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One for All: The Single Computer and Technology Integration

by Ross Perkins

A Familiar Experience?

Jim, an experienced social studies teacher, was sitting in the teacher's lounge grading some mediocre papers about the effects of British colonialism. His juniors had about as much interest in writing them as he had in grading them. He stopped for a moment after reading a particularly confusing run-on, and suddenly he had an inspiration. His students could use the computer to create multimedia mini-documentaries on colonialism. It would be a great way for them to get excited about producing a report. They would do research, storyboard, create, and present. But then hard reality slapped Jim in the face. What was he thinking? First, it was almost impossible to schedule the computer lab for the time that would be necessary. Second, the one computer sitting in the back of his classroom would not be much help – he had 26 students in one section of world history and 24 in another. He stared down at the run-on, gave it a healthy dose of red ink, and read on.

It is quite likely that you have had an experience similar to the one just described. The excited talk of "technology in the curriculum" seems to be a fantasy for those whose reality, like Jim's, means that one computer sits in the classroom and the notion of letting two dozen or more students use it for educational purposes is beyond the pale.

Or is it? Many teachers around the country are in a similar circumstance, but they are using their single classroom computers effectively. The problem does not seem to be that there is only one computer, but that good information about how to use it for a classroom full of students is not widely disseminated.

Moving Forward

While it is true that teachers will not use computer technology in their classroom before they themselves are comfortable with it (Hurst, 1994; O'Neil, 1995), it is also true that simply learning to use the computer for specific tasks does not mean that teachers will use it effectively as a tool to help student learning (Tan, 1998). Teachers need to be trained to combine educational technology with teaching styles and specific management techniques in order to make learning happen.

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This article assumes that readers want to use the computer in their classroom but are at a loss to develop their ideas given equipment restraints. The purpose of this article is to give suggestions that are informative yet general enough so that all teachers, at whatever grade level, area or expertise, can put their solitary computer to good use.

An Administrative Assistant

The single computer can be a valuable a tool for many administrative, communication, or planning tasks. Advice found in many articles and books about the one-computer classroom point out that teachers can use the computer to meet their own needs (e.g., Dockterman, 1997; Kahn, 1998; Oehring, 1993; Tan, 1998). The use of the machine for personal activity is directly related to teaching, even if the students themselves are not "doing" anything with the computer. How? As any classroom teacher will agree, ideas and tools that help save time, energy or effort do in fact benefit the instructional process. Creating word processing documents or calculating grades via a spreadsheet can save hours of time – time that is better spent developing creative ways to teach content.

An "Electronic Chalkboard"

If one were to create a taxonomy of computer use in the classroom, there would likely be a good deal of debate about which use is the most important for student learning. Among one of the top uses, though, would likely be that of presenting or displaying information. After all, since the first standardized classrooms were created there has been a way for teachers to display information to the entire class.

A number of authors writing about the one-computer classroom discuss the merits of using the computer to project information (e.g., Brown, 1998; Dubois, 1997; Johnston, 1998; Tan, 1998). Projection may be done either by connecting the computer to a television, connecting it to a LCD device that can be used with an overhead projector, or by the use of a projection display device. Some teachers may even have access to "smart board" technologies.

As Tan (1998) points out, this "electronic chalkboard" can be used to display agendas, train students to use certain software or the Internet, aid in delivering lectures, or show simulations. A networked machine could display web sites and Java animations. Other uses might to display data input from digital cameras, digital microscopes, or probeware. Students can use it to display projects that they create.

Making such use of the computer, Tan writes, allows students to observe the teacher using programs, which will in turn help them use computer software and they will "learn to value the classroom computer as part of their learning experience" (1998, p. 10). Other insights reveal that using projection devices with one computer can help enhance students' visual literacy skills (Dubois, 1997), help a teacher monitor student work (Johnston, 1998), and help a class build community stories (Oehring, 1993). Another suggestion would be to use it to conduct "game show"-like reviews, or demonstrate how student work is assessed.

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Visibility Concerns

When planning to use the computer for presentations one should note variables related image visibility. Televisions, if used, should have at least a 27-inch screen so the image can be seen by students in the back of the room. If windows cannot be shuttered with blinds or curtains, a television's glass screen will reflect light, which would make it impossible for some parts of the class to see what is being shown. LCD projectors often require a special kind of overhead projector with an extra bright bulb, otherwise the image might be too dark. Finally, some projection display units are not well-suited to rooms where there is ambient light.

Student Use

Many teachers reading this article are already using the computer to complete personal tasks and may already be using it to display presentations. What they are looking for, however, are ideas that will allow students to actually sit in front of the monitor and "do." This next section provides information about group organization, collaboration, time management, software selection.

