

Preparing Teachers for the “Schools That Technology Built”: Evaluation of a Program to Train Teachers for Virtual Schooling

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Abstract

As a result of the growth of virtual schools across the United States, K–12 school courses and diplomas are increasingly offered, either completely or partly, at a distance. In light of this increase, it is apparent that there will be demand for teachers who are prepared to teach from a distance and a complementary need for local counselors. The U.S. Department of Education agreed that the creation of a model for incorporating virtual schooling in preservice teacher education programs accompanied by appropriate assessment of the effect for a range of competencies would be a significant innovation. This article describes the planned model led by Iowa State University and the evaluation designed to establish its effectiveness, including dissemination through a national community of practice. For example, evaluation of the competence of counselors, who will be prepared to mentor K–12 students learning from a distant teacher, moves from a formative approach into scientifically-based research with experimental and control groups. In addition, instruments to measure institutional adoption include a modified version of the CBAM instrument developed by Christensen and longitudinal surveys of preservice student teachers and graduates.

INTRODUCTION

Virtual Schooling: A Growing Phenomenon

The virtual schools movement, in which K–12 school courses and diplomas are offered either mostly or completely using distance technologies, is expanding rapidly, thanks in no small part to the success of Web-based distance learning in post-secondary education (Clark, 2001; Loupe, 2001; Roblyer, 2003; Setzer, Lewis, & Green, 2005; Zucker & Kozma, 2003). A just-released report on K–12 virtual schooling from the National Center for Education Statistics (NCES) (Setzer, Lewis, & Greene, 2005) says that about one-third of U.S. public school districts—representing nine percent of public schools—had students enrolled in distance education courses during the 2002–2003 school year. According to Wood (2005), this translates to about 300,000 students attending online classes in this time period.

This is a remarkable growth rate for a phenomenon whose Web-based incarnation only emerged around 1996. Although technologies such as broadcast radio and television had enabled distance learning in school programs in the United States and elsewhere for many years, pilot projects by the Concord Consortium in Massachusetts and Florida’s Virtual School marked the beginning of

an organized effort to offer K–12 distance courses using the Internet (Roblyer, 2005). According to Revenaugh (2005), nearly half of U.S. states now offer “statewide supplementary online programs, full-time cyber-schools, or both” (p. 25). In addition, a variety of pre-secondary schools in Canada, Australia, the United Kingdom, and elsewhere have opened their “virtual doors” (Roblyer, 2003; Zucker & Kozma, 2003). The NCES study (Setzer, Lewis, & Greene, 2005) reported that two-way interactive video is the technology most often cited as a primary instructional delivery system in small districts, but in large districts, Web-based systems are used to offer the majority of programs.

Although many of these enterprises have been in operation less than a decade—and some only a few years or less—students seem to be flocking in record numbers to the “schools that technology built.” Virtual schools that use the Internet began with high school students taking individual Web-based courses, but now many of them offer complete high school diploma programs, and some provide instruction for middle school and even elementary school students.

The demand for virtual schools seems to be growing in response to a variety of needs, some that existed prior to 1996 when the K–12 Web-based movement began, and some that have emerged as a by-product of our ever more technological society. The vision that drove the first virtual schools was that of more affordable, consistent, and equitable access to high-quality educational opportunities for students who need them most: rural, underserved, and at-risk populations. However, today’s virtual school student is just as likely to be one who prefers the self-pacing and flexibility of virtual learning as one who lacks local access to courses needed for graduation (Wood, 2005).

The demand for virtual schools is driven at least in part by fundamental changes in our society and the students who inhabit it. As ubiquitous communications and immediate access to information have become more common, learners recognize that learning can be an anytime-anywhere experience. They want educational opportunities that reflect these characteristics. The disconnect between many current educational methods and those possible in an information-connected environment is becoming increasingly obvious. A new kind of student requires a new kind of schooling.

A Program to Prepare Virtual Teachers

Just as today’s virtual student differs in fundamental ways from those of the past, virtual teachers must also reflect different qualities. Virtual school experiences of the last ten years have demonstrated that students who have been successful in traditional classrooms are not always as accomplished in virtual ones (Roblyer & Marshall, 2003). Those who succeed in online learning possess a set of skills that enables them to thrive in the rich atmosphere of cyberspace. It has become apparent that successful online teachers also require a unique set of skills. Wood (2005) quotes Blomeyer’s observation that, “(there is a) persistent opinion that people who have never taught in this medium can jump in and teach a class ... A good classroom teacher is not necessarily a good online teacher” (p. 36).

