

WIPTTE 2009 Schedule

(Abstracts Follow Below)

Monday, October 12, 2009

7:15am to 8:10am

(Latham Foyer) Registration and Breakfast (and time for poster, video and vendor setup)

8:10am – 8:30am

(Latham Room C) Welcome and Announcements

Dean Benson

College of Engineering, Virginia Tech, USA

WIPTTE Committee Members

8:30 – 9:30am

(Latham Room C) Monday Keynote

Talkin' 'bout Mo' Generation: Generative Technologies for a Mobile Generation

Eileen Lento

Intel, USA

9:45am - 10:30am (Three Concurrent Sessions)

(Latham Room C) Math in Your Hands: Integrating the Use of Maple with the Collaborative Use of Wireless Tablet PCs

Joshua Holden, Shannon Sexton, and Julia Williams

Rose-Hulman Institute of Technology, USA

(Duck Pond Room) Impact of Tablet PCs and DyKnow Software on Learning Gains in Inquiry-Learning Oriented Course

Zdeslav Hrepic and Kristin Reed

Columbus State University and Fort Hays State University, USA

(Drillfield Room) Hands-On Class: Music (applicable to other disciplines too)

Jennifer Snodgrass and Jeffrey Lazenby

Appalachian State University, USA

10:30am - 11:15am

(Room Latham DEF) Posters/Videos/Vendors

11:15am - 12:00noon (Three Concurrent Sessions)

(Latham C) Patterns of Tablet Usage across Multiple Learning Domains: a Tablet Comparison Program

Murray Logan, Katharina Franke, Gordon Sanson, and Nathan Bailey

Monash University, Australia

(Duck Pond) Slides Manager Tool: Supporting Active Learning Using Tablet PC and Pen-Based Devices

Ricardo Edgard Caceffo, Rodolfo Jardim de Azevedo, and Heloisa Vieira da Rocha

University of Campinas-Unicamp, Brazil

(Drillfield Room) Hands-On Class: Chemistry and Science (applicable to other disciplines too)

Matt O'Brien

Brisbane Boys College, Australia

12noon – 1:30pm

Lunch on your own

1:30pm - 2:15pm (Three Concurrent Sessions)

(Latham Room C) Analyzing the Benefits of Using Tablet PC-Based Flash Cards Application in a Collaborative Learning Environment – A Preliminary Study

YoungJoo Jeong, Ananda Gunawardena, and Kenneth Koedinger
Carnegie Mellon University, USA

(Duck Pond Room) Grading Qualitatively with Tablet PCs in CS 50

David Malan
Harvard University, USA

(Drillfield Room) Hands-On Class: Examples from Varied Disciplines

Dave Berque
DePauw University, USA

2:30pm - 3:15pm (Three Concurrent Sessions)

(Latham Room C) Use of Ubiquitous Presenter: 2006-2009

Elizabeth Bales, William Griswold, Beth Simon, Aaron Hieber, Michael J. Kelly, James Lintern, and David Ouyang
University of California-San Diego, USA

(Duck Pond Room) Tablet PC Instruction Improves Undergraduate Mathematics Learning

Carla Romney
Boston University School of Medicine, USA

(Drillfield Room) Hands-On Class: General Classroom Techniques

Joseph Tront
Virginia Tech, USA

3:30pm - 4:15pm (Three Concurrent Sessions)

(Latham Room C) Scoring DyKnow Retrieved Panels for Large Classes

Jarad Hatfield, Jeffrey Hieb, and James Lewis
University of Louisville, USA

(Duck Pond Room) MessageGrid Replayink: Pinpointing Student Misconceptions

Roy Pargas, Eric Anderson, and David Bowman
Clemson University, USA

(Drillfield Room) Hands-On Class: History (applicable to other disciplines too)

Barry Dean
Brisbane Boys College, Australia

4:30pm - 5:15pm

(Latham Room DEF) Posters/Videos/Vendors

5:15pm - 6:00pm

(Latham Room A) Networking Reception

6:00pm - 7:30pm

(Latham Room A) Conference Dinner

Tuesday, October 13, 2009

8:00am - 8:45am

(Latham Foyer and Latham DEF) Breakfast and Posters/Videos/Vendors

8:45am - 9:00am

(Latham Room C) Announcements

9:00am - 10:00am

(Latham Room C) Tuesday Keynote

Potential of Pen Technologies in K-12 Education and Opportunities for Higher Education Involvement

Ananda Gunawardena

Carnegie Mellon University, USA

10:15am - 11:00am (Four Concurrent Sessions)

