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**New Technologies  
and  
Innovations  
in  
Agricultural Economics  
Instruction**

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# Electronic Classroom of the Future

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## Introduction

A major change is occurring in the teaching\learning paradigm in higher education. Professors are no longer expected to only transmit their knowledge to students but are expected to assist the student in making the linkages to other bodies of knowledge, increase their ability to solve problems, and develop them as critical thinkers. Many institutions have revised curricula and adopted plans to provide students with a core of general studies or liberal arts courses, increased discipline content, and are providing activities to prepare graduates for a productive career. We are challenged to provide our students with the ability to become life-long learners as well as to be productive citizens of society.

We are becoming increasingly aware of the various learning styles of students. Research has shown that students understand and retain material in different ways. As professors we tend to present material in ways that represent how we learn. In most cases this is not the leaning style of the majority of the students in our classes. This indicates that we need to develop activities that take into consideration the various learning styles of our students. The classroom must be conducive to allowing efficient and easy access to various media and methods in order to incorporate active learning techniques that will assist the various learning styles of students.

The traditional method of teaching economic relationships has been to teach in discrete parcels of knowledge based on technical definitions and mathematical equations. Students should become accustomed to using economic concepts as a means of understanding and interacting with their environment. We in the educational system must provide students with

the ability to answer questions and solve problems and not just memorize facts. This will require utilization of projects which emphasize critical thinking. The classroom must be a place where the student is challenged to use cognitive skills including knowledge, translation, interpretation, extrapolation, application, analysis, synthesis, and evaluation. The ability to use simulations, demonstrations, computer programs, and have data readily available to answer questions can enhance the ability of the instructor to provide these higher level cognitive learning experiences.

The classroom should be a place where the professor can have immediate access to information, film segments, computer programs, and graphics capabilities that can be projected on a large screen. This will allow the person to present a scientific process in a step by step procedure that will increase the student's understanding of the process as well as increase the student's ability to utilize these scientific principles in making decisions and solving problems.

It is now possible to integrate technology into one in-class system that allows the professor and students to switch from the use of one type of technology to another at any time during the learning experience. The ability to show a video, run an application program, present complicated graphical data, run an interactive program on a mainframe computer can all be incorporated into a single classroom. This would allow a professor to use materials and software in the classroom which were developed for research and extension programs. It will also increase the effectiveness of the educational process as well as the ability to use the current technology more efficiently.

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The blackboard is not sufficient to present much of the complicated economic and mathematical data required in today's educational program. Much time is wasted in the classroom trying to present these ideas in a two dimensional surface. The computer and high resolution graphics capability can increase the ability of the instructor to present complicated material in a manner that students can understand. It also allows the instructor to build a system of processes rather than just presenting the final product.

A properly designed classroom can produce positive result to both instructors and students. The professors will have access to state-of-the-art equipment where they can present their material using the latest technology and in a manner that will increase the ability of the students to comprehend the process behind the end result. This will give students a cutting edge exposure in the classroom. The student's ability to understand and use the latest technology will increase as a result of this exposure in the classroom.

A state-of-the-art classroom will increase the ability of professors to present complicated scientific information and knowledge to students. It will also increase the efficiency of the learning experience. Students will be able to discern the steps in a particular economic or scientific process more distinctly given the ability of the instructor to present the process in a step by step procedure.

Technology advances have provided the ability to consolidate many of the different media and computer applications in one location. It is now possible to have a micro-computer outfitted with a CD Rom, video disk, multi-media cards, and high level graphics capability. The output from these devices can be projected onto a large screen enabling any size class to see the presentation. It is also possible to have video and satellite downlink capabilities attached to the same system so that a professor can use materials from any where in the world. The high storage capability of CD ROM and video disk allow the professor to have access to large data bases in the classroom for illustrative purposes as well as for

research projects that the students might do as part of the class.

### **Capability of the Classroom**

The classroom of the future should provide a variety of options for a professor. It should be one that can serve the needs of various disciplines within the College or University. The physical configuration should be such that the equipment and projection does not interfere with the normal functioning of a class. The design should not interfere with the more traditional usages of a chalkboard and overhead projector. In most cases these traditional tools will be used in conjunction with the electronic technology.

The ability to run computer applications in the classroom allows a professor to demonstrate a program to the entire class rather than having to make the demonstration to each individual or to a number of students at one terminal or PC. Having this capability will also allow programs developed by others or for other uses to be part of the normal classroom activity. Having the computer application available in the classroom enables one to demonstrate applications that otherwise could only be discussed or at best run in a computer lab outside of class.

The development of CD ROM technology and products has the potential to provide the classroom with a means of handling the information explosion. Often we would like to present current data or materials at a particular time in a lecture or teaching module. The data may be part of a larger body of materials such as the Census of Agriculture or the Agricultural Statistics. Currently we can retrieve the material in published form and duplicate the passages needed or we can put the materials on reserve for the students to review on their own. In many cases, it would be more beneficial if we could produce that data directly in the classroom. This would allow us to view the data and discuss the materials at the same time. It may also be that questions regarding other pieces of data might arise in discussion that could be extracted and presented immediately rather than at a later time.

This would allow us to take advantage of those "teachable moments".

