighting key elements so that “reading to analyze” can be accomplished.

**Keywords:** online annotation, reading strategy, reading support, computer-assisted language learning (CALL)

# Relationship between Cultural Perceptions, Leadership Style and Computer Use by Principals

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**Abstract:** School leaders are key factors in implementation ICT in schools. They need to understand the capacities of the new technologies, to have a personal proficiency in their use, and be able to promote a school culture which encourages exploration of new techniques in teaching, learning and management. However, there is less information about the current status of ICT use by Iranian principals. This paper investigated the extent to which secondary school principals use computers in Tehran, Iran and determined factors related to level of computer use by principals (cultural perceptions and leadership style of principals). The findings indicated that principals spent a few times a week working on their computers. Also, cultural perceptions and transformational leadership contributed significantly to the level of computer use by principals. It is anticipated that the data obtained from the study will open new lines of inquiry about the crucial roles of school leaders in the adoption of ICTs and will contribute to decisions about future developmental needs because more will be known about their preparedness for change.

**Keywords:** ICT, school principals, leadership style, cultural perceptions

# Scaffolding Preservice Teachers' Use of Technology to Design Teaching-related Artifacts

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**Abstract:** This paper describes six methods used by teacher educators to scaffold preservice teachers during independent labwork, where they apply technology skills to design teaching-related artifacts. It discusses how varying tasks contexts affect the nature and practice of instructor scaffolding during technology skills instruction.

**Keywords:** scaffolding, technology, teaching, preservice teacher education

# Technology-Enhanced Workplace Learning: Blended Learning in Insurance Company

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**Abstract:** This paper reports on a study of blended learning in a large, multinational organization. The focus is on understanding what blended learning means in the context of workplace learning, what advantages and disadvantages can be identified and, based on empirical findings, to discuss how courses are set up with the objective of enhancing learning outcomes through a combination of social interaction and individual learning. A sociocultural perspective guides our analysis, in particular Vygotsky's notions of "duality of learning" and "zone of proximal development." The sociocultural perspective helped us to choose one interpretation of blended learning among the multiple approaches available.

**Keywords:** blended learning, case study, collaboration-oriented blended learning, concept-based blended learning, duality of learning, sociocultural perspective



# The Narrative approach to teach Information and Communication Ethics Education in Elementary School

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**Abstract:** In this study, we reviewed the necessity of Information Communication Ethics Education and described the narrative method for teaching in elementary school. It provides an overview of the current condition of the reverse function of Information use. And we proposed the contents for teaching. By making full use of narrative approach educationally, students can present his own ethical experiences and will have more ethical authority and responsibility. So the application of this program in class will not only encourage the elementary school students to have positive attitudes but also keep them from having negative in daily Internet or Information use. The presentation will include coverage of resources for teaching of Information and Communication Ethics and Computer Education for instructors who may wish to adopt this new style of instruction.

**Keywords:** Narrative, Information and Communication Ethics. Narrative Learning

# Three-level Mechanism Design for Profile Utilization in Digital Classroom Environment

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**Abstract:** More and more researchers emphasize the importance of teachers' roles in technology-enhanced digital classroom, especially when the classroom mode is transformed from teacher-led instruction to student-centered learning. In such digital classroom environment, it is significant for teachers to understand students' learning statuses at any moment, and further offer adaptive assistants to students. Therefore, in this paper, we propose a three-level mechanism for profile utilization in a digital classroom supporting system, named DCE, to help teachers understand students' learning status, including keeping track of students' learning progress for praise/alert message, help seeking, and misconception diagnosis. Through the three-level real-time supporting system, teachers' role can be changed from "monitor" to "mentor", which provides students with adequate assistants to benefit their classroom learning. A preliminary experiment was conducted, and the results revealed that teachers showed positive perceptions on such mechanism design.

**Keyword:** digital classroom environment, profile, mentoring system

# Use of CALMS to Enrich Learning in Introductory Programming Courses

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**Abstract:** This paper reports on the ongoing development of a Computing Augmented Learning Management System or CALMS in the context of an introductory programming course. In the first phase, integration of computer science related content with the university specified learning management system is being carried out. The pedagogic foundation for the introductory programming course design including learning theories, instructional process and learning taxonomies is discussed along with the choice of educational media and the organization of the learning content. In the second phase, plug-in modules related to computer science education will be integrated with the learning management system. The data presented in this paper is from an introductory programming course designed to be used with a CALMS. The results indicate gains for students and instructors from the standpoint of improved learning and teaching.

**Keywords:** Learning Management System, CALMS, Moodle, computer science education, introductory programming

# Verification of the Effectiveness of Blended Learning in Teaching Performance Skills for Simultaneous Singing and Piano Playing

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**Abstract:** One of the core performing courses in institutions for pre-school teacher training is simultaneous singing and piano playing. It is important to ensure sufficient training hours for this course. We have designed a course that incorporates blended learning, and analyzed the effectiveness of this learning method.

**Keywords:** blended learning, University Education, assurance of lecture, skill transfer

# A Preliminary Case Study of Computer Supported One-to-One Chinese Peer Learning System

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**Abstract:** In this article, we would like to describe a computer supported model and an initial implementation on Chinese learning. Teacher plays a role of coordinator, while the students are the main actors. From the basis of peer instruction and negotiation of MCSCL, we designed a model which would be possible to enhance elementary student's Chinese comprehensive skill. During the peer discussion among students, those grade 4 students would appear conflicts. Hence, this study was to describe the design and the setting of our experiment, the facts that we found, and the conditions in this experiment will be discussed and analyzed.

**Keywords:** individual learning, peer learning, peer discussion, chinese learning, conflicts, mcscl

# Applying Multimodal Analysis to Popular Websites to Develop Students' Digital Literacy

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**Abstract:** Adolescents' use of online social networking sites (eg. MySpace, Facebook) has increased dramatically in a relatively short period of time. These sites present an abundance of authentic texts where words, graphics, pictures and music are used to project a desired image and engage in communicative acts. To understand how different communicative modes are being used to create one's online identity social semiotic multimodal analysis can be applied to deconstruct MySpace profiles. This paper describes the framework and highlights the usefulness of applying multimodal analysis to MySpace to develop students' digital literacy.

**Keywords:** multimodal analysis, online social networking, MySpace, digital literacy

# Development of Educational Software for Advancing Communication Skills at Borrowing and Lending for Students with Intellectual Disabilities

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**Abstract:** As presented in this paper, we describe development of educational software for students with intellectual disabilities. The software advances communication skills used for borrowing and lending activities. We report the design and development of the educational software and its use in a class environment.

**Keywords:** Communication skills, intellectual disabilities

# Framework of Information Ethics Education Applicable to Developing Information Society

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**Abstract:** The information ethics/moral education is carried out widely in the world. Information ethics education contains philosophy and the information moral education contains case studies. The case studies treated in the present information moral education will not be utilized in the future information society. It is necessary to create a way of thinking in information ethics education. In this study, we consider a new framework of information ethics education applicable to the future. Further we produce web contents to carry out time-invariable information ethics education in the future.

