

Teaching Engineering in a Multimedia Environment

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Abstract

Texas A&M University at Qatar is a newly established branch campus of Texas A&M University offering undergraduate degree in engineering programs. TAMUQ is committed to ensure high-quality education by providing advanced multimedia equipment in classes and lecture halls. It includes: Creston Controller/Switcher, Digital Document Camera, DVD Player, VCR, PC Computer with a Sympodium and Tablet Capabilities, Hookups for VGA Sources, Air-Projector, Video Conferencing and Wireless Microphones. This paper will present and examine the effectiveness of high-level multimedia equipment in teaching and learning engineering subjects.

Introduction

Modern engineering environment provides the instructors with the up to date teaching tools to conduct the classroom instructions involving complex equations, drawings, graphs and charts in a clear and informative manner. It provides the students the ability to understand and comprehend the subject materials. In addition, it enables the students to store all or pieces of information on internal or external devices for future referral. It was observed that the students performed better when they were taught in a multimedia environment.

Multimedia environments have changed the teaching and learning process^[1,2,3]. It helps the students to communicate effectively and in a professional manner.

Background Information

Texas A&M University at Qatar with Carnegie-Mellon University, Georgetown University, Virginia Commonwealth University, and the Weil Cornell Medical College

form a multi-institutional complex known as Education City in Doha, Qatar. It is funded by Qatar Foundation under the leadership of Her Highness Sheikha Mozah Bint Nasser Al Missned. The goal is to provide world class academic institution by acquiring globally recognized professionals using world class instructional technology. TAMUQ began instruction in 2003 offering programs in Chemical, Electrical, Mechanical and Petroleum Engineering.

Students entering the TAMUQ Programs have demonstrated a record of academic achievement and have been selected through a highly competitive process. Students graduating from TAMUQ receive their respective engineering degrees from Texas A&M University.

In order to provide the first class education to highly motivated students, classrooms, lecture-halls and boardrooms are equipped with modern teaching aids such as Creston Controller, Digital Document Camera, DVD Player, VCR, PC computer with Sympodium and Tablet capabilities, VGA connections, Air-Projector, Video conferencing and Wireless Microphone. It is our intention first to explain the multimedia equipment and their functions followed by displaying the environment in which they are used.

Multimedia Equipment

Crestron Controller

The Crestron controller is an interactive medium by which the instructor can have access to the various features and equipment. Initially, the Crestron screen is in dormant mode. Touching the screen activates it as shown in Figure 1. Retouching the screen displays Figure 2



Figure 1. Crestron Controller

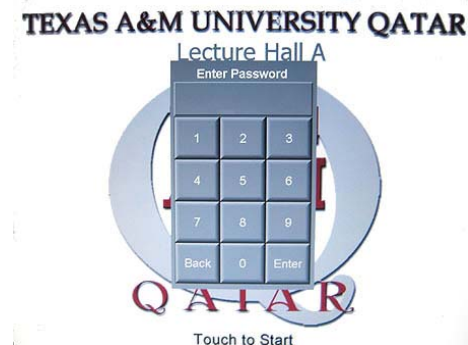


Figure 2. Numerical keypad

which enables the instructor to login his or her access code. After entering the code, Figure 3 is displayed which shows the different features available to the instructor such as PC, DVD, Document Camera, etc. It is self-explanatory.

