Closing The Gap

Assistive Technology for Children and Adults with Special Needs

AT - IN DEPTH

Re-examining the role of assistive technology in learning

By Dave Edyburn

Welcome to *AT In-Depth*. We've chosen to start a column that will introduce readers to some of the leaders and specialists in the field of assistive technology. Their insights, knowledge and first hand experiences, along with real-world examples and strategies, have changed and continue to influence the education we provide in schools today.

Each issue, a leading expert will appear in this column representing their specialty. You will see a variety of topics covered, including technology integration, literacy, language development, and learning styles to name a few.

In this issue, our featured columnist is Dave Edyburn, Ph.D., Professor, University of Wisconsin-Milwaukee, Department of Exceptional Education. Join us, as Dave challenges the reader to closely examine the role of assistive technology in learning.

Thank you for taking time to read this column and our publication. As always, your thoughts and feedback are welcomed. Please send your feedback to: <mturek@closingthegap.com>.

Megan Turek
Managing Editor
Closing The Gap, Inc.

Many students with disabilities struggle to learn commensurate with their abilities. When a student with a disability struggles to read at grade level, write sophisticated prose, or display automaticity in basic math algorithms, such challenges follow him from classroom to classroom, day after day, year after year.

When students are unable to experience success in a learning activity, there is still a learning outcome: Students learn that they don't like the subject matter and they internalize the failure in ways that reflect they are "no good" in subject. Indeed, the emotional scarring of this process is so powerful that these negative outcomes are transmitted through the gene pool. What teacher has not had the experience at parent-teacher conferences where the first explanation a parent offers for their son/daughters' academic failure is, "Well, I was never very good at ___ in school either!" It appears that academic failure has a lifelong impact that closes doors to learning and opportunity.

Chronic underachievement is not a new problem. In practical terms, the problem can be illustrated in a graph as shown in Figure 1. The diagonal line illustrates the the intended learning outcome: one year of academic achievement for each year in school. However, the gray line illustrates a pattern of achievement by many low performing students. The area between the gray line of low performance and the diagonal line of expected grade level performance is known as the "achievement gap." Concern about chronic underachievement is one of the core tenets of No Child Left Behind (NCLB).

Given over 50 years of educational research documenting the achievement gap, the lessons should be clear. First, contemporary schooling practices are not effective for all students (i.e., students of color, students with disabilities, students living in poverty, and students whose first language is not English). Second, continuing to do what we have always done will perpetuate rather than eliminate the

This article originally appeared in the December/January 2007 issue of *Closing The Gap*, Vol. 25 No. 5.

Address
526 Main St.
P.O. Box 68
Henderson, MN 56044

Phone
507-248-3294

Fax
507-248-3810

Web site
www.closingthegap.com

E-mail
info@closingthegap.com

achievement gap. Finally, repeated failure over time creates an achievement gap that is exceedingly difficult to erase.

As I ponder the complex issues associated with enhancing the academic achievement of students with disabilities, I wonder if it is time to reexamine the role of assistive technology in learning. In this article I reflect on a series of issues regarding the role of performance support technology for enhancing academic performance.

When to intervene: Searching for a trigger event

Do we have a responsibility to do more than simply fail students who are not benefiting from current models of one-size-fits-all instruction? How long do we allow students to fail at a given task before we determine they need assistive technology in order to perform the task as expected? In my opinion, one lesson of the achievement gap is that we must provide performance support interventions much sooner than ever before.

Poor academic performance should be a trigger for assistive technology consideration. If a child has repeatedly failed, how much failure data do we need before we have enough evidence that the child can't perform the task? When do we intervene? And, what do we do? (Edyburn, 2006).

Consider the following two scenarios (Edyburn, 2007):

Scenario 1

A child working on the family farm has an unfortunate accident with a combine and loses his right arm. Due to the response by the local paramedics and excellent treatment at local medical facilities, the physical wound is treated quickly. However, the trauma, loss, and grief will linger for the child and his family. When the child returns to school, if the child was right handed, is it reasonable for his teacher to expect that he will write his name the same way he did before the accident? Of course not. His right arm and hand are no longer available for completing the simple task of writing his name on his papers. In situations like this, the child typically receives occupational therapy services where he is taught a variety of interventions to compensate for the physical limitations he may encounter. For example, he may learn how to write with his left hand, how to keyboard with one-hand, how to use a speech recognition system, and how to use a rubber stamp so that he can quickly sign his name.

