

AC 2008-1930: INCORPORATING TABLET PORTABLE COMPUTERS INTO THE CLASSROOM

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Incorporating Tablet Portable Computers into the Classroom

Abstract

Universities are constantly updating to keep up with changes in the student's future profession. That is why Penn State Harrisburg's engineering technology classrooms and laboratories emphasis is placed on integrating modern technology with practical experimentation. The complexity of accomplishing various learning environments has become enormous. Therefore, integrating a multifunction lecture/laboratory/wireless computer room at Penn State has allowed this combination of learning into one environment.

This multifunctional room comprises of wireless tablet portable computers which are hidden and secured in mobile work stations. Each wireless tablet portable computer houses various programs, instructional aids, document resources, and has access to the university network for lab and lecture use. The mobile tables, which tablet portable computers are housed in, are flexible and can be reconfigured to meet students' need for working in groups. This facility provides faculty and students the flexibility through lab and/or lecture use and interaction through multi-platform user interfaces.

This paper will discuss the potential benefits and challenges encountered by students and faculty members at Penn State Harrisburg when using the tablet portable computers in the multifunctional classroom. This paper will also discuss some applications and functions that improve teaching, learning, and research initiatives through using tablet portable computers in a classroom environment for both laboratory and lecture use.

Introduction

Two years ago, Penn State Harrisburg (PSH), which was an upper division and graduate college, expanded to offering lower level classes and started to accept freshman. This change was challenging but exciting to the college. The college became a highly sought after campus with enrollment significantly growing which required offering more courses. Because of the significant growth of student enrollment, the college was pressed to increase the usage of existing spaces, which included laboratory facilities. The Structural Design and Construction Engineering Technology (SDCET) program already offered several labs and classes in their designated space but also initiated a revamping of this space. The face lift was to redesign and modernize the space, the physical fixtures, and instructional material, as well as become a wireless computer room. This endeavor was a success and has become a high demand by the program and the college.

Facility and Fixtures

The classroom facility at first consisted of just your computer-based presentation systems such as instructor's computer, overhead projector with screen, and a DVD/VCR player. These support high quality handwriting over slides, enables the instructor to prepare materials with supplemental text, pictures, or diagramming, and also to show videos. Advantages to this system

included the ability to structure material in advance, prepare high quality examples and illustrations, and easily share and reuse material. However, one drawback to this is that students could not participate on certain programs being taught in the classroom as well as other material or examples that need a computer to interact. Since technology was constantly changing, it was up to the university to implement those changes and provide the most updated equipment for students and faculty. In order to start integrating cutting edge classroom technology, changes and updates needed to be made. First, there were components that had to be integrated in the room to maximize the program's technological classroom with an updated laboratory facility and add a new addition of portable computer tablets would provide excellent instructional environment for the students and faculty.

The planning of this project incorporated the present needs while considering the maximum number of students for various classes and laboratories that may use the room in the future. Enhancing the traditional "lecture only" classroom environment included purchasing Tablet PCs. They were incorporated into the classroom for maximum technological use between the students and the instructor. Since the release of Tablet PCs in 2002, they have slowly gained attention as a useful tool for educators. Tablet PC's are traditional notebook computers that have the ability to process digital ink by writing with a stylus on the computer screen. The computer screen is convertible and looks like a traditional laptop except the screen may also be swiveled 360 degrees and turn to lie flat on the keyboard to become slate ¹. This allows students a flat surface to write on.

The renovation to the room included customized long tables and chairs. The tables were designed with locking multi directional rollers on its legs. These rollers permit the tables to be mobile from standard row seating into group table locked positions. The positions provide a large area to view construction documents as well as perform other exercises in the classes and laboratories. The table's electrical wiring system is placed in an enclosed channel that incorporates an interlocking device at the end of the tables. This allows the electrical wiring to be disconnected when the tables are moved. The wiring systems for each row are also interlocked to the wall electrical raceway.

The tables have two separated storage spaces called garages in each table which each stores a wireless PC tablet. The garage units have a door that are integrated into the table tops so there is a smooth surface when they are closed, which allows the students to use as a desk during lecture. The garage doors have locks which are controlled by a wireless remote. The instructor can click the remote control which unlocks all of garage doors so the students could have access to the tablets. The doors are held open by a bracket for the students. Each table also has two movable cloth chairs with flexible backs. The chairs were selected because of a better learning environment while making them also mobile.

A customized instructor's station was installed at the front of the room which holds the defined hardware equipment as well supportive items. This includes a similar Tablet PC, which is wired to the program's software as well as the university systems. The station has a DVD, VCR, and other instructional materials. This permits the instructor to utilize various instructional media that are needed in the lecture. The remote controls for the garage doors and other activation devices are secure in the station as well as a pullout shelf for a larger standalone keyboard that is

connected to each Tablet PC. The station is also a podium for the instructor lectures with space for the instructor's material and a reading light. The light helps the instructor read when the room lighting is turned down, in cases where a PowerPoint presentation or video is used. The station is also on rollers so it can be relocated easily.