**Keywords:** Information education, Information ethics, information moral



# Students' use of Primary Science Blog for scientific investigation

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**Abstract:** This study aims to investigate the use of blog as an inquiry-based approach on science investigation in primary education. This study elaborates a set of elements included in an effective science blog which helps students to record their learning process. Through the blog's posts (including text, images and media objects content), students created their online journals while their inquiry learning process. A guideline of content to the blog and rubrics were given for groups of students to record and evaluate their process of science investigation. Teachers will serve as a facilitator under the approach of project-based inquiry. The results showed that students through the blog for constructing understandings, extension of knowledge, diverse perspectives, share data and resources, reflection and voice to all (Brownstein & Klein, 2006) .

**Keywords:** Blog Learning, Science Investigation, Web2.0, project-based inquiry

# Web 2.0 Meets Learning: Technological Characteristics, Learning Examples, and Future Directions

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**Abstract:** Education affects human life deeply. In the education progress, technology plays an important role. In the past, Web 1.0 was the age of teaching on the internet; now, Web 2.0 is the age of learning on the internet. The paper discussed the newly application on Web 2.0 which promote internet to a current learning platform. In the Web 2.0, every participant could produce personal content and share it to others. Otherwise, we introduce new learning technology, such as social blog (ELGG), knowledge sharing platform (Wikipedia) and innovation software website (Scratch) which could increase the possibility of Web 2.0 in learning, collaboration and creativity. Finally, we told about Web 2.0 how to enhance the learning motivation and entrench learning to lifelong learning.

**Keywords:** Web2.0, Learning, Collaboration, Creativity

## **Abstracts of Keynote Speakers**



# What can computers do when they understand learning and instructional theories?

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**Abstract:** The enterprise of AI includes making computers intelligent. One of the direct ways to its realization would be to make computers have knowledge. However, it has been a challenge in AI for many years and many people have thought it is very difficult. Ontological engineering has appeared to help people attack the challenge. I have been involved ontological engineering for more than 15 years to make it easier to put knowledge in computers. During the last ten years, I have been developing an ontology of learning and instructional theories named OMNIBUS with my colleagues. OMNIBUS makes computers understand those theories. In order to demonstrate how well computers understand theories, we developed a theory-aware authoring system named SMARTIES which can help authors develop theory-compliant instructional scenarios by proposing appropriate instructional strategies from theory base, generate explanation of strategies and generate IMS-LD compliant code of the scenario which runs on IMS-LD player such as Reload. Although OMNIBUS/SMARTIES are under evaluation, I believe their contribution to the AI in Education community is clear. In my talk, I would like to discuss the underlying philosophy and main technical details together with how SMARTIES work.

# How I view learning and thinking in CSCL groups

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**Abstract:** I am particularly interested in the ways small groups can build knowledge together thanks to communication and support from networking technology. I hope that CSCL environments can be designed that make possible and encourage groups to think and learn collaboratively. In my research, my colleagues and I look at logs of student groups chatting and drawing about mathematics in order to see if they build on each other's ideas to achieve more than they would individually. How do they understand each other and build shared language and a joint problem focus? What kinds of problems of understanding do they run into and how do they overcome those? How do they accomplish intersubjective meaning making, interpersonal trains of thought, shared understandings of diagrams, joint problem conceptualizations, common references, coordination of problem-solving efforts, planning, deducing, designing, describing, problem solving, explaining, defining, generalizing, representing, remembering and reflecting as a group? What can we say about the general methods that small groups use to learn and think as groups? How can we support and encourage this better with software features like social awareness, social networking, simulations, visualizations, communication tools; with pedagogical scaffolds and guidance; with training and mentoring; with access to digital resources; with new theories of learning and thinking? To answer these important questions, we must look carefully at the details of discourse in CSCL groups and develop innovative tools and theories.

# Learning Cultures on the Move

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**Abstract:** Technology is fundamentally changing how we teach and learn. Is that assertion true? It is something many would wish to believe, as education struggles to re-shape itself in response to the perceived challenges of the early 21st century. I will examine the assertion by exploring the concepts of learning, culture, and mobility, highlighting the role of technology as a positive stimulus for change alongside real difficulties and barriers. Evolving 'learning cultures' are one of the manifestations of change, and can be observed both at the levels of individuals and social groups. Our ongoing research with mature learners and teachers gives insights into emergent practices that have implications for all those involved in the design of learning technology and working in education. Learners are increasingly in a position to engage in activities motivated by their personal needs and circumstances, including those arising from greater mobility and travel. This leads to a variety of uses of mobile devices inside and outside the classroom, in flexible and spontaneous forms of learning and sometimes with 'lifelong learning' as an ambitious goal. Foreign language learning is a good case in point. By looking at how language learning is changing, and could change, we can see the transformation that is possible but also the challenges that need to be understood.

# Adaptive and personalized learning experience through mobile technologies

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**Abstract:** Mobile educational systems have started to emerge as potential educational environments supporting life-long learning. However, these environments still suffer from various technological and access related problems in many parts of the world. For example, the access to course materials is slow; courseware does not adapt to individual students; the real time interaction between student and the environment is hard to achieve because of the connection unreliability and bandwidth limitations. There is also a lack of pedagogical infrastructure for mobile learning. This talk will discuss the research in mobile learning, with particular focus on adaptivity for individual learners. While adaptivity in desktop based environments has attracted much attention and sophistication in e-learning environments, mobile learning is still struggling with basic technological and pedagogical problems. But there is much evidence that suggests that mobile technology is going to provide a natural extension for e-learning in long run. With The exponential growth of wireless technology in recent years, increasing availability of high bandwidth network infrastructures, advances in mobile technologies and the popularity of handheld devices have opened up new accessibility opportunities for education. The true potential of e-learning as "anytime, anywhere" has finally begun to be realized, particularly for those with disabilities or those living in remote communities.

The talk will discuss various aspects of the research that aim to exploit the benefits of location, context, device and learner modelling, and combine them with mobile technology to achieve personalized delivery of multimedia-rich learning objects: anywhere and anytime; collaborative problem-solving in the context of learners' surroundings, authentic problem-solving through multiple forms of input; and appropriate use of these different media formats as part of problem-solving for rich learning experiences.



# Educational Innovations Beyond Technology: sustainable change through nested networks of learning and innovation

**Nancy LAW**

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**Abstract:** The belief that developments in our societies should be reflected in education and in the organization of learning is widely accepted. The implication for an information society is that learners have to acquire 'productive' (as opposed to 'reproductive') skills, problem solving skills, independent learning skills and/or skills for life long learning. This is only possible when schools enable learners to become more active and to make them more responsible for arranging their own learning process. However, learning in schools has traditionally been organized such that the learner receives support in the form of well-adapted subject matter content, learning activities organized by a teacher, adequate curriculum materials and technical infrastructure. While ICT can be and is widely applied to enhance education using a traditional pedagogy, to bring about the learning outcomes desirable for an information society requires important changes in pedagogy, a key aspect of the implemented curriculum.

