Factors to Weigh When Bringing the Internet to Schools

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ABSTRACT

This article discusses which factors should be considered in deciding how the Internet should be brought into primary and secondary schools. Based on a five-year study of the adoption of Internet use in a large urban school district in the United States, the paper outlines four factors which are likely to have a strong impact on the amount of use that is made of Internet access and on how such access influences educational processes and outcomes. These factors are: (i) the cost of present-day Internet access compared with other resources and delayed access; (ii) the need for substantial amounts of technological and pedagogical support for Internet-using teachers; (iii) the alignment between the norms of the school system, the community in which it is embedded and those of the Internet; and (iv) the alignment between existing educational goals, pedagogical approaches and assessment systems and the Internet's potential educational uses.

Introduction

There is no doubt that Internet access is spreading rapidly in primary and secondary schools around the world. Not surprisingly, Internet access is widest in relatively affluent and developed countries in the West. For example, in numerous countries including the United States, Finland, Canada, England and Wales it can now be found in virtually 100 per cent of schools (Department for Education and Skills, 2003; National Center for Education Statistics, 2001; Pelgrum and Anderson, 2001). However, it is fast becoming available in schools in many countries from Israel to Korea (Organization for Economic Co-operation and Development, 2002; Pelgrum and Anderson, 2001).

This trend raises the question of what factors should be considered in deciding how rapidly and in what ways the Internet should be brought into

primary and secondary schools. Indeed, decisions with potentially major educational and financial consequences must be made not only about whether to connect schools to the Internet, but also about what kind of connections to use, who will have access to those connections, and whether access will be widespread at the classroom level. There is reason to think that the adoption of the Internet and other computer-based technologies in schools may not always be as fully considered as is desirable. There is sometimes the temptation to bring computer technology into schools and classrooms as a symbol of modernity rather than to ask hard questions about exactly what it can realistically accomplish in a given setting (Bosco, 1986; Jackson and Deal, 1985; Schofield, 1995). Furthermore, since the Internet is generally seen as a desirable resource, there are pressures to have it widely available, as exemplified by the policy of one school district in the United States which decided that the Internet should be used in all schools, at all grade levels, and in all subject matters. Thus, the purpose of this paper is briefly to discuss four issues that should be considered in making decisions about Internet access in primary and secondary schools. Many of these comments are based on my experience in studying the adoption of Internet use in a large urban school district in the United States over a five-year period (see Davidson and Schofield, 2002; Davidson, Schofield and Stocks, 2001; Schofield and Davidson, 2002; Schofield and Davidson, in press a; Schofield and Davidson, in press b). However, they are also importantly informed by interactions with scholars and practitioners from around the world at a variety of international conferences focusing on educational technology. Although some of the issues mentioned, like cost, are obvious, others are not always taken into consideration but are likely to have a strong impact on the amount of use that is made of Internet access and on how such access influences educational processes and outcomes. The issues discussed do not, of course, exhaust the list of those that should be weighed, since space limitations preclude a comprehensive discussion of all such factors.

Cost of present-day Internet access compared with other resources and delayed access

Bringing about Internet access and use in primary and secondary schools is not cheap (Department of Education and Skills, 2003; Pelgrum and Anderson, 2001). Of course, estimates of the exact cost vary (Anderson and Becker, 2001; Coley et al., 1997), and costs depend on a complex set of factors including exactly what configuration of computer resources and support is

selected. But, just as an example, estimates for obtaining widespread Internet access for students in the United States suggest an initial investment of almost US$110 billion and continuing costs of nearly US$30 billion a year (Dede, 2000). Indeed, the US government has spent more than US$7 billion just on subsidies for Internet connections in schools since 1997 (Universal Service Administrative Company, 2003), and India recently announced plans to spend the equivalent of US$2.5 billion to bring e-learning to 600,000 schools during the next four years (Consortium for School Networking, 2003). Costs are especially high in situations in which schools are not already equipped with personal computers able to be used for Internet access. Not surprisingly, they also tend to be higher as access becomes ubiquitous, such as in programmes found in the US in which all students in a given school or district are given their own personal Internet-ready laptop computers (Mahoney, 2003).

It is important not to think of the costs incurred in achieving Internet access as one-time expenditures. Rather, such costs will be ongoing given that the pace of technical change is so rapid that technical innovations often make what would otherwise be perfectly usable equipment obsolete or virtually so in five to seven years because it does not interact well with evolving network requirements and resources (Dede, 2000). Furthermore, the technical and other support necessary to facilitate teachers' and students' use of the Internet is also a continuing expense. Hence, a real question arises, especially in countries where labour is relatively inexpensive, about whether the huge expenditures needed to bring widespread Internet access to all classrooms would be more productively spent on other things. Furthermore, given the pace of change, one prudent step is carefully to explore impending technological developments to see if they are likely to provide major cost savings. For example, schools that are especially difficult and expensive to wire because of their structure and the materials used in their construction might do better to wait until wireless technology is practical for them. Such an approach could turn into an endless holding pattern, because new and presumably better or cheaper means of access may always seem to be on the horizon. However, careful investigation of anticipated technological developments and their impact on cost and capabilities is an important step in any decision to spend large amounts on Internet access.

