Roles of IT in Improving Our Educational System. Part 5: The Learner and Teacher Sides of the Digital Divide.

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Rather than simply focusing on access as the quick fix for the Digital Divide, we need to concentrate on information technology integration and training.

Broadcast and print media usually represent the Digital Divide as an issue of who has information technology (IT) facilities and who doesn’t. With that type of representation, it is relatively easy to “buy” a solution to the problem. Local, state, and federal monies can be allocated to schools in a manner to produce equity in access to IT facilities. Such efforts can even address inequities of IT access at home.

Addressing access is important, but it will not solve the real Digital Divide problem faced by our educational system. The real problem is a learner and teacher problem that exists in both our formal and informal educational systems.

**IT as a “Language”**

Robert Logan (2000) makes an important contribution to the science of teaching and learning. He describes writing, mathematics, science, computers, and the Internet as “languages” that humans have developed for communication and as cognitive amplification tools. Notice that the first three of these human-developed languages are part of the basics of education. It takes many years of formal instruction and practice to achieve contemporary standards of fluency in these three languages.

For the purposes of discussion in this article, I combine Logan’s (2000) fourth and fifth languages into one, which I call IT. The languages of writing, math, and science all require various levels of technology (e.g., paper, pencil, and science instrumentation). IT requires a relatively high and more expensive level of technology (e.g., calculators, computers, and telecommunications systems) than writing and mathematics. Some science teaching and learning can be done with inexpensive technology, and some requires quite expensive technology.

Pencils, paper, and books are essential technologies in learning reading, writing, arithmetic, and science. A child who lacks access to these tools—at school and at home—is severely handicapped. On the other hand, access to the tools does not mean that the child will gain fluency in writing, math, and science.

Similarly, access to IT facilities is necessary if a child is to gain fluency in IT. But by itself, access to the facilities is not sufficient. I discuss this from a formal education and an informal education point of view.

**Formal Education**

We all know that the fields of computer and information science, communication using computers, desktop publishing, reading and writing interactive multimedia documents, and other
aspects of IT are both huge and complex, far transcending what most people can and will learn on their own in an informal (nonschool) educational setting.

Moreover, IT blends with and extends writing, mathematics, and science. The development of a new language such as IT does not obviate the need for students to learn the earlier languages. Rather, it creates the need to blend the new with the old in a manner that extends a student’s overall fluency in communication and thinking using the human-developed languages.

ISTE has developed National Educational Technology Standards (NETS) for students (ISTE NETS Project, 2000a) and for teachers (ISTE NETS Project, 2000b). These standards help define the rudiments of IT content areas that are necessary for achieving IT fluency for students and for teachers. At this stage in the development of these standards, ISTE has not yet provided ways of assessing student and teacher IT fluency. Current and future ISTE projects, as well as many school and district projects, are addressing or will address this issue.

The NETS mention the importance of IT in all disciplines. ISTE’s NETS Project (2000a) provides a number of excellent examples of curriculum materials that integrate IT into other disciplines in a manner consistent with the national standards in these other disciplines. This book makes a major contribution to blending the IT language with other human-created languages.

It is clear what our formal educational system needs to be doing to help all students achieve IT fluency. The curriculum needs to be revised so that IT is thoroughly integrated into the instruction and practice that is designed to produce fluency in writing, mathematics, and science. That is, IT needs to be integrated into all curriculum areas at all grade levels as a routine and everyday component of curriculum, instruction, and assessment.

This means, of course, that all teachers need to develop IT fluency at a level consistent with the need to carry out their job of integrating IT throughout curriculum, instruction, and assessment. We have a huge Digital Divide with respect to IT fluency of teachers. Students who have teachers who are IT fluent have a significant advantage in developing their own IT fluency.

### Informal Education

It is clear that many children are gaining an initial level of IT fluency through their home environments and the many hours they spend playing computer games, communicating by e-mail, and browsing the Web. The instruction needed is provided by parents, siblings, peers, and so on. (That is, a wide range of “teachers” exists in our informal educational system.) This informal education is a powerful force in helping children achieve an initial level of IT fluency.

Because of the significant differences in the informal IT-learning environments available to children, we have a significant Digital Divide in informal education. This is not unlike the problem that our education system faces in dealing with children who come from homes with few or no books, and whose parents and other adults in their lives do not read to them or model use of contemporary levels of reading/writing fluency. Research strongly supports the value of parents reading to their children and interacting at a high cognitive level with their children when doing this reading.

However, even with a quite good IT home environment, the level of IT fluency that the typical child learns through our informal educational system is modest compared to contemporary standards of IT fluency. If you doubt this, ask children to explain some of the roles of IT in understanding and applying the content from mathematics, science, social science, or
language arts that they are learning in school. These aspects of IT fluency are not things typical children learn on their own!

The Digital Divide problems of informal education will gradually go away as more and more adults achieve IT fluency. However, contemporary standards for IT fluency will continue to rise for many years to come. This means that there will continue to be a large gap between the average IT fluency of parents and the contemporary standards for IT fluency being set by schools. Thus, we face a major and continuing Digital Divide IT problem in our informal educational system. Adult education, often with children and parents learning together, is one way to approach this problem.

**Final Remarks**

Ultimately, the Digital Divide problem—helping all children achieve contemporary levels of IT fluency—can be solved only by a significant and continuing effort in our formal and informal educational systems. In our formal educational system, this means that IT fluency needs to be a major goal, alongside writing, mathematics, and science fluency. Efforts to achieve this goal must be thoroughly integrated throughout the curriculum, much like reading and writing are integrated throughout the curriculum.

Essentially, all parents have a significant level of fluency in the languages we call writing, mathematics, and science. Thus, they can and do contribute significantly to the development of their children’s fluency in these areas. The same cannot be said for IT fluency. Our educational system has a unique opportunity to make use of the informal education aspects of the Digital Divide issue to improve and expand community education, with the whole community learning together and contributing to the informal education of its children.

**References**

