Software Review:
Studio, Director and SoundEdit 16 from Macromedia. (1-800-288-4797).

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If you are serious about using multimedia to develop content for the World Wide Web or for your courses, and are feeling constrained by Microsoft's PowerPoint, you should consider Director. To really serious multimedia users, I would suggest considering Macromedia's Studio. It includes Director, SoundEdit 16/DeckII, Extreme 3D and Xres. I'll limit myself to Director and SoundEdit since I can't get Xres to work anywhere as well as PhotoShop (both are programs that allow almost magical manipulation of images). The Studio software package comes on four CDs, plus three additional CDs with tools and examples. Studio, which includes Director and three other programs, can be purchased for less than Director costs! Packages are available for both the Mac and Windows operating systems.

Director is a very powerful system which allows you to manipulate and animate anything you can put up on the screen, in color and with sound. I've looked at Director several times but found it rather difficult to use and the results more suited to advertising than teaching. My perspective changed when I had occasion to use Director for a project I did for Sandia National Labs. The project was an attempt to explain very technical material to people who didn't have a technical background. This is pretty close to the situation of teaching many of my students, I decided to pursue experimenting with Director.

In starting with Director 5, I worked through the examples given using atoms and electrons instead of the arty material covered in the examples. I could draw atoms, show electrons, electron clouds, and animate them interacting with each other.

You can put the atoms in a film loop and have them translating, rotating and showing vibration all over the screen. In other words you can make a realistic simulation of how atoms and molecules are thought to act. You can actually see them. You can give the atoms colored patterns, and sound effects while they carom off each other. Perhaps sound and color are like using 11 different fonts and bolding 30 characters per page when word processing just started-a new toy that you play with to see what happens. I haven't tested my work with enough students to see if it makes a difference in their conceptual understanding of interactions on an atomic level. Interest at least is high.

For instance, you can use the same sound everytime an electron is lost by an atom and another sound when the electron is gained by another atom, and still another when a bond is formed. Additionally if color is used consistently so that neutral metal atoms are blue, charged metal atoms red, neutral nonmetal atoms green, charged nonmetal atoms yellow, these visual and sound clues may help understanding. Another plus is that they are also fun to play with which could induce students to spend some time thinking about them and enjoying it.

Figure 1 shows my typical work screen (on a 20 inch monitor), and five of the dozen or so windows you can work in-not counting many special windows. The upper left is the action window where your work or animation appears (called the Stage). Below it is the window where you setup each object-atoms, electrons, molecules (called the Score). This is where you adjust your atoms and electrons to move and interact add sounds and other special effects.

Next, in the lower right we have the storage for your images, film loops, etc. (called the Cast). This is a way of storing objects which may be copied, manipulated and called as often as needed. Objects such as atoms and ions can be created in the Paint window, top right. The Paint window is quite impressive in the versatility and ease of use of its tools.

One way of starting a project would be to make or transfer an image in the Paint window. Use the many tools available (it can also call plug-ins from PhotoShop) to adjust the image to your ideal. The created objects (atoms, electrons, etc.) are simultaneously in the Paint and Cast windows. When ready you can select an object from storage or the Cast and move a copy to the setup or Score window (here the object is called a sprite).

