MERIT® software

In-depth Interactive Learning Tools
— Because You Want Results

Research Basis for Merit Software

METHODOLOGICAL FRAMEWORK

Whether students are learning reading, writing or math, they should be mastering skills for practical use rather than simply for academic purposes. Concepts should be broken down into manageable parts. Students must be shown tasks or challenges they can master. They benefit by seeing their mastery grow from small steps to larger applications. In the United States today, classroom work focuses not just on learning facts and procedures, but on metacognition—gaining awareness of strategies and the ability to control them (Schoenfeld, 1999).

Educational software can assist students in learning to read and react strategically. An instructional program's aim should be helping students to become confident working with basics; to make connections; to gain skills, understanding and insight; to express themselves clearly; to be able to compare and contrast both familiar and unfamiliar concepts; to ask questions when they need help.

For students using educational software, constructive feedback must be presented frequently. Positive re-enforcement should occur at the successful completion of each step. This idea, first promulgated by Skinner in 1954, underlies the basis for the current Constructivist perspective on learning. "Interactive assessment…provides the means to scaffold next steps (Shephard, 2000)." Dynamic assessment is a major component of constructive feedback.

Bloom's Taxonomy, first published in 1956 and still regarded as a standard method of conceptualizing critical thinking, classifies cognitive processes into categorical levels— knowledge, comprehension and application, analysis, synthesis and evaluation. Both key words and the kinds of questions encountered within the software are what help students make progress throughout each cognitive level. It is equally vital for software programs to provide context clues and to support students' attempts to organize their thoughts.

Educational software should also offer students a variety of approaches, since effective readers tend to use various strategies. There should likewise be a good deal of interactivity between student and computer. Interactivity should comprise a multi-sensory approach, including text-to-speech software capability (Balajthy, 2005). It is in this manner that the student can become involved in the learning process. Instructional programs must offer first prompts, then guided practice. There should be points at which students are able to generate questions.

It is the theories of Skinner, Bloom and the more contemporary Constructivists that serve as the foundation for Merit Software. The methodology guiding Merit programs allows students to encounter self-paced learning, encouragement to continue, understandable language and interesting content, opportunities to approach tasks in different ways, clearly delineated steps for dealing with material, straightforward instructions and introductions to material. Students likewise encounter frequent chances to print and see progress. They experience a diversity of exercises such as fill-ins, multiple choice, two-answer questions, matching lists and puzzles. Students should be presented with opportunities to reflect in writing upon what they are encountering and receive help while organizing ideas in writing.

RELEVANCE OF EDUCATIONAL TECHNOLOGY

Studies suggest that educational software can accelerate the learning process. A group of teachers and administrators surveyed by the New York City Literacy Initiative suggests that using computer technology to complement class work will benefit learners who are concentrating on areas needing improvement. If utilized properly, technology can assist students in learning independently and at an individual pace. In addition, students who are at ease using technology tend to take more time doing classroom assignments as well as showing a willingness to try new challenges (Denny, 2000).

Other recent studies have emphasized biological elements to explain the adaptability of the mind and brain (Schwartz, 2002). Analytic and linguistic ability can be improved through new activities, focus, and practice. Software usage can dynamically alter learning patterns. Indeed, software offering text-to-speech capability has been shown to rapidly enhance the comprehension skills of struggling readers (Pisha & Coyne, 2001, and Disseldorp & Chambers, 2002).

Educational software should have a multiple impact on students, including increasing self-confidence, improving comprehension and retention, and increasing motivation. Therefore, it is vital to provide students with the right technological tools. The purpose of educational software is to help students both in and out of the classroom. Technology augments "opportunities to access, evaluate and communicate knowledge (Denny)."

Students should be learning more than basics; they should be learning to connect concepts, to solve unfamiliar problems, and to communicate ideas. They should feel appropriately challenged upon completing an instructional program, receiving a lasting impression and being able to apply what they have learned. Educational software should not only help to foster excitement about learning, and enable students to complete their own computer-related goals, but provide part of a foundation for advanced schooling and for a future profession.

Additionally, educational software should impact classes, programs, and schools. Rather than replacing classroom instruction, it should effectively supplement it. As with other kinds of computer-assisted instruction (CAI), educational software is at its best when it is integrated into theme-based curricula. Educational software should serve as an efficient means to help schools and programs demonstrate criterion-referenced academic progress. It should improve learning for all students, from the lowest to highest quartiles in each class. Educational software should help to ameliorate acute differentials in academic expectations, opportunities and outcomes.

