Welcome

Welcome to the fourth edition of NCREL’s Educational Technology News, a biannual newsletter published by the Center for Technology at NCREL. As one of ten regional educational laboratories funded by the U.S. Department of Education, NCREL is a leading research laboratory, helping hundreds of schools integrate technology effectively since the mid-1990s.

In this issue, we present a look at the research work the Center for Technology and its collaborators have been doing recently on exemplary programs in rural and urban teacher education, “what-works” practices in classroom instruction involving technology implementation, and “what-works” practices that encourage the development of language arts literacy skills in K–12 classrooms. In addition, we present the results of a quantitative study of the effects of teaching and learning with technology on students’ outcomes, and we give readers a brief overview of changes that have recently been made to the Center for Technology’s Technology in Education Web site.

Thank you for your continued interest in our work. NCREL invites you to learn more about the Center for Technology by visiting our home page (www.ncrel.org/tech).

Research Spotlight: NCREL Investigates “What Works” in Exemplary Rural and Urban Teacher Education Programs

By David Durian, NCREL Center for Technology

Many teachers in today’s schools find themselves facing a number of changes and challenges. Policymakers and community members are focused on higher academic standards, holding teachers and schools more accountable for student learning outcomes. Teachers are expected to redefine their traditional roles as educators, becoming consumers of technology and active facilitators of learning as opposed to passive transmitters of knowledge. They also are being expected to become instructors of an increasingly diverse population of students, a mixture representing multiple nationalities, languages, and customs, in addition to special-needs students who are mainstreamed into the regular classroom. At the same time, the teaching profession is experiencing a dramatic shift from a senior teaching force now retiring to a younger staff just beginning to teach,
with high rates of turnover observed during the crucial first few years of teaching. These high turnover rates, as well as the increasing challenges that new teachers face upon entering the classroom, have led to chronic teacher shortages in many rural and urban areas of the United States, particularly in the content areas of mathematics, science, and special education (Fulton, Glenn, Valdez, & Blomeyer, 2002).

To help provide a “what-works” model to teacher education programs looking for guidance in dealing with multiple aspects of these complex issues, the Center for Technology recently released several research reports specifically designed to investigate the practices of exemplary teacher education programs throughout the United States. Consisting of three reports centered on teacher education programs addressing rural and urban teaching populations, the documents are the first in a series of reports to be released discussing research being conducted by NCREL over the next three years on what works in these programs. Written by Center for Technology staff in collaboration with Allen Glenn of the University of Washington at Seattle and Kathleen Fulton of the National Commission on Teaching and America’s Future, the reports were recently made available via the NCREL Technology in Education Web site (www.ncrel.org/tech).

The first report in the series, titled A Perspective on the Renewal of Teacher Education (Glenn, 2001a), provides a summary of the issues that are currently confronting the field of teacher education and presents a foundation for the research that NCREL will conduct over the next few years. Specifically, the report looks at teacher education within the current reform-centered education agenda and provides a concise summary of the trends that have occurred within the field over the last half-century that have led to the current views of teacher education reforms. Moreover, it discusses the impact of recent innovations in technology on the training needs of new teachers and presents some preliminary questions these innovations have raised for American teacher education programs.

The second report, also by Glenn (2001b), is titled Emergence of Technology Standards for Preservice Teacher Education. It discusses in more detail the technology-integration reforms that have changed classroom teaching since the 1970s and provides an analysis of how these reforms have impacted preservice teacher preparation programs during the last 30 years. In addition, Glenn discusses the impact that standards-based reforms have had on state teacher certification policies for new teachers and summarizes the initiatives that have led to the emergence of technology standards for teachers over the last decade. He also contributes to the foundation for NCREL’s ongoing research work on exemplary teacher education programs that make use of standards-based and technology-infused approaches to teacher training.

The third report, Preparing Technology-Competent Teachers for Urban and Rural Classrooms: A Teacher Education Challenge, was written by Kathleen Fulton, Allen Glenn, and NCREL researchers Gilbert Valdez and Robert Blomeyer. In it, the authors build on the research summarized in the two Glenn reports by detailing the results of their initial study of six exemplary teacher education programs: Appalachian State University, Florida State University, University of Texas at El Paso, University of Wisconsin at Milwaukee, Western Illinois University, and Xavier University of Louisiana. Through the use of in-depth case studies written in conjunction with the dean and assistant dean of education at each institution, the report provides research-based examples of strategies that teacher education programs can use to infuse technology into their curricula, establish strong links to local schools, and implement a standards-based program founded on standards such as those proposed by the National Council for Accreditation of Teacher Education (NCATE) and the International Society of Technology in Education (ISTE).

In addition to presenting the case studies, this report also provides an overview summary of the commonalities that make all six of the investigated teacher education programs exemplary. In sum, it provides seven areas shared by the schools that illustrate their strong programs in technology integration and in preparing graduates to teach in high-need urban and rural settings (see Exhibit 1). Furthermore, the report discusses the ways in which each of the six programs is unique, although as the findings suggest, there were, in fact, more commonalities than differences among the programs, which suggests that the areas of commonality are strong indicators of the strategies used by the programs that have led to their success.