International studies of ICT adoption and integration in teaching and learning across the school curriculum have been able to identify transformative uses of ICT associated with outstanding exemplars of curriculum and pedagogical innovation emerging from very diverse socio-economic and cultural contexts. However, many of these exemplars fail to become sustainable practices that have a lasting impact on the educational scene at large. This is because transformative uses of ICT are intrinsically disruptive, i.e. these require changes in roles, practices and power relationships within different levels of the institutional hierarchy that often challenge established values and beliefs. Classrooms and schools are complex systems nested within the broader education system. Any change in one part of system at any level inevitably disturbs and is constrained by the other parts and levels of the system and is much more easily damped than sustained.

Using case study data of ICT-supported educational innovation collected over the past decade in Hong Kong and elsewhere, this paper illustrates the importance of getting teachers, principals and education policy-makers to go beyond ICT to consider issues of change, innovation and leadership, and to establish new ways of working and thinking about work in order for transformative uses of ICT to become sustainable. Analyses of case studies of sustainable ICT-supported innovation indicate that nested networks of innovation supportive of learning and self-organization provide a viable model for nurturing multilevel leadership for sustainable and progressive educational transformation. This paper further discusses the implication of such a model for policy and practice.



## **Abstracts of Theme-Based Speakers**



# Personalized Learning Support for Creative Design Reasoning

**Yong Se KIM**

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**Abstract:** Every learner is different from various points of views including cognitive preferences and learning styles. Creativity involves various cognitive and affective elements that are combined to form the basis of design problem solving ability. Every design task may also have many issues. Apparently creative design reasoning presents many challenging learning research issues. According to McKim, who led the pioneering product design education at Stanford, design ideation process involves iterative interactions of seeing, imagining and drawing. Experiences in this process can be obtained through visual reasoning exercises where visual analysis, visual synthesis and modeling are interactively engaged. A learning support system called Intelligent Visual Reasoning Tutor (IVRT) has been developed so that personalized critiquing in visual reasoning can be given. My talk will provide explanations on the current capabilities of IVRT as well as other research results on diagnosing learner characteristics. Also various other efforts at the Creative Design Institute in design education will be briefly discussed.

# Can a Classroom Operate as a Dynamic Creative System?

**Jianwei ZHANG**

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**Abstract:** Education in the 21st century needs to develop a citizenry with productive knowledge and creative capabilities. Recent research highlights creativity as collaborative and social. Most creative breakthroughs are produced by innovative communities that work as dynamic creative systems. Of commonly promoted practices, inquiry-based learning comes closest to supporting the needs of developing creative knowledge capabilities. However, current inquiry designs focus on collaboration in fixed small groups. This presentation will examine the possibility of having a whole classroom operate as a creative system and elaborate pedagogical and technological means to achieving this goal.

In this talk, I will first synthesize key sociocognitive processes that sustain an innovative team to work as a creative system, highlighting self-organization as a primary framework. This framework informs a series of questions: Can young students work with opportunistic processes to advance knowledge as a community without fixed grouping and pre-scripting? What are the interactional processes that sustain a community to work as a productive creative system? In what ways can the teacher participate in these interactional processes to scaffold a creative system? I will discuss these issues based on my studies in Knowledge Building/Knowledge Forum classrooms. These studies suggest the possibility of having an elementary classroom work as a productive creative system. The “secret” lies in the self-organizing, self-sustaining processes: A knowledge-building community evolves knowledge resources, practices, and structures to scaffold itself from inside out; the most powerful instructional support leverages the self-organization mechanisms so that the community can productively support itself.

# Research Issues of Web 2.0 on e-Learning

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**Abstract:** Web 2.0 has become a major technology that supports content publishing over the Internet. Web 2.0 refers to an expected second generation of Web technology that allows people to create, publish, exchange, share, and cooperate on information (knowledge) in a new way of communication and collaboration. The Web 2.0 technology makes the Web not only for browsing, but also for creating and sharing. The success of Web 2.0 heavily relies on interactive communication and collaboration among people over the Internet -- where are the people; what people possess; whether people are willing to communicate; how a group of people can be formed as communities of practice; and how people can work together through new generation of interactive social software such as Wikis, Blogs, RSS feeds, podcast, Ajax-based browsers, peer-to-peer, instant messenger, and other social networking software. Some successful examples of Web 2.0 applications are Wikipedia, YouTube, MySpace, and Flickr. The Web 2.0 is shifting economical value of the Web to new business models for the next generation of Web technologies and interactive e-learning. As a result, the critical challenges of Web 2.0 for interactive e-learning is how to identify the right co-learners, find the right content, provide the right services, and through the right user interfaces to facilitate the interactive communication and collaboration in e-learning domains. The speaker will present current research issues of applying Web 2.0 to e-learning by the experience of editing a journal special issue. Apart from it, he will also give a vision of introducing mobility concept to it.

# Research Issues and Applications of Context-Aware Ubiquitous Learning

**Gwo-Jen HWANG**

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**Abstract:** In recent years, the advance of wireless communication, sensing and mobile technologies has provided unprecedented opportunities to implement new learning strategies by integrating real-world learning environments and the resources of the digital world. With the help of these new technologies, individual students are able to learn in real situations with support or instructions from the computer system by using a mobile device to access the digital content via wireless communications. With such an innovative approach, the learning system is able to detect and record the learning behaviors of the students in both the real world and the digital world with the help of the sensing technology. Such a new technology-enhanced learning model has been called context-aware ubiquitous learning by researchers. It not only supports learners with an alternative way to deal with problems in the real world, but also enables the learning system to more actively interact with the learners .

In this invited talk, several applications of context-aware ubiquitous learning are presented; moreover, several issues concerning this innovative approach, including the development of learning contents and systems, the design of learning activities, and the investigation of learning behaviors and achievements, are revealed as well.



# Promoting Self-Regulated Learning Skills through Social Interactions in Agent-based Learning Environments

**Gautam BISWAS**

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**Abstract:** We have developed computer environments that support learning by teaching and the use of self regulated learning (SRL) skills by interacting with virtual agents. More specifically, students teach a computer agent, Betty, and can monitor her progress by asking her questions and getting her to take quizzes. The system provides SRL support via dialog-embedded prompts by Betty, the teachable agent, and Mr. Davis, the mentor agent. Our primary goals have been to support learning in complex science domains and facilitate development of metacognitive skills. Results demonstrate that students who teach learn more than students who learn for themselves. Furthermore, students who receive SRL prompts while teaching, demonstrate even better performance.

