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A Virtual School Environment for Enhancing College Preparation And Retaining Highly Qualified Teachers In Rural School Districts

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Abstract

This article introduces a concept for increasing the number of high school students in rural areas that seek college education by restructuring current concepts of how school infrastructure is defined and implemented. The underlying assumption for this paper is that every child of the Xbox generation can have access to a caring, competent, highly qualified teacher in every subject he/she studies when schools cooperate in a larger educational entity (a virtual cooperative school district) that can take advantage of the benefits of both existing infrastructure and modern telecomputing technology. The anticipated result is that high school students who might not attend college because of lack of preparation, understanding, and support will have the opportunity to effectively prepare, attend, and be successful in college.

Introduction

This article discusses a prospective approach to increasing the number of high school students in rural areas that seek college education by restructuring current concepts of how a school district is defined and implemented. The underlying assumption for this concept is that every child of the Xbox generation can have access to a "highly qualified" teacher in every subject when schools cooperate in a larger educational community (a virtual cooperative school district). Participating school districts can take advantage of the benefits of both existing infrastructure and modern telecomputing technology. The anticipated result is that high school students who might not attend college because of lack of preparation, understanding, and support will have the opportunity to effectively prepare, attend, and be successful in college.

Rural Students

Texas has over 3.6 million rural citizens – more than any other state in the nation. Yet only 8% of these residents over age 25 have a college degree (Beeson & Strange, 2003). According to the U.S. Department of Education (2004b), approximately one-third (almost 5,000) of all school districts in the United States are considered rural. Students in rural areas are much less likely to earn a college degree than residents of urban and suburban areas (Poole & More, 2001). Only 11 percent of rural adults hold a baccalaureate degree, compared with 18 percent of adults residing in metropolitan communities. The disparity is highest in southern states, including Texas, where only 8 percent of rural residents over age 25 have a college degree, compared with 16 percent of the residents in urban areas (Poole & More, 2001; U.S. Bureau of the Census, 1999). More rural people live in Texas than in any other state, and in addition, rural child poverty and minority rates are among the highest in the nation, making rural education especially important in Texas (Beeson & Strange, 2003). Attaining a college education can greatly impact a rural student's future. College graduates typically have higher rates of employment, jobs of higher status, and earnings that surpass people who do not have a college degree (Gibbs, 1995; Poole & More, 2001). The Gates Foundation and the Partnership for 21st Century Skills embrace the fact that current and future middle-class jobs require skills acquired through levels of education beyond that of high school (Gates Foundation, 2003a; Partnership for 21st Century Skills, 2003).

Brown (1985) found that rural youth tend to be less academically prepared for college than urban and suburban youth. They generally have lower SAT scores and less access to advanced preparatory courses, which deter them from attending competitive colleges. Low achievement scores among rural youth is chiefly due to limited high school course offerings and poor preparation for college (Poole & More, 2001). Rural students who do attend college often have difficulties attaining high academic achievement, even though intellectually they are no different than their urban peers (Poole & More, 2001). These underperforming rural students often state that their high school coursework was not challenging and did not prepare them adequately for college (Knisley, 1993).

In addition to the delivery of high quality college preparatory courses, students require effective mentoring and remediation to promote adequate college preparation and high attendance. Through mentoring and modeling, students understand the importance of setting goals to reach college, as well as attaining those goals. Mentoring programs have been tested in many rural communities with success (Poole & More, 2001). Prosperous schools provide sustained involvement with caring adults who mentor, advise, and support students throughout their high school careers (Gates Foundation, 2003b). Through mentoring, students of low-income families can establish college awareness (Gates, 2003). Remediation support ensures that students that might be discouraged or dropout when they fall behind or get frustrated continue to progress and build self-esteem. According to the Education Commission of the States (2003) , "Policymakers will therefore need to continue developing comprehensive programs – such as mentoring/tutoring services, after-school programs and summer school programs – that integrate a series of services to help children succeed."