There has been an increase in the availability of educational materials on video tape in the past years. A number of video tapes produced by private companies, public agencies, and educational institutions can be utilized in the classroom. Any electronic classroom should have the capability to project video taped materials. The ability to show a video should be integrated with the projection mechanism used for the computer. One should be able to transfer from one media to another with ease. Having video-tape equipment attached to the system also provides the ability to tape programs received from satellite or cable. This allows the possibility for students to review materials presented during live broadcasts as well as having the capability of capturing certain segments for use at a later time in the course.

Networking is another attractive feature that the classroom of the future should have. This capability allows a person to connect to campus mainframe computers, computers at other institutions, and computers at agencies like NSF, USDA, or NASA. This would allow one to demonstrate programs and applications on other platforms, retrieve data not available on site, access function such as library catalogs, and do research work in the classroom. It would also allow for national and international electronic mail. The ability to deliver assignments and answer questions when students are not in class can be enhanced with this type of networking.

An electronic classroom should have the capability to downlink satellite programs from anywhere in the world. The growth of AG\*SAT and other consortia of higher education institutions that share courses make this an attractive feature. It can be used to receive a satellite course, allow students to participate in satellite conferences, and receive broadcasts from other agencies and providers.

#### **Advantages and Disadvantages of an Electronic Classroom**

Some may argue that the technology will revolutionize the educational process while others

believe that the technology will distract from the learning process. The actual outcome may lie between these two extremes. In fact, the technology may be totally inappropriate for some courses or areas of study but may be exactly what will allow another area to excel. As with any new technology, one must ascertain when and how it can be applied to a particular situation.

#### **Advantages**

The type of classroom described in this paper can assist in the learning process. It allows professors to present material in ways that are not possible with the traditional classroom. The ability to present a step-by-step process in multi-dimensions can aid the students' understanding of the process as well as the final product. Many of the economic principles and processes cannot be adequately presented in two dimensions.

Incorporation of the technology in the classroom will allow the inclusion of more active learning techniques into the classroom. Utilization of these alternatives to the traditional lecture format will assist in achieving our objective of getting students to higher levels of cognitive understanding. We will be able to assist our student in developing the ability to analyze, synthesize, and evaluate. These capabilities can be incorporated into the traditional classroom but they can be done more efficiently and in greater variety with this type of structure.

The abilities and functions of the electronic classroom will expose the students to the technology and applications that they are apt to be using when they graduate. The incorporation of computers, various audio and video mechanisms, and applications programs into the learning process will provide a more realistic utilization of these items when they get into a career situation. Employers are demanding that our graduate not only have experience with computers and application programs and they have experience with using them in solving problems. Utilizing these in the classroom give the students exposure with how these technologies can be used on a day to day basis rather than just in an abstract context.

The electronic classroom allows the professor to use materials from many different sources. The reliance only on a textbook or lecture notes is reduced. The technology allows one to utilize material from any location or source. This provides additional linkages to the real world for the students as well as increases the types of activities that the professor can include in the class.

Electronically equipped classrooms can be used for activities other than graduate and undergraduate instruction. These types of classrooms can be used for staff training sessions, seminars, county agent training, and student club competitions and activities. The ability to train a group of staff or faculty on the use of a particular software package is enhanced with such a facility. The classroom can be used to demonstrate an application to a large number of people at one time. Individual usage and practice can then be accomplished in a computer lab or on an individual workstation. This is of particular benefit when training individuals on the use of an application on a mainframe.

#### **Disadvantages**

Costs of equipment and retrofitting existing classrooms may be one of the major disadvantages. Although the cost may seem rather high--as much as \$25,000 per classroom--the technology is decreasing in price and new multi-media systems are being introduced that have many of the desired features in one unit. In most instances, the classroom will be used by many different departments and units within the institution. As such, costs can be spread among several units and courses.

Although not necessarily a disadvantage, it should be pointed out that this type of classroom will require more maintenance and supplies than the traditional lecture hall. The equipment will break and repairs will be necessary. The projection equipment will require normal servicing and convergence. New software programs and application packages will have to be purchased as faculty develop new and innovative ways to present materials. This must be taken into consideration when implementing the classroom.

There is a rather steep learning curve for those that will use this technology in their class. Experience has shown that in the early stages of use, the time needed for preparation will increase. However, as the individual becomes more acquainted with the technology and the equipment, the time needed to update and develop new materials decreases. Also as the electronic classroom is used by more and more faculty, the ability for individuals to assist each other improves and new applications or activities become easier to implement.

#### **Summary**

A classroom that incorporates a variety of electronic capabilities such as micro-computing, multi-media presentation ability, networking, satellite downlinks, and large storage devices such as CD ROM and video-disk can enhance the teaching and learning activities. This type of configuration increases the number and type of active learning techniques that can be utilized. It also allows the professor to incorporate different activities that address the various learning styles of our students.

The electronic classroom allows professors to present complicated economic and mathematical material in a manner that assists students in understanding the process as well as the final product. This type of classroom can overcome some limitations of the traditional lecture hall with only a two-dimensional blackboard as the presentation device. It also can increase the ability of the students to apply principles to solving problems.

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