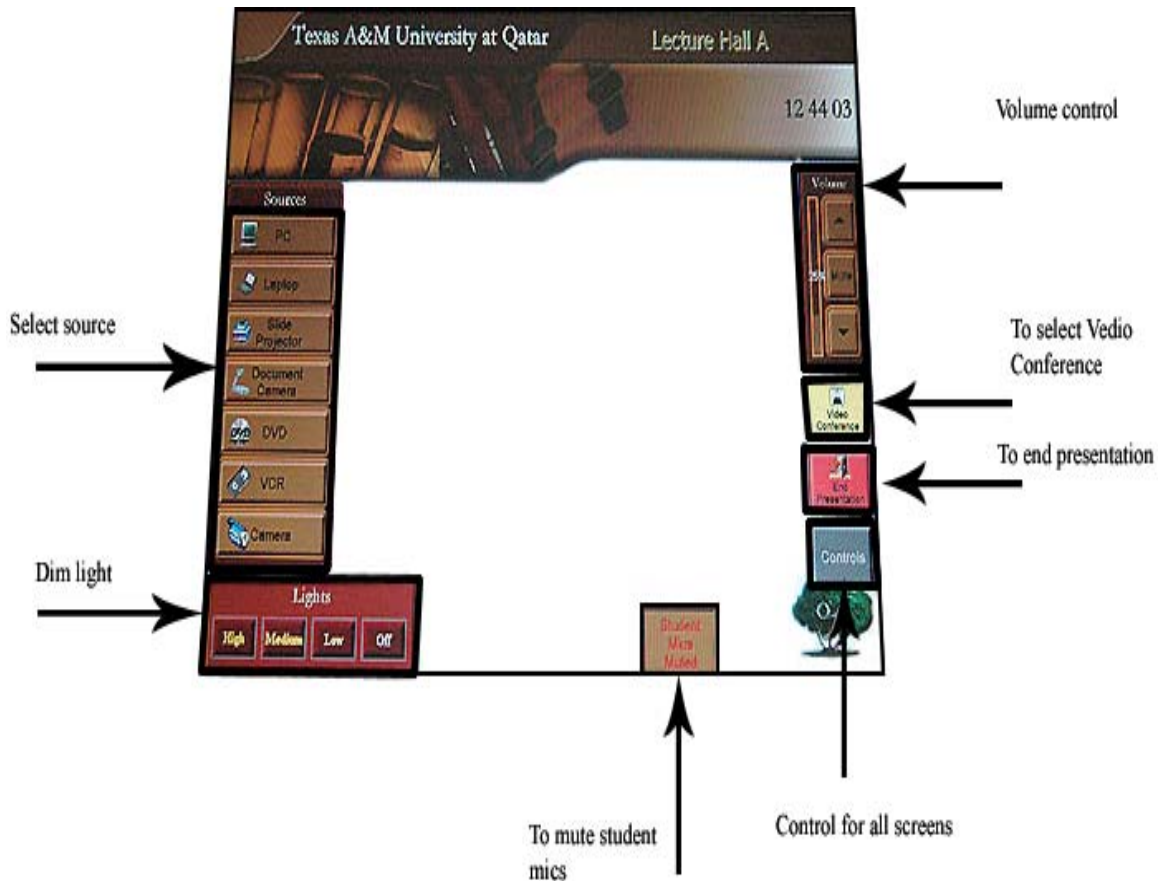


Figure 3. Display of Various Features of Crestron Controller

Symposium

The SMARTBoard Symposium is a versatile console with which the instructor can write and have control over the computer applications while facing the students. The instructor can modify, make changes, and add notes to his or her presentation. Figure 4 shows the SMARTBoard tool icon which appears at the lower left or right corner of the interactive console screen after it has been activated, Figure 5. Clicking the Orient feature of the SMARTBOARD tool icon calibrates the interactive pen with the console screen. The console itself provides a number of keys such as Floating Tools toolbar, Pen-Tool buttons, and Function buttons.

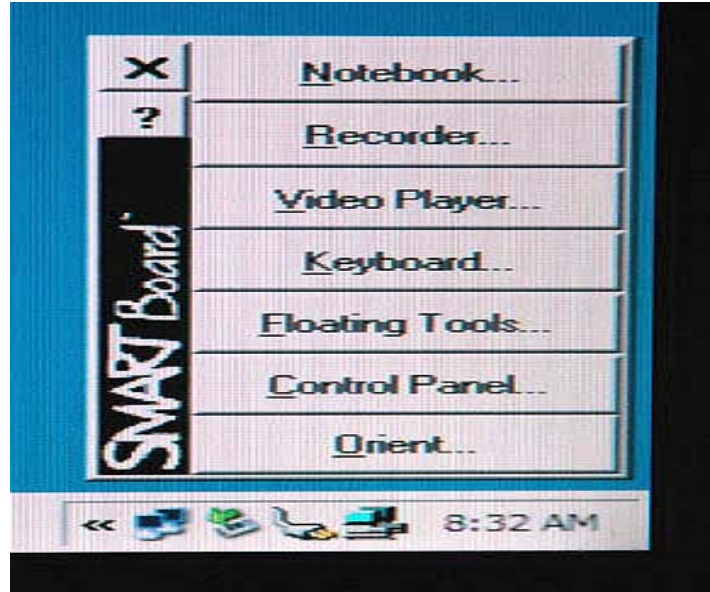


Figure 4. SMARTBoard Tool Icon

Interactive Console



Figure 5. The Interactive Console

The Floating Tools toolbar, Figure 6, is a list of icon short-cuts used for writing. It enables the instructor to clear writing entirely, erase a specific portion, capturing the entire or portion of screen and writing it onto a notebook page. It is also used to undo any writing or erasing as well as highlighting. The Pen-Tool buttons located on the top of the monitor is used to change from pen to mouse and vice versa. In addition it helps the instructor to choose the colors of his or her choice or to erase them. The Function buttons

located at the bottom of the interactive console provides quick access to frequently used features of SMARTBoard.



