DISTANCE LEARNING TECHNOLOGIES: GIVING SMALL SCHOOLS BIG CAPABILITIES

The consolidation of schools or districts is sometimes introduced as a means to address a variety of educational concerns including curriculum and costs. Especially in times of fiscal austerity it is tempting to reduce the complex issues surrounding educational reform to an economic "bottom line" that is neither wise, economically efficient, nor educationally effective. The choices states and districts make have a lasting impact on children.

In school and district consolidation, the well-documented benefits of small schools to students and their communities are lost. It doesn't have to be this way. Other alternatives, such as distance learning, are both possible and preferable. Distance learning can provide students access to a virtually unlimited curriculum while retaining the benefits of small, local schools. But distance learning can be done well, or badly. Here, too, there are choices.

Distance Learning as an Alternative to District and School Consolidation

The ability to offer a comprehensive or advanced curriculum has long been associated with larger schools and districts. However, when distance learning technologies are used, schools or districts of any size—regardless how small—can have access to advanced high school, Advanced Placement, or dual credit courses *without* school or district consolidation.

Simply stated, distance learning is any form of learning in which the instructor and at least some of the students are not physically located together. Essentially, there are four major types of current distance learning technologies:

1. Two-way interactive television (I-TV)
2. Web-based or online learning (which uses the Internet)
3. Instruction by satellite
4. Blended distance learning technologies (which use combinations of the above and other communications technologies)

Each technology can have a role to play, based on the specific needs and capabilities of individual districts, but all distance learning technologies are not created equal.

Instruction by satellite does not allow students and teachers to interact spontaneously. Usually one lecturing instructor teaches up to several hundred students simultaneously, with student questions typically handled by phone, fixed-response key pad, or e-mail. Likewise, **web-based or online learning** rarely involves live instruction, nor does it allow for interactivity on a real-time (immediate and continuous) basis. Students most often work through a set of pre-recorded video and/or text-based lessons at their own speed at times of their own choosing. Interaction with the instructor (to the extent it exists) usually occurs on a delayed and intermittent basis by e-mail, Internet chat, or through web-based course management software.

Two-way I-TV technologies—in which teachers and students can see, hear, and interact with each other across all sites at all times—is most often the best technology choice for K-12 students. This distance learning technology most closely resembles a traditional class, but it allows small numbers of students at each of two to four sites to interact within a larger "virtual" classroom, taught by an instructor from near or far. Students and instructors can talk with each other as if they were in the same room. Questions can be asked spontaneously and answered immediately.

A document camera allows text material, photos, writing, or a dissected frog to be seen instantaneously by all students, sometimes better than they could be seen in a crowded classroom. Homework and tests are faxed or e-mailed by local school facilitators, but teachers, aides or supervisory adults need not be located in each classroom, as the remote instructor can see and hear all students at all times. A combination TV-VCR can be located in each principal's office, as a discipline aid. Student-parent contracts alert all parties to expected behaviors and the consequences of contract breach.

Two-way I-TV, if implemented using appropriate equipment and according to best practices, has the distinct advantages of retaining a close student-instructor relationship, in a structured classroom environment, in a real-time setting, while retaining the primacy and familiarity of the local school. Other distance learning technologies cannot achieve these goals.

The Consortium Model of I-TV

Small schools and/or districts can collaborate through shared classes and shared teachers, without imposing the educational and financial costs of consolidation, simply by forming consortia for this purpose. Consortia decrease the need for local technical support, greatly expand on the pool of potential instructors available, and encourage common calendars and bell schedules to maximize utilization. Through an I-TV consortium, the goal is to function as one while meeting the needs of all small school and/or districts by sharing the skilled teachers and the student population needed to support them.

An I-TV consortium model typically consists of 4-10 small schools and/or districts, all of which have a defined need for additional classes. Under this arrangement, the consortium may hire a part-time director or technical support person who assumes responsibility for all I-TV class scheduling, and equipment upkeep and for the day-to-day management of the consortium. The coordinator is directed by a governing board most often consisting of the superintendent of each participating district and/or the president of the school board, or the principal and another representative if schools are part of the same district. As a practical matter, similarly sized schools or districts work best as consortium partners. It is especially important that one large high school (with a broad curriculum) not become the focal point of an I-TV consortium, where most classes originate from one school and other smaller schools/districts simply receive classes. The consortium model works best when *all* consortium members both send and receive classes. This places all member districts on an equal footing and best contributes to the long-term viability of the consortium.

Under a consortium arrangement, School A might provide the teacher for a physics class sent via I-TV to Schools B, C, D, at the same time that School E might send a Spanish II class to Schools F and G. Classes can originate from any I-TV classroom within the consortium, so that School A might send two classes and receive five classes during the school day, while School B might send three classes and receive three classes, etc. Each school participates only in those classes for which it has a need. Typically, no more than two to four sites participate in any one class at the same time and the aggregate number of students across all sites does not exceed that of a typical high school classroom.