(Latham Room C) Preliminary Quantitative Data Showing Student Improvement in Mathematics From a Trial Tablet PC Deployment

Matthew O'Brien and Barry Dean

Brisbane Boys' College, Australia

(Duck Pond Room) Tablet-Based Recitations in Physics: Less Lecture More Success

Cynthia Sisson

Louisiana State University Shreveport, USA

(Cascades Room) Active Learning and Screencasting with Tablet PC: A Detailed Evaluation

Pedro Almeida and Rodolfo Azevedo

University of Campina, Brazil

(Drillfield Room) Hands-On Class: Computer Science (applicable to other disciplines too)

Natalie Linnell

University of Washington, USA

11:15am - 12:00 noon (Four Concurrent Sessions)

(Latham Room C) How do Students Solve Chemistry Problems?

Sam Bryfczynski, Roy P. Pargas, Melanie M. Cooper, Nathaniel P. Grove, and Sonia M. Underwood

Clemson University, USA

(Duck Pond) Assessing the Use of Dyknow Ink and Audio Tools: If You Record It Will They Still Come?

Dave Berque

DePauw University, USA

(Cascades Room) Investigating Changes in Students' Perceptions on Tablet PC Applications

Parastou Mokri and Vinod K. Lohani

Virginia Tech, USA

(Drillfield Room) Hands-On Class: Mathematics (applicable to other disciplines too)

Ananda Gunawardena and YoungJoo Jeong

Carnegie Mellon University, USA

12:00 noon - 12:30pm

(Latham Room C) Wrap-up / Prizes Awarded

Paper and Keynote Abstracts

Monday, October 12, 2009

8:30 – 9:30am

Monday Keynote

Talkin' 'bout Mo' Generation: Generative Technologies for a Mobile Generation

Eileen Lento

Intel, USA

One of the problems with the way computers are typically used in education is that they are most often just an extension of the idea that education is synonymous with learning accepted facts. But, what is truly compelling, when reflecting on learning environments and the learners in them, is the more profound use of computers to transmit ideas, points of view, and new and innovative ways of thinking. You don't need a computer for this, but just as with a musical instrument, once you get facile in this way of using them, then the computer is a powerful amplifier for learning. Moreover, there are design affordances on and in computing devices, like tablets with pens, and software, such as student response tools, class capture functionality, collaborative learning tools and anytime-anywhere access which enhance both teaching and learning in and out of the classroom; thereby, further augmenting educational processes.

9:45am - 10:30am

Math in Your Hands: Integrating the Use of Maple with the Collaborative Use of Wireless Tablet PCs

Joshua Holden, Shannon Sexton, and Julia Williams

Rose-Hulman Institute of Technology, USA

In the Fall Quarter of 2008 we explored the use of tablet PCs in third-quarter (multivariable) calculus classes for incoming freshman in order to foster student engagement by incorporating active learning and collaborative activities. The use of tablets can make many improvements in a classroom, but mathematics classes pose special challenges which have not yet been systematically explored at Rose-Hulman. The most difficult of these from a technical perspective is the integration of computer algebra systems such as Maple with other Tablet PC software, such as collaborative note-taking systems. This project explores ways to achieve this integration as well as other pedagogical improvements which the use of tablet PCs could bring to mathematics classrooms. We will report on student answers to questions about familiarity, ease of use, and effects on learning.

Impact of Tablet PCs and DyKnow Software on Learning Gains in Inquiry-Learning Oriented Course

Zdeslav Hrepic and Kristin Reed

Columbus State University and Fort Hays State University, USA

Tablet PCs and DyKnow software were utilized at Fort Hays State University in the teaching of an inquiry-based physical science course for elementary education majors since the summer semester of 2006. This course was originally developed in 2004 and 2005 through an NSF sponsored research effort. In this paper we compare learning gains obtained in this course during three semesters when pen-based computing technology was not utilized (Fall 04 - Fall 05) with gains obtained during three later semesters (Fall 07 - Fall 08) in which we utilized Tablet PCs and DyKnow software in teaching the course. We also report on students' attitudes toward DyKnow software and compare them with obtained learning gains.

Hands-On Class: Music

Jennifer Snodgrass and Jeffrey Lazenby

Appalachian State University, USA

Material in this class will be based on using Tablet PCs to teach music. However, the teaching approaches will transfer to other disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPTE. Software utilized in this class will include Journal and DyKnow.