You can combine several drawings the same way simple animations are made-each one is a little different-and make a film loop animation. The film loop for instance might show the stretching vibration of hydrogen in a diatomic molecule. This would be made up of 8 or more drawings of the hydrogen molecule showing the changes during the vibration (or vibration and rotation). You next go through some cumbersome, poorly designed manipulations and have a film loop sprite in the Setup or score window. You can use the command 'in between' to automatically fill in an animation from one point of the screen to another. You can even use the special 'in between' to define curved paths. You would place the film loop in the setup window at the beginning position and another copy at the final position. Then use 'in between' and Director will smoothly fill in everything in between.
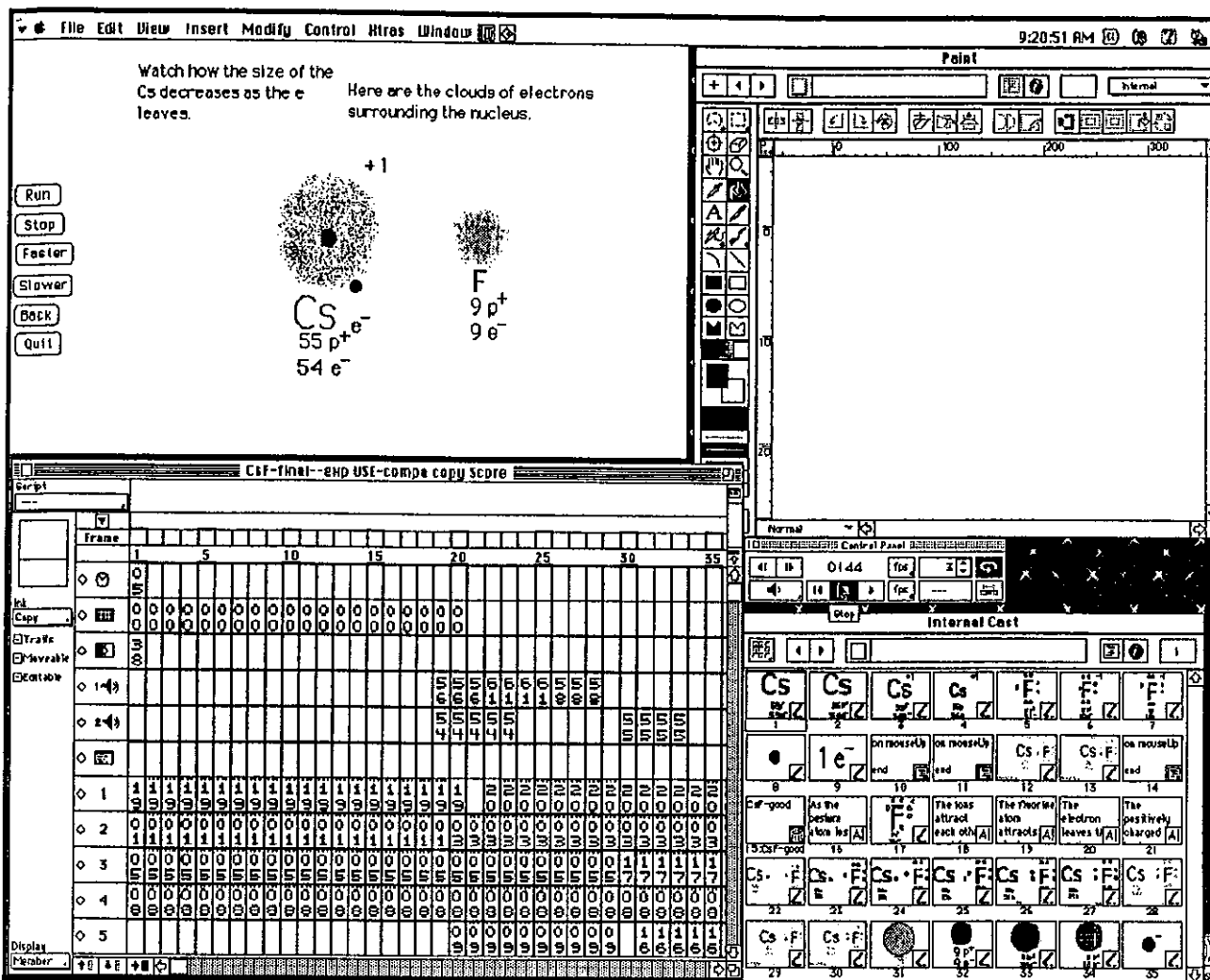
Figure 1 shows a work screen (on a 20 inch monitor), and five of the dozen or so windows you can use. The upper left is the action window where your work or animation appears (called the Stage). Below it is the window where you setup each object-atoms, electrons, molecules (called the Score). This is where you adjust your atoms and electrons to move. In the lower right we have the storage for your images, film loops, etc. (called the Cast). This is a way of storing objects which may be called as often as needed. Objects such as atoms and ions can be created in the Paint window, top right. The Paint window is quite impressive in the versatility and ease of use of its tools.

The result can be any number of atoms, molecules, etc. translating, rotating and vibrating over the screen. These are probably the most powerful commands available in Director.