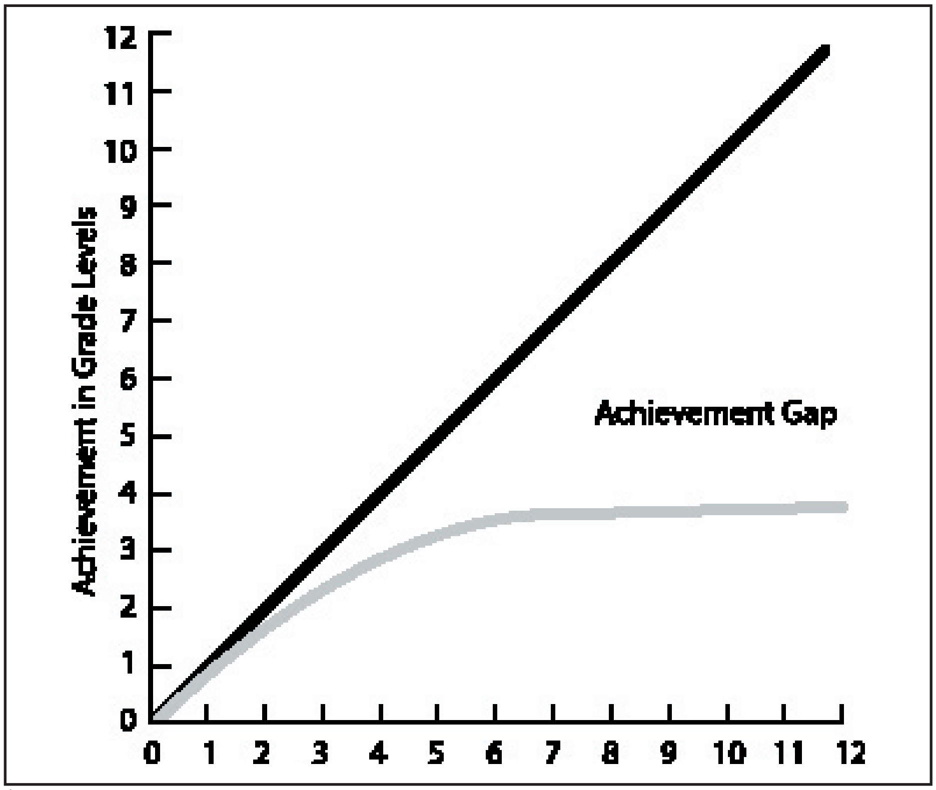

Figure 1.

Scenario 2

A child comes to school not being able to read. Despite the best efforts of his teachers, the child is slow to recognize the letters of the alphabet. He has great difficulty in learning the sounds each letter makes. His knowledge of sight words is minimal. He has limited interest in looking at books or listening to stories. By the time the child reaches fourth grade, his reading skills have advanced to a level equivalent of a mid-year first-grade student. Year after year, the child, his parents and teachers have tried new instructional approaches; used a variety of instructional materials; devoted extra time to reading activities; engaged peer readers to work with him; and used a host of motivational techniques to model, reward, and even coerce him to read. Despite everyone's best efforts, the child has not developed the reading skills that allow him to derive meaning from text with adequate speed, fluency, and comprehension.

I believe these two scenarios are instructive because many educators fail to see any relation between the responses to the challenges each student experiences. For example, in the first scenario we notice the obvious physical impairment demands an immediate response. However, in the second scenario, four years have been devoted to teaching a child to read with little evidence of success. Likewise, we recognize that it would be cruel and unacceptable to demand that a child write with his right arm after it has been lost, but we feel no remorse in demanding that certain children read like their normally achieving peers, despite having years of failure data that indicate that they cannot do the task. Finally, we fail to notice the double standard we hold. In the first case, there is little interest in how the child completes the task; the emphasis is on functional performance. In the second case, we insist that the only way