Highly Qualified Teachers

In 2001, President George W. Bush signed in to law PL 107-110 – the No Child Left Behind Act (NCLB). As one of the requirements to be eligible for federal grants earmarked for education (Title I funds), each state had to "ensure that all teachers hired … are highly qualified" (U.S. Department of Education, 2001). Furthermore, NCLB mandates that states "ensure that all teachers teaching in core academic subjects within the State are highly qualified not later than the end of the 2005-2006 school year." The U.S. Department of Education (2004a) defines a

“highly qualified” teacher as one that possesses three qualities: 1) holds a bachelor's degree, 2) has a full state certification or licensure, and 3) proves that he/she knows each subject they teach. A serious problem faced in rural and urban schools is the lack of highly qualified teachers. Education Week reported the percentages of public school teachers, grades 9-12, in each field who held neither a major nor a minor in the subject that they are teaching. Table 1 shows the Texas and U.S. percentages (Archer, 1999).

	English	**Math**	**Science**	**Social Studies**
Texas	17.8%	29.8%	21.7%	17.4%
U.S.	21.5%	28.1%	18.2%	17.8%

Table 1: High school teachers without a major or minor in their subject area

These numbers are substantiated with data from the U.S. Department of Education (2004a) in its Third Annual Report on Teacher Quality. In the report, they find that nationally, 7.8 percent of teachers in high-poverty districts are on waivers. California, Delaware, Idaho, Louisiana, Maryland, Missouri, New Mexico, New York, North Carolina, South Dakota, Texas and Virginia had a higher percentage of teachers on waivers in high-poverty districts than the national average. One state, Maryland, had more than one out of every five teachers in high-poverty districts on waivers. One of the ways school districts address teacher shortages is to allow a teacher to teach a subject other than the one in which he or she is trained if it is in a high-need area. Many states grant waivers to teachers who have made progress toward fulfilling certification requirements but have not met one or two conditions, such as taking a required examination or completing course work. Additionally, some states issue waivers to teachers who were certified in another state but have not met all of the new state's requirements. When trained teachers are not available, school districts hire teachers on emergency permits or staff classes with long-term substitute teachers. These actions have consequences for student performance and preparation for college (Texas Education Association, 1999). Nationwide, students in one of five classes in U.S. secondary schools have teachers with neither a major nor a minor in the subject (Archer, 1999). In schools whose students come from low-income households, which include rural populations, the percentage of teachers teaching out of their field is much higher (Chaika, 2000).

In addition to locating highly qualified teachers and effectively distributing them to reach the greatest number of students, the issue of retaining highly qualified teachers must be solved. The Texas Teacher Recruitment and Retention Study (Texas Education Association, 1999) reported that a large percent of teachers leave teaching because they are dissatisfied with teaching or for other personal reasons. Undesirable working conditions, including class assignments outside the field of certification, may lead to dissatisfaction and attrition from the profession. In surveys conducted for the Texas study, better staff development was often mentioned as a primary retention tool (Texas Education Association, 1999). Nationally, 8 percent of all public school teachers moved to a different school, and seven percent left the teaching profession in 2000 (Luekens, Lyter, & Fox, 2004). Among the reasons that public school teachers gave in 2000 for moving to a new school were an opportunity for a better teaching assignment – either grade level or subject area (40 percent) and dissatisfaction with opportunities for professional development (15 percent).

The reason that locating and retaining qualified teachers is of such importance is that rural and small schools traditionally have fewer human and financial resources available compared to larger school districts. Their per-pupil costs tend to be higher than larger school districts because of the need to provide a wide range of courses and services to fewer students (SEDL, 2003). The Goals 2000: Educate America Act of 1994 (U.S. House of Representatives Report 103-446) specifically singles out geographic location as an at-risk student variable. Many rural communities are remote, and many of their isolated, small schools have difficulty recruiting and retaining teachers. Qualified teachers are frequently unwilling to teach in these remote areas (Berkeley & Ludlow, 1991). Many states build additional weighted factors for small school size and/or isolation into their school funding formulas in an effort to help these school systems overcome these obstacles. However, state legislatures and education agencies frequently seek to reduce expenditures and increase courses and services to students through various efforts and pressures to consolidate these rural and small schools with neighboring school districts (SEDL, 2003).