Although much of the experience that defines competencies required for effective virtual teachers is anecdotal, there is widespread agreement on many of

these skills. Roblyer and McKenzie (2000) found that many of the factors that make for a successful online instructor are the same as those for any successful instructor: good communication and classroom organization skills. However, a review of research by Cyrs (1997) identified several areas of unique competence for distance instructors, all of which require experience with distance learning environments:

- Course planning and organization that capitalize on distance learning strengths and minimize constraints
- Verbal and nonverbal presentation skills specific to distance learning situations
- Collaborative work with others to produce effective courses
- Ability to use questioning strategies
- Ability to involve and coordinate student activities among several sites (p. 17).

Easton's (2003) study of skills required by distance learning instructors supports the observations of both Cyrs (1997) and Roblyer and McKenzie (2000). She found that many communication skills required of the online instructor are similar to those needed for effective classroom teaching. However, she also pointed out that the online instructor's role requires a paradigm shift in perceptions of instructional time and space, virtual management techniques, and ways of engaging students through virtual communications.

In light of the increasing demand for virtual courses and the rapid expansion of schools to meet the demand, it is apparent that there will be a parallel need for teachers who are prepared to teach at a distance from their students. There will also be an equivalent need for counselors and other support personnel who understand the unique benefits of this new medium and are prepared to meet its needs and requirements. Research in K-12 Virtual Schooling (VS) shows that a "distant" teacher should be complemented with a local counselor and, better still, guidance from each student's homeroom teacher. That is, good practice in VS has local as well as distant components (Aronson & Timms, 2003; National Education Association, n.d.). Therefore, this rapidly developing facet of K-12 education is more likely to have a beneficial effect if all K-12 teachers become competent as VS counselors.

To help meet this demand, a consortium of universities led by Iowa State University is developing a model program to train personnel qualified to counsel, support, and teach K-12 virtual school students. This article will describe the Iowa State program, the evaluation designed to establish its effectiveness, and methods anticipated to disseminate the model.

A NATIONAL MODEL TO INTEGRATE VIRTUAL SCHOOLING INTO PRESERVICE TEACHER EDUCATION

The U.S. Department of Education agreed that a model for incorporating VS in preservice teacher education programs, accompanied by appropriate assessment of the range of acquired competencies, would be a significant and much-

needed innovation. In Fall 2004, a project was funded to create a model to integrate a comprehensive VS curriculum into four diverse programs of preservice teacher education for the first time. Led by a land grant university (Iowa State University [ISU]), the project aims to spread to a large public southern university (University of Florida [UF]), a highly selective eastern university (University of Virginia [UVA]), and a liberal arts college (Graceland University [GU]) with several Midwest campuses, including a virtual campus. This creation of an innovative and transferable model of curriculum for more than 1,000 teachers' colleges across the United States will be supported by collaborating virtual schools, consultants, and a community of practice.

The context of VS provides significant challenges to preservice teacher education, beyond those of technology integration that will continue to challenge sustainability (Davis, 2003). Virtual schools do not have physical premises to visit because courses, classrooms, and their administration have been adapted with technology specifically to disperse teachers and students for some or all of their time in VS. In addition, simultaneous renewal of teacher education and K-12 education is necessary (Goodlad, 1994; Thompson, Schmidt, & Davis, 2003) at a time when many K-12 schools and services are in the early stages of developing policy and practice for VS (Setzer, Lewis, & Greene, 2005). The challenges to teacher education include finding ways to expose examples of effective VS curriculum and practice so that preservice teachers may study the whole educational process and develop their own reflective practice.

The goal is for all teacher candidates to learn how to counsel a student who is participating in VS. In addition, the provision of guided observations and effective mentoring to develop the candidates' practice in live K-12 virtual classroom(s) needs to be creatively developed, so that some beginning teachers join the profession with an ability to assist other teachers in VS or have teaching experience in VS. The project will also add an advanced course in which teacher candidates design part of a course for K-12 students, similar to a course provided by a Virtual School for its teachers. In all, the project aims to affect a total of four courses during the next three years and to assess the development of candidates' competence in the four roles listed in Table 1, namely Counselor, Assistant, Teacher, and Designer. The goal is to integrate competence of VS Counselor into all four preservice programs for all students, but only a few teacher candidates will be advised to take additional courses that develop competence in the other three teaching roles. This follows existing policy. For example, ISU's approach to developing competence as a VS teacher will build on its policy for student teaching abroad, through which strong teacher candidates suited to the experience are selected and carefully prepared for K-12 teaching experience in a foreign culture.

The Teacher Education Goes Into Virtual Schooling (TEGIVS) project has three complementary strategies to address these problems and build a model:

- Curriculum development in teacher education to map VS into the four programs and adapt or create selected courses that will include assessment of VS competence against standards. This will be underpinned by strategic professional and organizational development.