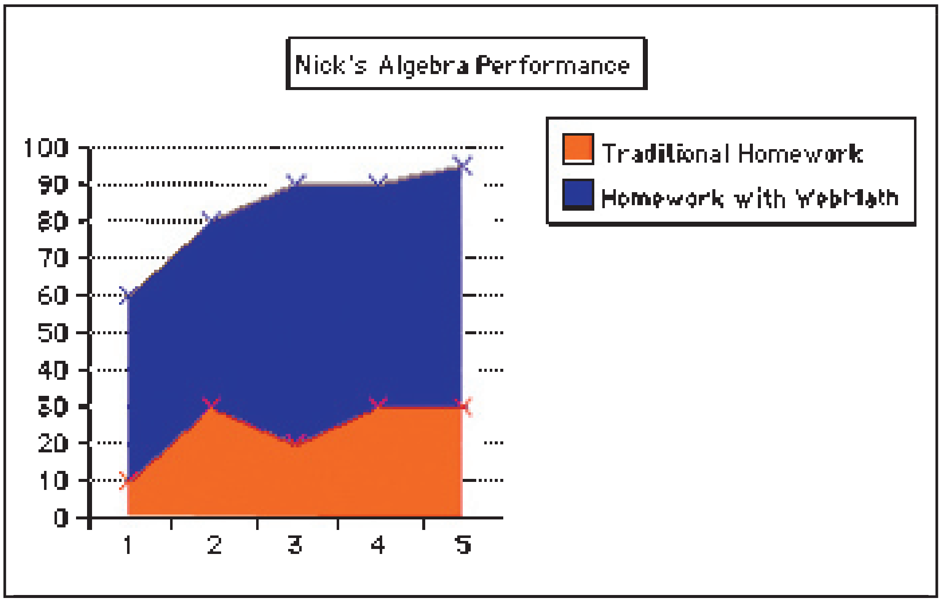

Figure 2.

to read is by using the same visual, perceptual, and cognitive functions as everyone else, despite a plethora of data that points to an impairment in those organic systems.

In each scenario it is important to consider the event that stimulates an intervention and associated support services. Such issues are clear in the first example. However, in the second scenario, there is no single event that triggers action. Therefore, how long do we continue to provide reading instruction when a child is clearly not benefiting from instruction? This point is not meant to suggest that we give up teaching a child to read. Rather, at what point do we intervene with assistive technologies, that enable a student to bypass the decoding aspects of reading that he has not been able to master, in order to engage in the higher-order processes of extracting meaning from text?

Remediation vs. compensation

Assistive technology theorists (Cook & Hussey, 2002; Edyburn, 2005; King 1999) suggest we have a critical decision to make regarding our interventions: remediate or compensate. That is, how do we decide if the best course of action is remediation (i.e., additional instructional time, different instructional approaches) versus compensation (i.e., recognizing that remediation has failed and that compensatory approaches are needed to produce the desired level of performance)? Benchmarks to guide decision-making about remediation and compensation are much clearer in situations involving mobility and sensory impairments than situations involving cognitive functioning like reading, writing, and problem solving.

I believe one means of addressing the remediation vs. compensation problem is to consider the R vs C decision to be an equation rather than an either/or decision. For example, every IEP team should ask the following question as part of the assistive technology consideration process: What percentage of time and effort should be devoted to instruction/remediation and what percentage of time and effort should be devoted to compensation?

Explicitly asking the R vs C question allows the IEP team to explore the balance of support needed to be successful. For example, a decision to allocate 30 percent time and effort to instruction and remediation and 70 percent time and effort to compensation for a middle school student struggling to read content area textbooks is an important step forward. The balance of percentages can be adjusted over time by the IEP team as additional evidence about performance is gathered.

The role of challenge in learning

When a task is too hard to be completed successfully, students get frustrated and disengage. When a task is too easy, students get bored. Learning occurs when the challenge level of a task is "just right." I refer to this phenomena as "The Goldilocks Effect." A critical function of teaching is to find the level of challenge that is "just right" for each student.

The flexibility of digital curriculum (Rose & Meyer, 2000) makes it easier than ever to adjust the challenge level of academic tasks. The concept of a volume control slider is a useful metaphor for describing the supports available in a universally designed learning environment. Tomlinson (1999) uses the term "equalizer" to discuss the concept of a slider. She envisions a number of equalizers that could be developed to control the level of challenge and support diverse student needs throughout the learning process. One practical application of a slider is a cognitive rescaling intervention utilizing the AutoSummary feature in Microsoft Word (Edyburn, 2002).