Need for substantial amounts of technological and pedagogical support for Internet-using teachers

Frequently, those planning to bring computers to primary and secondary schools focus too heavily on hardware costs and not enough on other costs

that are equally or more important. For example, Anderson and Becker (2001) point out that investment in software is more strongly related to various measures of the use of educational technology than is investment in hardware. Yet, often such investments receive much less attention. Correspondingly, far too little attention is often focused on issues connected to how technical problems that arise during use will be solved and how teachers can develop both the computer and pedagogical skills necessary to make good use of Internet access. Underspending on support is likely to curtail use (Ronnkvist et al., 2000). In fact, Anderson and Becker (2001) found that the ratio of investment for support and training relative to hardware/software is clearly related to computer use in schools, with relatively more spending on support yielding higher frequencies of numerous kinds of computer use including more frequent use of the World Wide Web. The importance of setting aside substantial funds for professional development and ongoing technical support is increasingly recognized in countries in which large investments have been made for use of the Internet in education (CEO Forum, 1999; National Grid for Learning, 2003; President's Committee of Advisers on Science and Technology and Panel on Educational Technology, 1997). Nonetheless, finding the right balance between expenditures on hardware, software and support is a difficult problem that many countries clearly have not solved, since teachers' lack of adequately developed information technology skills is frequently seen as impeding productive use of information and communication technology (Pelgrum and Anderson, 2001).

Training and support are likely to be especially important with regard to fostering effective Internet use because, unlike many other computer applications used in schools, the Internet was not specifically designed for educational purposes. Further, though educators in many countries are increasingly likely to have some familiarity with the Internet developed for their own personal purposes, there is no reason to think that they will necessarily be familiar with the kinds of Internet applications or the specific web sites that are likely to be of most use to their students. Thus, educators often have both to learn more about the Internet and to develop a vision of how it can be used productively in their work. The latter is a very different task for teachers from allowing or encouraging students to use a piece of software actually designed to help students develop various skills or to learn about a particular topic. Furthermore, it is not a simple task, especially for educators who may have relatively little experience with curriculum development. There are more and more web sites, listserves and books intended specifically to aid educators who wish to make use of the Internet in their work. However, these are much more readily

available in some languages than in others (Hogenbirk, 2000). Finally, many teachers may not have the time or the inclination to take the initiative to make use of these resources without the impetus provided by professional development activities. Thus, readily available professional development activities and ongoing support as teachers try to use the Internet to enhance their own skills or to provide their students with valuable experiences are crucial (Feldman et al., 2000; Schofield and Davidson, 2002).

Alignment between the norms of the school system, the community in which it is embedded and those of the Internet

One of the primary benefits of the Internet is that it can connect students to information resources and people all around the world (Cummins and Sayers, 1995; Garner and Gillingham, 1996; Koizumi et al., 2000). This opens up an extraordinary variety of potentially useful educational possibilities, including students' accessing courses not offered in their schools, students' interacting with experts unavailable in their communities, students' obtaining useful new audiences for their work, and students' participating in collaborative educational projects that they could never undertake within the confines of their own communities. However, the very access to people and resources that would not otherwise be available, and that gives the Internet so much potential as an educational tool, raises an important issue: whether it also exposes students to individuals and to written, auditory, or graphic content that is unacceptable within their community, at least within the context of an educational institution (Futoran et al., 1995).

Norms, values and behaviours vary markedly from culture to culture. Thus, those who are part of educational systems in different parts of the world are likely to find different kinds of content on the Internet disturbing, offensive or unacceptable. To take just one example, concerns about Internet content in the context of US schools tend to focus on access to explicit sexual material (Schofield and Davidson, 2002). In much of Europe, in contrast, there is less concern about certain kinds of sexual material and more concern about ethnic and racial hatred (Thornburgh and Lin, 2002). When Internet content is inconsistent with local mores, use can be curtailed in schools due to concerns about controversy within the community (Thornburgh and Lin, 2002) as well as about the actual impact of such material on students. Indeed, not only may use be curtailed, but the kinds of use allowed can be so circumscribed that a substantial portion of the possible educational value of

Internet use can be undermined (Schofield, in press; Schofield and Davidson, 2002). For example, some teachers in a school I studied allowed students to visit only pre-approved web sites, due to fears about their encountering inappropriate material, which dramatically reduced the resources students could access using the Internet and impeded the development of certain kinds of Internet-related skills. As another example, a librarian in a different school kept the computer keyboard behind her desk and let students check it out for use only after she had approved the search terms they planned to use, again because of fear about what material students might seek or encounter inadvertently if left to their own devices.