11:15am - 12:00noon

Patterns of Tablet Usage across Multiple Learning Domains: a Tablet Comparison Program

Murray Logan, Katharina Franke, Gordon Sanson, and Nathan Bailey
Monash University, Australia

To date, Tablet PCs have had little impact as an effective teaching and learning tool within the Australia higher education context. Monash University has been engaged in exploring the potential of pen-based technology since 2008. Evaluations of pilot projects suggest that students would like a choice in certain tablet PC features, predominantly concerning size and portability. This paper discusses a tablet PC comparison program in a level three biology subject at Monash University. Our findings indicate that while size and portability are important factors to consider, it is even more important to create a teaching and learning environment that makes effective use of pen-based technology within the classroom. Only in an environment that actively seeks to engage students (through tablet technology) do preferences for size and performance come to play a role.

Slides Manager Tool: Supporting Active Learning Using Tablet PC and Pen-Based Devices

Ricardo Edgard Caceffo, Rodolfo Jardim de Azevedo, and Heloisa Vieira da Rocha
University of Campinas-Unicamp, Brazil

This work shows the development of a higher educational tool to support the creation of a collaborative educational environment, based on the Active Learning model and Tablet PC technology. A prototype of the tool was developed, implementing functionalities that allow a better interaction between the students and teacher, also providing the possibility of insertion, analysis and comparison of the student's material in the classroom. The results evaluation show the benefits and advantages that the use of Slides Manager Tool have in the classroom, like the increase of student's participation and the real time feedback that the instructor can provide to the students.

Hands-On Class: Chemistry and Science

Matt O'Brien
Brisbane Boys College, Australia

Material in this class will be based on using Tablet PCs to teach chemistry and science. However, the teaching approaches will transfer to other disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPTE. Software utilized in this class may include OneNote, DyKnow, Tablet Flash Cards and ChemPad 3.

1:30pm - 2:15pm

Analyzing the Benefits of Using Tablet PC-Based Flash Cards Application in a Collaborative Learning Environment – A Preliminary Study

YoungJoo Jeong, Ananda Gunawardena, and Kenneth Koedinger
Carnegie Mellon University, USA

This paper examines the potential use of the Tablet PC-based Flash Cards Application in a collaborative learning environment. The application provides the flexibility of handwritten input and the ability to share flash card decks. The application was deployed in an eighth grade geometry classroom at a girls' school in Pittsburgh. Each student was asked to individually create decks of flash cards reviewing the material that they had already learned as well as create decks previewing upcoming material. We selected groups of students of different sizes, pooled their flash card decks, and measured the percentages of topics represented on the cards. The teacher's decks were used as the control. We found, for the upcoming material case, that the decks of fewer students covered a higher percentage of material. We also surveyed the students to determine their criteria for selecting material when they created the cards. Half of the students created flash cards for material with which they were confident, half created cards for material that they thought they should review more, and some did both. The finding of this study gave us a better insight into the use of Tablet Flash Cards in a collaborative k-12 educational setting.

Grading Qualitatively with Tablet PCs in CS 50

David Malan

Harvard University, USA

CS 50 is Harvard College's introduction to Computer Science for majors and non-majors alike. Each week, our 330 students submit programming assignments comprising hundreds of lines of code that must then be graded. Although we can assess the correctness of some code automatically, some measures of quality require human attention. In fall 2008, we equipped the course's 27 teaching fellows (TFs) with Tablet PCs in order to grade more efficiently but no less qualitatively. By blurring the lines between files and paper, we hoped to facilitate typed and handwritten feedback alike so that grading itself would be not only evaluative but instructive as well. At term's end, most TFs (63%) reported that grading took less time with a Tablet PC, and nearly half (48%) also reported that they provided students with more feedback because of the same. We present in this paper CS 50's experience with Tablet PCs along with pedagogical benefits thereof.

Hands-On Class: Examples from Varied Disciplines

Dave Berque

DePauw University, USA

Material in this class will be based on using Tablet PCs to teach a variety of subjects including the psychology of design. However, the teaching approaches will transfer to other disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPTE. DyKnow software will be utilized in this class.

2:30pm - 3:15pm

Use of Ubiquitous Presenter: 2006-2009

Elizabeth Bales, William Griswold, Beth Simon, Aaron Hieber, Michael J. Kelly, James Lintern, and David Ouyang
University of California-San Diego, USA

Ubiquitous Presenter (<http://up.ucsd.edu>), first deployed in 2006, is a web-based adaptation of the University of Washington's Classroom Presenter system, which was first deployed in 2002. UP supports technology-enhanced teaching scenarios where the instructor has a Tablet PC and students interact using a web-enabled device such as a laptop or cell phone. UP is hosted via a web server at UCSD and is freely available for instructors around the world – enabling free downloads of the instructor client and free server accounts for instructors and students – albeit with minimal technical support. In 3.5 academic years, UP has registered more than 565 instructors and 9,918 students. Here we report on statistics regarding “active” instructors, classrooms, and students using UP. We also report what percentage of classrooms make significant use of the active learning features that UP supports. To our knowledge, this is the first longitudinal study of the overall educational use of a non-commercial Tablet PC lecturing system.