Exhibit 1. Areas of Commonality Found Among the Six Schools

| Strong leadership by the dean or director of teacher education in terms of technology integration |
| One or more technology role model(s) trusted by the faculty |
| Effective technology support staff |
| Significant external funding sources, most particularly federal grants |
| State mandates that forced the issue |
| Continuing challenge of influencing teaching in the programs outside the college of education (e.g., arts and sciences classes) |
| Emphasis on creating and maintaining very strong local and community ties that have communication and ideas flowing both ways |

Adapted from Fulton, Glenn, Valdez, and Blomeyer (2002), page 6.
These three reports present NCREL’s initial research findings conducted in the area of teacher education. Over the course of the next three years, NCREL will continue its exploration in this field by conducting further research on three of the institutions investigated in Preparing Technology-Competent Teachers and attempting to determine further what works in these programs when it comes to preparing teachers to use technology in the classroom and to teach in urban and rural settings. In doing so, NCREL hopes to provide the larger educational community with a model of success in these efforts, so that other programs may find solutions to aid them in helping the next generation of teachers meet the challenges of teaching in today’s schools.

To read the reports discussed in this article, visit the Teacher Preparation portion of the NCREL Technology in Education Web site (www.ncrel.org/tech).

References

Web Site Update: NCREL Releases New Content on enGauge Web Site

By Nicole Gallmann, NCREL Center for Technology

The enGauge Web site is an online framework designed to help schools and districts evaluate and plan for the systemic and effective use of educational technology. It provides a comprehensive view of critical factors in the educational system that strongly influence the success of learning technologies. Initially released in 2000, enGauge continues to be refined, revised, and further developed, based on feedback from users and field experience. Over the course of the last year, NCREL has continued to work with the Metiri Group and the North Central Regional Technology in Education Consortium (NCRTEC) to improve enGauge, making it a more user-friendly Web tool. At the end of the 2002 contract year, NCREL added the Metiri Group’s report titled What Works: Enhancing the Process of Writing through Technology as well as six new Success Stories, which provide extensive project summary descriptions, scenarios, condition-specific strategies, and identification of areas for future school improvement. While perusing these new postings on enGauge, readers also may want to note the ongoing alterations the Web site is undergoing in its organization and appearance.

What Works: Enhancing the Process of Writing through Technology—Integrating Research and Best Practice

Commissioned by NCREL and written by Cheryl Lemke and Vandana Thadani of the Metiri Group, What Works reports on a number of strategies that can be used by K–12 educators in the language arts classroom. As Lemke and Thadani (2002) suggest, this report might best be used as a “foundation for improving the teaching and learning of writing in the context of today’s Digital Age” (p. 1). Therefore, the report is divided into six sections devoted to researching what “proficiency in writing” (p. 1) demands. Writing, as the term is used within What Works, branches out from the traditional definition of the written word to include the literacy skills of visual and audio communication as well.

“Section One: The Complexity of the Writing Process” focuses on the multiplicity of preexisting writing processes and what a student writer encounters throughout multiple steps. This section in particular is helpful in determining the assistive role the report can ultimately play for educators, while effectively citing the process under investigation. “Section Two: Best Practices for Effective Writing Instruction” and “Section Three: New Dimensions to Writing through Visual Intelligence” take a practical and easily applicable approach, delving into the successful strategies developed while using...
technology in writing instruction, as well as the methods employed for integrating visual intelligence into the modern written medium. The purpose of “Section Four: Technology and the Teaching of Writing” is tied to recounting “how conventional writing—written products, the writing process, and writing assessment—has been, or can be, impacted by technology” (Lemke & Thadani, 2002, p. 1). Expanding on the ideas presented in Section Four, “Section Five: Examples of Promising Technology-Supported Solutions,” “Section Six: Future Directions for Technology,” and the “Teaching of Writing” provide direction and real applications for educators.

Success Stories Unveiled

Also new to enGauge this year are additions to the Success Stories matrix. The stories, as they apply to the conditions and indicators of the enGauge framework, are based on the real-life experiences of educators and school districts nationwide who have found methods of implementing new techniques or practices with a high level of successful implementation. Each Success Story in enGauge then serves as an effective example—or a template—providing innovative teaching ideas for both teachers and administrators.

High Mount Elementary School in Swansea, Illinois, and Germantown Elementary School in Germantown, Illinois, share their programs’ achievements in implementing peer collaboration, generative and performance-based assessments, and innovative teaching practices, respectively. The applications for each of these Success Stories are appropriate for integration into the early-childhood to eighth-grade classroom. As a school involved in the Federal LITES (Leaders in Technology Enhanced Schools) Grant Program, High Mount’s Success Story (NCREL, 2002c) outlines the school’s ability to create a model learning community through the professional development of its instructors. Alternatively, Germantown uses its Success Story (NCREL, 2002b) to highlight a hands-on interdisciplinary unit that incorporates literature, social studies, and mathematics.