Precautionary & Preventative Measures

If the classroom computer is being used to complete the administrative tasks outline above, the teacher must be aware of the risks associated with allowing students to use it. The first measure a teacher can take has nothing to do with encryption, but has everything to do with planning. When teachers allow students "free time" on the computer, the likelihood of a getting a virus or another electronic bogey is quite high.

Each time a student sits in front of the classroom computer, he or she should have an educational task to complete (Banaszewski, 1997). Specifying a certain time period during with they can use the computer also helps reduce unwanted activity (Oehring, 1993) . Other ways to restrict the possibility of students misusing the system is to use screen display capabilities "televise" a student's or groups' activities to the class (Johnston, 1998). There are certain software solutions that allow teachers to track all keystrokes and all web site visits. Anti-virus software is highly recommended. Even well-intentioned students can inadvertently delete files, so teachers are also advised to make back-ups of any important information. Use password protection on files that contain private student information. System administrators may have additional suggestions.

Decide the Purpose

As Brown (1998) points out, a question a teacher must ask is, "For what purpose do I want my students using the computer?" This is a pertinent question because the answer guides a number of other decisions. Good teachers allow their objectives to dictate the media used, not the other way around. If objectives justify the use of the computer, one needs to know that it can aid in developing a number of instructional goals. These goals include: creation and/or planning of projects, presentation of material, information research, problem-solving, data management, drill and practice, educational gaming, and student assessment. Some of the activities listed are conducive to collaboration, whereas others are reserved for individual use.

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Establishing Groups

Creating groups falls mostly within the realm of "the art of teaching." There are no hard and fast rules about who to place with whom, as only the teacher knows his or her pupils well enough to make such judgments. However, it is not as simple as asking students to "get into groups of three or four." Such a method is in fact highly discouraged (Eraut, 1994) as it tends to give rise to gender inequity, social exclusion, and less-able groups. Eraut (1994) describes some of the aspects of group formation.

Group processes include pupil roles, decision making, turn-taking and participation, argument and conflict, and collaboration. Optimal group size depends on age, expertise, personalities, and collaborative ethos. Factors such as availability of time, level of participation for each group member, and the nature of the software being used should also be considered when developing groups. Students, even adult students, do not automatically collaborate just because they are in groups (Lowry, 1994). Collaboration must be modeled and each student should be assigned specific roles, although such roles can (and should) rotate.

Managing Time

The problem with individual use of the single classroom computer is that it takes too much time. The math is not difficult: if 25 pupils in a class that lasts 50 minutes must spend 15 minutes each at the single computer, the 25th student would finally finish in the seventh class session, or a full week after the first student began! For complex projects, individual use of the single computer is simply not an option in the one-computer classroom.

Teachers can save time by first training students on software or Internet use. They should also provide explicit models of what needs to be accomplished. By using presentation devices, or by simply modeling outcomes and skills with paper-based materials, the teacher can establish an organized method for computer use. Instructors should break projects into steps so that groups can complete each stage quickly.

Another suggestion, as noted by Banaszewski (1997), is to encourage peer tutoring. He notes that finding students who are skilled in computer use is not difficult and many are willing to help. Banaszewski cautions the teacher not to let these students become "experts," as it may establish an undesirable dichotomy between the "doers" and "non-doers." Rather, he suggests that all students get the chance to teach each other skills. Another suggestion from Banaszewski is for teachers to use free time to train small groups of students. This is particularly useful in that it allows for small-group formative evaluation to take place, where one can estimate what kind of training works and what does not. Gaining feedback about the software or lesson is also a result of such sessions.

Students must also know when they are to use the computer and for how long. By establishing a posted rotation schedule and keeping timers on hand, the teacher can more easily manage time. Suggestions include using a name board,

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using numbered cups, or a clothespin chart (Oehring, 1993). The teacher must decide how best to implement the rotation of individuals or groups, as deciding how to do it is paramount to success. A final time management strategy involves "staggering" computer use (Banaszewski, 1997) . While some students are at the computer, others are not simply waiting to use it, but receiving instruction or completing work related to the lesson.

Hardware and Software Considerations

The actual layout of the workstation is important to consider with regard to group creation (Eraut, 1994). How many students can sit around the computer and work together comfortably? Is the screen on top of the desk so all students can see it, or is it recessed below the desk, meaning the each person will have to stand up and lean over the person at the keyboard? Is the desk situated to permit easy (and quiet) access and egress? Kahn (1999) states that software considerations are equally important. Does the program force a student to start and stop at pre-determined points, or can he or she begin and end an activity at will? Does the program allow students to work together in teams, fostering collaborative problem-solving activities? Is the software easy to use, or will a student learn more about process than content? Teachers should keep in mind that not all software is conducive to the specific requirements of the one-computer classroom. In evaluating software in such an environment, one should keep in mind aspects related to ease-of-use issues and collaboration.