Tablet PC Instruction Improves Undergraduate Mathematics Learning

Carla Romney

Boston University School of Medicine, USA

Students often struggle to learn mathematics in undergraduate classes because they do not engage in problem-solving during class and spend precious class time focusing on copying the instructor's notes rather than thinking about the material that is presented. In fall 2008, we began to use Tablet PCs in a networked undergraduate classroom configuration that allows students to view and annotate the instructor's PowerPoint slides in real time and also participate in interactive problem-solving. Students save their annotated slides for subsequent review. Immediately after each class session, the instructor posts a synchronized and searchable file that contains an audio recording of the class (student and instructor comments) as well as the instructor's annotated slides on a classroom management website. Twenty students participated in the pilot class, College Algebra and Trigonometry. Student attendance, retention and performance were better in the Tablet PC enriched course than in the previous three years that the course was taught by the same instructor using the same textbook. The evaluation of the instructor was unchanged. Tablet PCs are a promising pedagogical tool to improve the effectiveness of mathematics instruction.

Hands-On Class: General Classroom Techniques

Joseph Tront

Virginia Tech, USA

Material in this class will include general classroom techniques for using Tablet PCs to teach a variety of subjects. The teaching approaches will transfer across disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPTE. Classroom Presenter software will be utilized in this class.

3:30pm - 4:15pm

Scoring DyKnow Retrieved Panels for Large Classes

Jarad Hatfield, Jeffrey Hieb, and James Lewis

University of Louisville, USA

The Department of Engineering Fundamentals teaches core, calculus based, engineering analysis classes. Having students work problems in class, and giving them some credit on weekly exams for completing in class problems has been an effective teaching methodology for many years; it encourages students to attend class regularly and keeps them engaged in the material. After the school adopted a Tablet PC program, the department began teaching with Tablet PCs and DyKnow. Recently instructors in the department wanted to move to an electronic in-class problem. Due to the large size of classes, manually reviewing and recording scores by looking through DyKnow notebooks was too inefficient to be seriously considered. Instead the DyKnow Panel eXtractor was developed to assist instructors. The DPX tool is currently being used in two courses to support scoring of in-class problems retrieved through DyKnow. DPX has made scoring of in-class problems much more efficient and manageable. Instructors also report that requiring students to work a problem electronically on their tablet has led to more students embracing tablet pc based note taking.

MessageGrid ReplayInk: Pinpointing Student Misconceptions

Roy Pargas, Eric Anderson, and David Bowman

Clemson University, USA

In this paper, we present a web-based software tool called MessageGrid ReplayInk. This tool enables an instructor to assign a problem to a class, collect Ink solutions from students, replay student solutions, tag errors in the solution and analyze performance of a class of students through statistical analysis of tag frequencies. Both instructors and students can replay solutions. This allows instructors to see exactly where students commit errors and exposes where misconceptions lie. This also allows students to observe and replay the answer key, giving a step by step demonstration of how to build a specific data structure. We describe the parent application, MessageGrid, and this latest addition, ReplayInk. We explain how we implement the replay function and show how we used ReplayInk in two computer science data structures classes. We provide a summary of the students' evaluation of the tool and of the overall teaching and learning structure (less lecture, more activity) used in the class.

Hands-On Class: History

Barry Dean

Brisbane Boys College, Australia

Material in this class will be based on using Tablet PCs to teach history. However, the teaching approaches will transfer to other disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPTE. Software utilized in this class may include OneNote, DyKnow and Tablet Flash Cards.