You can include rotation when you first make your drawings. Show a slight rotation-1/4 of a turn or so- from drawing to drawing as well as the vibration change. The result when you play your movie is one or many hydrogen molecules vibrating and rotating while they zoom around the screen. You can add sound to emphasize when collisions occur. Text can also be made to move so a sentence or two on why individual atoms and electrons don't make sounds, or other matters of interest are easily included. Using chemical fonts (with subscripts and superscripts already built in) is a straight forward way to have subscripts and superscripts wherever you want.

There are other special windows for making text and for making scripts or macros to allow more control. For instance the buttons .(-in the action window top left)-run, stop, back, etc., have scripts attached which give the user control of some aspects of what is happening on the screen. The scripts are written in a special language called Lingo. Lingo even has its own debugger to help in finding errors.

The small window under the paint window is for controlling and following how fast you play your work. Most windows with controls have a built in help similar to Word and Excel. When the cursor passes over the control a

4

short name appears. For some reason the window I use the most, the Score or setup window, doesn't have this help built in. If you find yourself wishing for an easier way to use a control or tool, try double clicking on it, and often another window will open and make what you're trying to do easier. Not always of course-where is the challenge in that?

Since I'm trying to give you some idea of what Director is like to work with let me mention that what appears to be inconsistencies can cost a lot of time. The action window or stage is where you watch all of your results. For some reason you can't just move or resize it as you can with all the other windows. You have to select 'Modify' from the toolbar, then 'Movie', then 'Properties.' Then you have to fill out a dialog box with no feedback as to what the new window will look like, quit the dialog box, see what you made, then cycle through until you have what you want. Why all this for this particular window? I don't know, but it is a pain. So is the nomenclature (a chemist should talk!?).

Some of the power becomes apparent when you have a movie that calls other movies. I made a simulation of ammonia being formed from nitrogen and hydrogen. The student can see successful and unsuccessful interactions on the screen. Two other movies of catalyzed and uncatalyzed reactions can be viewed at the same time. See Fig. 2. It helps, however to have a big screen! Each movie can be stopped or all can run together or separately. This technique is called a movie in a window. All three show the atoms and molecules moving. I just put these together to see if I could do it. They were made independently.

I find myself constantly asking why I'm showing something a certain way, i.e., can I justify what is happening on the screen? If I can get students in the same questioning mode this will be quite a learning tool.
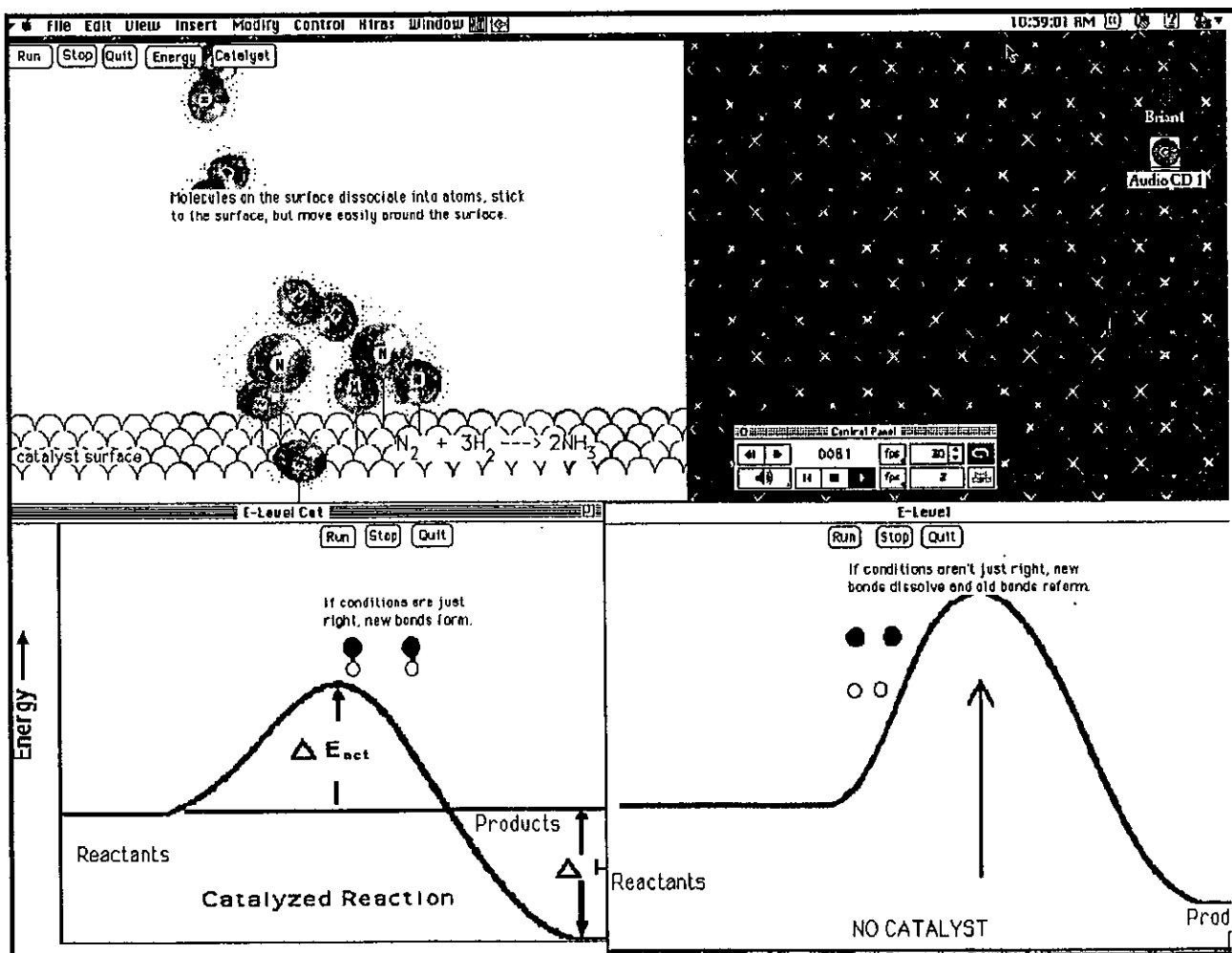