The Concept

A virtual cooperative school district could be created to share and distribute teachers among rural schools in such a way that highly qualified teachers have effective interaction with the greatest number of students. The primary purpose of these virtual school districts would be to enable students to have personal and direct interactions with expert teachers while still using existing school infrastructures. A combination of current low-bandwidth distributed learning technology can provide a solution that can solve the problem of limited course offerings, as well as mentoring and remediation, to students in a personal and caring manner. Several benefits emerge from this approach: 1) increase the pool of available highly qualified teachers, 2) increase the number of courses needed by students preparing for college, 3) allows teacher to teach within their primary field and focus their teaching and learning, and 4) increase potential of teacher retention and satisfaction by coupling instruction with on-going, just-in-time professional development through local and online communities.

Hardly a new concept, district administrators have long been anticipating virtual schools. In Phi Delta Kappan Van Horn (1997) outlined the major advantages of virtual schools 1) the ability to keep quality staff and distribute their skills across geographic boundaries, 2) the ability to harness the skills of traditionally uninvolved individuals through enhanced communication ability, 3) multiple times and areas for student access to learning resources, and 4) multiple opportunities for public/private collaboration. The state of Texas has decided to actively embrace these advantages through legislation requiring exploration of virtual learning environments. Senate Bill 1, passed by the 74th Texas Legislature and codified as Texas Education Code, Section 32.035(a), called for the agency to establish demonstration programs to: (1) investigate the uses, effectiveness, and feasibility of technologies for education, and (2) provide models for effective education using technology. A focus of these projects, as authorized in TEC Section 32.035(b), is "to encourage participation by and collaboration among districts, regional education service centers, the private sector, state and federal agencies, non–profit organizations, and institutions of higher education. Building upon Senate Bill 1, the Legislature passed Senate Bill (SB) 975 calling for a program to examine the state policies, requirements and restrictions that impact districts and charter schools offering electronic courses to local students who are not physically present for all or part of these courses. According to Senate Bill 975, an

"electronic course" is defined as an educational program or course available primarily through the Internet or other electronic media and in which a student enrolled in the course is not physically present in the classroom for all or part of the course. In response, the Texas Education Agency offered two pilot programs: the Virtual School Pilot (VSP) and the Investigating Quality of Online Courses (IQ) Pilot. The results of these pilots identified numerous advantages for students similar to Van Horn's (1997) findings. The pilots noted the following advantages to virtual schools (Texas Education Agency, 2004b):

1. Students in small, remote and rural areas of the state may gain access to highly qualified teachers through electronic courses delivered at the school or to another location in the community.
2. Students throughout the state may benefit from availability of advanced courses taught by experts who would not otherwise be accessible.
3. Electronic courses offer opportunities for students to take advanced high school courses. (There is a rising need for high-level courses to challenge students and prepare them for college, and electronic courses may be one way to address this need).
4. Students at risk of dropping out of school because of pregnancy, high mobility or disciplinary problems may also benefit from access to electronic courses.
5. As teachers and administrators become more comfortable with technology, online learning will catch on at most secondary schools.
6. As programs become more efficient, program costs will decrease, thus increasing delivery capacity and perhaps increasing revenue. Initial investments could potentially make virtual school districts self-sustaining in the long-term.

The Texas Education Agency is continuing this effort by offering financial incentives through the 2004-2005 Electronic Course Pilot (eCP) where participating schools can receive funding through the Foundation School Program based upon the number of students enrolled in electronic courses through Texas public independent school districts and open-enrollment charter schools (Texas Education Agency, 2004a). Districts are eagerly awaiting the outcomes of these pilots to see how implementations can be further expanded.

Changes in technology and the reduced cost of that technology make it possible now to teach online courses in an immersive and engaging atmosphere to students that do not have the most modern computers or broadband Internet connectivity. The technology outlined in this approach is being used at the college level but is even better suited for the rural school populations. This approach would allow rural high school students to gain access to "a highly

personalized, rigorous education that prepares every student for college, work, and citizenship" (Gates Foundation, 2003a).

Virtual Cooperative School District

A virtual cooperative school district is composed of one or more school districts that agree to share teacher expertise, participate in on-going professional development, and have the desire to improve the number of students who seek and eventually attain college degrees. These virtual school districts coordinate courses, student course loads, manageable teacher loads, technical training and support, and professional development of the teachers involved. At the core of the sharing are student course credits. Participating schools in a virtual cooperative school district agree to a set fee per student course credit. A student course credit is defined as one student taking one online course. Schools obtain credits by teaching online courses and spend credits by enrolling students into online courses. A form of accounting and payback would be created to pay or charge schools depending on their balance of student course credits in the co-op.

