Research ways how to use one computer in the classroom (4th - 8th grade)

Though schools appear to be making computers more accessible to students, classroom teachers still find themselves in situations where they have only one computer in their classroom. This computer might have to serve both as the teacher's record-keeping and email machine as well as a resource for students. In poorer schools, where fewer computers are more common, students are also more reliant on school computers, a symptom of the "digital divide" documented by national surveys such as the Computer and Internet Use by Children and Adolescents in 2001 (NCES, 2003). Still, computers are found in nearly all public schools, with 93 percent of schools connected to the Internet as of 2003 (NCES, 2004). Finding effective and efficient management strategies for one-computer classrooms are necessary if the computer is to serve as an educational tool and not as a distraction or something that divides the students. Building on the experiences of other teachers -- many of them readily available through the Internet -- and solid pedagogical theory, it is possible to effectively use one computer in upper elementary and middle school classrooms. The key is proper planning, as with any educationally effective lesson.

The most effective way to use a computer in the classroom is as a tool to accomplish existing educational goals and meet established standards. Provenzo, Brett and McCloskey (2005) say this is the most common and important use in schools already. The authors are careful to point out, however, that as a tool, the computer is more than just a device to increase productivity and efficiency. Eugene Provenzo especially has had an important voice for 20 years discussing how computers, as tools, are changing and enhancing students' cognitive processes.

Some practical concerns come first, and like any tool, the computer must be used properly and maintained frequently. The teacher should be familiar with how to operate the computer and all its hardware, such as the printer, scanner or video connection equipment. The teacher should also be proficient in all the software the class will use, and should have a set of websites that have been cleared for content. A copy of the school's computer use policy should be reviewed. The teacher will need to communicate all of these things to the students, offering help with hardware and software, and guidance on proper computer use. The computer should be placed in an easily accessible spot that can be easily monitored and yet does not cause distractions to students engaged in other activities. Common sense rules dictate the computer should not be near a window, moisture, chalk dust or a heat or magnetic source.

Computers can serve many functions in the classroom, whether there are many or only one. Donna Ashmus (http://www.serve.org/seir-tec/present/onecomptr.html) outlined seven main uses for a single computer, organized by function and user, including as a administrative tool for the teacher for attendance and grading, an email station for students and teachers, and a variety of research options. Any of these student uses (not to mention finding time for teacher, too) will require advanced planning by the teacher to avoid the "drinking fountain" phenomenon that author Whit Anderson notes in his article "That's Not a Drinking Fountain," (http://www.ncrtec.org/tl/digi/onecomp/index.html). Teachers should find ways to avoid having students line up to use the computer like they do for a trip to the water fountain. "Classroom time is too valuable to have a line of students waiting around for a turn to use the computer," he writes, in addition to being an invitation to misbehavior. Nor is it always practical to attempt scheduling computer time for 30 students on one machine. Therefore, the easiest strategy would be to reduce the number of users by organizing students into collaborative learning teams.

Research has shown that collaborative learning can be effective in many settings (Saab, van Jooligen, & van Hout-Wolters, 2005). Johnson & Liu (2000) found through a meta-analysis of 102 other studies that collaborative learning is one of the critical factors for successful integration of technology in the classroom, along with using the right kind of software and proper assignments. They define software as either Type I or Type II. Type I software utilizes the computer as a teaching machine and involves drill-and-practice, passive learning. Type II software includes those programs that are useful as tools that require the user to “create, manipulate and produce,” including word processing, graphics programs, database and spreadsheet software (p. 6). The best assignments, they found, are problem-based.

Collaborative and problem-solving projects fit in well with a popular model of learning that draws on cognitive and developmental psychology known as constructivism. Constructivism is a “theory of learning that maintains that learning is a process of constructing meaning, rather than receiving knowledge. … Constructivism recognizes the social nature of learning and emphasizes the need for active participation by the learner” (Collins & O’Brien, 2003, pp. 75-76). Traditional classrooms, where the teacher lectures and students sit singly in desks, passively receiving knowledge, fit the behaviorist model.

Relying on the functions outlined by Ashmus, the upper elementary or middle school teacher can develop project-based assignments and divide the class into teams of four or five students. Numerous teacher-authored websites, such as Education World (http://www.educationworld.com), offer lesson plans in subject areas and across the curriculum, or that can be used in team teaching projects. Within each team, the students are given assigned tasks that can be rotated so that each student gets "computer time." However, this is a good opportunity for teachers to give students that might not be the top grade-earners to shine, especially students who may be better typists, better organizers, artistically gifted or more experienced searching the Internet. As Anderson suggests, the computer can be used as just one of several stations in the project. The teams rotate through the stations, which might include the computer, classroom encyclopedias, a station to review printed articles on the topic, an art station, a project assembly station, etc…

Regardless of the setup or grade level, teachers need to guide students through the process of completing the project. Barker and Whiting (2000) describe a project for middle school students they undertook that used an Internet-based resource developed by the state of Utah at http://www.surweb.org. Students were required to put together slide projects about Utah in the role of "tourist consultant," and their completed projects were published on the website. The teachers involved reported that rather than simply regurgitate knowledge to earn a grade, their students, from third to seventh grade, became "knowledge explorers" and "knowledge producers." Projects like SURWEB are similar to WebQuests, a popular, constructivist learning project format for using Internet research to produce an often multimedia project (Starr, 2002). WebQuests are natural for team-based projects, and can be broken down into tasks and station work to take advantage of the one-computer format. Many education websites have information, including already developed WebQuests and strategies for creating new ones.

Although Anderson's much-quoted article on one computer classrooms focuses on how to manage many students on one machine, he also offers suggestions for expanding the options. For example, if one teacher’s class is out at lunch, or physical education class, another class that is not out can use that computer as well. Some students may be able to come in early or stay after school if possible to get computer time, although this option must be used cautiously so as not to disadvantage students who ride a bus or have after school activities. Teachers can also use a downloading program like WebWhacker (http://www.bluesquirrel.com/whacker) to download entire websites to be used offline. This can save time for page loading, or allow the computer to be used for searches even if the network is down. As one Texas eighth-grade earth science teacher told researchers in one case study (McGee, 2000), “always have plan B available,” -- good advice for anytime computer use is planned.

Strategies for using one computer in the classroom, then, are not all that dissimilar from any effective learning strategy. Solid theory, relevant topics and good planning are necessary whether the teacher has one computer, 30 laptops or no computers at all. “With or without computers, exciting things should be going on in classrooms. Students should be engaged in activities that stimulate their learning” (Provenzo, Brett & McCloskey, 2005, p. 237). The one computer classroom can be challenging, but it may also be a blessing in disguise for the prepared, but flexible, teacher who knows how to use this important tool.

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