Curriculum Lags Technology

Abstract

As we approach the 21st century, no one disputes computers/computer-based technology is here to stay. With the evolution of more affordable technology, business and education have increased investment in computers. Corporate environments have completely altered their daily work environment as a result. The implications produce an overwhelming challenge to our school system. The critical question, then, is how do we best prepare our children for such a technologically advanced environment? There are many theories and ideas on how this task should be accomplished.

Curriculum Lags Technology

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CHAPTER 1

Introduction

As we approach the 21st century, no one disputes computers/

computer-based technology is here to stay. With the evolution of more

affordable technology, business and education have increased investment in

computers. Corporate environments have completely altered their daily work

environment as a result. The implications produce an overwhelming

challenge to our school system. The critical question, then, is how do we

best prepare our children for such a technologically advanced environment?

There are many theories and ideas on how this task should be accomplished.

Schools have been combating technology issues for over a decade.

Software changes on a daily basis, hardware becomes outdated and

obsolete almost as fast as it is purchased. The amount of training and time

required to facilitate and use technology is also growing at a steady rate. As

if this isn't enough, teachers' jobs become even more challenging as students

are inundated with a media-rich environment outside the classroom, while

inside the classroom they only find chalkboards and paper. This makes it

nearly impossible to keep them motivated and focused in learning (Butzin,

1992).

Society does agree on two key factors: technology is here to stay and

it is going to cost money. Some schools have attempted to meet this

technological challenge, but have not invested enough time to plan. They are

lacking access to the equipment or their staff is not supplied with enough

resources for the integration to be successful. Often times the equipment becomes outdated before anyone learns how to use it effectively in the classroom (Cuban, 1993).

This paper will investigate how technology is currently being used in schools today. Concentration will be placed on the issues that educators face concerning the integration of technology into the current curriculum. This research will give school districts insight on the current problems and an awareness that can be used to improve their technology plans.

Background

In the past decade many school districts have attempted to integrate technology solutions. Funding has been traditionally done quite haphazardly. School boards often target specific curriculum areas creating more of a band-aid type of solution rather than an across the board district wide implementation (Mehlinger, 1996). This type of approach to funding has also led to poor access to technology for the students and teachers and, often times, doesn't include time or money for staff development so the technology can be used effectively. The result is frustration on the part of the staff and curriculum which is shallow in the use of technology for the students.

Many schools in the past have limited teacher and student access to the computers by placing them in labs. Teachers are required to follow strict rules on scheduling lab time. Computers are not allowed to be removed from the lab for the teachers to be able to develop curriculum at home or after

hours. This provides yet another barrier to the whole technology integration issue.

Not only have teachers been given equipment and expected to figure out how to use it, they also have to learn how to implement the hardware and software into the curriculum without any technical support. So most of the time which should be spent on writing curriculum to integrate the technology into their specific areas has been spent on troubleshooting hardware and software technical problems. The end result often is an attitude that it is easier to stick with what they know and not use the newer technology (Mehlinger 1996).

Purpose

Education has come a long way on the expansion of computer availability in the public schools. The Office of Technology Assessment (1995) report indicates many schools have improved their computer student ratio. The nationwide average was 9 to 1 in 1995. Even though schools have enhanced the availability of computer resources, the effectiveness of their use is questionable. Schools lack direction because there is very little research to guide and lead them. The changes in technology make it difficult for researchers to stay ahead and provide direction towards curriculum revision.

The definition of computer-based technology changes faster than the typical five-year technology plan. Since the early 80s computer-based technology has expanded from a basic computer with a monitor, printer and

hard disk to a computer with CD-ROM, modems, scanners, laser printers, local area networks (LAN)s, and Internet. This researcher will seek answers to the following question: what are the issues facing educators today in their attempt to integrate technology into the curriculum? As a result of this literature review, this researcher chose to focus on the following specific areas: current funding methods, computer access, and staff development.

Definition of Terms

The following terms are defined as follows:

Computer-based technology - relates to any instructional activity that uses computers or any device connected to or controlled by the computer.

Curriculum - is a set of learning objectives and content that is selected to meet the needs of the student. The design of instruction starts with a needs assessment; analysis of learner, resources and environment.

Integration - is the infusion of computer activities into the curriculum which supports instruction where appropriate.

CD-ROM - (Compact Disc—Read Only Memory) is another form of data storage. A CD-ROM disk can store up to 650 MB (megabytes) of data. Its main use is for installing application programs, playing games that require a great deal of storage, or accessing large volumes of reference information such as an electronic version of an encyclopedia.

Modem - is a piece of hardware that converts digital electronic information into audible telephone signals that are then sent over telephone wires. On

the receiving computer, the sound waves are then converted back into digital information.

