

POSTER ABSTRACTS

Learning BY numbers: Large scale peer-to-peer learning with Monash MeTL

Nathan Bailey, Katharina Franke, Chris Hagan, David Hagan, and Murray Logan
eEducation Center, Monash University, Australia

Monash University has been exploring tablet-based education since 2008. An integral part has been the use of Classroom Presenter (CP). When both students and instructors have access to Tablet PCs, CP provides opportunities for increased interaction, participation and instant feedback. Our findings indicate that students perceive tablet-based teaching as more engaging and interactive than non-tablet-based classes. However, interaction with CP remains largely focussed on instructor-student feedback, limiting the power of collaboration and peer-based instruction that can significantly enhance engagement and learning. To address this, Monash started to develop its own software, *Monash MeTL*, allowing us to progressively move towards a collaborative approach where students can work together with peers and the instructor in exploring the lecture topic. Currently, *Monash MeTL* incorporates a number of common interactive features, including importing PowerPoint slides for annotation, adding whiteboard space and creating structured quizzes. *MeTL's* full potential is best realised when students take advantage of the shared visual space to collaborate as part of the classroom experience and beyond. Since *MeTL* is server-persistent, students and instructors have access to *MeTL* anytime anywhere, enabling them to collaborate and continue their learning experience beyond the class. In 2010, *MeTL (2.0)* was used in two Medicine cohorts, allowing students to interact with peers during class and to collaboratively construct their understanding of the lecture content. Rigorous testing took place in early 2010 to prepare for the rollout, which indicates that *MeTL* is able to host about 900 simultaneous participants per server.

Using Pen-Based Technology to Improve Instruction in Engineering Economics

Glen P. Ciborowski and Bruce V. Mutter
CART, Inc, Bluefield State College, USA

Abstract: CART, Inc. worked with the School of Engineering Technology and Computer Science (SET) at Bluefield State College (BSC) to implement a more active learning environment for teaching a junior-level engineering economics course (ENGR 315). Using a pen-based Tablet PC coupled with the CART CMS, a Moodle®-based course management service and interactive software, our instructional approach was modified to convert the traditional lecture-based ENGR 315 course to a more student-centered live learning environment. This method is now being planned for introductory mathematics and advanced computer science courses. Results show that the use of pen-based Tablet PC coupled with live capture of the lecture posted on the CART CMS have resulted in better student retention and improved attention during the course. There is evidence of improved student performance and faculty evaluations.

Using the Tablet PC instead of whiteboards, overheads, and blackboards allowed the ENGR 315 instructor to: (1) face students naturally and continually while solving equations; (2) produce cash flow diagrams more accurately and efficiently; (3) eliminate interruptions and distractions caused by physical

transitions between whiteboard and projector screen; (4) quickly introduce color during live presentations that further improve understanding of concepts and classroom discussions; (5) facilitate student note taking through CART CMS posts that improve organization and elaboration; (6) accommodate student review for tests and quizzes; (7) provide students with a ready-made, savable, printable, portfolio useful for Fundamentals of Engineering (FE) review and exam preparation, and (8) work more high-quality problem examples due to these increased course delivery efficiencies.

TABLET COMPUTING AS ENABLEMENT FOR PERSONALIZED LEARNING COMMUNITIES IN HIGH SCHOOL AND COLLEGE MATHEMATICS CLASSROOMS

Eric Hamilton, Brian Fisher, and Kevin Iga
Pepperdine University, USA

This effort, funded by Microsoft Research, the US Air Force Academy, and Pepperdine University, advances a vision for personalized learning communities in mathematics education. The advent of network communication tools that allow teachers to view student work in thumbnail and full screen form, coupled with tablet computers permitting freehand mathematical notation, permits a new form of classroom dynamics that emphasizes salutary aspects of both individualization and community within the classroom, in an effort to solve the need to elevate mathematical engagement by students. One lens for analyzing classroom dynamics involves the construct of interactional bandwidth, which refers to the quantity of personal and content interaction that can pass over the classroom communication systems. (One way to describe bandwidth involves the use of classroom response systems (CRSs). A classroom that adds a CRS also adds bandwidth, another avenue for important information to cross hands. The same can be said for any configuration that furnishes electronic communication between members of the classroom.) The solution we employ to elevate engagement with tablet computers entails significantly multiplying the interactional bandwidth of a classroom, allowing the teacher and the students to co-navigate large bodies of visual data that a) disclose student mathematical thinking in richer detail; b) enable more timely feedback and more richly informed feedback by the teacher to the student; and c) sustain significantly higher levels of mathematical engagement in the classroom. The pen-based computing solution entailed furnishing every pair of student with one tablet computer, using Windows Journal and collaboration software.