- Tools to expose VS will be created. For example, shell software will be created to provide a means for preservice students, faculty, and staff to select and explore particular instances of VS, drawing upon related software design such as the goVHS tour (<http://www.govhs.org>), and the eDoc electronic portfolio project in ISU (Hassall, Nilakanta, Sheppard, & Wang, 2005).
- A national community of VS practice in teacher education is being developed to facilitate adoption of VS into teacher education nationwide.

Comprehensive evaluation within the project will inform the project development and assist in its dissemination. The plan has been accepted by the Fund for the Improvement of Postsecondary Education (FIPSE), which is using the project's evaluation plan as a model to inform other projects.

EVALUATING THE VIRTUAL SCHOOLING PRESERVICE PROGRAM

A theme that runs throughout the design of the TEGIVS project is "planned innovation." The methods used to evaluate the success of the project are designed to match and reflect the innovative nature of the instructional strategies themselves. A team of internal and external evaluators is working together to develop creative ways of assessing the project's success in developing and implementing the training program. Formative assessments throughout the project also will help identify and guide needed modifications to strategies. Described here are the goals, strategies, and instrumentation that have been planned to carry out the evaluation.

Evaluation Objectives

The goal of the project is to prepare preservice teachers in the four cooperating institutions to implement effective VS curricula at four levels of competence: counselor, assistant, teachers, and designer. The evaluation plan described here focuses on formative and summative measures of the implementation, results, institutionalization, and effect of three major project objectives that lead to this goal. These objectives, framed as research questions, are:

- VS competence: Do preservice teachers in the member institutions demonstrate competence in each of four levels of VS instruction?
- VS tools: Has the project developed effective tools for VS preservice teacher education?
- Community of practice: Are personnel inside and outside the project using project methods and procedures and working together to enhance them?

Project personnel will use formative data to guide development of the curriculum, tools, and courses and to improve dissemination methods, as needed. Summative data will be documented in final project reports to project staff, the consortium members, and to the funding agencies.

Evaluation Strategies

The evaluation plan consists of the following activities designed to address each of the three objectives:

1. **Strategies to evaluate objective 1:** In keeping with new federal requirements to use scientifically-based research in evaluation methods, evaluators will employ a quasi-experimental design, using a control group to provide comparisons with groups trained in the project. A test consisting of Web-based scenarios is being developed to integrate with the curriculum. For example, VS Counselors at ISU will be trained in six labs with 15–20 students each. Three labs, chosen randomly, will participate as the experimental group and three will serve as the control group. Testing at the other consortium members will replicate this evaluation strategy as much as is possible in light of their course structures.
2. **Strategies to evaluate objective 2:** Three types of activities will be used to assess accomplishment of this objective. First, formative evaluation will review documentation of the software development, using evaluation procedures described by Hix and Hartson (1993). This procedure calls for identifying the benchmark tasks and usability specifications, and then using “critical incidents” observation as students perform benchmark tasks. These observations will be reported in cost/importance tables, with data analyzed to produce a priority ratio and priority rank for each critical incident. Incidents with a sufficiently high priority rank or ratio will identify areas in need of revision. Second, summative evaluation will consist of survey and observation of the student and instructor users about the usability of the software during pilots and field trials; observations, based on the pre-identified benchmarks, will include one-to-one evaluation first, then small groups, and then field trials. The benchmarks are typically more carefully defined in one-to-one evaluation, and become more loosely defined as the software matures and users’ use of it becomes more representative of real world use. Third, summative evaluation of Objective 2 will occur when the tools are used as part of the intervention evaluated for Objective 1 with the quasi-experimental design.
3. **Strategies to evaluate objective 3:** Summative evaluation for this objective will use a set of checklists to monitor milestones met, logs of participant data, and a modified version of the *Concerns Based Adoption Model (CBAM)* instrument, developed by Rhonda Christensen in conjunction with the Institute for the Integration of Technology into Teaching and Learning at the University of North Texas (see <http://www.iitl.unt.edu/surveys/demos/CBAM.htm>). Data logs will be kept on participants in conferences, workshops, and Web sites; use of digital library items; and minutes of meetings in which new courses and certificates are approved.

Assessment Instruments and Resources

Materials to carry out the project evaluation are developed by the external and internal evaluators with the help of the project management team, and the external evaluator will establish instrument validity and reliability. Instruments will include:

Pre-post course evaluation Likert scale—These instruments will provide formative, self-report data from students on all aspects of course satisfaction. Students will complete pre-course and post-course evaluations, and results will be compared for a match between anticipated and achieved results.