The lighting system has modern fluorescent lights with reflectors which have been identified to be better for a classroom. It is important to have good lighting because research has found that it promotes better leaning, improves students' moods, behavior concentration, and therefore their learning². The lighting system is controlled on two separate switches near the front and back classroom doors and a central dim controller near the instructor station. This permits the instructor to set the appropriate lighting for visual comfort. A feature that was not installed in the room was specialized window treatment. This would provide optimum natural lighting but the project's budget did not provide for this cost. Therefore an efficient but less expensive window treatment was used.

The mechanical system for the room supports the computer as well as the student comfort. This is electronically managed by the college's physical operations along with the room's fire protection. Access to the room is limited by a locking system that the SDCET program controls. The chalkboards at the front and side walls were evaluated for possible other writing instruments including a white board that could be raised or lowered. However, the engineering faculty preferred keeping the chalkboards so there were no changes.

Tablet PCs

It was determined to have wireless Tablet PCs available for every student as part of this new leaning room but they had to be secure. The easy accessibility to the students and instructor was an essential element. Since the college was rapidly growing, it was also decided to purchase enough Tablet PCs for current and increase class size needs.

The wireless Tablet PCs were connected to a recharge system when they are stored in the garages. Therefore the faculty did not have to worry about the Tablet PCs being charged. The Tablet PCs also had swirl monitor that permitted it to be shared with a group of students around the Tablet PC. This is beneficial in laboratories and student exercises. The unit includes the program as well as all of the other college and university software/network systems. This feature allows the student access to any data within the program, university and the world wide superhighway.

The Tablet PCs allow students to type or draw information on the monitor. This information is recognized and converted on the PC. Students are not limited to the keyboard or their type of written communication. The instructor's Tablet PC is also loaded with the same software along with extra software programs for the instructor's use. This tablet can integrate with each of the students' tablets that projects the exercise on the overhead projector as well as on their monitor. The school also provides each program's faculty their own tablets. The tablets are identical to the instructor's station. This helps the instructors to become familiar with the operations of the Tablet PC.

Experiences Using Tablet PCs

In the Fall of 2006 the Tablet PCs were first used in C E 456 “Planning and Scheduling” to deliver classroom presentation and for learning a scheduling software program called Primavera 5.0. Prior to delivery via a Tablet PC, the instructor primarily conducted the course. The instructor showed the program from the instructor’s computer projected to the overhead screen during class lecture. In this situation, the instructor would go over the program step-by-step, as it was projected on the overhead screen, while the students would pay attention and take notes. The only room that had computers for the students to work on a specific program was a computer lab, which is used by students by both the Structural Design and Construction Engineering Technology (SDCET) and Mechanical Engineering Technology (MET) Departments. Since the students were following along without any hands on, the instructor would move the class to the computer room for a more hands on learning. This made it difficult because the instructor would have to plan ahead and reserve the room for the class.

In the new renovated classroom/lab room, the major use of the Table PC creates an environment where students can work together in groups and follow along with the instructor on a specific program and/or assignment during lecture/lab. The Tablet PC is a wireless system that also enables students to access information on the Internet. For example, this has been used in C E 458, “Construction Management II” for looking up civil cases using an on line legal search engine called Lexis-Nexis. In addition, more information and resources, such as contract documents, were posted on ANGEL (a learning management system tool) for the students to look up while they were analyzing the legal case. This enabled the students to read, look up information, and discuss the material with their group.

Another major use of the Table PC is to have the option to use it in place of the blackboard. Some advantages to that is the following:

- The lecture can be conducted entirely by using the digital ink.
- The instructor can easily display any covered material again, which would have been erased using the blackboard.
- There is no messy chalk or fumes from dry erase markers.
- The instructor can always maintain eye contact with the students and does not have to turn his/her back such as writing on the blackboard.
- The instructor has the conveniences to access multiple pens in different colors, widths, and styles.
- It is easy switching from one application to the other when using a Tablet PC.

In spite of all the advantages that the Tablet PC has provided in the classroom environment, it has a few difficulties that SDCET is currently trying to tackle. There are a lot of programs installed in each Tablet PC because many departments at Penn State Harrisburg use them. In that case, because of the number of students using Tablet PCs per day, it is important that each student opens and closes the garages properly or else the hinge may break because of carelessness of following directions. For that matter, a note is stuck on the top of each garage, located on the table, with the directions of how to properly open and close the garage after use.

Another small disadvantage is that since the Tablet PCs in the classroom run wireless, there are certain programs that might not be able to work properly. For example, Sage Timberline has been having some problems working in a wireless setting. It was later found out that it only works in a wired setting. The whole point in having wireless is to allow students to move the tables around and form groups during class assignments or projects. The School of Science, Engineering, and Technology is currently trying to change the classroom with the Tablet PCs to allow both wire and wireless settings and allow all the programs to work without any difficulties.

Conclusions

A multi function classroom/laboratory computer center room can be used as an effective tool for preparing lectures, delivering classroom presentation, allowing students to form groups for assignments and projects, and allow students to follow along a lecture using programs or research tools. As Universities and programs are more fiscally accountable with limited resources and space, this is an excellent example how a program can develop a multi function classroom/laboratory computer center room. This room provides opportunities to integrate cutting edge technology with “innovative thinking” for an excellent learning environment that results in outstanding education. In the future, we intend to explore more in using Tablet PCs for distance learning as well. Tablet PCs may have a lot of benefits that may be derived from its use in academia.

References

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