As part of the “21st Century Skills” scenarios, the four other new Success Stories contribute additions to various conditions and their subsequent indicators across the enGauge framework. The four additions are from the following projects and schools:

• TREE (Technology Rich Educational Environment) project at Glen Grove Middle School in Glenview, Illinois (Grades 4–6) (NCREL, 2002e)
• NO LIMIT! Learning Disabilities and Technology project through the Special Education Technology Center at Central Washington University in Washington state (Grades 6–7) (NCREL, 2002d)
• Kentucky’s Scott County School District (Grades 2–12) (NCREL, 2002a)
• Truman Middle School in Fontana, California (Grades 7–8) (NCREL, 2002f)

Referencing both primary and secondary skills, the content areas that each Success Story covers range from mathematics and science to writing and reading. Specific strategies for educators are outlined as well, fostering students’ skills in high productivity, effective communication, Digital-Age literacies, and inventive thinking.


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In an attempt to release research studies that are more aligned with the research agenda currently advocated by the U.S. Department of Education (2002b), NCREL recently conducted a scientifically based study on the impact of the use of technology in teaching and learning on student outcomes. The study, titled \textit{A Quantitative Synthesis of Recent Research on the Effects of Teaching and Learning With Technology on Student Outcomes}, was conducted by NCREL consultants Hersh Waxman and Michael Connell of the University of Houston and Jon Gray of Lamar University. It was recently made available via the NCREL Technology in Education Web site (www.ncrel.org/tech/effects/). Presenting a meta-analysis of 20 research studies conducted on the observable impact of technology on student learning outcomes, the research study suggests that “teaching and technology processes either may directly impact student outcomes or may interact with technology features and indirectly impact outcomes” (Waxman, Connell, & Gray, 2002, p. 14).

Meta-analysis, a technique developed by Gene Glass (n.d.) in the 1970s, enables researchers to test for possible cause and effect using a statistical procedure known as \textit{effect size}. Effect sizes are established by comparing findings from other related research to estimate the overall potential impact of the treatments affecting student learning outcomes. Using meta-analysis as a tool to synthesize a corpus of related studies, a researcher can make general findings on the \textit{effect} a particular instructional technique, strategy, or technology tool may have on the academic performance of all the students participating in all the studies considered within the corpus. Another strength of meta-analysis is that the procedures used to select individual studies for inclusion in the corpus are useful for screening out all but those studies having the highest standards for methodological rigor that conform to the requirements for scientifically based research as stated in the No Child Left Behind Act (U.S. Department of Education, 2002a).

As the Waxman et al. (2002) study demonstrates, meta-analysis is a very useful statistical tool, because not only does it allow researchers to compare the impact of treatments on student outcomes, it also allows them to compare the findings of one research study with another. Specifically, in their study, the researchers executed a meta-analysis of 20 high-quality, quantitative, educational studies examining integrated, classroom-level, instructional technology interventions conducted over the past 25 years. As the authors point out in their conclusions and recommendations, the effect size of their meta-analysis is apparently low to “modest” (Waxman et al., 2002). This indicates that teaching and learning had a positive effect on student outcomes when compared to traditional instruction. Although claims about the net effect of classroom technology use on student academic performance may be modest, the significance of this finding should not be dismissed. This initial scientifically based evidence, demonstrating a net positive effect from integrated technology use on classroom-level student academic performance, is a very important preliminary finding because \textit{there is an effect and it is positive}. During the coming year, NCREL and the principal author will continue working together to expand the meta-analysis in the hope that increasing the number of studies in our research synthesis will help us to understand more clearly the

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possible positive impact that teaching and learning with technology are having on student learning outcomes.

For readers wishing to learn more about the techniques and methods used in this study, and for those wishing to read the study itself, A Quantitative Synthesis of Recent Research on the Effects of Teaching and Learning With Technology on Student Outcomes is available on the NCREL Technology in Education Web site (www.ncrel.org/tech/effects/). NCREL has also provided a user-friendly glossary of research terms employed in a study such as this (www.ncrel.org/tech/effects/glossary.htm).

**References**


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**Special Announcement: Introducing New NCREL Technology in Education Web Site**

Over the past six months, the Center for Technology has made a number of modifications, revisions, and overall structural changes to its Web site based on user feedback received since the launch—as the NETRO site—at the end of 2001. These changes have led us to reconsider the design, structure, and layout in an attempt to make the site more user-friendly for our constituents, and to make information easier to locate throughout both the site and the resources database affiliated with the site.

In early April 2003, the new version of the site was unveiled as the Technology in Education Web site. Among the changes are a new “Bibliography of Resources in Educational Technology” database, a reorganized category system that makes navigating the site by topic much easier, and a collection of resource matrices that allow users to see at a glance the educational technology resources NCREL has to offer for each of the main topic categories contained on the site. In addition, major NCREL resources in each topic area now feature in-depth annotations that help users understand how one major product relates to other products created by NCREL dealing with educational technology.

We invite you to visit the new NCREL Technology in Education Web site (www.ncrel.org/tech) and, as always, we hope users will enjoy it. We also welcome your feedback on the redesign via our e-mail address (technology@ncrel.org).

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