

Research Paper:

Technology in Education: The Final Frontier?

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Introduction

After years and years of using computers in schools -in both administrative and academic areas- we have to face facts: learning has not be improved in any substantial way, student achievement has not been boosted, education in general has not been changed by technology in such a way that all efforts and investments can be deemed worthwhile.

Unlike other changes and reforms in education, the incorporation of technology has its own, unique characteristics. The use of calculators can help Math, Statistics, and Physics classes, but will not affect English, Literature and History classes. Technology, on the other hand, has "...the potential to touch every teacher, administrator, staff member and student in the building."¹

This paper will attempt to analyze the relationship between technology and education, identifying myths and common assumptions as regards how beneficial the introduction of technology in education can be, as well as the factors that hinder the full exploitation of

¹ Williams, B. Barriers to New Technology

computer technology. At the same time, some hints will be given as to what should be done to maximize the benefits computers can provide in the field of education. Finally, some ideas will be expressed about the feasibility of improving the teaching/learning environment with the aid of technology.

Becoming aware of the problems

An analysis of the arguments that support the presence of computers in the schools, the kind of staff found at those schools, and the kind of equipment they are provided with, can give some insight to what has been done, and what has to be done. This situation analysis may explore factors like:

- Excessive expectations: one common assumption is that computers can store lots and lots of information. With the development of computer networks, and eventually, the Internet, this idea was reinforced. Suddenly, a huge, world-wide, virtual library was available on computers connected to the Net. But, as Talbott^(a) puts it, “the availability of information is not the educational bottleneck. It has not been for several decades, if it ever was. Our challenge, given the infinitesimal fraction of available information we can actually use in the classroom, is how to make it the occasion for a profound learning experience.” What usually happens is that, once computers allow for tons of information to be accessed, people realize that access is not the main issue, and improvements in the quality of education do not follow just because more information is available.

This is not the first time the potential technology has to be used in education is not fulfilled. For instance, the New York Times wrote in 1923 about the radio:

“The Hertzian waves will carry education as they do music to the backwoods, isolated farms and into the mountains of Tennessee, Kentucky and West Virginia. The limitations of the “little red

schoolhouse” will pass away; the country schoolteacher will be reinforced by college professors and other specialists. Radio will be an institution of learning as well as a medium for entertainment and communication.”

Then television was seen as the panacea, and Sarnoff wrote, in 1941:

“While children may be bored and restless when merely listening to a speaker [on radio] without seeing him, living talent or motion pictures broadcast at a certain time to all schools in a given area will capture and hold their interest. The fascination of television for children has already been demonstrated in the homes of those now possessing television receivers in the New York area.”

In turn, interactive computer networks were thought to have great potential, but that lasted only some years. Nowadays, some people consider that a flat-screen, two-dimensional world is not enough, and that virtual reality is the solution education has been waiting for. Again, fulfillment of educational potential has not been achieved, and the future is deemed to hold an answer.

- Workforce training: schools want to prepare their students to use the kind of tools they will be using when forming part of the labor force. However, given the fast pace of change and improvement, the kind of computers and software they can use now will not necessarily be similar to the ones they will be using in 10 or 15 years. Thus, a given software program today will be obsolete in a couple of years, and both students and teachers feel, with time, they are left behind, outdated.
- Role of computers: computers have been considered as a kind of “magical box”, which would teach people, correct exercises and grade students. Although many of these things can be done, they cannot be accomplished by computers alone. First someone (a programmer) has to create the right software, then staff has to be trained, and a new approach to these tasks has to be developed. After all, people begin to think, the “good old ways” were much easier, much less complicated. This adaptation process results in extra

expenditures, as well as stress and frustration, since people who thought the computer would take care of everything, find themselves busier than ever, reformulating the whole work environment.

- **Teacher development:** teachers are not normally prepared to use computers in the classroom. They need educational guidance, support and help. Although computers may be motivational, and students may enjoy using them, this does not mean learning is taking place. Training staff does not only mean teaching word processing skills, spreadsheet programs and general computer literacy, but also pedagogic and didactic elements that help introduce computers and technology in the curriculum in an effective way.
- **Technophobes - gurus:** probably staff will include both people who reject technology (technophobes), and those who, in spite of little education in computer sciences, still have the tag of “computer guru”, simply because they are ahead of the others. These two types are described by Williams^(b), and both extremes are bad, since technophobes are a load that prevent progress and evolution, while gurus, in their zest to move ahead, run the risk of widening the knowledge gap, leaving others behind.