Figure 6. Floating Tool Toolbar

Digital Document Camera.

The digital document camera displays multidimensional objects. Also, as an overhead projector it displays documents, transparencies, and slides. It can also interact with a PC or a laptop.

AirProjector

The AirProjector is a wireless receiver/transmitter that allows the instructor to project from his or her laptop wirelessly without having to connect to VGA cable to the podium. When the AirProjector is activated, it lists the available AirProjector in each classroom, lecture-hall, and boardroom as illustrated in Figure 7. Also, the students can use their tablet PC's wirelessly one at a time.

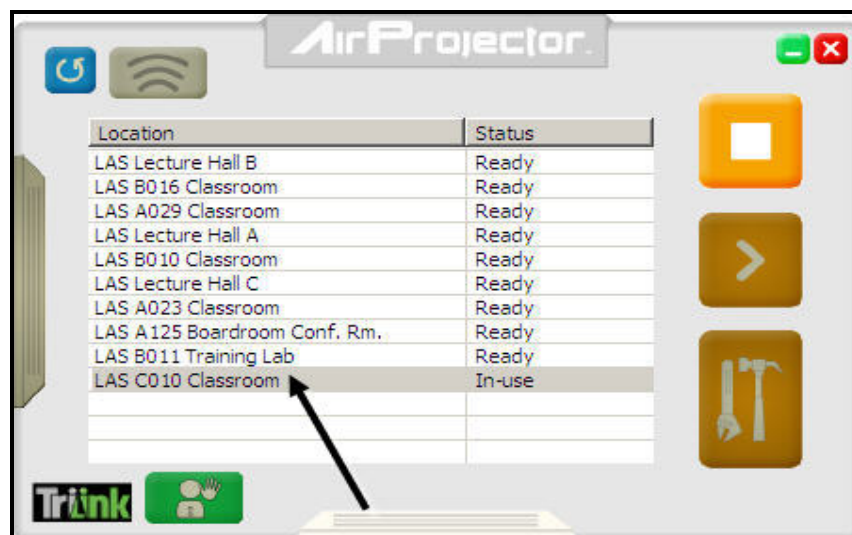


Figure 7. List of AirProjectors

Multimedia Environments

Figure 8 shows a typical classroom with modern multimedia equipment. As seen in the figure, the two projectors can operate and project the classroom instructions dependently or independently. The video camera placed between the two screens is used for video



Figure 8. A Classroom Equipped with Multimedia

conferencing. The podium in Figure 9 houses the multimedia components and is basically the same in every classroom and lecture-hall. A view of the multimedia screens, and a



Figure 9. Podium Showing Multimedia Components

a view of lecture-hall in session are presented in Figures 10 and 11 respectively. The main speakers Figure 10a are used for all sound sources such as DVD, VCR, PC, and