Tuesday, October 13, 2009

9:00am - 10:00am

Tuesday Keynote

Potential of Pen Technologies in K-12 Education and Opportunities for Higher Education Involvement

Ananda Gunawardena

Carnegie Mellon University, USA

K-12 perhaps holds the most promise in yet-fully-untapped potential of Tablet PC's in education. Students who have not yet-fully-mastered typing skills are more likely to embrace the natural unrestricted expression modality provided by pen and touch computers. The concept of communicating with a computer as if there is some smart paper that is able to understand student sketches and provide feedback is highly appealing. The ability of pen computers to act as smart paper and collaborative platforms opens a new dimension of technology in education. In this presentation, we will share our experiences working with k-12 teachers to develop pilot projects around pen technologies and will demonstrate some innovative pen-based applications developed at Carnegie Mellon University. We will emphasize the need to develop frameworks and networks that allow k-12 teachers to partner with universities to jointly collaborate on research projects. We will emphasize the need for new smart pen applications that are developed using solid human computer interaction principles. We also need innovative ways of looking at the utility of pen-based computers in education. We invite the community to join our efforts to share this wonderful technology through blogs and social networking sites. We can, and we should mobilize and show the world the potential of this new technology.

10:15am - 11:00am

Preliminary Quantitative Data Showing Student Improvement in Mathematics From a Trial Tablet PC Deployment

Matthew O'Brien and Barry Dean

Brisbane Boys' College, University of Queensland, Australia

A Tablet PC trial deployment to a year 7 class in a private all boys' school allowed for comparison of performance in the Mathematics area of study between the class receiving instruction using the Tablet PC and the other three classes who were taught using traditional modes. All assessments were the same for all classes and the ICAS Mathematics test was used to verify internal assessment measures. Prior to the trial, classes were of a similar performance level, however following the trial, the Tablet PC trial class had increased performance in comparison to all other classes, significant at $p=0.003$. The results support the use of Tablet PC as an effective instructional tool, with demonstrated performance increases for students. Following the success of the trial, the SOSE and Science subject areas will now also be instructed using the Tablet PC in semester 2 and a site-wide deployment of Tablet PC's will likely occur for years 7 and 10 in 2010.

Tablet-Based Recitations in Physics: Less Lecture More Success

Cynthia Sisson

Louisiana State University Shreveport, USA

Two sections of introductory physics at Louisiana State University in Shreveport replaced one day per week of lecture with a collaborative, tablet-based problem solving session. This approach was used in both algebra-based physics in year one, and calculus-based physics in year two. Analysis of student performance shows that students in the tablet recitation sections were significantly more successful in the course than the five year historical average (for both instructor and department), earning A's, B's, and C's at rates that were one and two standard deviations above the five year departmental baseline. This success was in spite of minimal changes in the syllabus to accommodate the recitations, fewer lectures days to cover material, and identical final exams. In addition, although the tablet recitations focused on problem-solving, neither section showed a loss in conceptual understanding. Rather, both sections showed a slight, although not statistically significant, increase on a widely accepted inventory of conceptual understanding in physics. Finally, students in the calculus-based physics course in year two showed a significant increase in problem solving skills on the final exam.

Active Learning and Screencasting With Tablet PC: A Detailed Evaluation

Pedro Almeida and Rodolfo Azevedo

University of Campina, Brazil

After achieving good results on Tablet PC acceptance from students in a Software Engineering course, we decided to reformulate a whole Computer Architecture course in order to use Tablet PCs. This is a graphically dense course, full of details that can be better explained with the use of digital ink. The presentation by itself is a great advantage, but since we can go further with the digital ink we have also used the Tablet PCs to build an active learning environment and to record screencasts of the instructor annotated transparencies. The main goals were providing a real time feedback tool to the instructor, consisting of the active learning environment where the students and instructor can trade their electronic ink and letting the students review the lecture's content in their own pace and with all the details, provided by the screencasts recorded during the lectures. This work describes the changes that were made to the course and an evaluation showing how these changes impacted in the students' behavior and performance. This evaluation shows that the modifications were very well accepted, with students finding out that the Tablet PCs were an important tool in their learning process in this discipline, pointing out interesting results about students' behavior and how the new lectures can give the instructor information about which topics are more troublesome or needs more attention.

Hands-On Class: Computer Science

Natalie Linnell

University of Washington, USA

Material in this class will be based on using Tablet PCs to teach computer science. However, the teaching approaches will transfer to other disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPTTE. Classroom Presenter software will be utilized in this class.

11:15am - 12:00 noon

How do Students Solve Chemistry Problems?

Sam Bryfczynski, Roy P. Pargas, Melanie M. Cooper, Nathaniel P. Grove, and Sonia M. Underwood

Clemson University, USA

OrganicPad is a stand-alone Tablet PC application used to help teach high school and college organic chemistry classes. OrganicPad utilizes the Tablet PC's functionality to provide users an intuitive way to construct Lewis structures. It allows teachers and students to interact in several ways to facilitate learning. It records the construction process of molecules, stores them in a database, and provides a tool for teachers to replay student submissions for post analysis. By taking advantage of graph isomorphism algorithms, it can check student submissions automatically and provide feedback to students at any time.