As an example, a physics teacher in a rural school might teach three physics classes a day and then teach other classes throughout the day outside her subject area to fill out her schedule. This rural school could volunteer their highly qualified physics teacher to teach up to three online sections in addition to the three face-to-face classes she teaches. The school would receive one student credit for each online student to whom their school is providing a high quality physics class. Those credits could then be used to have students in their district take online courses in biology, math or other subjects from highly qualified teachers from another district.

Coordination and Management of Virtual Courses

The primary reason for the co-op is to enable students to get the best education possible, so that students can be highly motivated and adequately prepared to attend college. Through the coordination of virtual courses among participating schools, the following outcomes are possible:

1. Provide access to courses not normally available by distributing expert teachers to support a larger geographical region,

2. Provide access to expert teachers, with the ideal that expert teachers are better at teaching the subject matter than unqualified teachers, and
3. Produce lower student-to-teacher ratios so that more mentoring and remediation are possible, allowing "powerful, sustained involvement with caring adults who mentor advise and support" (Gates Foundation, 2003b) that allows students to be challenged because teachers have the time and ability to focus on specific curriculum content to meet the needs of the students involved.

Verification of the Qualifications of Participating Teachers

The virtual cooperative school district would be responsible for overseeing issues related to teacher certification and qualifications for the courses they are teaching. The virtual school district would also monitor teacher and student satisfaction and handle any issues related to problems in this area.

Verification of the Prerequisites of Participating Students

The virtual cooperative school district would be responsible for ensuring that students are properly prepared for the courses in which they enroll. This may involve the successful completion of a prerequisite course or passing a competency exam prior to being admitted into an online course.

Auditing of Student Progress and Attendance

The virtual cooperative school district would be responsible for following the guidelines and regulations set forth by their State education agency regarding student progress and attendance. This includes any requirement for state-mandated testing and end-of-course examinations.

On-Going Professional Development

All teachers and administrators in the involved districts would attend yearly Summer Institutes for training and professional development. The highly successful Eisenhower Grants (now, the Teacher Quality Enhancement Grants) model could be used in which an intensive professional development summer institute is followed by needs-based continuation activities.

After the face-to-face training during the summer, online follow-up meetings via the virtual co-op infrastructure would be held to provide support, encouragement, and continued professional development. As previously described, professional development linked to the ability to create communities of teachers working together can help with the problem of teacher retention (Texas Education Association, 1999). A virtual cooperative district would allow teachers to build virtual communities within the same content area.

Parent Education about their Child's Potential for College

The virtual cooperative school district would also work with participating schools to develop programs that focus on parent education – emphasizing how rural students have endless opportunities to attend college, but require parental support to succeed. Many students in this country do not grow up with parents who graduated from college and expect their children to do the same. "…it starts with awareness – giving students the inspiration and information to attend college" (Gates, 2003). Parents need to be educated about the importance of college and encouraged to think that their children have the potential to attend college and be successful in life. These same online forums could be used to inform parents of rural students getting accepted into, attending, and graduating from college.

College Scholarship Awareness Programs

Information on how rural students can gain college degrees in an affordable manner, either through scholarships or via online college programs, would be presented to online students and their parents. Families in need of support could be introduced to financial aid workers from universities and colleges located around the country using the virtual co-op infrastructure. Programs could be designed to assist students in finding sources for scholarships as well as techniques for successfully applying for scholarships.