Figure 2 has a simulation of ammonia being formed on a catalyst. by clicking the 'Catalyst' or 'No catalyst' buttons the second movie (lower left of screen0 and the third movie (lower right of the screen) can be launched. Each movie has its own set of independent controls. All three play simultaneously

You can export your work as a movie projector which will run on a computer which does not have Director. The downside is that the included software to make it work is about 1.3 MB, leaving no room for your work on a diskette. My smallest projectors are about 1.7 MB. So you probably need a removable disk drive such as Iomega, Epson, or Syquest to move your work, or a lot of patience working with the Internet. A second method is to make a Quicktime movie. This results in a smaller file but buttons for users will no longer work. It also requires a lot of memory for Director.

I can give Director about 15 MB on my system and it needs more to make a QT movie. According to Macromedia's technical support using Ram Doubler doesn't help. I tried it and it didn't. The Quicktime movie is generally an advantage since you can resize it to fit any screen. You also have a great deal of control over how it plays.

The movie projector can be played on both the Mac and the PC, but to do this you need buy Director for both systems. This is expensive.

SoundEdit 16 is a really clever program. Figure 3 shows a graph of the sound, with a portion selected. You can cut and crop, and paste. You can choose from 8 bit or 16 bit sound and use compression techniques which will decrease the file size by up to a factor of 8. There are 19 modifications or special effects you can make. Once you compress your sound you lose the ability to do most of the modifications, so make the modifications first then compress.

The program comes with a variety of sounds. You can also record then modify your own. You can record the sounds, if you wish, directly onto the Mac. Figure 4 shows the graph of me speaking the last sentence. The program seems much more intuitive to me than Director. I'm not doing very complicated operations like having a synchronized soundtrack for a whole movie, but it does seem to have a great deal of power to make changes easily.

