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Implementation Responding to Student and Teacher Needs

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Technology implementation and integration in schools are receiving quite a bit of attention lately. Proponents of instructional technology are increasingly being held to answer for the massive infusion of computers and other technologies into our schools. Now that computers and other technologies have been a part of the classroom for many years, some questions are arising concerning their use and the benefits we are seeing. Relating specific educational gains to the use of technology is difficult, however, because "...there is no clear consensus on what it means to integrate technology" (Riedl). There have never been specific educational goals for the integration of technology.

Until very recently, the issues surrounding the implementation of technology revolved around how much could be bought for the schools and how fast. The appropriateness of computers in the classroom has not been questioned. Technology was, after all, the "wave of the future" and the students would have to deal with the mysteries of programs, bits, and bytes; not to mention the fact that tomorrow's citizens would have computers at their fingertips at every turn. ATM machines, computers in the workplace, computer-based record keeping, and the information explosion have all been cited as justification for instructional technology expenditures. Once personal computers became available, the race was on to gather together all available resources to purchase and install them in the schools. Not much attention was paid to how the computers would be used, and even less to how the computers might effect learning and teaching. As Chris Dede writes, "...computers are seen as magical devices, silver bullets to solve the problems of schools." Classroom computers, he contends, are "envisioned as a technology comparable to fire: just by sitting near these devices, students get a benefit from them, as knowledge and skills radiate from the monitors into their minds."

Teachers, parents, administrators, and the public were enthusiastic about giving the students access to computers. Local and state administrators called for standards on the numbers of computers that should be in schools - one multimedia, network-ready computer in every classroom and a 5 to 1 ratio of students to computers. (Six-Year Educational Technology Plan for Virginia) Sophisticated software and peripherals all made their way into the classrooms. The funding for such expenditures was rarely, if ever, questioned and the infrastructure in place in many schools grew to the point where, today, network administrators are as common in schools as reading or math specialists. Indeed, in some instances, the support needs for instructional technology have been met at the expense of other programs.

The methods by which success with technology implementation was measured focused solely on numbers of computers and associated peripherals. Newspapers published computer counts and ratios to indicate a school district's progress in technology implementation. A school with a 10 to 1 ratio of students to computers was assumed to be doing a better job of incorporating technology than one with a 20 to 1 ratio. Teachers were given the hardware and software but little or no guidance as to its instructional uses. "Oregon Trail" has become a caricature of instructional technology - the kids loved it, teachers were using technology, and the parents were excited about an educational game where the kids took a simulated trip out west. Unfortunately, though, games like this were mainly played by students when they finished their other work. Typically, the best (or at least the fastest) at the 'real work' got to use the computers. To be sure, some excellent integration strategies were in use but these were the exception rather than the rule. Teachers simply weren't given training and strategies to integrate this technology. A specific plan for the integration of the new technology did not exist.

Today, the infusion of technology is coming under critical scrutiny. Rather than continue to endorse the indiscriminate purchase and implementation of newer and faster technologies, a growing segment of the public is looking for justification for technology implementation. What benefit is it to the students? Is there an increase in learning? Is there an increase in test scores? Andrew Totter, in Education Week, writes, "...the nation's schools, policy makers and the public are finally starting to demand evidence that their investments have been worthwhile." With $5 billion per year spent on technology implementation across the country, people are beginning to ask, "Why?" This is an unsettling question to those who took it on faith that computers would somehow radiate learning to the students.

Measuring success with technology implementation is hampered by the fact that there are no clearly defined instructional goals for it. Without a definition of what technology integration is, there is no way to assess whether technology is being integrated or to measure the impact of integrating technology (Riedl, 1998). Without articulating goals, there can be no measurement of whether or not technology implementation has been successful. Educators need to agree on, and clarify, their goals for using technology, or they have no business looking to research for answers. (Cuban, 1998).

Recent research conducted by Harold Wenglinski, an associate research scientist with Educational Testing Service reveals some very interesting findings. Wenglinski studied the performance data of 4th and 8th graders on the math section of the 1996 National Assessment of Educational Progress. In 1996, for the first time in its 30 years the NAEP contained questions to students and teachers about how they used computers in math. His findings indicate that in classrooms that have successfully integrated technology, the critical factor is not the type of computer or the length of time it is in use, but the way in which is was used by teachers. Technology can have positive benefits. But those benefits depend on how the technology is used (Wenglinski).

His findings indicate that students will not achieve more simply by virtue of the computer's presence in the classroom or the amount of time the student spends on it. Rather, they suggest that the differences in achievement scores are related to how the teacher uses the computer. In short, technology combined with good teaching will make the difference. The indications are that it is the teacher who makes the most difference in the success of technology integration. How the technology is integrated and the context in which it is used has a much greater effect than on the time spent on the computers.

Unfortunately, the teachers and students have largely been left out of the planning process for implementing technology. Technology has been purchased for its own sake and it was hoped that some good would come from it. This is what has brought many school systems to the point today where they are finding it difficult to justify expenditures on technology.

"Studies of innovation in other types of institutions indicate that successful change is always bottom-up, middle-out, and top-down. The driver for bottom-up innovation in a district is the children. To activate these bottom-up, middle-out, and top-down forces for improvement, educators must take the lead in developing a shared vision for systemic reform, distributed learning and sophisticated utilization of technology." (Dede, 1998)

What is missing are instructionally relevant goals and a vision for the successful integration of new technologies. Technology implementation has, in most cases, overlooked the very things that should be given highest priority: the needs of the students.

"What schools need to consider now are the goals for its use. The obligation for educators, practitioners, and educational policymakers to think about what it is they're after. Only with clear goals can educators be intelligent about how much they want to spend for what purpose, and under what conditions." (Cuban, 1998)

The first goal in implementing any type of innovation, be it teaching style, management technique or instructional technology, must be to meet the instructional needs of the students. When the needs of the students are matched with appropriate technology then the implementation of that technology will likely be more successful. If technology integration is to be successful, it must be relevant and appropriate to the tasks. Clearly, educators must be included in planning and implementing technology. The curricular goals and the needs of the students have to drive the technology that is purchased. These can best be voiced by educators.

There is a bandwagon that school systems around the state and around the country have been riding and we need to get off and take a good look at where we are going. We must first realize that technology infusion is not an end in itself. There are a vast number of ways that technology can be used to enhance instruction but the driving force behind its infusion must be the curriculum and learning needs of the students. To place computers and software in classrooms where teachers have no need for them is to doom the computers to be relegated to game playing when work is done. Unless we first engage in some serious discussion about what

we want to see happening in the learning setting and then decide on how to use the technology to further the desired activity, we have not really accomplished anything (Riedl, 1998).

Technology can have a great impact on schools. Computers can provide motivation for reticent students; provide virtual worlds for otherwise impossible simulations; provide access to tools for students who might otherwise be incommunicative; or develop higher-order thinking skills in the management of information. But the implementation of technology must be responsive first to the needs of the students and teachers. Educators must be included at all stages of planning for technology implementation. School systems that continue to purchase and implement technology without regard for its ultimate purpose will be hard pressed to show or exploits its benefits.

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