With this arrangement, the consortium can build an I-TV class schedule on a year-by-year basis, directly responding to the immediate needs of the participating schools and/or districts and relying on the cumulative teacher expertise across all schools. In the event that a teacher for a needed class does not currently exist

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National Office: 1825 K Street NW, Suite 703, Washington , DC 20006
Phone: (202) 955-7177 Web: www.ruraledu.org

across the consortium schools, it is then possible to link to another consortium or a higher education institution, which may be able to provide the course.

In an ideal consortium model, no funds exchange hands for instructional costs. All schools and/or districts agree to provide at least one course per year and all are free to enroll students in any I-TV class, based on a predetermined set of operational policies, e.g., course prerequisites, maximum aggregate enrollment, priorities for upper class students, etc. This model works extremely well in meeting the needs of individual students, schools, and districts, but its success is also dependent on the existence of one person who takes responsibility for the day-to-day management of the consortium—ensuring that the needs of all districts are equally met, I-TV classes are scheduled, instructors are trained and supported, local counselors understand the prerequisites of the classes offered, facilitators are in place, and textbooks are located where they are needed, among many other duties.

The Cost of Two-Way I-TV

One-time classroom equipment costs for a site at each school can range from $7,000 to $28,000, depending on the capabilities desired in each classroom. Subsequently, each member district (or school) should plan on the equivalent of 10% of their initial equipment cost as an annual contribution to the consortium maintenance and upgrade fund. Beyond that, the ongoing transmission line costs range from zero to $3,600 per year, depending on the type of transmission used. All telecommunications costs, however, are eligible for federal **E-Rate discounts**, which can provide from 20-90% discounts on the ongoing transmission costs based on each school's free and reduced lunch rate.

What do you get for this money?

- You get the equivalent of a **teacher who can teach any subject matter**, seven periods a day.
- Teachers and staff can access almost unlimited **professional development opportunities** across the state or country and can attain advanced degrees (perhaps through a partnering higher education institution) without the expense associated with time or travel.
- Schools can remotely access many **student services**, which they may not otherwise be able to provide, including health consultations, diagnostic or mental health services, counseling support, speech therapy, etc.
- Students of all ages can experience **"virtual field trips**." An increasing number of sites—from the Johnson Space Center in Texas, to the Liberty Science Center in New Jersey to the Museum of Radio and TV in Los Angeles allow students the thrill of real-time interaction with people, places, animals, works of art, historical documents, etc. across the nation and around the world. Virtual field trips allow students, no matter their location, the opportunity to see, experience, and talk with the world beyond their local community.
- After school hours, the community can participate in **adult education courses**, college courses/degree work, required **professional continuing education**, etc.

The cost of two-way I-TV technology has dramatically decreased in the last decade, making it a wise educational and economic investment for small schools or districts. With the range of potential uses of two-way I-TV technology, the cost of the equipment and the ongoing transmission costs involved are certainly justifiable. When comparing the costs of consolidation and the costs of implementing two-way I-TV capabilities across small schools and/or districts, the better option is clear.

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Infrastructure Requirements

Just as there are many distance learning technologies, there are several two-way I-TV technologies, each using a different transmission mode. The four basic options ranging from highest to lowest audio and video quality are:

1. DS-3 (45 mbps) or ATM which give you the audio and video quality of the nightly news
2. Dedicated T-1 (1.54 mbps) lines within a consortium
3. ISDN lines for which there is a per minute charge
4. IP (Internet Protocol) over fractional to full T-1 lines, e.g., 384 kbps to 1.54 mbps

There are certainly infrastructure limitations, regardless of whether the option chosen is a broadband network (DS-3 or T-1), an ISDN line, or an IP connection. Most rural areas will potentially have access to at least a fractional T-1 line, but not all telecommunications companies (especially larger companies) are willing to provide them or make them available at a reasonable tariffed rate. This may be an issue in some rural areas, but one that could be overcome through aggressive statewide action to bring all telecommunications partners to the table. It is certainly an area that deserves public policy deliberation.

Conclusion

Small schools work, not just because they are small, but also because their size provides a greater opportunity for students to excel in the context of a manageable, caring, cohesive, and safe environment. The limitations of small size are few; the advantages are many. With the concerted effort to provide access to appropriate distance-learning technologies to small districts, the curricular limitations of small school and/or district size can be eliminated. No one has to make a choice between what is most economically efficient and what is most educationally effective for their students.

By facilitating the adoption of appropriate distance-learning technologies in rural schools and by striking down the myths related to school and district size, the rationale to engage in the wholesale reorganization or consolidation of schools or school districts quickly disappears.

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