

Construction of an Integrated Audio-Visual System and its effective Use for Education (11)

— How to make Effective Use of the Powerful Personal
Computer in Classroom Teaching —

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ABSTRACT

We have tried out a handy presentation system using a powerful personal computer, in addition to the chalk and blackboard treatment. Such a system was used as an aid for the teacher who can explain the subject matter verbally without changing the usual classroom style. As a result of our experience, we have concluded that our presentation system is quite helpful for educational purposes.

1. ARE YOU SATISFIED WITH A CHALK AND BLACKBOARD PRESENTATION?

In a classroom lesson, the general teaching approach uses the chalk and blackboard. For many years, this type of presentation has been used in the normal lecture. This is the case in Japan and in Canada. It is such a simple presentation, available in daylight, simple in operation and the running cost of the instructional materials are acceptable. We don't say that the chalk and blackboard technique is at all bad. However, the chalk and blackboard technique has its limit. For instance, in some subjects, we find items which can not be presented via the blackboard.

The advancement of learning has created a lot of subjects to teach. This is the case with disciplines which need mathematical treatment such as chemical engineering and physical chemistry. When using chalk and blackboard it is difficult to show suitable graphs and simulation results for students. We are looking for better methods to solve this problem. If current methods offer only a little help for students to understand subjects, it is better to use teaching tools. In this paper, we discuss a very handy teaching system concerned with a powerful personal computer.

2. VARIOUS PRESENTATION AIDS AND TOOLS

In a lecture, various kinds of teaching aids and tools are used. The Over Head Projector is used everywhere. The preparation of transparencies and focusability on the screen are easy. The ability to present large pictures is also good. From the viewpoints of focusability on the screen, ability to present large pictures and repetition of instructional materials slides are convenient. However, they take longer to prepare. Video-cassettes are a good teaching aid and lend themselves to repetition. They can include some sounds and the explanatory voice of the teacher. But sometimes ready-made tapes do not satisfy our purposes. Occasionally, they include other related content. The video floppy is a magnetic disk (size : two square inches). One video floppy disk can include fifty stationary pictures. Handling is easy, but focusability is less than that obtainable with slides. The laser disk is a new medium which contains a large quantity of informa-

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tion. It can provide many clear animated pictures and sounds. However, it is a little too expensive for our demands.

3. POWERFUL PERSONAL COMPUTER

So we come to the micro-computer, especially the so-called personal computer, as one of the teaching tools. We recognized the personal computer as an alternative teaching tool to the chalk and blackboard presentation. It has the capacity to present animated colourful pictures and graphs of calculation results on the display. It can also store a lot of data in the disks. The use of a personal computer for education, the so-called C. A. I. (Computer Assisted Instruction) is appropriate for the purpose of individual study. Each student can use a personal computer as his / her own learning instrument or as a stand alone tool. We do not criticize such individual utilization, in fact we are very interested in the individual method. In Canada, Dalhousie University in Halifax, has many programs for chemical education that were supplied by Local Area Network in order to facilitate effective management and record keeping¹⁾. Each student can study general and organic chemistry at any time and everywhere on the campus. We have a plan for an analogous system.

But in the classroom lecture, the general style of teaching is for mass education. Many students look at and listen to the teacher's presentation and explanation at the same time. We have tried to use the personal computer to keep the usual style rather than the individual study approach. The personal computer is used for the purpose of presentation. Consequently, it is utilized by teachers as a tool for mass instruction. We have constructed two original presentation systems based on the personal computer. One of them is MIPP²⁾. MIPP means Mass Instruction system by Personal computer connected to a Projector. We have tried to show pictures via displays on a large screen. At first, nine years ago, we used an 8 bits personal computer. Then 16 bits machines appeared and we could achieve our purpose. Our MIPP system consists of, in addition to a personal computer, a converter, which changes the signal from computer to VTR, a projector and a screen. It can enlarge a picture for display on a large screen. The large pictures are so important for classroom lesson. However, MIPP must be used in a rather dark room. It is not available in daylight. It needs blackout curtains. It is also difficult to show small characters, since they can not be sharply focussed. So a second system was constructed in 1989³⁾ at Tomakomai National College. It is a small-scale low-cost broadcasting system. The hardware of this system consists of a converter (same as MIPP), a video player and an amplifier. The computers are linked by a co-axial cable. In all, forty six computers (including one for the teacher), a converter and a video-player have been installed, the additional cost being very low, about 300,000 yen. If you ordered the same system in the market place you would probably pay twenty times more for it. It provides a new usage for computer terminal monitors in our CAI room. Students can choose one piece of information from the three different ones by pushing the channel switch on their own displays. So the system can be used in a lighted room, which is not the case with MIPP. Some interesting aspects can be mentioned. One of them is the personal computer display. This is the case with the micro-computer, the individually lent computer, the so-called personal computer. This style represents the general use of the personal computer. Secondly, the information is the same as that on the teacher's display. The teacher can show the computer software to compensate for the deficiencies of chalk and blackboard presentation. At the Université de MONCTON the same setup works well in Room 181 of the Faculté d'Administration. Another aspect is information transmitted via the VTR camera, which can show the textbook or a sheet material for explanation. The teacher can explain subject matter to his / her students using the VTR camera. It can be used repeatedly to help individual students who are behind in their studies.