Final Thoughts . . .

Remember Jim's dilemma? Should he abandon his idea altogether based on what he perceives is a constraint, or can he implement some of the ideas found here? There is not one right answer. Just as "Jim" must work out his own solution, each teacher must balance his or her own strengths, those of the students, and the resources available. Beyond using the computer as an "administrative assistant," or "electronic blackboard," innovative teachers can and will find ways to create productive, collaborative teams of students, develop ways to manage instructional time effectively, and select engaging software solutions.

There are many solutions for teachers like "Jim" who have one computer but hundreds of great ideas for educational technology implementation. Two fairly recent books offering more solutions and examples are listed below. The appearance of the titles in this article is not an endorsement of the content. Teachers who wish to review them are invited to send their comments to any of the editors of the VSTE Journal.

The abstracts shown here for each book are abbreviated forms of the entries found in the ERIC database.

Dockterman, D. A. (1997). Great Teaching in the One Computer Classroom (4th ed.). Watertown, MA: Tom Snyder Productions.

This book offers practical solutions for turning the computer into a valuable teaching tool both inside and outside the classroom. It shows how teachers can use a single computer to help ease their administrative burdens, enliven classroom presentations, spark discussions, and foster cooperative learning and critical

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thinking. Appendices include step-by-step instructions for getting started with some basic software tools and classroom applications as well as general information; a list of education and technology organizations; a list of education and technology publications; a list of 59 education-centered listserv discussion groups; a glossary of Internet terms; and a 27-item reading list.

Cost: $19.95
Pages: 110 pages
ISBN: 1-57809-681-2
Accession No.: ED414873

Kahn, J. L. (1998). Ideas and Strategies for the One-Comptuer Classroom. Eugene, OR: International Society for Technology in Education.

This publication is intended to provide teachers with ideas and strategies for using one computer in the classroom. The focus is on elementary school classes, but some activities can be used with older students. Recurring themes are: scaffolding learning, "crap" detection or critical thinking, and knowledge organizing. Chapter 1: "Classroom Management"; Chapter 2: "Ideas for Using Integrated Packages"; Chapter 3: "Knowledge Organizers"; and Chapter 4: "Teaching With One Computer in the Content Areas." Five appendixes provide: a sample keyboard diagram, a worksheet for creating a ClarisWorks database, basic information on useful software packages, contact information for software publishers and other resources, and contact information for national educational software distributors.

Cost: $25.00
Pages: 141 pages
ISBN: 1-56484-132-4
Accession No.: ED 421981

References

- Banaszewski, T. (1997). Strategies for the one-computer classroom. Learning and Leading with Technology, 25(1), 32-35.
- Brown, C. A. (1998). Presentation Software and the Single Computer. Learning & Leading with Technology, 26(2), 18-21.
- Dockterman, D. A. (1997). Great Teaching in the One Computer Classroom (4th ed.). Watertown, MA: Tom Snyder Productions.
- Dubois, J. (1997, November 1997). Going Solo: Creative Ideas for the One-Computer Classroom. Retrieved December 8, 2001, from http://ths.ttsd.k12.or.us/jdubois/97_12_Going_Solo.html
- Eraut, M. (1994, April 4-8). Groupwork with Computers in British Primary Schools. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

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- Hurst, D. S. (1994). Teaching Technology to Teachers. Educational Leadership, 51(7), 74-76.
- Johnston, A. (1998). The Internet Pyramid. Learning & Leading with Technology, 25(4), 36-37.
- Kahn, J. L. (1998). Ideas and Strategies for the One-Comptuer Classroom. Eugene, OR: International Society for Technology in Education.
- Kahn, J. L. (1999). Part of the process: problem-based education in the one-computer classroom. Learning and Leading with Technology, 26(5), 42-46.
- Lowry, M. (1994, February 16-20). Collaboration as an Instructional Innovation. Paper presented at the Association for Educational Communications and Technology, Nashville, TN.
- Oehring, S. (1993). The One Computer Classroom. Instructor, 103(1), 84-87.
- O'Neil, J. (1995). Technology schools: A conversation with Chris Dede. Educational Leadership, 53(2), 6-12.
- Tan, S. B. (1998). Making One-Computer Teaching Fun! Learning & Leading with Technology, 25(5), 6-10.

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