One challenge we face in developing self-regulated learning prompts is identifying which strategies are productive and unproductive for student learning. We have developed methods to log students' activities on the system, and react to potentially unproductive behavior patterns. For example, students might ask Betty to take a quiz without first probing her knowledge with questions. In this talk, I will present three schemes for characterizing students' learning behaviors: (1) frequency analysis of activities, (2) sequence analysis schemes to analyze activity patterns, and (3) hidden Markov model (HMM) methods for deriving aggregated student behavior sequences from the activity data. These techniques allow us to go beyond analyses of individual behaviors, instead examining how these behaviors cohere in larger patterns. We discuss the information derived from these models, and draw inferences on students' use of self-regulated learning strategies.

# Technology Enhanced Learning in K12 Schools: The Experiences from Microsoft 'Partners in Learning'

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**Abstract:** How the technology is enhanced and promoted learning in K12 schools is still the research focus. This report will illustrate the achievements and share the experiences of the first phase of Partners in Learning in Chinese Mainland. Meanwhile the innovations of the second phase are presented. Partners in Learning is a global initiative designed to actively increase access to technology and improve its use in learning. The goal is to help schools gain better access to technology, foster innovative approaches to pedagogy and teacher professional development and provide education leaders with the tools to envision, implement and manage change. There are three key areas that have the greatest potential to empower students and teachers and transform education: Innovative Schools, Innovative Teachers and Innovative Students. In this report the three key projects will be explained in details.

## **Abstracts of Forum**



# **Grand Challenge and Problems in Technology-Enhanced Learning (TEL) - Broaden the impact of TEL Research**

<sup>a</sup> **Tak-Wai CHAN, Yin-Cheong CHENG, KINSHUK, Chen-Chung LIU,  
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**Abstract:** Since the term Technology-enhanced Learning (TeL) was introduced in our community, we have been anticipating that the technologies invented by us will eventually improve how people learn. People also look forward to witnessing the improvement imparted by these technologies. Surprisingly, the assessment report conducted by SRI brought us depressing results indicating that large amount of investment in technologies for learning did not promise significant improvement in learning. It seems technology-enhance learning is still an unsolved challenge in both social and economic level. The goal of this panel is to seek "out-of-the-box" thinking to expose some of the important challenges yet to be met in TeL research, rather than to expose current research. The following questions will be discussed in this panel:

Is there any grand challenge that we must take in order to create a significant economic and social impact? What large-scale collaborations between people from multiple disciplines and locations in our community can contribute to solve this grand challenge in TeL?

# Self-directed or Teacher Facilitated Game-based Learning? What are the Roles for Teachers in GBL?

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**Abstract:** During the last decade, with the advancement of computers, multimedia, and Internet technology, the focus in game-based learning has shifted from “sugaring the pill” to issues of how to sustain players’ engagement over time, to support rich simulation-based learning experiences, and to facilitate the establishment of communities of players engaging in constructivist learning and productive sharing of ideas.

As for education, there has been a shift from didactic models of instruction to more constructivist models that emphasizes active inquiry. However, it is often still the case that teachers are best at identifying how students should solve problems arising in the process of learning, and provide the right scaffolding for them to solve problems constructively. Some educators think that the same pedagogical idea should also apply to game-based learning. Hence, the discussion of game-based learning should not only focus narrowly on exploiting games into a “self-contained” constructivist learning environment, but also exploring how to articulate gaming and learning with teacher-facilitated pedagogy which assists students in transforming their gaming experience into a learning experience.

In this forum, we invite participation from educational and game researchers to exchange views on the theme of discussion— “Self-directed Game-based Learning? Or Teacher-facilitated Game-based Learning?” We aim to provide interesting points of view regarding research, implications for practice including practical models for implementing game-based learning.

## **Abstracts of Workshop Papers**





**- Workshop 1 -**  
**International Workshop of Modeling,**  
**Management and Generation of**  
**Problems/Questions in Technology-Enhanced**  
**Learning**



# Automatic Text-Coherence Question Generation based on Coreference Resolution

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**Abstract:** In this paper, we propose a multiple-choice question generation program based on coreference resolution for measuring learners' comprehension of the article. The coreference of the entire article is accomplished by the connection of noun phrases referring to the same entity in the real world. In order to improve question difficulty and discrimination, we employ clusters' relation of the coreference to generate the answer and distractor.

**Keywords:** coreference resolution, distractor, target words, agreement features

# Problem Generation as Structure Simplification Following Problem-Solving Process

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**Abstract:** In this paper, three types of increasing problem simplification, (1) formulation partialized problem, (2) solution partialized problem and (3) specialized problem are introduced. They are defined as problems that can be solved as sub-process of the original problem. In this paper, a model of problem solving process is proposed. Based on the model, then, the three types of increasing problem simplification are described. Several ways to help students with the simplified problems are also explained.

**Keywords:** Increasing Simplification, Problem Generation, Problem Simplification, Scaffolding, Problem Structure Transformation

# Question Repository Model on Open Source LMS: A Case Study of LEARN SQUARE

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**Abstract:** Web-based learning becomes an important tool in education. The use of web-based testing together with web-based learning helps improving quality of teaching and learning. Addition of the question repository model into the web-based testing enhances the system efficiency. This paper represents the model of question repository in our open source LMS; LearnSquare. A standard metadata in LOM is used to define a question. In addition, the development of new features for recommending a question helps user to select a suitable question for their tests.

**Keywords:** Question Repository, Web-based testing, Open source LMS, Recommended System

# Any Effects of Different Levels of Identity Revelation for Online Student-Generated Questions Activities?

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**Abstract:** The focus of this study is to examine whether there are any differential effects of different identity revelation modes (real-name, nickname, anonymity) for student-generated questions activities. One hundred and one 7<sup>th</sup> graders from three classes participated for six weeks. An online learning system that allows students to contribute to and benefit from the process of question generation and peers' feedback was adopted. A pretest-posttest experimental research design was used. Data analysis did not confirm original contemplation that different levels of identity revelation lead participants to view their interacting partners or the process differently.

**Keywords:** Anonymity, interaction process, nickname, student-generated questions

# Analysis of the Learners' Assessment Activity in a Collaborative Learning Support System Based on Question-posing

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**Abstract:** A collaborative learning support system based on question-posing by learners named Concerto III has been developed. It has been applied to a distributed asynchronous environment since 2006. In previous study, learning effectiveness based on number of question-posing and quality of posed question has been analyzed. As the analytical results, it was revealed that posing many questions or posing high-quality question had a positive effect on learners' learning effectiveness. In this study, assessment activity in the learning support system is analyzed. As for analysis of learners' assessment activity, learners' action log data stored in Concerto III was visualized. As the result of visualization and more analysis, it was revealed that a learner who made assessment of the question immediately after answering it marked higher score in post-test than those who did not. Thus, making assessment of the question immediately had a positive effect on learners' learning effectiveness.

