Practical Issues: Computer Technology in Schools

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Abstract

All schools in Singapore have computer facilities. Many teachers have received training in using computer technology. We believe teachers, heads of department, and principals make key decisions to integrate computer technology into schools.

This paper will discuss some of the practical issues when computer technology is used in schools. The issues include those related to presentation, classroom management, physical layout of the computer facilities, and ergonomic concerns in using computer technology. With an understanding of these issues, educators will be able to integrate computer technology into schools in a more effective way.

Introduction

All the schools in Singapore have computer hardware and software. In a sense, all the schools are using computer technology everyday. Computer technology is only a tool. Teachers have the new challenge of using it effectively in their schools.

This paper will discuss presentation, classroom management, physical lay-out of computers, and ergonomic issues. We believe these issues are important. They can affect the level of success of IT integration in schools. We will discuss each issue and suggest ideas on how teachers can cope with their IT classroom situations.

Presentation Issues

Many teachers need to present commercial and / or "self-made" software to the whole class for different reasons. To allow teachers to do it, the school needs to have the appropriate set up. We will discuss three approaches in setting up the equipment.

The most common approach is to use a liquid crystal display (LCD) and an overhead projector. According to Kemp and Smellie (1989, p.211), an LCD unit "looks like a glass window the size of an overhead transparency, is plugged into the microcomputer monitor output and placed on the glass stage of the projector". When an image is called up on a computer monitor, the image is also projected on the screen. However, some LCD units "do not require an overhead projector as their light source" (Heinich et al., 1996, p. 148).

By using this approach, the lights in the room must be dimmed or switched off. It is a good idea to have horizontal control of the lights. Sometimes students need to jot down notes when they are listening to a presentation. In such a case, the first few rows of lights can be switched off while the last few may be kept on. The room should have curtains for all the windows to ensure no external lights such as sunlight will affect the quality of the projected image. The quality of the LCD units will also affect the clarity of the image. LCD units are more expensive if they are used to present motion images (Heinich et al., 1996).
The second approach is the software approach. If this approach is used, computers in the room need to be connected by a local area network (LAN). A broadcast software such as the “Smart School System” should be installed in the network to allow a teacher to broadcast his/her screen to students’ computer monitors or broadcast a selected student’s monitor to the rest of the computers in the room. However, this approach needs to depend on the LAN that the school has. If the LAN is not reliable, this approach is not reliable too.

The third approach is the hardware approach such as “PC Semi” system. It needs to have hardware to connect the computers together, but it does not need to have a LAN. It has features similar to that of the software approach. It also allows the teacher to broadcast his/her screen to students’ computer monitors or broadcast a selected student’s monitor to the rest of the computers in the room.

By using either the software or hardware approach, schools can save money in buying overhead projectors and LCDs, but would need to spend the money for the software or hardware. Both approaches do not need the room to be darkened, and the quality of the broadcasted images will be as good as the original images.

Classroom Management Issue

One of the major concerns of conducting a class in a computer laboratory is the classroom management problem. Some teachers have a difficult time monitoring students in computer laboratories. Some students may not be “on-task”. It is more difficult for teachers to get their students’ attention.

When the teacher does a demonstration or presentation in a computer room, he/she needs to get the students’ attention. However, some students may be distracted by other activities such as exploring other software packages or surfing the Net. With the help of the software and/or hardware approach, a teacher may be able to monitor students more effectively. The software and/or hardware, such as the “Smart School System” and “PC Semi” system mentioned previously can provide teachers with some features to help them manage the class. For example, teachers can freeze all the students’ computer monitors, view any student monitor from his/her monitor, broadcast a student’s screen to other students’ screen, and take over the control of students’ keyboards and monitors. All these features provide teachers several alternatives to manage the class in various situations.

Physical Layout Issues

Physical layout of the computer facilities is an important issue. The layout may affect the quality of teaching and learning. Picciano (1994) suggested three layouts: the row design, the cluster design, and horseshoe design. Another common design is the column design. Each design has pros and cons.
Row Design

Cluster Design
Schools need to give serious considerations in choosing their design, or developing a design for their own situation. We would like to make the following suggestions for schools to consider when they design the layout of their computer room:

- the layout should support the intended instructional activities in the computer room,
- the layout should reduce tripping and mobility problems by putting cables away from where teachers or students might walk,
- the layout should include enough working space for students,
- the layout should allow teachers to have easy and efficient access to students, and
- students' monitors should face the teacher unless there is available software and/or hardware to help the teacher to monitor the use of the computers.
Ergonomic Issues

Ergonomics is the “study of the interface between people and machines with a view to increasing the ease of usability of these machines” (Poole, 1997, p. 428). "Ergonomic factors are hardware features directly related to whether the equipment has been designed with the people who have to use it in mind” (Picciano 1994, p. 122). In a sense, an appropriate arrangement of the hardware which includes computers, tables, and chairs, can help make an environment that is comfortable for the users.

Computer Monitors

Computer monitors emit electromagnetic radiation. They emit extremely low frequency emissions (ELF). According to Poole (1997, p. 93), there is “no significant adverse effects from normal exposure to ELF”, but he also pointed out that there were several studies (Branscum, 1991; O'Connor, 1991) which indicated that there were some concerns. Computer users should be two to three feet from computer monitors, and the users should also keep the same distance from the sides and back of other computers around (Poole, 1997).

The second issue is the position of the monitor. Some studies suggested that the monitor should be slightly below eye level (Ankrum and Nemeth, 1995; Hagar, 1991). Such a setup will take the pressure off the user’s neck and upper back. However, Nova (1993) suggested that computer monitor should be below the glass surface of the table (i.e. under the table surface). This design is not only ergonomically sound, it also saves working space.

Computer Keyboard and Mouse

According to Poole (1997), users have pain, numbness, and/or tingling sensations that occur in the thumb and fingers after using the keyboard and mouse for long hours without rest. He made three suggestions to alleviate the problem. Firstly, users should take a break at least every hour or two. Secondly, the wrist should have support. This can be achieved by adjusting the height of the keyboard, or putting some kind of padding or wristband to support the wrist (Hagar, 1991). Thirdly, different tasks should be rotated in a team so that no one needs to use the keyboard or mouse for long hours.

Tables

According to Hagar (1991), tables should be large enough to provide ample work space for writing or other activities. Hagar (1991) also pointed out that tables should be deep enough to make the computer monitors well packed together on tables and there is not enough space for the users. This is due to the size of the computer room. In those situations, they should find a larger room or buy laptop computers instead.

(1997), users should sit in a comfortable upright position with a good support for the lower back. He also pointed out that the legs should not be allowed to dangle for long periods since, over time, this can lead to injury at the back of the knees and
upper legs" (Poole, 1997, p.100). The ideal situation would be if the chair can be adjusted to a position to allow the user to have the backrest support for the lower and middle back and his/her feet on the ground. However, for the younger children, we may consider giving them footrests to make sure their legs are supported.

**Conclusion**

In this paper, we discussed only a few practical issues in using computer technology in schools. We believe teachers should consider using computer technology in addressing the presentation and classroom management issues. Teachers should consider the type of instructional activities conducted in the computer room when they design the physical layout of computer rooms. Although teachers are not experts in ergonomics, they still need to have some basic ideas in the field of ergonomics so that they can make lives easier for themselves and their students when using computer technology in schools.

**References**


