Chapter 2.6
Inadequate Infrastructure and the Infusion of Technology into K–12 Education

Gregg Asher
St. Cloud State University, USA

INTRODUCTION

Although the lack of adequate funding is probably the most significant barrier to the effective infusion of technology (since bundles of money could eliminate almost all other barriers), I will focus on "inadequate infrastructures" as the most impregnable obstacle in rural schools. According to the dictionary, an infrastructure is "an underlying base or foundation" (www.dictionary.com). As I see it, following this definition, a school's infrastructure would include teachers, the physical requirements needed to support a robust network, and the community of recipients or users.

Many of the teachers in rural school districts are older, approaching retirement, relatively set in their ways, and have little interest in infusing technology into their teaching. Many others are relatively new to the profession and, even if prepared in the new technologies, reticent to make waves or move too quickly to change the status quo in the schools in which they have just begun to teach. The older, more seasoned teachers are from a generation not typically exposed to computers and have had very little opportunity to become familiar with the new technologies. Generally, they have had some training in the use of the most common technological tools, but received no help in how to incorporate these tools into the classroom, much less use them to enhance the curriculum. Most teachers, whether old or new, have begun to use technology for administrative functions, for example, attendance and grade books, but they are not using them in instruction or assessment. Most feel that they have been "successful teachers" in the past without this technology, so they wonder why they would need to incorporate it now. "I'm too old to start learning that stuff now" becomes an excuse for doing things the same old way. Even those teachers who would like to learn how to use and infuse the new technologies generally face many hurdles before being able to do so. In most cases, they teach in small schools that are just now obtaining Internet connections. Many

rural communities are still waiting for adequate bandwidth and high-speed network connections to reach their communities. So, even in the places where there is a critical mass of teachers in a rural school who may realize the enormous potential the new technologies have for dramatically expanding resources and learning horizons for their students, little can be done to infuse technology into their curriculum and instruction until their district and schools have dependable, high-speed access to the Internet.

Generally, the local telephone company (telco) or Internet service provider (ISP) is not going to provide this high-speed access because of the "last mile" problem. The last mile problem is associated with the expense a telco has to bear to provide the last mile, that is, a linkage between the cable or other communications channels brought to the edges of a community and potential users in the service area. Many rural schools are located in communities that have small populations, very few retail establishments, and no industrial base. There is little or no economic incentive for a telco or ISP to either provide or upgrade the existing service into the community.

To further exacerbate this shortcoming, the existing physical and electronic infrastructures of many rural schools contain a seemingly unending array of challenges to the installation of quality networks and Internet connections. Most are not wired to accommodate any type of high-speed connectivity. Many are old and do not have walls, ceilings, and wiring pathways that would easily accommodate the necessary electrical and network cables required to build robust infrastructures. Some are rife with asbestos, which would have to be removed before improvements are made (usually an expensive process). There are even situations in which the heating ventilation and air conditioning (HVAC) are not conducive to installing quality technology networks. Overhead projectors overheat; the equipment in the telecommunications closet quits because of high heat and humidity; or microcomputers are sometimes rendered inoperable in the absence of surge protection.

EDUCATION AND BARRIERS

How do educators react to these barriers? New teachers are usually discouraged by the lack of technological resources in these schools and move on to richer suburban districts. They enter teaching with a fresh enthusiasm and want to be the "best" teachers they can be, only to be confronted with aging technology or no technology. All of the tools they were taught to use and had available to them in college are non-existent where they now need to practice. They may have come from a laptop university that has high-speed Internet connections that allowed them to 'surf' the Web, send e-mail, chat with their professors, and so forth. Now they are relegated to using the tools of the '50s. This new teacher is now going to have to depend on the more senior teacher to learn how to use the old media. This backward reality further reinforces the negative views of the more senior teacher about adopting technology.

The transference of skills between teachers is stymied. The new teacher could educate the older teacher in the use of the newest techniques, tools, and technology currently available. The more senior teacher could also impart to the new teachers all the tips, strategies, and knowledge gleaned over years of teaching. If a rudimentary adoption of technology is present in the school, this will serve to reinforce a negative attitude of adoption; this attitude may transfer to the new teacher.

The policymakers—school boards, city and county officials—are influenced by the members of the communities that comprise the school district. Most of the school districts in rural Minnesota are consolidated. This means that multiple communities and governmental jurisdictions now influence what happens in the newly formed school district. You can have a