For educational software to be successful in purpose and outcome, students must be able to apply new skills within multifarious learning environments. However, the degree to which CAI actually helps students has rarely been quantified. It is unfortunate that there is scant standardization by software publishers; in contrast to standardized-test developers, they have not been held accountable for validating their own claims. Field-testing of software products and validation of mastery claims by publishers remains the exception rather than the rule (Buckleitner, 1999). If they do subject their software to rigorous scientific research, few publish the results. It is rare for educational software to be subjected to empirical testing, via use of treatment and control groups, and comparative analysis to identify CAI as a factor—rather than variable—in increasing student test scores. It is rarer still for any educational software publisher to show concrete evidence of long-term gains after their software treatment.

Though educational technology can be a useful tool, it can easily be a harmful one (Okan, 2003, and Buckingham & Scanlon, 2003). The pressure on schools to provide accountability—that is, consistent academic gain—for all levels and sub-groups of students, can lead to the selection of deficient educational material. Recent research demonstrates that inadequately designed educational technology can negatively impact students (Donnelly, 2006). Rather than fostering learning, such technology can actually impede students' ability to learn essential skills. This sort of negative impact may have far-reaching effects. Only in recent years have local and national governments started redressing the impact of inadequate education. Researchers have measured the tremendous cost of illiteracy (Belfield & Levin, 2001). It impacts everything from school funding, to local municipalities' ability to provide sufficient social services, to students' future earnings, families, and health. The cost of choosing deficient educational materials is enormous.

INSTRUCTIONAL SOFTWARE AND READABILITY

Since the educational psychologist Edward L. Thorndike began researching English vocabulary lists in the 1920s, formulas for readability have followed the general premise that the more often a reader encounters a word, the easier it is for him or her to remember and understand it. Delineating reading levels and choosing vocabulary lists for educational software—just as for traditional classroom texts—requires careful balance. Software reading content must be difficult enough to challenge students with new words as well as with more complex sentences. Content, however, must remain simple enough for students to be able to complete a software level through reading, concentration and practice.

Educational software should involve an up-to-date approach to readability. First, formula-use should employ the most effective approaches for calculating readability: estimating the number of unfamiliar words versus the number of syllables per word and sentence length. Then, a variety of additional factors should always be considered. Tone, content, organization and design all influence the extent to which students regard a particular text as simple or difficult.

One major purpose of educational technology is to help students practice the most crucial reading skills: figuring out vocabulary from context, while re-enforcing key vocabulary words within a beginning context that demonstrates meaning. These skills should be re-enforced by practice and by the constant interactivity—including text-to-speech capability—which software provides. Merit Software's own reading levels and vocabulary lists are based partly on the Dale List of 3,000 Easy Words, the Harris-Jacobson Core Vocabulary and the EDL Core Vocabulary, along with advice from educational practitioners regarding current classroom materials.

According to the National Assessment of Educational Progress (U.S. Department of Education, 1998), students at an advanced reading level ought to be able to demonstrate overall understanding, provide literal and inferential information, use background knowledge, draw conclusions, and judge text critically as well as offer answers showing careful thought. Yet learners can only progress to such a point after they have basic skills in place. Merit believes that a major goal of educational software is to address such questions, going beyond what the traditional classroom can do in helping students to bridge the gap.

RESEARCH CONDUCTED WITH MERIT SOFTWARE

In 2003, Merit Software commissioned consultants at the Marshall University Graduate College in South Charleston, West Virginia to conduct a control versus treatment group research study utilizing several of its reading and language arts programs. The programs were used in classrooms at the Calhoun County Middle/High School in West Virginia. The purpose was to evaluate the effects of Merit programs on students in grades 6 and 8. The results of the study showed that treatment group students increased achievement growth in their scores for several sub-tests of the West Virginia standardized test (Jones, Staats, Bowling, Bickel, Cunningham, & Cadle, 2004).

Study results demonstrated that treatment-group students scored better than the control group in several sub-tests of the Stanford Achievement Test, Ninth Edition (SAT-9). With a suitable complement of controls in place, treatment-group students increased their SAT-9 Reading Vocabulary score by 13.1% of the total sample mean and their Reading Comprehension score by 10.5%. Membership in the experimental group also yielded an average gain of 11.1% for the SAT-9 Language Expression sub-test and an average gain of 8.3% for Spelling.