4. A HANDY PRESENTATION SYSTEM IN THE CLASSROOM

We have twenty four classrooms at Tomakomai National College. All classes have a hanging screen, but

only about half of them have a set of blackout curtains.

We can bring a portable TV set and an Over Head Projector into the classroom, if needed. For the purpose of obtaining a large picture conveniently, we can use an liquid crystal display projector panel. This type of panel is handy to bring into a classroom, thus it is used everywhere. We have two at Tomakomai National College and there are fourteen at Université de Moncton. They are used on top of an Over Head Projector. With this devise, unfortunately, we could only see shades. We did not try to use a colour model. We have experimented with various combinations of systems for normal classroom lessons instead of using CAI room or Language Laboratory. These rooms are usually reserved for English and German lessons. So we have tried out computer software to present some useful pictures on the screen in our classroom.

Table VARIOUS CONVERTERS AND PROJECTORS

year	CONVERTERS	PROJECTORS
1984	Videotron PL/2860B	National TH-10000P
1985		National TH-1055N-10
1990	Digital Art DSOC-1	Sharp XV-100Z
1992	My com. soft XPC-1V	
1993	Sharp XC-10SC1	Sharp CU-SX1 SONY PH-1251QJ

Up to now, we have used various converters and projectors for mass education and these are shown in the Table. We started this work in 1983 for the purpose of developing better presentations for students. Many different types of converter have been produced during the last ten years. Three years ago, less expensive converters appeared and we have used them for easier presentation in the normal classroom. However, last year a very small one was on sale at only 41,000 yen, and this year we can use a new liquid crystal projector which enables us at a stroke to present clearer pictures in the classroom in conjunction with a small handy computer. We have used this handy system in the normal classroom. We have found that a combination system using a cheaper converter is as good as an expensive one. Sharp's new CU-SX1 type projector gives a clearer picture compared to the old XV-100Z model. Using this new projector, we can see small characters. It has higher resolution power compared to an old one. The same type projector is in use at Université de Moncton. So at last, we reached the objective set ten years ago.

When these systems are used it is better to program so as to enlarge the pictures and the characters on the display⁴⁾. If you can use a TV set in class, you bring only a light weight converter and a note-type personal computer with your textbook. When using a portable liquid crystal projector (13kg), one must bring it into a room equipped with blackout curtains and a screen. As a result of our experience, we have found that such a handy presentation system is quite helpful for students. This easier method is useful not only for chemical education but also other subjects. These systems will be improved together with the development of the hardware. Our presentation system (Figure) is the best yet, and it now meets the needs. It is a medium which identified ten years ago.

We are now experimenting with the video floppy disk. It is a medium which can contain up to fifty copies of stationary pictures. We can copy from the pictures onto the display very quickly. Although focusability is less than that obtainable with slides, preparation and handling are very easy. If you need a lot of time to obtain a picture or graph by personal computer, it is convenient to use a video-floppy disk. A video floppy recorder is controlled by a personal computer⁵⁾. When you present each disk, you can control the time as needed.

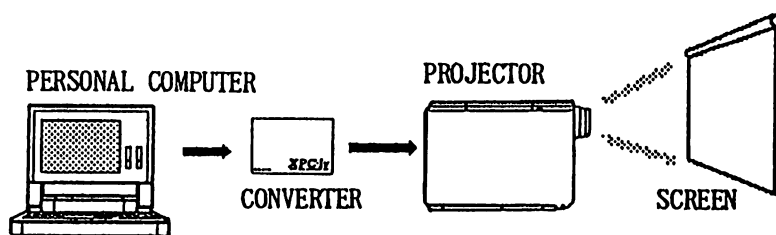


Figure A PRESENTATION SYSTEM USING A LIQUID CRYSTAL PROJECTOR AND A SMALL CONVERTER

5. CONCLUSION

We concluded that a personal computer is so powerful to study not only chemistry but also other subjects. As a result of our experience, the handy presentation system using a less expensive converter and a liquid crystal projector is very useful for classroom lessons. The usual type C. A. I. is devoted to individual study, whereas our systems may be used in the normal lecture and as an aid for the teacher. It is difficult to say whether the use of such systems is better or not, but explanation from different points of view will be helpful to promote understanding in students. After you have discussed the subject via chalk and blackboard, why not use computer software to make sure that the necessary knowledge has been acquired? At first, you deal with a logical subject by chalk and blackboard presentation to motivate the left hand side of the student's brain. Then you use suitable computer software of visual correspondance to the same subject, so as to make the right side of the brain function. The effect of such repetition is that knowledge is retained in both parts of the brain with close interconnection. The learning of your students will then be ensured. Each teacher has his / her own method of presentation. So it is you who will determine the best approach! If the methods employed offer only a little help for students to understand topics, it is better to use teaching tools. The approach taken will of course depend on the material to be taught. However, it is the sustained effort of the teacher that will, hopefully, lead to effective treatment of the subject matter.

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