Of course, strategies have been developed to try to deal with incompatibility between local values and those of the world accessible via the Internet. For example, acceptable-use policies which many schools require students to sign as a condition of Internet access often limit approved in-school Internet activities to those with educational goals and specify the kinds of materials that students are permitted to seek out. Failure to adhere to the acceptable-use policy can lead to termination of in-school Internet access. In addition, filters that block certain kinds of content can be used to try to prevent students from encountering materials considered inappropriate for them to see. However, filters are typically designed to block very specific kinds of materials, which may or may not overlap completely with the ones that would concern a particular community. Although many filters are flexible and allow users to influence the kinds of things that are blocked, there is no guarantee that they will be structured in a way that meets every community's desires. Further, they inadvertently block at least some unobjectionable material that would be of use to students (Digital Chaperones for Kids, 2001). Many efforts have also been made to create educational resources that students and teachers can use to help students learn how to avoid danger or exploitation by individuals they may encounter on the Internet who may not have their best interests at heart (Thornburgh and Lin, 2002). However, these are more available in English than in the native tongues of many countries that are now moving towards bringing the Internet into their schools. Finally, it must be noted that none of these approaches is completely effective in keeping students from accessing materials or having experiences on the Internet that may pose problems for the school or for the student (Thornburgh and Lin, 2002). To the extent that these problems are serious and community influence over schooling is strong, Internet use is likely to be curtailed and pushed towards highly controlled kinds of access that may well not make full use of the Internet's potential value for education.

Alignment between existing educational goals, pedagogical approaches and assessment systems and the Internet's potential educational uses

It has become increasingly clear during the past two decades that merely placing computer technology in schools does not guarantee its use, let alone its effective use (Collis et al., 1996; Cuban, 2001; Schofield, 1995). Use depends on factors such as the extent to which teachers believe this innovation helps them reach valued goals and the ease with which use fits into everyday classroom practice (Cohen, 1988; Cuban, 1986, 2001). The same appears to be true with regard to use of the Internet by students. For example, when low-Internet-using schools were compared to high-Internet-using schools in the same district, Schofield and Davidson (2002) found that use was high when it readily facilitated goals that the teachers were striving to reach before the introduction of the Internet. Thus, for example, use was high in a case in which teachers had decided that it was important to expose foreign-language students to the words of native speakers of the languages they were studying, which the Internet does readily by providing access to foreign-language newspapers, web sites and chat rooms. In contrast, and not surprisingly, use was often low when it did not lend itself in such an immediate and obvious way to achieving ends for which teachers were already striving. Similarly, use was high in classroom situations in which it fitted with long-standing practices and procedures and low when it did not. So, for example, teachers with a small number of computers in their classroom with Internet access were likely to have students make use of those connections in their classrooms if they were used to having students work in small groups. In contrast, teachers with similar computer set-ups who were more used to and comfortable with whole-class instruction had their students make relatively little use of the Internet (Schofield and Davidson, 2002).

Another major factor likely to influence use is the alignment between the assessment systems that teachers and school systems use and the kinds of skills and experiences that Internet use is likely to foster. There is good reason to believe that use of many kinds of computer technology facilitates students' attainment of highly valued educational outcomes (Kulik and Kulik, 1991; President's Committee of Advisers on Science and Technology and Panel on Educational Technology, 1997; Wenglinsky, 1998). However, the Internet's relative infancy means that strong evidence about its effectiveness in fostering various kinds of outcomes is not readily available in large and convincing quantity (Lehtinen, 2000), although it is clear that many teachers value it highly (Becker, 1999; Schofield and Davidson, 2002). Further, as mentioned

above, unlike many kinds of computer-based educational applications, the Internet itself is not designed specifically to enhance learning. Thus, it should not be surprising that Becker et al. (1999) found that teachers who emphasize the importance of mastering basic skills are less likely to use the Internet than others. In addition, one of the great advantages of the Internet is that it can individualize learning by helping students pursue their own individual interests (Schofield and Davidson, 2002). However, in many countries there are national or regional exams that play an extremely important role in determining individual students' or educational institutions' futures and reputations. Such exams, almost of necessity, presuppose a given common set of knowledge and skills that are tested. To the extent that the Internet leads to more diverse and individualized learning opportunities for students, there is at least the possibility that such use will not be reflected in such high-stakes examinations and that this will ultimately discourage teachers and educational institutions from taking maximum advantage of Internet access.

Concluding Note

There are many potential educational benefits flowing from Internet use in primary and secondary schools (Bransford et al., 1999; Schofield and Davidson, 2002). The Internet provides a means for teachers to obtain information for themselves and their students, to develop their skills in a variety of fields, and to communicate with other educators as well as with the community their school serves. Furthermore, it provides students with a potentially invaluable means of gathering information as well as communicating and collaborating with those outside their schools and communities. However, there is little reason to assume that it will typically increase scores on the standardized tests that are so important in many countries (Schofield and Davidson, 2002). Further, it seems highly unlikely that substantial positive educational outcomes will occur without very large expenditures on support and teacher professional development, as discussed above. Thus, while the rapid trend to increase Internet access in primary and secondary schools provides those schools with a resource having great educational potential, questions regarding how best to realize that potential and how to assess the extent to which it has been realized remain far from solved.

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