**Keywords:** Learning on question-posing, Learning support system.

# Changing Students' Perceived Value and Use of Learning Approaches for Online Student-Generated Questions via an Integrative Model

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**Abstract:** This study investigated whether integrating online question generation tasks as part of the instructional process affected learners' perceived value toward the introduced strategy, and their adoption of learning approaches. Fifty students registered for an "Instructional Principles" course participated in the integrated condition while 161 students were put in the non-integrative condition. Data analyses via *t*-tests found statistical significant differences in task value ( $p < 0.001$ ) and surface approach ( $p < 0.001$ ). Students in the integrative study perceived higher value toward the online question-generation tasks and adopted surface approach significantly less frequently than those in the non-integrative approach. Implications for technology diffusion, instructional strategy instruction, and future studies are provided.

**Keywords:** technology integration, learning approaches, online student-generated questions, task value



# The Effect of the Game-based Problem-posing System for mathematical learning

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**Abstract:** “Problem-posing” is an experience-converting instructional strategy for effectively enhancing students’ thinking abilities and is broadly discussed in many domains. This study aims to probe into the possibility of technology assistance for problem-posing strategy. Based on the design principles of problem-posing and game theories, we designed a game-based problem-posing and solving system. Moreover, the influences of game-based problem-posing Math learning activities for students’ problem-posing, problem- solving abilities, and flow are discussed. Four classes of fifth graders were participated in the research. Two classes were provided with game-based problem-posing system, while the other two used paper-based problem-posing method. The result shows that game-based problem-posing system positively enhances students’ overall flow and problem-posing abilities.

**Keywords:** Problem posing, collaborative learning, flow experience, game-based system.

# Insertion Training with Computer Acupuncture Education System

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**Abstract:** As one of the series studies for the development of a computer training system for acupuncture, this paper deals with the construction of a system capable of quantitatively evaluating the training effect of the insertion technique. Precise insertions without pain require high technique obtained by repeated training and experience. However, the insertion technique has hardly been quantitatively analyzed in past times. In this study, the research for the development of a training system for a quantitative indexing of insertion operation in acupuncture has been done. The measurement and training system enabling the training of insert speed of needle were developed. Finally, the effect of developed system was confirmed by proof experiment.

**Keywords:** Acupuncture, Computer training system, Insertion, Quantification of technique

# A Map-based Assessment System Supporting History Education

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**Abstract:** History education is hard for teachers to illustrate the history events accompany geography location, date and names. Besides, students learned History which people thought as common sense might not be true. Teachers have to cultivate students' historical thinking and realize the History development. If there is no appropriate geography tool for students, it would be hard for students to imagine the indefinable geography location and to organize the History events order. Students will lost their learning motivation and just cram some names or date into their mind that they even don't understand. In History education, teachers need to prepare history material and maps to describe the event front and back. Maps could enhance the history lessons to understand their local and global environment, and how human activities take place in these environments. The authors propose a map-based assessment system supporting History education which combines Bloom's taxonomy and History learning objects category in authoring items. Teachers can adjust the exam and items with the cognition and learning objects distribution easily. Students can realize the geography information with this system.

**Keywords:** History Education, Assessment, Google Map, Bloom, Authoring Tool

# Development and Evaluation of a Computer-based Training of Questioning

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**Abstract:** Questioning as a learning strategy can improve learning outcomes because it helps to integrate new knowledge into prior knowledge. In this project we compare two forms of training (question stems vs. question prompts) in an experiment. We consider the prior knowledge of learners as well as the numbers and quality of their questions. We aim at empirically based statements about the effectiveness of a computer-based training of questioning.

**Keywords:** Computer-supported learning, questioning, text understanding, evaluation

**- Workshop 2 -**  
**International Workshop on e-Learning Tools,**  
**Techniques and Applications for Cultural**  
**Heritage**



# Affective Classification of Movie Scenes Based on Two-pass Clustering Technique

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**Abstract:** Video-based learning not only provides rich content but also gives multimedia e-learning environment. In this paper, we present an affective movie classification tool, which automatically segments and labels emotion tags for the given video film. Our method integrates nine audio and visual features from each input video. Then the proposed two-pass clustering technique is used to group similar video scenes and gives labels. One good property of our method is that the need of manual annotated training data is un-required. We compared with the other famous algorithms such as ART2 and K-means. The experimental result shows that our video affect classification tool yields better accuracy (recall and precision) than the other clustering approaches. In short, it achieves ~80% in F-measure rate for 119 testing scenes.

**Keywords:** video content-based analysis, self-organizing feature map.

# Designing of Adaptive e-Learning System based on Content Link Hiding

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**Abstract:** Most of e-learning systems in Thailand are created as web-based learning, but they have limitation of learning effectiveness. This paper presents an approach to improve an e-learning system to be more intelligent where the system can adapt corresponding to student's behavior. Adaptive navigation technology on link hiding technique is used to display appropriate links based on student behavior while visiting page. The designed system will present different learning paths to students according to their knowledge levels.

**Keywords:** Adaptive E-learning, Adaptive Navigation, Link hiding technique



# Introduction of RFID Smart Museum Guide at Chao Sam Praya Museum

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**Abstract:** This paper will demonstrate how RFID technology can improve the quality of life and also serve as a tool to educate and encourage the interest in the culture heritage. An example presented in this paper is the introduction of implementing the Smart Museum Guide concept for the Chao Sam Praya museum, a museum depicting ancient artifacts unearthed from the old capital of Thailand. It will also present a concept for scaling development to museums all over Thailand and ultimately link all museums into one central database.

**Keywords:** RFID, museum, cultural heritage, e-learning

# **Pali-Thai Dictionary: A semi-automatic approach on form-based to content-based structure**

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**Abstract:** There are several dictionaries which are developed in form-based electronics format. Since these are designed to use only on manuscript dictionary, they are limited on usage in other ways, such as electronic dictionary with word associations, translation, question answering, content retrieval, and so on. Content based dictionary is more flexible to apply to such applications. In this paper, we describe the methodology to transform a form-based to content based structure in Pali-Thai dictionary. This dictionary aims to be an infrastructure for many applications in Buddhism domain.

**Keywords:** Dictionary Making Process, Form-based structure, Content-based structure, Bali, Thai

# Thailand tourism Collaborative Commerce (TCC) via XML Web Service

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**Abstract:** Tourism plays a central role in promoting and preserving Thailand's vibrant culture. While it is not a large part in the national GDP, the tourism industry employs and affects a substantial part of Thailand's population. Because the local tourism business focuses on displaying its traditions and culture, assisting the visibility and accessibility of the local tourism business is a big step towards conserving Thailand's identity. Today's knowledge economy has made information, and the ability to share it, crucial for tourism companies to successfully compete and streamline their operations. The worldwide travel industry has realized the potential mutual benefit of linking information and subsequently founded the OpenTravel Alliance (OTA: OpenTravel) to establish specific standards and methods of sharing between the players in the field. The tourism industry in Thailand can benefit from an efficient link between the businesses involved, especially the lodging, transportation (vehicles) and travel agencies. These businesses are hubs which connects tourist to local attractions and are regularly displaying playing their own part in promoting Thai culture, such as themed hotel rooms and hosting seasonal festivals. An integrated system and standardized information allows for even more activities from each participant to offer more innovative products and services for their customers.