Assessing the Use of DyKnow Ink and Audio Tools: If You Record It Will They Still Come?

Dave Berque

DePauw University, USA

This paper motivates and describes an integrated approach to using DyKnow ink and audio tools to support student learning inside and outside of the classroom. The approach is based on interleaving content dissemination, collaborative note taking, and active learning exercises during class while simultaneously making class content, including text, ink and audio available for review and replay outside of class. After setting the context and describing our approach, we present qualitative and quantitative evaluation results to show that most students elect to listen to the recorded class sessions, that they find the recordings to be a valuable to their learning, and that student attendance rates remain surprisingly high despite the availability of the recorded class sessions, even when there is no direct attendance grade.

Investigating Changes in Students' Perceptions on Tablet PC Applications

Parastou Mokri and Vinod K. Lohani

Virginia Tech, USA

In this paper, we examine the effects of technology, particularly Tablet PC and DyKnow, based instruction on teaching pedagogy and student learning. A mixed method approach is adopted for evaluating student learning in a freshman engineering program based on student attitudinal responses.

Hands-On Class: Mathematics

Ananda Gunawardena and YoungJoo Jeong
Carnegie Mellon University, USA

Material in this class will be based on using Tablet PCs to teach grade school math. However, the teaching approaches will transfer to other disciplines and the content will be accessible to participants regardless of background. Hands-on classes will be offered using Tablet PCs provided by WIPE. Software used in this session will include Tablet Math Whiz and Tablet Flash Cards. Participants will be encouraged to design a simple research project related to each of the software platforms. Participants will also have the opportunity to work with the developers in the future to customize software to fit their particular classroom needs.

Poster Abstracts

An Attitudinal Study of Pen Technology and Web-Based Recordings to Accommodate Students with Disabilities in Post Secondary Science Technology; Engineering; and Math (STEM) Courses

Laura Graves and Stacey Plant
Tennessee Technological University, USA

Graduating with a degree from a post-secondary institution has become an achievable goal for many students. However, for some students the manner in which course work is presented becomes a gatekeeper to reasonable access regarding course content. Students with learning disabilities (SWLD) including students with Attention deficit disorder (ADD) and Attention-deficit/hyperactivity disorder (ADHD) may be required to focus on teaching methods that are contrary to their learning strengths. Rapid note taking or intense auditory processing may interfere with their ability to focus. This limitation may be considered a form of exclusion for SWLD since they do not have the same access to a successful post-secondary education as compared to their non-disabled peers. This presentation reflects three semesters of an attitudinal study of students with learning disabilities at four post-secondary institutions as part of a larger National Science Foundation research study (NSF RDE FRI Award 0726449); and a two year Research Experiences for Undergraduates (REU) supplemental research study which included an attitudinal component of two STEM instructors. From spring 2008 through spring 2009, eleven students with learning disabilities were interviewed. The eleven students attended at least one STEM course in Biology, Chemistry, and Math where professors used pen technology that allowed asynchronous web access. The solution employed includes recorded pen technology that strives to meet equitable use among all students. Six overall common themes emerged from the reduced meaning of participant verbatim transcripts: clarity, organization, asynchronous access, convenience, achievement, and coping mechanisms.

Using Pen-Based Technology to Implement the Active Learning Methodology

Kiron Sharma, Laila Khreisat, and Neelu Sinha
Fairleigh Dickinson University, USA

In the fall of 2007 the department of Mathematics, Computer Science and Physics at Fairleigh Dickinson University implemented an active learning environment for computer science and mathematics courses. Using pen-based tablet PCs coupled with interactive software, we modified our teaching approach and converted traditional lecture and lab-based courses to be taught in a student-centered learning environment. The new environment has been employed for teaching introductory and advanced Computer Science and Mathematics courses. Results show that the use of enhanced technologies coupled with new pedagogical techniques have resulted in fewer students dropping or withdrawing from the courses. We have evidence of increased enrollment numbers in our courses, and improved student attendance and performance.

MessageGrid ReplayInk: A Demonstration

Roy Pargas, Eric Anderson, and David Bowman
Clemson University, USA

In this poster, we describe and demonstrate a web-based software tool called MessageGrid ReplayInk. This tool enables an instructor to assign a problem to a class, collect Ink solutions from students, replay student solutions, tag errors in the solution and analyze performance of a class of students through statistical analysis of tag frequencies. Both instructors and students can replay solutions. This allows instructors to see exactly where students commit errors and exposes where misconceptions lie. This also allows students to observe and replay the answer key, giving a step by step demonstration of how to build a specific data structure.