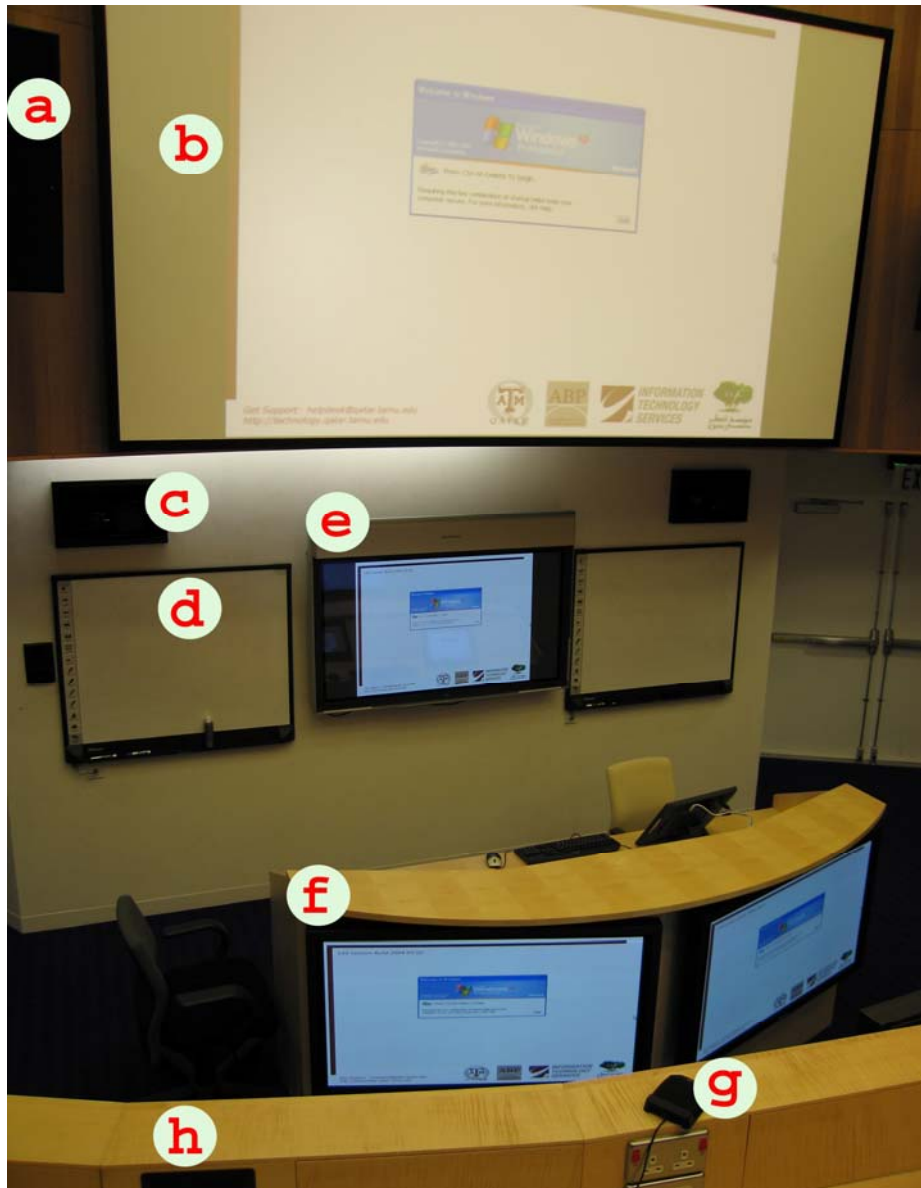


Figure 10. View of Multimedia Components in a Lecture-Hall
(a) Main Speakers, (b) Fixed Projection Screen,
(c) Video Conferencing Cameras, (d) Webster
White Boards, (e) PlasmaSynch Screen,
(f) Plasma Screen, (g) Microphones,
(h) Public Address Speakers

Laptop except for the microphones. The fixed projector in Figure 10b can be turned on and off independent of other screens. The video conference cameras Figure 10c are remote controlled cameras. Two of them point at students and one points at the instructor. Webster white boards are used for writing while it is being transmitted through the computer and projected on all screens. Plasma sync screen or smart screen Figure 10e has the characteristics such that when one writes on it, using special stylus, the information is projected on the other screens as well. One of the three plasma screens Figure 10f is used as preview to help the instructor. Pressure zone microphones (PZM) Figure 10g, one for every three seats, when it is touched the cameras are pointed at them. The public address speakers Figure 10h, one at every three seat, work with the (PZM) microphones and the Lavalier microphones.



Figure 11. Lecture-Hall in Session

Video conferencing rooms equipped with remote control Polycom camera Figure 12 enable the conference participants to communicate live with the students and educators at other locations.



Figure 12. View of Video Conferencing Boardroom

Figure 13 shows a self-contained video conferencing unit which has a microphone, two speakers, a camera, a screen and a codec as one unit. The codec is used for compression and decompression of audio and video signals.



Figure 13. Free Standing Self-Contained Video Conference Unit

Discussions

A number of modern teaching aids were presented and briefly discussed. The aim of employing modern teaching tools for classroom instruction is for the instructors to present the information to the students effectively, and for the students to understand the subject matters thoroughly. Examining an engineering course that was taught by the author during the Fall semester of 2005 at TAMUQ and during Fall semester of 2004 at TAMU, it was found that the grade average of students at TAMUQ was quite higher. The difference in grade average can not be mainly related to the effect of multimedia environment due to the unknown effect of other parameters such as class size and course load.

Although, the cost of the equipment and maintenance are high, but it is worth the education that the future educators and professionals receive.

Conclusion

The environments at which the engineering subjects at TAMUQ are being taught were presented. The components making up the multimedia environment were illustrated and briefly discussed. In a non-native English speaking environment, it is more effective to teach technical subjects using modern multimedia equipment.

Acknowledgement

The author would like to acknowledge the assistance he received from Mr. Naguib Ktiri of the Information Technology division at TAMUQ.

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