**Keywords:** OTA, System Integration, Tourism Business, Web Service, XML

# **The development and application of a mobile classroom system for basic services delivery in different culture – An Example of Pattani Malay**

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**Abstract:** In this paper, we present the e-Learning system with the focus on mobile classroom. The system was applied for basic services delivery in Thai Malay ethnic group. We evaluated the performance of the system through a variety of scenarios. The results showed that our system could support up to 200 clients in a general browsing mode.

**Keywords:** Mobile Learning System, Pattani Malay, e-Learning

**- Workshop 3 -**  
**International Workshop on Design and**  
**Experiments of CUMTEL (Classroom, Mobile**  
**and Ubiquitous Technologies Enhanced**  
**Learning)**



# Adaptive Kanji Learning Using Mobile-based Email

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**Abstract:** This paper describes an adaptive learning system based on mobile phone email to support the study of Japanese Kanji. In this study, the main emphasis is put on using the methods of adaptive learning to resolve one common problem of the mobile-based email or SMS language learning systems. To achieve this goal, our main efforts are made on three aspects: sending the contents following learners' interests, adjusting the difficulty level of the tests to suit each learner's cognitive level and adapting the system to their learning styles.

**Keywords:** Mobile learning, mobile-based email, learning Kanji, adaptive learning system

# Enhancing Self-regulated Learning by Using One-to-one Digital Ink eBag with eBooks

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**Abstract:** The purpose of this study was to examine the effect of the use of one-to-one digital ink eBag (Tablet PC) with eBooks on students' self-regulated learning, referring to self generated thoughts, feelings, and actions, which were systematically oriented toward attainment of students' own goals [16]. An elementary school started a learning and teaching scheme: one-to-one digital ink eBag with eBooks since 2005. This study investigated whether the use of one-to-one digital ink eBag with eBooks enhanced students' self-regulated learning, inquired the relationship between one-to-one digital ink eBag with eBooks and students' self-regulated learning, and explored the way one-to-one digital ink eBag with eBooks enhancing students' self-regulated learning. The research subjects were 190 students from Grade Four to Grade Six and 103 of them used eBag in their daily learning activities. A self-report questionnaire, based on the relevant part of the Motivated Strategies for Learning Questionnaire, was used to measure students' self-regulated learning and corresponding student interview form were used in the interviews. Research results revealed that the use of eBag could enhance students' self-regulated learning because students utilising eBag used significantly more self-regulating strategies, one of the major dimensions of self-regulated learning. Moreover, this study found that the longer time students spent in using the eBag, the higher self-regulation they could achieved. The General Expectancy-value Model of Motivation was used to analyse the data, finding that the students utilising eBag used significantly more rehearsal strategies and effort management strategies, two key sub-scales of self-regulated learning.

**Keywords:** mobile learning, self-regulated learning, Tablet PC, one-to-one computing, digital ink, eBag, eBook



# Fantasy in Educational games: they can go together?

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**Abstract:** This paper explores potential of fantasy in educational games, as a learning facilitator for more successful game in learning. Fantasy is meaningful in educational games in terms of cognitive and emotional aspects. Fantasy requires that it be regarded as one of the instructional strategies. Fantasy can be sorted as one of the design factors, such forms as response, narrative, and creative. This exploration is expected to expand the horizon of designing educational game.

**Keywords:** fantasy, learning in game, fantasy in game, fantasy and learning

# Supporting Communicative English Class Using PDAs

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**Abstract:** This paper describes a student-interactive speaking-listening support system using mobile devices. This system makes use of PDAs (Personal Digital Assistants) as a recording tool. Peer-to-peer interviews and interviews with international students were conducted in communicative English class of 20 university sophomores. The students uploaded the recorded files of interviews to the LMS (Learning Management System) through wireless LAN and shared the files by listening and made summary reports which were also uploaded to LMS. Advantages and disadvantages of the system were discussed. In conclusion, though some weaknesses are pointed out such as battery shortage, instability of wireless LAN, troublesomeness of stylus (small pen), its usability (easy to make recording, easy to upload), mobility, and novelty contribute to successful communicative English class and a combination of PDA and LMS helps make efficient use of class time, and provides effective support for evaluation.

**Keywords:** Mobile Language Learning, PDA (Personal Digital Assistant), LMS (Language Management System), EFL

# Supporting Japanese Mimicry and Onomatopoeia Learning Using Sensor Data

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**Abstract:** In this paper, we propose an improved context-aware system for supporting to learning Japanese mimicry and onomatopoeia (MIO) using sensor data. In our two previous studies, we proposed context-aware language learning assistant systems named JAMIOLAS (JAPANESE Mimicry and Onomatopoeia Learning Assistant System). We have used wearable sensors and sensor network respectively to support learning Japanese MIO. On the disadvantage of previous systems, we propose a new learning model that can support learning MIO with the sensor network to carry out context-aware learning mainly in ways of creating context initiatively and detecting context automatically.

**Keywords:** mimicry, onomatopoeia, sensor, language learning, context-aware learning, ubiquitous learning

# Supporting Joggers in a Web-Community with Simulation and Annotation Functions

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**Abstract:** This paper proposes a web-based community environment that supports joggers. The system shows a competitive simulation of multiple joggers who share the same course at asynchronous situation and stored their GPS data of jogging into the database. Joggers are also able to take annotation on the map along with this simulation in order to remember their own improvements of running for the next time. Joggers are given the possibility to detect the improvement area, running way, motivation and so forth in a simulation. This is an ongoing project related to researches of physical skill development. We report the idea, design, and implementation in this paper.

**Keywords:** Physical Skill development, e-running, Map-based community, Animated simulation, Agent

# The One-to-One Groupware for Supporting Collaboration Learning on Web

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**Abstract:** This study proposes a one-to-one groupware CELL to support collaboration learning on Web in one-to-one environments. It was found that the groupware was indeed useful in supporting students in their efforts to search the Web autonomously while simultaneously engaging in joint integration and reflection on the emerging search results. In addition, this study identified three discovery patterns in the use of the groupware and found most student groups demonstrated the iterative envisioning discovery pattern.