DyKnow Vision Training System

Shreya Kothaneth, and Kyunghue Oh, and David Bailey
Virginia Tech, USA

We present a discussion and content of a DyKnow training system designed for faculty and students who desire supplemental training resources. Through initial literature review and needs assessment, we identified specific faculty and student training needs. Using the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model, we developed a demonstrable training module in which faculty and students can learn and practice using DyKnow by enrolling in virtual classes and by using short, on-line videos. We incorporated principles of Malcolm Knowles' Adult Learning Theory, addressed the need to increase learner self-efficacy, and adopted Kirkpatrick's model in our discussion of the training system evaluation.

Instructional Strategies Utilizing a Tablet PC

Pamela Lowry
Lawrence Technological University, USA

Online students can experience how a faculty member incorporates instructional strategies using a Tablet PC. These strategies involve inking in Word, PowerPoint, utilizing WriteOn to annotate websites and discussion boards, and collaborating on the fly. These approaches are utilized in an asynchronous and synchronous environment with students who are K-12 teachers. Even though graduate students were not required to have a Tablet PC, this course enabled them to understand how a faculty member could utilize a Tablet PC in an online course whether it was delivered asynchronously or synchronously. Instructional strategies are discussed pertaining to utilizing a Tablet PC with respect to student assignments and discussion forums. Assignments included evaluating eLearning products, designing and developing an online class unit, evaluating online courses, and instructional research assignments. The course entitled "Distance Learning Through Technology" was designed to assist learners in identifying successful distance learning strategies through the examination of best practices, relevant case studies, and practical activities. It emphasizes the use of online teaching and learning and how to identify, implement, and utilize the various tools to enhance teaching and learning processes online.

Pen Attention: Highlight Your Pen Cursor for In-Class Presentations

Kenrick Mock
University of Alaska Anchorage, USA

The default cursor while inking with a Windows-based Tablet is a small dot that is 3 pixels wide by 3 pixels tall. This is convenient for the writer, who can see exactly where the pen is located on the screen, but it is inconvenient for students in a classroom that may be watching the instructor's screen displayed through a projector. The small dot is difficult to see even from close distances and becomes especially problematic if the instructor uses the pen like a laser pointer to reference specific items on the screen. To compensate, instructors have used a variety of techniques that include flipping the pen around to use the eraser as a pointer, holding down the right mouse button to bring up the ring icon, or using a physical laser pointer. PenAttention solves this problem by overlaying a translucent circle at the location of the pen while the user is inking. The highlight allows students in a classroom to easily see the location of the pen when the instructor's screen is displayed on a projector. PenAttention and CursorAttention (a version that does not require the Windows Tablet PC components) can be downloaded free at:

www.math.uaa.alaska.edu/~afkjm/techteach/?q=taxonomy/term/49

Drawing Lewis Structures with OrganicPad

Samuel P. Bryfczynski, Roy P. Pargas, Melanie M. Cooper, Nathaniel P. Grove and Sonia M. Underwood
Clemson University, USA

OrganicPad is a stand-alone Tablet PC application used to help teach high school and college organic chemistry classes. OrganicPad utilizes the Tablet PC's functionality to provide users an intuitive way to construct Lewis structures. It allows teachers and students to interact in several ways to help facilitate learning. It records the construction process of molecules and stores them in a database. It provides a tool for teachers to replay student submissions for post analysis. By taking advantage of graph isomorphism algorithms, it can check student submissions automatically and provide feedback to students at any time.

GenetiGraph: Tablet PC Genetics Graphing

Jeffrey Leyh
Clemson University, USA

GenetiGraph for Tablet PCs is a valuable tool for the creation and analysis of genetic data via Pedigree Charts and Path Diagrams. The utilization of tablet functionality to turn student drawings into professional and clear diagrams proves an effective teaching technique for professors. The added capabilities of advanced annotations allows for the expanded use of the tool in other medical fields. More than just a basic graph creation and editing tool, GenetiGraph positions itself to be much more of an all inclusive research assistant. Primary features include shape dependent tracking of gender, tracking of affected/unaffected individuals, tracking of obligate carriers, identification of deceased individuals, identification of twins, and identification of inbreeding. Secondary features include the ability to convert Pedigree Charts into Path Diagrams, tracking of multiple diseases on the same chart, and textual annotations. GenetiGraph is based upon the GraphPad analysis framework of fellow Clemson University student Sam Bryfczynski. By integrating with GraphPad, GenetiGraph has access to an excellent set of functions and tools for the analysis and manipulation of graphs and nodes. Additional features made available through GraphPad allow for the enhancement of an instructor's evaluation process. By replaying and comparing submissions, instructors can examine the user's cognitive processes and examine student's understanding of these genetic concepts. Together, GraphPad and GenetiGraph become a powerful set of tools for use in the medical education and research fields.