Learning Communities for Students in a Virtual Cooperative School District

An important aspect of course management is to ensure that students who wish to participate in virtual classes are prepared to succeed in the online model before being placed into virtual classrooms. Learning communities (LC) is an approach to help students be more successful by linking classes together with a common theme (Tinto, 1998). LC allow students to

create communities over time that improve discourse and interchange on the subject matter . Jones (2001) observed the scaffolding of cognitive discourse when students work together online for extended periods over multiple semesters and even years. Students taking courses together would have the opportunity to work together online, as well as have someone to partner with in order to study the materials or discuss issues related to the course. If two or more students from a local district are taking the same class, they would be in the virtual LC, and in addition, could create a local study group. Student relationships, as well as community building are important in maintaining a healthy virtual environment (Garber, 2004). The literature suggests that drop-out rates among online students are higher than those of traditional face-to-face courses (Rovai, 2002). Since students who possess strong feelings of community are more likely to persist than those students who feel alienated and alone (Tinto, 1993), cohort communities could be nurtured by both local and online teachers to ensure their success.

The Technology

A combination of technologies is suggested to provide the student-teacher, student-student, and teacher-teacher interactions. Traditional technologies include email and web pages. These approaches would be used to provide asynchronous means of communications. The primary new technology to be used for synchronous virtual course delivery is online 3D online learning environment. A 3D environment provides a way to create Internet resources that are stimulating, appealing, easy to use, and educationally sound, without the need to develop highly elaborate technical skills (University of Sheffield, 2004). A 3D environment creates a context or scaffolding for interaction using 3D presentations to engage and/or immerse the student into a situation for learning (situated learning) or entertainment (Jones & Bronack, in press). This type of interface has strong ties to their text-based cousins, dating back to the 1980's (Holmevik & Haynes, 2000), but now provide highly collaborative, immersive environments that promote interactions among students and with the instructor. As computer performance on low-cost personal computers increases, these types of systems allow teachers to provide students with unique online collaborative learning opportunities in the areas of language, science, computer graphics, and other fields (Chen, Toh, & Fauzy, 2004; Jones, 2003). The 3D graphics technology has greatly improved over the last several years such that cost-effective 3D online environments can now provide realistic, immersive learning environments that deliver required education

materials while fostering learning communities (Jones, Morales, & Knezek, 2004). The University of North Texas has been using such a system since 2003 (Figure 1) for enhancing online and hybrid courses for the Department of Technology and Cognition in the College of Education. Research conducted in 2003 and 2004 showed that the students in the sections using the 3D online learning environment performed as well as the students in the face-to-face sections. Furthermore, student satisfaction in online sections was equivalent to face-to-face sections (Jones, Morales, & Knezek, 2005). Research conducted between 2003 and 2005 shows that student using the 3D online leering environment have more in-depth discourse than students that only use Learning Management Systems (Jones, 2006).

Figure 1: Online learning environment being used at the University of North Texas

The major advantage to using this technology for rural student course distribution is it's ability to bridge the digital divide by utilizing technology commonly found in these settings (Jones, 2003). Like web pages, 3D objects and their associated textures are transmitted once and then cached in the user's computer. This means that the initial bandwidth used to create the environment can then be reused for other instructional information needs like streaming video and audio, slide shows, whiteboards, etc. By distributing the processing of the environment and presented digital materials among each participating user, the information flow between user and server can be greatly reduced. Subsequently, a rural learner who is not close to an Internet backbone can have the same quality access to virtual teachers as those in well-connected suburban locations. Barriers to using 3D virtual environments for education have been overcome in recent years (Jones, 2004).

Once a virtual cooperative school district is in place, teachers and content experts could utilize the online environment for professional development. Without the need to travel, professional development activities could take place at any time and include teachers from a variety of rural communities, professionals from state education service centers and faculty from universities and community colleges. Teachers from rural districts could finally have a community of peers and experts to assist with maintaining their status as “highly qualified” teachers.

By using next-generation, online, multi-user, 3D learning environments, we can distribute expert teachers in specific disciplines so that they reach students requiring highly qualified teachers to increase their college preparation. Most high school students will have little problem moving from an in-person classroom to one conducted in a 3D environment, since a large majority of these students have been playing games in these environments for many years. Some teachers might find the 3D environment strange at first, since they have not grown up with it like their students, but no special expertise is required to place materials online. Teaching in the 3D learning environment is very much like teaching course materials in face-to-face classes. This will be especially true as the technology improves over the coming years and teacher fluency with technical environments increases.

