ELECTRONIC CLASSROOMS

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Chemistry is probably the best discipline which could be taught in an electronic classroom. There are two reasons for this - the nature of the material and the availability of software. Chemistry is complex, abstract, and often needs to be visualized in three dimensions. In organic chemistry and biochemistry more than one level of visualization may be essential for understanding. There are many excellent molecular modeling programs that can supplement the normal array of animation and authoring programs.

As a part of the design of the J. Joseph Moakley Center for the Application of Technology which is being constructed at Bridgewater State College, we have examined existing electronic classrooms at a variety of colleges and universities in the northeastern United States. As a result of this study, we have identified the following categories of electronic classrooms:

1. the two microcomputer classroom. Although there is no reason why only one microcomputer cannot be used, the use of a high level Macintosh **and** a 486 IBM/ clone allows full access to a larger base of software. A computer projection device, which may vary from a LCD panel on an overhead projector to a sophisticated video projection system, completes this model. We were surprised to find that departments which could afford more sophisticated setups often chose this model.

2. the desktop microcomputer model. The addition of ten to thirty microcomputers and a local area network (LAN) which is often connected to the institutional backbone, converts the two-microcomputer classroom into this model. A number of colleges have found that two students per microcomputer works better than one; hence fifteen is a popular number for student stations. It is essential that such a classroom be tiered so that the computer monitors do not interfere with the view of the projection TV screen. Although one would think that this type of classroom could be used as a computer laboratory (if adequate security is provided), many institutions found that interest in using the electronic classroom as a classroom did not leave much time for student use outside of class.

3. the maximalist model. The addition of screen control and screen sharing from a "master" microcomputer is relatively easy to implement in software. Some faculty object to the "control" implications of this model; others like the software control system.

4. the workstation model. At least one university in the northeast has an electronic classroom that uses UNIX workstations. The decreasing cost and increasing power of workstations may make this the choice of the future. An easy to use graphics user interface (GUI) can hide the complexities of the UNIX operating system and provide Macintosh-like ease of operation. If such a system is networked properly it can provide enormous computing power at very reasonable cost.

EDITOR: Bill is willing to set up a bulletin board about electronic classrooms at his college. Please send any suggestions for the format and other subjects of interest to Bill. This sounds like a great idea for getting ideas for those of us who are in the process of introducing electronic classrooms to our colleges.

HyperChem for Windows, Release 2. Reviewed by: **Andrew N. Welch and Yuzhuo Li**, Clarkson University, Potsdam, NY 13699. E-mail: welchan@craft.camp.clarkson.edu

Autodesk, Inc.: Scientific Modeling Division, 2320 Marinship Way, Sausalito, CA 94965. List Price $3500; educational discount price $595.

HyperChem for Windows is a powerful molecular modeling program that performs calculations using *ab initio* and semi-empirical quantum mechanical methods. HyperChem is designed in such a way that all of its commands and output can be controlled externally by other Windows programs, such as Excel or Visual Basic. In order to run HyperChem, the following is required: an IBM-PC compatible computer with an 80386 CPU and an 80387 math coprocessor, or an 80486 or higher CPU, 4 megabytes of memory, a hard disk with at least 5 megabytes free, a VGA or better video display, a parallel port for the locked version, a pointing device compatible with Windows 3.0 (such as a mouse), MS-DOS Version 3.1 or higher, and Windows 3.0 or higher.

HyperChem was tested on both a 486-25 and a 386-33. Installation was quick and easy and was completed in under ten minutes. There are two versions of HyperChem, an unlocked version and a locked version. The unlocked rendition requires no special action. However, the locked version demands that a hardware key be continually present in the parallel port. This form of copy protection does not permit simultaneous use of the software on different machines.

Upon loading HyperChem, the screen resembles that of other Windows programs. There are pull down menus, buttons for moving and scaling both the molecule as well as the entire HyperChem win-