Tablet PC-Based Learning Environment to Improve Academic Performance in a Freshman Computer Engineering Course

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We report our preliminary findings on the evaluation of a mobile Tablet PC-based instructional approach and its impact on learning and teaching in a 20-student pilot project applied during the spring 2009 semester. Its target group has been Computer Technology, a core freshman course in the Computer Engineering degree at the Universidad Politécnica de Valencia (UPV). The main goal has been to deploy a more interactive teaching and learning environment to reduce both class attendance and drop-out rates (higher than 50%) and so eventually, improving students' performance. Tablet-PCs have been used to regularly solve in-class active learning exercises as well as to access to the specifically designed resources, i.e., videos, Java applets, Flash animations and questionnaires. Poliformat, the Sakai-based LMS at our University, has been used to strengthen the task delivery, the formative assessment and what is more important, the corresponding feedback. In many cases, digital ink has showed its potential to work on such kind of engineering disciplines. Preliminary results show that drop-out rates decreased below 25% while a 35% of the students in the pilot group passed the course in the June exams. On average, this percentage goes down below a 17%. Qualitative assessment has also showed a good perception both from students and staff. To conclude, research team achieved their successful results using well-known tools dealing with collaborative blended learning like ConferenceXP and Classroom Presenter respectively.

Using Pen-Technology to Collect Tag; And Analyze Student Errors in Freshman Calculus

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Tablet PCs are used in multiple sections of Calculus I (MthSc106) to create a database of student group activities and individual quizzes. Using the web-based software, Messagegrid, we replay these digitally-inked student submissions and insert unique error-labels or error-tags. We analyze these tags to explore student misconceptions and also to provide feedback to the students. We compare this tag-analysis with the statistical data from coordinated student exams in all sections of Calculus I from 2006-2009. This exam data, based on an item analysis of all questions on each exam, ranks Calculus I concepts according to the difficulty they have caused the students. Our course materials will evolve based on this kind of error analysis over several years. We are introducing pen-technology to our neighboring community college, not only to expand our error analysis, but also to encourage a pedagogical shift to an active-learning classroom where pen-technology plays a significant role in the success of at-risk students. We will preview our new Hewlett-Packard pen-technology classroom that we hope will serve as a model for other colleges and universities.

Integration of Pen-Based Communication Technologies into a Professional Practices in Parasitology of Bioanalysis Course with Associated Community Activities

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Laboratory Professional Practices in Parasitology is taught for final year Bioanalysis students in the Health Sciences program at the University of Carabobo, Venezuela. Intestinal parasite educational materials are provided using real stool specimens from children attending a local public elementary school. We use New Information and Communication Technologies (NICT), including pen-based technology, to support teaching and learning in our laboratory class environment. The pen-based technologies are also used to teach elementary school children about intestinal parasitic disease prevention. In the laboratory class, the information generated from stool specimens by the professor's microscope is captured by a digital camera and sent to the students wirelessly. The professor's explanations, augmented with pen-based annotations in combination with Classroom Presenter software, enhance teacher-student interaction at both individual and group level 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. The use of the pen-based technology with the school children allows each Bioanalysis student to address a group of school children, sketching illustrations, pictures and informative color posters and multimedia animations of the parasites evolutionary cycles. The younger children also have access to educational pen-based games such as Microsoft PowerToys, encouraging additional learning through play. The combined educational activities teach the children how to change community behavior related to preventive health practices.

Video Abstract

Technology in the Field: Vassar College and Tablet PCs

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We are using tablet PCs for teaching science in an innovative way at Vassar College. Using tablet PCs, GIS and other analytical software, we take classes of Vassar students outside to map, reflect, locate, create, observe, collect, and make science happen. The mobility of tablet PCs and the tablet's pen technology have transformed how we teach field-based curricula. Our students collect information on invasive species, document historical artifacts, measure how far a stream migrated using tablet PC technology. Applying the science they learn in the lecture, students go out into the real world and collect scientific data in real time on their tablet computers. Our video documents three Vassar courses – Geomorphology, Field Archeology and Ecology - in which the students are engaged in research-based, collaborative learning in the field. **Video link:** <http://vimeo.com/1884478>