You can put special effects such as: Backwards, Echo, Emphasize, etc., on a toolbar for easy use. Many aspects of the program are customizable, this is helpful if you use the program a lot. You can copy part of the sound you see and just play that portion. Figure 4 shows both the sound as a linear waveform and as a spectrum which maps the relative strengths of the frequencies in
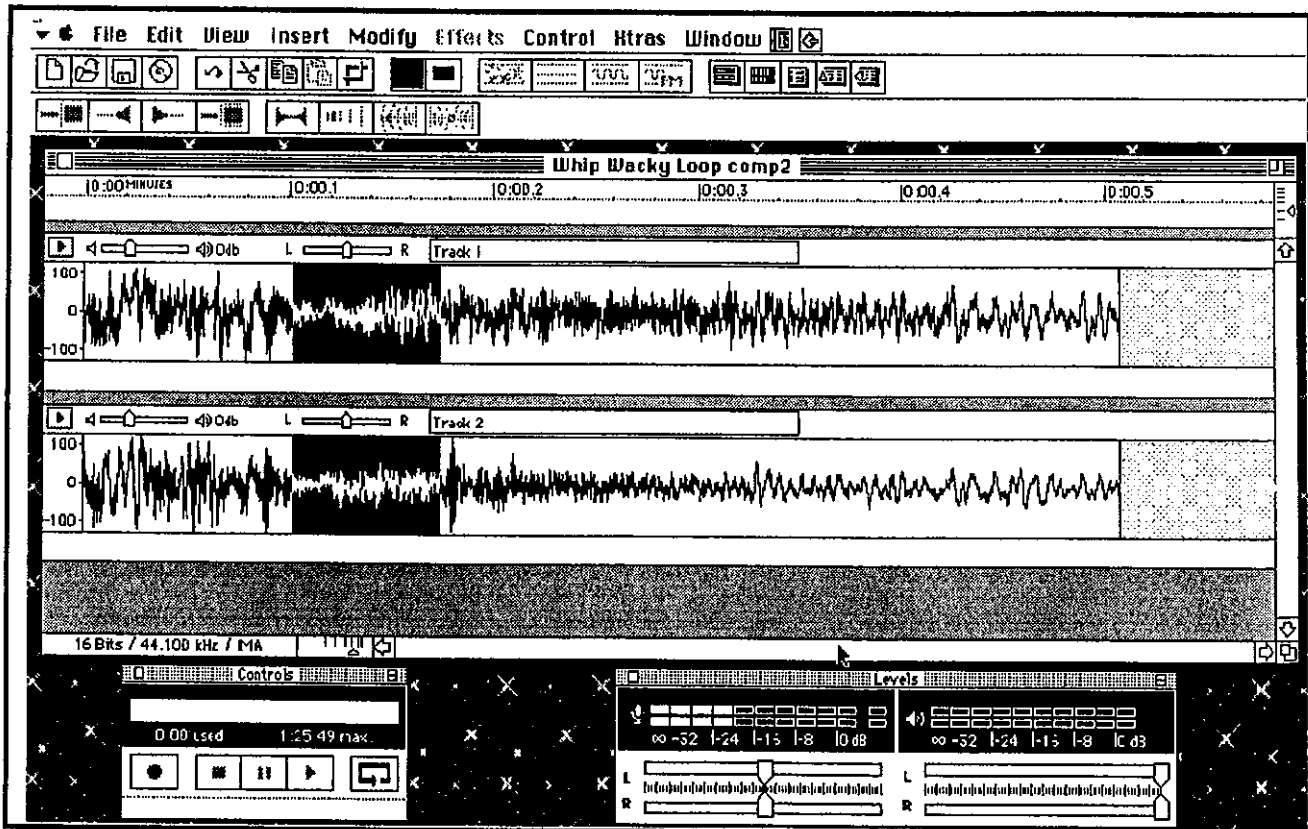