Scanner - is a hardware device that converts text or graphics from paper into an electronic form that a computer can use.

Laser printer - provides high quality output. Laser printers use toner cartridges, which contain a dry ink, and a laser light to fuse the ink onto the page. The Laser printer provides the most flexibility in printing graphic images.

Local Area Network (LAN) - connects a group of computers, usually located in the same room or building, using wiring similar to television or telephone cabling. Networks allow for hardware and data sharing.

Internet - is a worldwide network of computers that are designed to share information and make it possible to send messages to other computer users around the world. Access to the Internet is gained through a subscription with an Internet provider.

CHAPTER 2

Literature Review

Educators are being challenged more today than ever before to stay abreast of changing technology resources to improve the delivery of curriculum. Technology is also influencing student expectations and motivation as to how they learn. The purpose of this paper is to discuss the issues of integrating technology into the curriculum. What are the obstacles educators are facing in attempting to update the curriculum to include appropriate computer activities?

Current Funding Methods:

Education has been traditionally cautious regarding spending. Allocation of funds based on a solid plan is lacking and those who control the budgets are many times not educated in what needs to be accomplished to effectively integrate technology across the curriculum. Mehlinger (1996 and Dyrli & Kinnaman (1994) describe haphazard spending habits on the part of schools and school officials, emphasizing the decisions school officials and communities must make concerning education and technology. The rapid changes in technology have schools boards grasping for answers in an attempt to keep updated. For example, in one community the board may approve the purchase of several computers to use for writing skills, while in another district, the board supports the use of Channel One to access educational television. Yet in another district, they maybe pursuing

subscriptions to a computer online service to become a part of the information highway. Often the approach taken has been one of treating technology purchases as a one-time capital expense such as the purchase of a bus or the repair of the roof. So, when the staff approaches the school board the following year for updated or additional equipment their request is often denied because there is no budget for it. Even the most simple requests, such as the installation of a phone line, or the purchase of a fax machine, are out of reach or impossible to attain. Technology has not yet been seen by most schools as a priority yearly budgetary item. Wiburg (1994) cautions schools to look into long-term integration plans so they do not just buy a bunch of computers without consideration on how to use them effectively.

These types of funding policies have several consequences. According to the Office of Technology Assessment (1995) some reasons for teachers' resistance to using the available technology include: the age of the equipment in their schools, the lack of training opportunities, and limited access to technical resources. Much of the equipment found in schools today is too outdated to run the current sophisticated software. This makes it frustrating for teachers as it limits their ability to use the technology. Even when districts have new and updated equipment, it often is not readily available to teachers because it is found in the administrative offices and not in the classrooms.

Education is often criticized by business and the public for not keeping up with current technology. Melnick (cited in Albright & Graf, 1992) stated "private industry spends an average of $50,000 per employee on technology, the average for education (including K-12) is just $1,000 per employee" (p. 13). Melnich observed that if the growth of productivity in education had matched the growth of productivity in the computer industry, we would now be able to consolidate twelve years of public education into ten minutes, costing five cents per student.

The whole funding issue revolves around public attitude and what they are willing to financially support. The public is willing to pay lip service to the fact they all want the latest and greatest of technology to be in place and effectively used in the schools. The problem lies in paying for it. According to Mehlinger (1996) it is not yet clear if Americans will want it badly enough to pay the price to have it.

Current Computer Access

Current literature supports the fact that there are computers in the schools, but students are not being given the opportunity to use them individually or in the classroom on a daily basis. Rosen & Weil (1995) addressed this topic by stating that even though nearly all schools had technology of some sort available for teachers to use only about half of the teachers actually attempted to integrate the technology into their current curriculum.

The location of most computer labs in the schools restrict students use to specific times which are not always conducive to busy schedules. Teachers combat this same problem in trying to schedule time to get their classes into these overbooked computer labs so that if they do get into the lab, they often fill the time with activities even if they are a non-productive and do not fit into their curriculum (Mehlinger, 1996; Zammit, 1992).

Rosen & Weil's (1995) study contradicts this fact by stating that computers are available nearly everywhere but teachers are avoiding the technology. Their findings showed that computers were available to nearly all teachers at all schools. Although access was not a problem, teachers still did not actively use computers with their students. Several reasons were cited for this situation. Some of those are: teacher anxiety to using the technology, lack of control over the classroom by never knowing if their computer lesson will work correctly, lack of confidence in their ability to learn how to use the technology, lack of time to be able to learn how to use it and implement it into the curriculum, and lack of pre-developed materials to be able to adapt into the curriculum.

As telecommunications becomes an everyday part of communicating, schools are once again challenged with supplying teachers accessibility to phone lines and modems. Most of these types of telecommunication links are found in offices and out of the way places not conducive to classroom use (Office Technology Assessment, 1995). So once again, it becomes obvious that in order for schools to have a successful integration of

technology they must plan to make the equipment accessible to not only the students but the teachers so it will be used effectively and consistently.