SuperIDR: A Tablet PC Tool for Image Description and Retrieval

Uma Murthy, Nadia P. Kozievitch, Edward A. Fox, Ricardo Torres, and Eric Hallerman
Virginia Tech, University of Campinas

SuperIDR is a tablet-PC-based tool, which combines text and visual content-based image description and retrieval. It allows users to mark parts of images and associate them with text annotations. Annotations can be entered using either pen-based or keypad-based input. Later, users can browse information and perform text- and content-based search on textual descriptions, annotations, images, and parts of images. We developed SuperIDR as an aid to fish species identification and seeded it with images and descriptions of freshwater fishes of Virginia. We evaluated SuperIDR in an Ichthyology class at Virginia Tech (VT) and found that students had a higher likelihood of success with SuperIDR than with traditional

methods for species identification. Later, we adapted SuperIDR to work with parasite images and descriptions for Zooparasitology students at UNICAMP, Brazil. In two studies at UNICAMP, students tested SuperIDR and felt that it was useful for species identification. In all studies (VT & UNICAMP), students had some difficulty with pen-based input and felt that they needed more training to use it effectively. Overall, we found that students (and teachers) had a positive reaction to SuperIDR as an aid to species identification. A new version of SuperIDR (to be made available for download) will include combined text & image search and ability to compare two images side by side, while marking and annotating them. Also, we will conduct a qualitative study to understand the use of SuperIDR in the workplace and field. We hope to get more subjective and detailed feedback from this study.

Designing a Web-based System for Tagging Errors in Freshman Calculus Using Pen-Technology

Roy P. Pargas, Eric Anderson, Marilyn Reba , and Calvin Williams
Clemson University, USA

Pen-technology motivated the construction of a large database of student work in Calculus, both inked and scanned, through which the tagging and analysis of student errors and problem-solving strategies becomes possible. To minimize failure rates, we want to know where students in at-risk groups, and students in general, are making errors and then, guided by an extensive statistical error analysis, develop and evaluate new teaching materials and online instructional interventions. Due to collaboration between the Department of Mathematical Sciences and the Department of Computer Science funded both by Hewlett Packard and NSF here at Clemson University, we have been able to enhance the web-based software, *MessageGrid*, to meet the needs of this tagging project. The process of developing an error-analysis study based on tagging involves the interplay of four components: (i) Student Inked-submissions; (ii) Item-Analysis Statistics ; (iii) A Tagging Lexicon; and (iv) Web-based Software. In Summer 2010, several faculty members and graduate students developed a lexicon of errors and tagged 2000+ Calculus I finals from Fall 2009.

Student Helpdesk Support for Tablet PC and Pen-Based Computing Environment

Kevin Rokuskie
Cary Academy, USA

How can a school district or private school handle the hardware, software and numerous other requests that are associated with a Tablet PC and pen-based computing 1:1 computer environment? It all starts with the information technology staff and the support model that they put in place. If the support is not there for faculty, staff and students, then frustration can mount and with that frustration comes people not using the tablet for what it is meant to be used for. Even if the information technology support staff is there, they might not be able to handle all requests. How can this support be supplemented and added to in the classroom? Utilizing a student helpdesk is a great benefit for the school to use with a Tablet PC and pen-based computing environment. Cary Academy has used a student helpdesk environment since we started using tablets in the fall of 2006. The class is called CANE (Computer and Network Essentials). Upper School students have this as an extra class and come to the information technology support office located in the middle school, during a study hall, free period or after school. Students learn the basics of hardware and software troubleshooting, networking and minor repairs.

This can eventually lead to a summer internship with the information technology staff, that includes a resume and interview process. Learn how to utilize the best resource you have, the students who use the tablets and other pen-based computers.

Pen-based Technologies Integration into a Professional Practices in Parasitology of Bioanalysis Course: Preliminary results

Rowland Saer Hurtado, Salvador Bucella, and Yasmin Tanq
Unisersidad de Carabobo, Venezuela

Laboratory Professional Practices in Parasitology is taught for final year Bioanalysis students in the Health Sciences program at the University of Carabobo, Venezuela. We use Tablet PCs and digital ink in the laboratory classroom to support our teaching and learning environment. The pen-based technologies are also used to teach elementary school children about intestinal parasitic disease prevention. The professor's explanations, using pen-based technology in combination with Classroom Presenter software, enhances teacher-student interaction at both individual and group levels by providing immediate access to images and providing a collaborative learning environment. The approach also contributes to more accurate identification of the parasites found in specimens examined from different microscopes in the laboratory.

Our project has begun to yield preliminary results. We administered four different surveys to our students. In one of these, related to the use of pen-based technology, we have processed data from 68 student surveys administered in 2009 (61.8 % of 110 students participants) and from 85 surveys in 2010 (68 % of 125 students participants). These surveys included questions about student satisfaction, previous experience with the use of Tablet PCs, perceived usefulness of the Tablet PCs and the pen based tools, as well as many other questions. The survey results show a trend toward student satisfaction with the use of these types of technology tools and suggest that these tools can be powerful for teaching health education to children.