Figure 3 is a graph of one of the sounds used in a Director movie with part of it selected. The selected portion can be cut and cropped, and pasted.
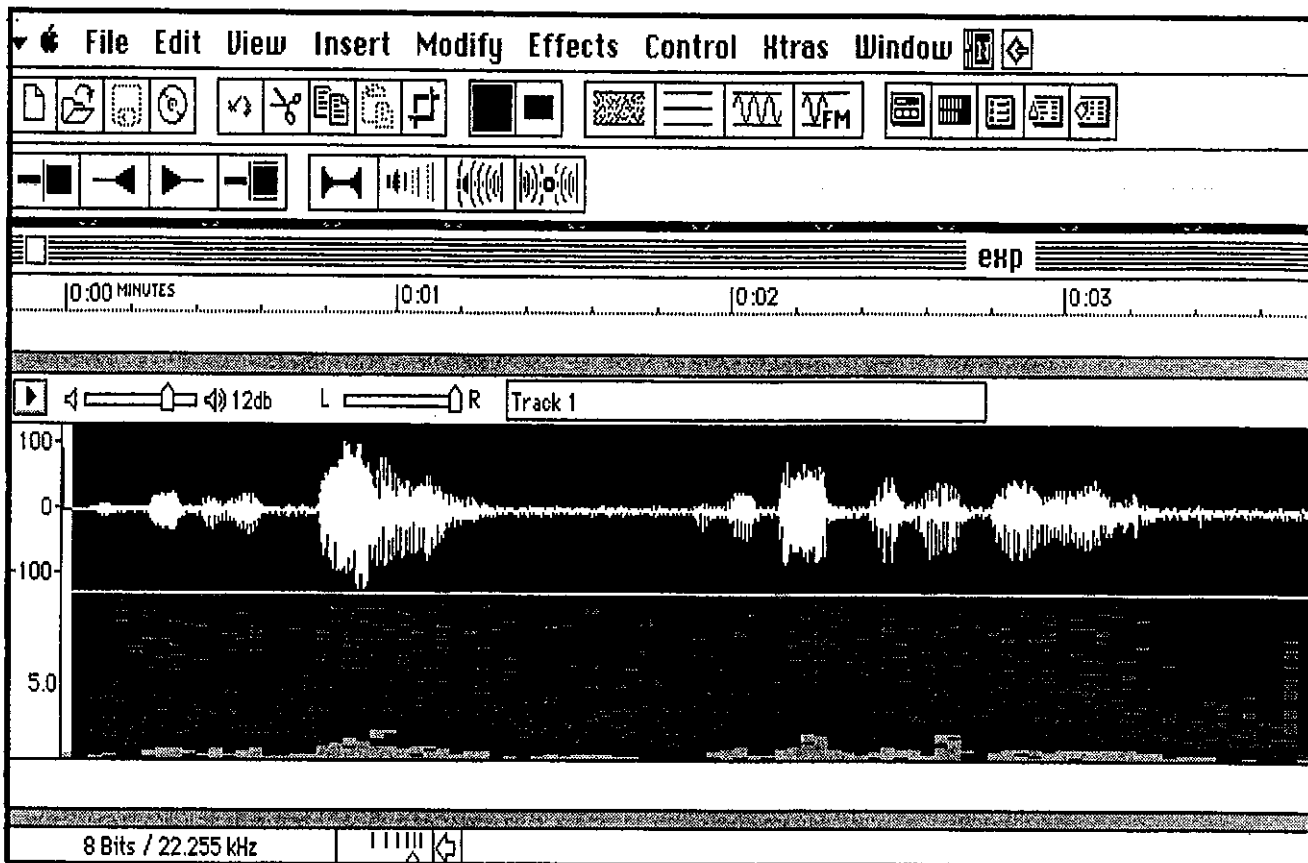
Figure 4 shows the graph of me speaking a sentence. It shows sound as a linear waveform and as a spectrum (lower portion) which maps the relative strengths of the frequencies in the sound.

the sound. You see more detail in color. You can show the spectrum simultaneously as 2 D (frequency and time) and 3 D (frequency, time and power). There are a wide variety of options to emphasize different aspects of a graph. The ability to cut and paste on the graph of your sound, and listen to the change immediately, makes working with SoundEdit delightfully easy.

You can add a lecture or comments to go with the action on the screen. The easiest way to do this is just to speak and record as you watch the movie on the screen. The sound track takes very large amounts of memory. I have some question as the value of having a roomful of computers lecturing and making special effects sounds.

If the SoundEdit and Director programs get easier to use and less expensive it will be interesting to see students' ideas of what is happening at the atomic level.

Will a more 'realistic ' picture of interactions at the atomic and subatomic scale have any long term value? I like to think so. The closer to reality the better the chance for a real insight? Or will students get less practice in using mathematical models because this is so much easier? There has been some interesting results published (Zeweil at CalTech) about femtosec(10-15) reactions using lasers to excite and study energy changes and physical movement in reactions. Perhaps by making it easier to form a model through animation the next step of understanding femtosec reactions will become easier. And with that understanding may come better control of simple and complicated reactions. What do you think?

7