In 2004, Merit Software commissioned Marshall University consultants to conduct a second quantitative research study. The purpose was to follow up and extend the previous study. Researchers were to evaluate the long-term effects of Merit reading and writing software on students in grades 6, 7, and 8 in Calhoun County Middle/High School classrooms, determining whether the educational gains at Calhoun were short-lived or continuous. Results of the second study showed that treatment-group students outperformed control-group students on sub-tests of the West Virginia Educational Standards Test (2004 WESTEST). Low-achieving students in the treatment group made continuous advances in Reading and Language Arts; WESTEST scores for this group averaged 4.38 points higher than scores for low-achieving students in the control group. WESTEST Science scores were an average of 2.14 points higher; WESTEST Social Studies scores were an average of 8.23 points higher.

Both the first and second Calhoun studies yielded statistically significant positive results. The Merit treatment had the greatest impact on middle school students in the lowest class quartile—those who were below the reading and language arts competency level required by state guidelines. These students were considered struggling readers and "at-risk." The second research study also confirmed that improved learning among students in reading and language arts correlated with educational gains in social studies, science, and math (O'Byrne, Securro, Jones, & Cadle, 2006).

To evaluate Merit Software's effectiveness on younger students, the Marshall University consultants conducted a third quantitative research study in 2005. Glenwood Elementary School is a K-5 school located in a poverty-stricken neighborhood in Charleston, West Virginia. Glenwood third graders were divided into control and treatment groups. The treatment group, which used Merit reading and writing software, showed significant test score gains over the control group. This study confirmed the results of the two previous studies: that students using Merit significantly increased their reading test scores and that the gains transferred to other measured areas of academics (Cantrell, Jones, Securro, & O'Byrne, 2005).

The impact of Merit math software was the subject of a 2005 study at Horace Mann Middle School, also located in Charleston, West Virginia. Horace Mann is an inner-city school, where 51% of students qualify for free or reduced-price lunch. This fourth quantitative research study examined the software's impact on student achievement, the effect of the Merit math treatment, and the probability that other schools could replicate its effect. The Horace Mann study showed that using Merit math software increased student achievement in math. Additionally, the skills developed in math transferred to other areas of academic performance. The effect size measurement of Merit math on student achievement was calculated to be .844 (Securro, Jones, Cantrell, & Blackwell, 2006).

A fifth research study was commissioned to determine the impact of Merit when used over an extensive time-period during a school year. The "What Works Clearinghouse" had established evidence standards which called for curriculum-based interventions to last at least 18 weeks and for random assignment of students. In the 2006 - 2007 school year 6th and 7th graders at Calhoun County Middle School used Merit reading and language arts software for twice a week for 24 weeks. Year-end test scores for Reading/Language Arts increased by 30 points for students using Merit. In addition, 37% more Merit 6th graders achieved Mastery level, or higher, on the state's performance rubric, and 19% more 7th graders. The effect size was .94 for the 6th graders and .70 for the 7th graders. (Securro, Jones & Cantrell, 2007).

RESOURCES

Balajthy, E. (2005). "Text-to-speech software for helping struggling readers." Reading Online, 8(4).
http://www.readingonline.org/articles/art_index.asp?HREF=balajthy2/index.html

Belfield, C. & Levin, H. (2001). "The Economics of Education on Judgment Day," The Occasional Paper Series of the National Center for the Study of Privatization in Education (NCSPE), Teachers College, Columbia University, 28.
http://ncspe.org/publications_files/56_OP28.pdf

Bloom, B.S. (2000). A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Krathwohl, D. & Anderson, L. (Eds.). White Plains: Longman Publishing Group.

Bryan, J., Merchant, C., & Cramer, K. (1999). "America Calls: Technology-based Interdisciplinary Planning and Instruction." The Association for Supervision and Curriculum Development, Classroom Leadership Online, 2(5).
http://www.ascd.org/readingroom/classlead/9902/1feb99.html.

Buckingham, D. & Scanlon, M. (2003). Education, Entertainment and Learning in the Home. Buckingham and Philadelphia: Open University Press.

Buckleitner, W. (1999). "The State of Children's Software Evaluation—Yesterday, Today, and in the 21st Century." Information Technology in Childhood Education Annual, 1, 211-220.

Cantrell, D., Jones J., Securro, S., & O'Byrne, B. (2005). "Successful Intervention: The Impact of Merit Reading and Writing Software on Low Achieving Elementary School Students," Research study conducted at the Graduate School of Education and Professional Development, Marshall University Graduate College, South Charleston, WV.

Chall, J.S. & Dale, E (1995). Readability Revisited: The New Dale-Chall Readability Formula. Cambridge MA: Brookline Books.