VS scenario rubrics—Scenarios will challenge students to respond with best practices in various virtual instructional situations; rubrics will measure their success in choosing most appropriate responses for each situation.

Post-course rubric for online instruction—Developed by faculty and staff at California State University, Chico, this instrument is designed to aid both the development and evaluation of online courses. (See the rubric at: <http://www.csuchico.edu/celt/roi>.)

Tool ratings checklists—Ratings checklists will assess usefulness and ease of use of each tool developed by the project. Checklists will be completed by instructors and preservice students at all four institutions.

Modified CBAM—This instrument has been modified to focus specifically on faculty's awareness and adoption of TEGIVS resources and methods, as opposed to awareness and adoption of technologies in general. (See the *JRTE* Web site [<http://www.iste.org/jrte>] for a copy of the draft instrument.)

Preservice and post-graduation follow-up survey items—To assess students' post-course and post-program perceptions of how well the program prepared them for work in virtual school environments, items will be added to two surveys used by ISU: the existing survey of students on teaching practice and the graduate follow-up survey. These surveys also provide an opportunity to sample the presence of VS in K–12 schools as perceived by ISU students and graduates.

Table 1 summarizes these evaluation instruments. Instrumentation currently under development is indicated with an asterisk.

Table 1. Evaluation Instruments in the TEGIVS Project

Project Objectives	Instrumentation					
	Course evaluation Likert scale (pre/post)*	VS scenario rubrics*	Rubric for online instruction	Tool ratings checklists*	Modified CBAM	Post-graduation follow-up survey items*
1: Teaching competence	X	X	X			
2: Effective tools				X		
3: Active community					X	X

In addition to the formal evaluation evidence described above, the project encourages faculty and graduate students to undertake complementary research. This will be facilitated by a code of practice that respects all participants and stakeholders, plus ongoing mandatory regulation by the Institutional Review Board in ISU.

CONCLUSION: PLANS FOR DISSEMINATING RESULTS

The goal of the project goes beyond the small representative sample of participating teacher education programs to create a model for all U.S. programs. One of the strategies is to create a national community of practice building on existing structures. In this way, early milestones have been achieved on target within the first six months. One example is the creation of the first version of the VS standards by building on ISTE's National Education Technology Standards (NETS) for Teachers (2004). ISTE's NETS have been widely adopted across the U.S., and NETS for Teachers (NETS•T) are part of the accreditation process mandated by the National Council for Accreditation of Teacher Education (NCATE). The published literature and participants' experience in VS were used to redraft a set of competencies for each VS role. (See Table 2.) Working through existing national communities in professional associations is a second example of the project building on existing national structures. The project held a session at the 2005 annual conference of the Society of Information Technology in Teacher Education (SITE), where the vision and the first version of the VS competencies were validated with peers in the United States and worldwide (Davis et al., 2005). The SITE committee for distance education discussed the challenges of VS, and that committee welcomed ongoing dialogue with the project through its online discussion board and conference sessions.

Table 2. The Four Roles (Levels) of VS Competence Planned for Preservice Teachers

Roles	Types of Competence
VS Counselor	Advise and support K-12 students participating in VS
VS Assistant	Assist a teacher providing a VS course
VS Teacher	Teach a VS class
VS Designer	Design and teach a VS course

The project will make extensive use of the Internet for dissemination. The project's Web site (<http://www.cctl.iastate.edu/research/projects/tegivs/homepage.html>) will be complemented by pushing information to locations where teacher educators tend to seek it. Resources developed by the project will be shared through the digital library of the Association for the Advancement of Computing in Education (AACE). These will include VS curriculum materials, tools, case studies, and evaluation instruments. Collaboration with leading-edge publishing expertise in AACE will enable the development of appropriate procedures and protocols to archive curriculum materials and other media, including the open source software of the VS tools. This approach aims to be sustained after the funded project's completion. The inclusion of the evaluation instruments in the digital library also answers calls to improve research into technology in teacher education using multiple sources of data and shared research instruments (Thompson, in press).

The authors welcome correspondence and plan to link readers' communications with the dissemination strategies above. We recognize that the virtual

schools movement brings many challenges to K–12 education and to teacher preparation. Goodlad's (1994) view of simultaneous renewal serves as a reminder that innovations in K–12 education must be matched by innovation in preservice teacher education—one cannot come before the other, because both must change together. We plan for this change to be carefully evaluated to inform the development of a model, to sustain VS in the collaborating programs of teacher education, and to inform and support its dissemination nationwide. With continuing evaluation and revision, the project will yield a model for how to prepare teachers and support staff who are both comfortable and competent with “the schools that technology built.”

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