Conclusion

"Since 25 percent of American students attend rural schools and one-third of American schools are located in rural areas, this is an essential pool of future mathematicians, scientists and engineers," said Luther S. Williams, National Science Foundation’s assistant director for education and human resources (National Science Foundation, 1998). The task in front of education is not to “reinvent the wheel” or to continue to foster past paradigms of implementation, but to look at new ways to accomplish the goal of expanding and then enabling the number of high school students in Texas and other rural areas of the U.S. that want to attend and then are able to succeed in college. According to the National Academies Press, "the technology to meet this challenge already exists and is in use outside of schools. This report [Reinventing schools: The Technology is Now] is not about putting more computers into

schools. It is dedicated to the idea that schools have to be reinvented to take advantage of the technology that is already ubiquitous in our everyday lives" (National Academies Press, 2003). The underlying assumption for this article is that digital content delivery for every child of the Xbox generation can provide greater access to more successful learning opportunities.

References

Archer, J. (1999, March 31). Out-of-Field Teaching Is Hard To Curb. *Education Week*.

Beeson, E., & Strange, M. (2003). Why Rural Matters 2003: The Continuing Need for Every State to Take Action on Rural Education. Retrieved September 20, 2004, from http://ruraledu.org/streport/pdf/tx_2003.pdf

Berkeley, T. R., & Ludlow, B. L. (1991). Meeting the needs of special student populations in rural locales. In A. J. DeYoung (Ed.), *Rural education: Issues and practice*. New York: Garland.

Brown, D. E. (1985). *Higher education students from rural communities: A report on dropping out* (No. ED 258 771). Las Cruces: New Mexico State University.

Chaika, G. (2000). Out-of-field teaching: How qualified is your child's teacher? *Education World, 2003*.

Chen, C. J., Toh, S. C., & Fauzy, W. M. (2004). The theoretical framework for designing desktop virtual reality-based learning environments. *Journal of Interactive Learning Research, 15*(2), 147-167.

Education Commission of the States. (2003). Helping state leaders shape education policy. Retrieved November 20, 2003, from http://www.ecs.org/html/IssueSection.asp?issueid=31&s=Overview

Garber, D. (2004). Growing Virtual Communities. *International Review of Research in Open and Distance Learning., 5*(2).

Gates Foundation. (2003a). Closing the graduation gap: Toward high schools that prepare all students for college, work, and citizenship. Retrieved November 18, 2003, from http://www.mcsba.org/reports/gates%20foundation%20report%20on%20HS%20ed-2003.pdf

Gates Foundation. (2003b). High Schools for the New Millennium. Retrieved November 21, 2003, from http://wpscms01/nr/downloads/ed/edwhitepaper.pdf

Gates, M. (2003). Speeches by Melinda Gates. Retrieved November 18, 2003, from http://www.gatesfoundation.org/MediaCenter/Speeches/MFGSpeechNCSL-030725.htm?version=print

Gibbs, R. (1995). Going away to college and wider urban job opportunities take highly educated youth away from rural areas. *Rural Development Perspectives, 10*, 35-43.

Holmevik, J. R., & Haynes, C. (2000). *MOOniversity: A student's guide to online learning environments*. Beedham Heights, MA: Allyn & Bacon.

Horn, R. V. (1997). Power tools: The virtual school. Retrieved May 22, 2006, from http://www.pdkintl.org/kappan/k_v78/k9702van.htm

Jones, J. G. (2001). *A study of communications between subject matter experts and individual students in electronic mail contexts*. Unpublished Dissertation, University of Texas, Austin, Austin, Tx.

Jones, J. G. (2003). Internet-based 3D graphical MOO software that supports distributed learning for both sides of the digital divide. In *World Conference on Educational Multimedia, Hypermedia & Telecommunications* (Vol. 2003, pp. 246-248). Honolulu, Hawaii USA.

Jones, J. G. (2004). 3D on-line distributed learning environments: An old concept with a new twist. In R. Ferdig & C. Crawford (Eds.), *Society for Information Technology and Teacher Education International Conference* (Vol. 2004, pp. 507-512). Atlanta, GA.: Association for the Advancement of Computing in Education.

Jones, J. G. (2006). Accelerating online text-based discourse via 3d online learning environments. In *Society for Information Technology and Teacher Education International Conference* (pp. 1372-1377). Orlando, FL: Association for the Advancement of Computing in Education.