Staff Development

Most of the literature on technology integration in schools summarizes the heart of the problem to be lack of time for teachers to experiment and develop the materials necessary for successful integration. Brunner (1990) suggests teachers do not have to be computer geniuses but they need to be comfortable with the hardware and software and the options available to them. Along those same lines the Office of Technology Assessment (1995) states teachers need to be able to attend workshops, communicate with each other about what works and what doesn't, be given time to experiment, and plan lessons using the new methods and materials.

Not only is there no time allowed to work with the equipment and plan, but there is no technical support so the time spent trying to utilize equipment can be productive and not spent trying to get the hardware and software to work correctly. This results in frustration for the teachers and an attitude to continue to stick with what they are already comfortable with instead of trying to use the new technology (Mehlinger, 1996).

Siegel (1995) gives us a broader picture of the state of educational technology training in his survey. This survey focused on staff developers and instructors nationwide and addressed technology staff development issues. The findings of this survey support previous statements. Some of these are: 8% of the respondents cited that little or no funding in their

technology budgets included staff development, over half of the respondents who were given training on specific software or workshops found it unusable or nonapplicable to their current curriculum, both participants and trainers cited not enough time was given to practice and follow-up when training was offered. Finally, only 6% of those surveyed are able to strengthen their skills by taking advantage of schools and districts loaning technology equipment to teachers or allowing them to purchase at a discount.

The Office of Technology Assessment (1995) report once again stresses that most schools have made significant progress in training teachers to do basic classroom tasks using word processors and databases. These skills make their jobs easier but do not further their efforts on integrating technology into the curriculum. Although it is beneficial for teachers to be able to take attendance, record grades, write memos and send e-mail to the office, these skills are not benefitting or enriching the curriculum being offered to the students. These are just daily routine tasks.

Unfortunately, training time is not spent on curriculum integration as stated by Marshall (1993). Training tends to focus on skills needed to manipulate the hardware and software and often ignores or barely touches upon how this hardware and software can be utilized as an integral part of the teaching/learning process. Administration often assumes a little training on hardware and software will magically facilitate integration of technology into the curriculum. Little thought is given to the fact that often this requires a complete reorganization of the classroom and the teaching practices used.

If staff development is truly the heart of what we need to focus on to move ahead with technology integration into the schools then Siegel (1995) makes several interesting points. Schools who budget for technology should reverse their thinking on how this money is allocated. Hardware and software shouldn't be the major emphasis. Training should be the priority making up 70% of the budget. This would include personnel support, staff development, time blocks for collaborative work, full-time technology coordinator, curriculum support, and smaller class sizes. This approach would take care of the problem as Jones (1992) states that teachers need more technical support, hands-on learning, time to experiment, and easy access to the necessary equipment. Siegel (1995) makes an excellent point in summarizing the staff development issue by stating: "You can have $200,000 worth of equipment, but if teachers are not aware of the capabilities, it'll just sit there and they won't use it" (p. 44).

Callister & Dunne (1992) also addressed the issue of forcing teachers to use technology without proper preparation. They stress the idea that efforts to replace teachers with technology have uniformly failed. This is mainly because we need to keep in mind that computers are machines and machines are tools. They are only valuable when a human intelligence organizes and uses them in a productive manner. Computers implemented as a teaching tool can extend the teachers' power to create an enriching and motivating environment in which students can learn.

CHAPTER 3

Conclusion

The literature suggests there are three main areas which are obstacles to educators in their struggle to integrate technology into the curriculum: funding, computer access, and staff development. After reviewing this literature the researcher has several ideas about how to deal with these issues. Looking at any of these individually will not solve the problem. The solution lies in effectively handling all of them at the same time. The only way this can be successfully accomplished is through a well thought out, carefully developed plan. Teachers should play a key role in this planning process to ensure the technology will be used effectively.

School personnel need to take a serious look at where they are currently positioned and where they need to proceed with regard to technology integration. Many schools do not have the expertise of staff to guide and direct them. Therefore, it may be beneficial to hire a district technology coordinator along with skilled technology curriculum developers who will assess, implement and evaluate the plan on a continual basis. Time should be set aside on a monthly basis for planning, evaluating and redirecting. The plan should start with a needs assessment which includes an analysis of the students, staff, current resources, and environment. The needs assessment will provide the direction for the goals and objectives so they are a guide to integrating the technology. The results of the analysis will

determine the breakdown of the plan and the priority that will need to be determined to complete the migration path.