Finding the right way

The first thing to do is to take into account the way this issue has been dealt with. In resorting to technology as a way of improving the quality of education, it seems to be that the solution has been found before the problem has been defined or, as Talbott puts it, “absolutely convinced that they have an answer, they set about looking for the question- upon which they are convinced their children’s future must hang.”

- **Dealing with infoxication:** as McKenzie^(c) states, “information is not the same as knowledge or insight. We are overwhelmed suddenly with information. What we need is insight. Insight answers the “So what?” question.” The goal must be to create a vivid,

intense learning environment, where information can be searched, selected, and processed adequately. Information alone does not solve things: it is the task of teachers, in an initial stage, to identify valuable pieces of information, separating valuable items from worthless ones, thus preparing the path for their students to follow.

- Forming infotelectives: this term, according to McKenzie, has been designed for education in the Information Age. An infotelective, according to him, is “...a student thinker capable of asking great questions about data..., in order to convert the data into information..., and eventually into insight.” These kind of mental processes, closely related to the use of technology and “virtual networks of knowledge” that link computers and databases around the world, are a problem-solving activity in which creativity, synthesis and research skills are developed.
- Deciding where you are: there are different stages in which both Institution and staff may find themselves in relation with technology development. McKenzie^(d) identifies the following:

Survival Stage

- * Struggle against technology
- * Assailed by problems
- * Status quo in the classroom
- * Cannot anticipate problems
- * Teacher-directed
- * Unrealistic expectations
- * Management problems
- * Chaos

Mastery Stage

- * Developing coping strategies
- * Increased tolerance
- * New forms of interaction

- * Increased technical competence
- * Increased experience and confidence with new classroom structure
- * More engagement

Impact Stage

- * New working relationships and structure
- * Learner-centered
- * Teachers as facilitators
- * Less threatened by technology
- * Technology enhanced curriculum coverage

Innovation Stage

- * Restructuring of curriculum and learning activities

Based on this (or a similar) chart, people have to analyze their work environments and decide where they are, and where they want to go to.

Developing a new attitude/approach towards technology

If computers are the tools employed to produce an educational change, and people want to use them in an effective way, there has to be a clear consensus as regards the definition of “effective”, and what has to be done to achieve this effectiveness.

For instance, this does not mean that “new” computers have to replace “old” books. They are a different kind of media, and each should be used in the right context. Replacing books with computers is not a good example of effective use of computers.

Using computers in the classroom requires a new attitude, a new approach, a different way of thinking. The new activities delineated under this scheme have to be planned and

prepared to take full advantage of computers, so that all the training and all the expenses are worthwhile.

Developing a strategy

Talbott clearly states that “every proposal to bring computers into the classroom ought to be preceded by a clear statement of the educational problem to which the computers are expected to be the solution.” And this seems to be the stem of the problem. Given a certain need, the right technology must be searched for. Given a specific problem, technology has to provide for a specific solution to that problem.

In the same connection, Mintz^(e) believes that the process should be one in which “the school must identify measurable goals for the use of computers, determine what will be learned, provide training and time for teachers to understand how best to reach these established goals, and then provide the support to carry out the plan”. We can clearly see how, once goals are determined, the other steps must help fulfill those specific goals. The key point, Mintz states is “to determine what the educational goals are and then to organize the resources in such a way as to meet these goals.”

Conclusion

All the steps, situations and ideas described above do not include an important aspect, which is the commercial one. Sometimes, sales tactics and commercial sponsorship exert great pressure at the moment of decision. Buying the wrong software, that nobody uses afterwards, or purchasing high-end user machines, that nobody fully exploits (with the consequent waste of funds), are common mistakes that are made not because of a lack of planning, but because of a heavy reliance on trends and advertising.

Priorities must be clear: the main reason for buying and using computers should be to improve the general process of teaching and learning, not to follow a trend to have a certain platform or a certain well known brand. Instead of engaging in a technical discussion about platforms and processing speeds just for the sake of it, the main goal established by that specific institution -when the needs analysis was done- is what has to determine all other steps and discussion along the way towards a more effective use of technology.

Even though the ideas described here need not necessarily work for every situation, and even when adaptation of these processes are needed, it is always positive to have a framework to work on, and a sequence of steps to follow. As with every process, an evaluation is needed at the end, with all the parties involved, to adapt things to each specific institution.

Since technology has so much to offer to the field of education, and taking into account that much has to be done yet, inclusion of technology in the schools has to be carefully planned, so that when it touches "...every teacher, administrator, staff member and student in the building", it does so in a rewarding, encouraging and definitely positive way.

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