Jones, J. G., & Bronack, S. C. (in press). Rethinking cognition, representations, and processes in 3D online social learning environments. In D. Gibson, C. Aldrich & M. Prensky (Eds.), *Games and Simulations in Online Learning* (Vol. 2, pp. 107-147). Hershey, PA: Idea Group.

Jones, J. G., Morales, C., & Knezek, G. (2004). Student Attitudes towards an Integrated 3D Learning Environment. In L. Cantoni & C. McLoughlin (Eds.), *World Conference on Educational Multimedia, Hypermedia & Telecommunications* (Vol. 2004, pp. 1378-1382). Lugano, Switzerland: Association for the Advancement of Computing in Education.

Jones, J. G., Morales, C., & Knezek, G. A. (2005). 3D online learning environments: Examining attitudes toward information technology between students in internet-based 3D and face-to-face classroom instruction. *Educational Media International, 42*(3), 219-236.

Knisley, C. (1993). *Factors influencing rural Vermont public high school seniors to aspire or not to aspire to a four year college education*. Burlington, VT.: ERIC Document Reproduction Service No. ED 364 377.

Luekens, M. T., Lyter, D. M., & Fox, E. E. (2004). *Teacher Attrition and Mobility: Results from the Teacher Follow-up Survey, 2000–01 (NCES 2004–301)*. Washington, DC: U.S. Government Printing Office.

National Academies Press. (2003). Reinventing Schools: The Technology is Now. from http://www.nap.edu/readingroom/books/techgap/pdf/chap1.pdf

National Science Foundation. (1998). NSF Approves Multi-Million-Dollar Awards for Texas and

Navajo Rural Schools. Retrieved November 4, 2004, from http://nsf.gov/od/lpa/news/press/pr9862.htm
Partnership for 21st Century Skills. (2003). *Learning for the 21st Century*. Washington, DC.: Partnership for 21st Century Skills.
Poole, D. L., & More, S. (2001). *Participation of Rural Youth In Higher Education: Factors, Strategies, and Innovations*. Austin, TX: Texas Rural Communities and Center for Social Work Research, The University of Texas at Austin.
Rovai, A. P. (2002). Building Sense of Community at a Distance. *International Review of Research in Open and Distance Learning., 3*(1).
SEDL. (2003). Rural Students at Risk 2003. Retrieved November 22, 2003, from http://www.sedl.org/rural/atrisk/context.html
Texas Education Agency. (2004a). Terms of Participation for the 2004-2005 Electronic Course Pilot (eCP). Retrieved March 11, 2005, from http://www.tea.state.tx.us/taa/comm120604.html
Texas Education Agency. (2004b). Virtual School Pilot Project (Implementation of SB 975) Retrieved February 12, 2004, from http://www.tea.state.tx.us/technology/wbl/wbl_vsp.html
Texas Education Association. (1999). *Texas Teacher Recruitment and Retention Study*. Austin, TX: Texas Education Association.
Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.
Tinto, V. (1998). Learning communities and the reconstruction of remedial education in higher education. Retrieved May 15, 2006, from http://www.doso.wayne.edu/SASS/Tinto%20Articles/Learning%20Communities%20&%20Remedial%20Education.pdf
U.S. Bureau of the Census. (1999). *Educational attainment in the United States, March 1999, detailed tables for current population report (Report No. P20-513)*. Washington, DC: U. S. Department of Commerce.
U.S. Department of Education. (2001). PL 107-110, the No Child Left Behind Act of 2001. Retrieved March 11, 2005, from http://www.ed.gov/policy/elsec/leg/esea02/index.html
U.S. Department of Education. (2004a). *Meeting the Highly Qualified Teachers Challenge: The Secretary's Third Annual Report on Teacher Quality*. Washington, D.C.
U.S. Department of Education. (2004b). *New No Child Left Behind Flexibility: Highly Qualified Teachers Fact Sheet*. Washington, D.C.
University of Sheffield. (2004). Virtual Learning Environments. Retrieved May 19, 2004, from http://www.shef.ac.uk/lth/strategic/elearn/vle.html
Van Horn, R. (1997). Power Tools: The Virtual School. *Phi Delta Kappan, 78*(6), 481-482.