Denny, V., Flugman, B. & Gartner, A. (2000). "Technology and Instruction within the New York City Adult Literacy Initiative, Findings and Recommendations." Center for Advanced Study in Education, The Graduate Center of the City University of New York.
http://www.lacnyc.org/publications/reports.htm.

Disseldorp, B., & Chambers, D. (2002). "Selecting the right environment for students in a changing teaching environment: A case study." Paper presented at the meeting of the Australian Society for Educational Technology International, Melbourne, Australia in July.

Donnelly, M. (2006). "Talking stories on cd-rom—how do they benefit their users?" EDUCATION 3-13: The Professional Journal for Primary Education, 33(3).

Fowler, B. (1996). "Bloom's Taxonomy and Critical Thinking." Critical Thinking Across the Curriculum Project, Longview Community College.
http://www.kcmetro.cc.mo.us/longview/ctac/blooms.htm.

Harris, A.J. & Jacobson, M.D. (1982). Basic Reading Vocabularies. New York: Macmillan.

Harris, A.J. & Sipay, E.R. (1975). How to increase reading ability. New York: David McKay.

Hasselbring, T.S. & Glaser, C. H.W. (2000). "Use of Computer Technology to Help Students with Special Needs." The Future of Children: Children and Computer Technology, 10(2).

Jones, J., Staats, W., Bowling, N., Bickel, R., Cunningham, M., & Cadle, C. (2004). "An Evaluation of the Merit Reading Software Program in the Calhoun County (WV) Middle/High School." Journal of Research on Technology in Education, 37(2).
http://www.iste.org/Content/NavigationMenu/Publications/JRTE/Issues/Volume_371/Number_2_Winter_2004_20051/An_Evaluation_of_the_Merit_Reading_Software_Program_in_the_Calhoun_County_(WV)_Middle_High_School.htm.

O'Byrne, B., Securro, S., Jones, J., & Cadle, C. (2006). "Making The Cut: The Impact of an Integrated Learning Sysystem on Low Achieving Middle School Students," Journal of Computer Assisted Learning, 22(3), 218-228.

Okan, Z. (2003). "Edutainment: is learning at risk?" British Journal of Educational Technology, 34(3).

Pisha, B., & Coyne, P. (2001). "Jumping off the page: Content area curriculum for the Internet age." Reading Online, 5(4). http://www.readingonline.org/articles/art_index.asp?HREF=pisha/index.html

Rings, S. (1994). "The Role of Computer Technology in Teaching Critical Reading." Paradise Valley Community College, Maricopa Center for Learning and Instruction. http://www.mcli.dist.maricopa.edu/critR/index.html.

Schoenfeld, A. (1999). "Looking Toward the 21st Century: Challenges of Educational Theory and Practice." Educational Researcher, AERA.NET Publications. http://www.aera.net/pubs/er/arts/28-07/schoen05.htm.

Schwarts, J.M. and Begley, S. (2002). The Mind and the Brain: Neuroplasticity and the Power of Mental Force. New York: ReganBooks.

Securro, S., Jones J., Cantrell, D., & Blackwell, J. (2006). "Intervention That Adds Up: The Impact of Merit Software on Standardized Achievement Test Scores of Middle School Students," I-Manager's Journal of Educational Technology, July.

Securro, S., Jones, J., & Cantrell, D. (2007). "An Evaluation of the Impact of Six-Month Usage of Merit Reading and Writing Software on 6th and 7th Grade Students in the Calhoun County (WV) Middle/High School," Research study conducted at the Graduate School of Education and Professional Development, Marshall University Graduate College, South Charleston, WV.

Shepard, L. (2000). "The Role of Assessment in a Learning Culture." Educational Researcher, ER Online. http://www.aera.net/pubs/er/arts/29-07/shepo1.htm.

Taylor, S. E., Frankenpohl, H., White, C. E., Nieroroda, B. W., Browning, C. L., & Birsner, E. P. (1989). EDL core vocabularies in reading, mathematics, science, and social studies. Austin, TX: Steck-Vaughn Company.

U.S. Department of Education. Office of Educational Research and Improvement. National Center for Education Statistics. (1999). The NAEP 1998 Reading Report Card for the Nation and the State. NCES 1999-500, by P. L. Donahue, K. E. Voelkl, J. R. Campbell, \ and J. Mazzeo. Washington, DC.

U.S. Department of Education. (2002). "No Child Left Behind Act of 2001: Reauthorization of the Elementary and Secondary Education Act Legislation and Policies Website." http://www.ed.gov/offices/OESE/esea/.