It is important to make sure that the areas discussed in this paper: funding, computer access and staff development are adequately addressed. A good technology plan will integrate and prioritize properly these areas to meet district goals.   School districts have to be willing to take risks with their technology plans. Rapid changes in technology will make it continually difficult for researchers to catch up. It will be up to schools to share their success and failures and build a research literature base to support technology integration. Once a school has successfully completed this process, they can serve as a model for other schools to follow.

Funding is a necessary part of the big picture, but as the literature points out it is not a solution in itself. Misappropriated funds will actually inhibit the process rather than move it forward. Schools need to have political leaders who have the courage to find the funding or the resources to provide the funding necessary to carry out district technology plans. This researcher believes if the school district has a well-thought out plan it will be much easier to generate public support for continued investment in technology.

Another source may include soliciting support and funding from the private sector. These programs may include partnerships where resources can be shared between the school and the business involved. The

classroom can be utilized by the school district during the day and as a training facility for the business in the evening or on weekends.

If a district has limited funds available, there is a need to analyze and reevaluate current funding policies based on the needs assessment of the district. This will require administrators to use creative means for funding, involve parent/teacher organizations, or apply for grants. All of these approaches require a commitment on the part of the district and the community. Everyone needs to work together to be able to effectively fund a well thought out technology plan. It is unwise to purchase technology resources faster than they can be effectively integrated into the curriculum.

Regarding access, the literature pointed out that the student computer ratio has improved over the past ten years. The problem seems to be where computers are placed within the schools. Outdated equipment may not be used only because of its current location. Schools need to take an inventory of the computers they currently have and determine how they are being used. Many benefits will be derived from this inventory. Schools may find they can move older computers into locations where the curriculum does not demand such sophisticated hardware and software. Computer labs may still be necessary to accommodate out-of-classroom work. An ideal situation may require schools to issue laptops similar to the way they issue textbooks.

Time and money spent on the best laid plans will completely fall apart if staff development isn't given a high priority. Teachers are not to blame for the slow integration of technology. There has not been enough time or

money spent on staff development. The literature was clear regarding limited funding allocations for technology training. Even when training is offered, it often does not address how teachers can integrate the technology into their specific curriculum. Educators' needs must be analyzed so the training is viewed as productive time. It must provide educators with the ability to utilize what they have learned and enable them to easily integrate it into their individual curriculum plans. Technology training and curriculum development will need to be done on an ongoing basis. Follow-up studies will assure the quality and effectiveness of the training. As technology changes, it will be the school's responsibility to evaluate the educational benefits of using computers as classroom tools. This process needs to include on-going training for the teachers so it can continue to be effectively used.

With the rapid changes in technology, it is more important today than ever before in the history of education to evaluate and update curriculum on a regular basis. Teachers should be given the time to continually experiment and test software as well as develop curriculum. They also need time to collaborate with other teachers about curriculum issues. Skilled teachers in technology may also mentor those who are just getting started. Districts need to view attendance at conferences, seminars and workshops as valuable use of time and set aside more money for teachers to be able to attend. These teachers can then be called upon by the district to demonstrate the skills they have learned and share these skills with the rest

of the staff. School personnel should consider sharing or trading resources with other school districts. Many times schools look outside for skilled people while they could be missing opportunities to effectively tap the ones they already have.

The plan cannot be a single investment but a strategic planning process with upgrades and additions every year. The planning process must not only involve purchasing hardware and software, but training for the teachers as well. The teachers must take ownership in the plan in order for them to feel responsible for the success of the program. Keeping the staff informed and supplying them with the resources necessary to feel comfortable using the technology will ease the transition from the traditional way of teaching to that of using computers as an everyday tool in the classroom.

Schools who have been successful with implementing technology into the educational program are those who have developed a well-thought out technology plan. Districts need community involvement in order to get taxpayer support to fund their plans. This requires that school personnel market their plan to the public. Since marketing is such new territory for schools, they will need to be creative in their quest to obtain money for technology.

Education uses research to support and guide them in curriculum decisions. In order to move ahead, however, educators will need to blaze new trails in this grassroots environment. School personnel will need to take

risks and hire visionary teachers who are willing to change. One thing is for certain, educational change will not be cheap. For school personnel to effectively implement technology it will take a major overhaul of the current funding system. Computers need to be seen as a readily available resource equal to textbooks, paper, and pencils. It should be such a priority that educators will not consider teaching in the classroom without the appropriate technology tools. Investment must be made in teachers, education's most valuable resource in order to address the demands technology will continue to place on them. Until technology is accepted as a valuable tool, schools will continue to struggle with these obstacles. Many people criticize schools for making slow progress. Unless more time and money is given, schools will continue to make limited advancement. As stated in the literature, it is not yet clear if Americans are willing to invest what it will take to make our schools ready for the 21st century.

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