**Keywords:** Collaborative learning, discovery pattern, one-to-one groupware



**- Workshop 4 -**  
**International Workshop on SPECIAL**  
**(Strategies for Practical integration of**  
**Emerging and Contemporary technologies In**  
**Assessment and Learning)**





# Automated Systems for Testing Student Programs: Practical Issues and Requirements

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**Abstract:** Many universities have developed automated systems to assess the correctness of students' programs. Such systems are of tremendous benefit in enhancing the teaching and learning of computer programming, particularly in providing prompt and useful feedback to students. On the other hand, most of the existing systems for automatically testing students' programs suffer from limitations that bring about some pedagogical issues in their use in practice. These issues may bring about educationally undesirable effects that can substantially compromise the benefits of such systems. This paper reviews the cause of these issues, describes their pedagogical implications, and discusses the need and requirements for an improved approach to the automated testing of student programs.

**Keywords:** practical issues of automatic assessment, program correctness, program testing, program validation, requirements of automated assessment system

# Concept Mapping for Collaborative Knowledge Construction in Distance Learning

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**Abstract:** Integration of social networking practices makes it possible to create a learning community in international settings. In order to meaningfully integrate this kind of technology, it is essential to assess what is actually being achieved among participants. This paper proposes a method to utilize a concept map in an on-line discussion. The result indicates that it can be used for the purpose of reflecting that collaborative knowledge is being constructed during and after the discussion.

**Keywords:** CSCL, concept map, knowledge construction, distance learning, mentor

# Digital Storytelling as an Assessment Tool in the Primary School English Language Classrooms – Potentials & Challenges

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**Abstract:** In the recent years, there has been a shift from traditional methods of classroom assessment to more flexible, alternative assessment formats that measure higher level thought processes (e.g., critical thinking), range of skills, and capabilities. Most assessment methods fulfil two assessment purposes – assessment of learning (summative assessment) and/or assessment for learning (formative assessment). The main distinction between these methods is that the former determines the status of learning and the latter aims to promote greater learning. This case study research outlines the issues on the fitness of purpose, validity, reliability, and equity in the use of digital storytelling approach as an alternative assessment for the lower primary pupils (i.e. aged 7 and 8) in an ICT-enriched learning environment. The findings imply the importance of a change in the epistemology of the teachers to focus on assessment to enhance pupils' learning than just a status check. It also calls for better planning, communication, and training among teachers. In addition, a balance of summative and formative approach of assessment might be necessary in a highly structured and efficient educational system that focuses on high-stake summative assessments.

**Keywords:** Formative and Summative Assessment, ICT, Digital Storytelling

# Evaluating E-learning by Using Kirkpatrick's Four Levels Model

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**Abstract:** This study examines the effectiveness of e-learning in Hong Kong. Kirkpatrick's Four Levels Model is the most widely used model for measurement of effectiveness for training program. Initial methodology has been proposed to measure the effectiveness of e-learning program. We implemented Kirkpatrick's model to measure the effectiveness of e-learning. Experimental results have shown that students are satisfied with e-learning programs. The e-learning programs are more effective in courses at the fundamental level. Students' academic results are significantly improved in these courses. However, the current e-learning programs fail to achieve some overall objectives of the schools. This study provides baseline data for schools in Hong Kong to set their strategic direction of e-learning.

**Keywords:** effectiveness, e-learning, evaluation, Kirkpatrick's Four Levels Model.

# Group Learning Modeling for Blended e-Learning: the Role of its Influencing Factors

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**Abstract:** Group learning is an essential component for organizing cooperative learning or collaborative learning, and it is important for implementing CSCL (Computer-Supported Collaborative Learning) as well. In this paper, we introduce an empirical approach for simulating a group learning model based on its influencing factors which have been extracted from our previous study. The architecture and a generic model of a group learning process are presented, and a model of a group learning process is devised for a blended e-learning environment.

**Keywords:** Group Learning, a classroom-based learning environment, a web-based learning environment, influencing factors, online learning, e-learning

# Towards an ITS for Decision Making on Managing Palm Oil Plantations

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**Abstract:** Although intelligent tutoring systems (ITSs) have proven their effectiveness, very few attempts have been made to embed ITSs into existing applications. In this paper, we describe the design of an Intelligent Tutoring System that will be embedded within an active Management Information System (MIS). With the ITS embedded within the MIS, users will be presented with real-life management scenarios and practice with actual operational data. This would help them improve their decision making skills and help them make more effective decisions in their work area. We discuss the architecture and use-case scenario for DM-Tutor (Decision Making–Tutor). We also include plans for system evaluation and future work.

**Keywords:** Embedded ITS, decision making, architecture, use-case scenario

# **Abstracts of Interactive Events**





# Applications of Virtual Agents, Student Modeling, and Knowledge Engineering in Education

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**Abstract:** This interactive event targets at increasing the interaction among researchers who are interested in the applications of artificial intelligence in the education domain. Some of the potential contributions of artificial intelligence to educational activities had been realized in the past decades. Adaptive assessment of students' competence in natural languages, such as English, has been used in the real world. Two students who take the language tests do not have to solve the same set of test items. Enabling software to work with her users in a context-dependent manner has also started to show attractiveness.

In this interactive event, invited speakers who are adept at student modeling, virtual agents, and knowledge engineering will share their expertise with the audience. These topics contain a subset of core technologies of AIED, and cover important areas which bridge the research results and educational applications in the real world. The participating audience will have the chance to exchange opinions and share experiences during the formal panel discussion and the relaxing social activities. In the current plan, the panel discussion includes four long presentations, five short talks, and a recess. The social activities will allow the participants to get along with each other in a relaxed atmosphere, in the hope to nurture international cooperation in the future.

# Taking Another Step in the Flood of Learning Technology Innovations

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**Abstract:** It seems like a paradox that technology has changed many aspects of our lives, from shopping and auctions to finding a doctor or a friend, but has significant difficulties to cover learning and education improvements world-wide. However, the potential for Web-based learning will not remain just a vision. Web 2.0 and Web 3.0 technologies, collaborative techniques and shared virtual places are in the scope of advanced technological development. Many exciting new learning technologies exist, but the application of these technologies has often been lacking coherence and their uptake unacceptably delayed. The problem is that mostly, content and systems are not interoperable throughout the world. In order to resolve this problem, we have to consider advanced technologies and standards as a joint main driver for innovation.

The goal of the Special Interactive Session is to point out and discuss both, recent learning technologies such as Web 2.0 advancements, and learning and performance standards, and their rising impact for research, development and societal changes. We will examine the interoperability of learning content and systems, the individual performance and the results of learning interactions with an eye toward maximizing an educational organization's investment in people and technology. We believe that open standards and an open source software community are key to realizing technology's promise in education and job training.

This Interactive Session puts together better-known worldwide leaders in researching and developing educational technologies, and adopting learning standards to educational systems. It provides insights on a global framework for international work, and cooperative standardization.

The Session will be moderated by Fanny KLETT. Participants will have a unique opportunity to listen to and learn from recognized experts' addresses about future trends and recent practical developments in educational technology.

# Playing and learning with dinosaurs in and out of school boundaries

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**Abstract:** This interactive event will partly simulate the approach of developing playful learning environments enabled by digital technologies, which seeks to bridge learning experiences across in and out of school environments. During the event, we will use "dinosaurs" as our motivating anchor of various school contents. The organizers and facilitators are involved in such efforts in their projects and the theme of dinosaurs has widespread appeal to public across different age groups, social and cultural backgrounds and professional interests. We will engage participants in the emerging discourse on how to bridge informal and formal learning contexts, and have them experience playing and learning with various games and toys that have potentials for facilitating such boundary crossing. Participants will have an opportunity to explore ways to do so using their own narratives, digital games, mixed reality technologies, and other hands-on activities.

# Integrating e@Leader into the English and Mathematics Curriculum in Hong Kong Primary Schools

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**Abstract:** Whether online edutainment gaming can really enhance active student learning, or truly correlate school academic performance remain debatable issues within education, and is of great interest to policymakers, researchers, educators and parents.

e@Leader is a purpose-built online edutainment programme and assessment system, specifically designed to enhance the learning and intellectual development of primary school pupils. Its design is drawn from research-based knowledge in neuroscience, cognitive psychology and education. e@Leader has been awarded the Creativity Award by EDB (2008) and the ICT Award by the HKSAR (2009), and is currently available for use in 400 primary schools in Hong Kong.

# The Trend of Digital Game and Intelligent Toy Enhanced Learning

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**Abstract:** Digital game and intelligent toy enhanced learning is an emerging research area, which attracts a lot of interdisciplinary researchers involved in it. The goal of this workshop is to discuss the trend of the research area as well as the benefit/damage of using digital game and intelligent toy in learning. This workshop provides a forum, with panels, paper presentations, and interactive sessions, for researchers and practitioners from various disciplines to exchange ideas.

# **An eLearning Strategy for Campus-based Colleges and Universities - eScholars Group for Sharing, Collaboration and Synergy**

**Roy KAM<sup>a</sup>, Lai Kuen CHAN, Dr. Marco YC PANG, Stephen D MAU**  
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**Abstract:** The main purpose of this interactive event is through a showcase of different eLearning deliverables developed by the eScholars Group for Sharing, Collaboration and Synergy from the Hong Kong Polytechnic University, to introduce a cost-effective, exemplary and sustainable eLearning strategy that is of particular relevance to the educational context of campus-based colleges and universities. An eLearning strategy, among other considerations, is the first and foremost critical factor to the uptake of technology-supported learning and teaching in campus-based colleges and universities, where technology in fact does not have an indispensable role to play in their daily educational patterns. The strategy introduced here makes eLearning relevant to academic staff in the sense that technology is pursued pedagogically to address the existing learning and teaching challenges and that the eLearning deliverables developed under this strategy are easy to reuse, repurpose and further fine-tune in a cross-disciplinary manner. This strategy is grounded in a thorough understanding of contemporary studies and practices on Information and Communications Technology (ICT) in Education and it is hoped that the multi-faceted issues addressed in the strategy such as educational leadership, educational design, multimedia capabilities, learning object development and blended mode of learning and teaching provide more well-informed insights into the formulation of strategic planning for the further advancement in the pedagogical integration of technology in education, particularly for campus-based colleges and universities.

# CSCL Practices in Schools in Asia

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**Abstract:** Many CSCL researchers in Asian countries have focused on school-based design research. While Asian countries tend to have more centralized educational school systems than countries from the West, the closer alignment of educational policy with education research and educational reforms have provided exciting opportunities for CSCL research to have an impact on practice. Researchers in regions and countries like Hong Kong and Singapore have embarked on various CSCL research initiatives (such as Knowledge Building) by working closely with teachers. In this interactive event, we invite teachers, practitioners and researchers to share their perspectives –examining innovative CSCL practices in schools and other educational settings for advancing our collective understanding.





## **Abstracts of Tutorial**



# Constraint-Based Tutoring Systems: From Theory to Authoring

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**Abstract:** This tutorial covers both the theory and practice of Constraint-based Modeling and Constraint-based Tutoring Systems. The first part of the tutorial introduces constraints and Constraint-Based Modeling (CBM) as a theoretical foundation for Intelligent Tutoring Systems (ITSs). The second part covers ASPIRE, our authoring system for developing constraint-based ITSs, and gives participants the opportunity to experience developing a small ITS in ASPIRE.

We first introduce constraints as a way of representing domain knowledge. Currently, cognitive models typically cast declarative knowledge as consisting of propositions – knowledge units that encode assertions (which can be true or false) that support description, deduction and prediction. We have developed an alternative model of declarative knowledge that consists of constraints – units of knowledge that are more prescriptive than descriptive, and that primarily support evaluation and judgment. In this tutorial we first present a formal representation of constraints and explain its conceptual rationale. We then introduce two applications of constraint-based modeling. The first is the use of constraints as a basis for a machine learning algorithm that allows a heuristic search system to detect and correct its own errors. From this point of view, constraint-based learning is a form of adaptive search. This algorithm was originally developed as a hypothesis about how people learn from errors. We present the algorithm in some detail and briefly summarize applications to various problems in the psychology of cognitive skill acquisition.

Next we develop in detail the application of constraint-based modeling to the design and implementation of Intelligent Tutoring Systems. The constraint-based knowledge representation provides a novel way to represent the target subject matter knowledge, which has the advantage of directly supporting one of the main functions of expert knowledge in an ITS: To detect student errors. More importantly, the constraint-based representation provides a theoretically sound and practical solution to the intractable problem of student modeling. Finally, the constraint-based representation and the associated learning algorithm provide detailed implications for how to formulate individual tutoring messages. We present multiple systems that follow this blueprint, together with empirical evaluation data.

In the second part of the tutorial we present our authoring system (ASPIRE). The goal of ASPIRE is to make ITS authoring available to educators who have no technical knowledge of ITS or Computer Science in general. ASPIRE does this by providing extensive authoring support, such that the author, as far as possible, is always working at the domain knowledge level, not the programming level. We describe its architecture and functionality, as well as the authoring procedure it supports. The participants will then have hands-on opportunities to investigate ASPIRE closer, by using it to build a simple tutor.



# **Abstracts of Doctoral Student Consortium Papers**



# Development of Intercultural Sensitivity through Online Interaction

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

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

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

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

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



# Smart Classroom 2.0: Context-aware Educational System

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

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

# A Research of Digital Technology-assisted Reading Habit Cultivating

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

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

# The Design of a Blog-based Learning Game

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

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

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

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

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

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

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

**Keywords:** Information Ethics, Delphi, scale development

# Scaffolding Strategies for Teaching Introductory Programming

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

**Keywords:** introductory programming, scaffolding

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

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

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

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