Learning does not occur simply as a result of access (remember the old saying: you can lead a horse to water but you can't make him drink). In all learning activities, the entry point must provide physical, sensory, and cognitive access and sufficiently supported to ensure success. Ultimately, high levels of learning and performance are only achieved as a result of engagement, sustained over time, in tasks of increasing difficulty and complexity. Therefore, there is an urgent need to locate technologies that adjust the level of challenge associated with core learning activities.

Intervention: Using technology to enhance academic performance

Once educators recognize a performance problem, they must determine how to respond. Unfortunately, I am not sure our treasure chest of interventions is stocked with all the tools we need. Consider the following instructional difficulties and the innovative performance support solutions:

- For students who experience difficulty in recalling facts, provide Ask for Kids <www.askforkids.com> and teach students how to retrieve information they do not know or remember.

• For students unable to independently read their textbooks, provide digital text and text-to-speech software such as ReadPlease <www.readplease.com> or Kurzweil 3000 <www.kurzweiledu.com> or Solo <www.donjohnston.com> so that the student can listen to the information as it is read by the computer.

• For students that struggle with the physical and mechanical tasks of generating a first draft of a paper, provide a dictation service such as iDictate <www. idictate. com> that will prepare documents based on dictation provided over the telephone.

• For students with computational difficulties in math, provide WebMath <www.webmath.com>. This Web-based tool provides calculating and instructional support for solving math problems from elementary through graduate school.

If we are going to ensure the success of all students, we must be much more comitted to locating solutions that support academic performance.

Evidence of technology enhanced performance

To understand whether or not a technology intervention contributes to enhanced academic performance, we need to measure performance with and without the technology, over time. Figure 2 illustrates a pattern of academic performance by a hypothetical student, Nick, as he completes algebra problems over a four-week period with and without technology.

The data associated with Nick's performance without technology reveals a persistent pattern of failure across the unit (i.e., 20, 30, 30, 40 percent). In terms of classroom grading, this pattern of performance will result in a failing grade at the end of the unit or term. Examination of this evidence, in the context of response to treatment (RTI), clearly indicates the need to change interventions as the current intervention is not effective for this particular student. In the context of assistive technology, the data reveal a functional performance problem that should be addressed through assistive technology consideration processes.

In contrast, the performance data associated with the student using a technology intervention (i.e., WebMath) reveals a considerable difference in performance with gains of 40 percent and 50 percent during the short period in which this intervention was provided. In terms of classroom instruction, this technology intervention may be considered instructional technology as the changed format engaged a struggling student in academic content they previously thought was boring, irrelevant, or difficult. Or, the technology may have served an assistive technology function by providing access to the general curriculum through an alternative format.

Given the significant gap between performance without technology and performance with technology, the argument can be made that the technology is serving an assistive technology function. That is, when performance is at an acceptable level (i.e., 80-90 percent) when the technology is being used and falls to an unacceptable level (i.e., 20-40 percent) when it is not used, by definition, we are observing the use of technology as a performance support tool.

Issue: Bias/naked independence

The previous example of WebMath illustrates the potential value of technology tools for enhancing academic performance. However, it also raises a number of provocative questions that reveal we have yet to understand the lessons of the achievement gap.

Since education places a premium on knowledge that is contained in one's head, performance that is completed without the aid of external devices and resources is prized over performance that is dependent on tools or resources. While this may be a historical artifact of society's conception of the educated person, there is a clear bias here. Assistive technology outcomes researchers have termed this form of bias, "naked independence," as it exults the performance of able-bodied individuals and devalues the performance of others that must rely on external devices or tools (Edyburn, 2003).

Teachers and administrators often react strongly to the example of WebMath as a form of assistive technology. They argue that allowing Nick to use such a tool amounts to endorsing cheating. They argue that Nick can't really perform the task like the other students. They argue that he is dependent on the tool. They wonder how he will be able to solve algebra problems when he isn't connected to the Internet. They argue that Nick can't possibly earn an A like other students who successfully complete problems without relying on a tool to help them. And, they argue that allowing Nick to use WebMath is not fair to the other students (e.g., high achieving students who earn their A with sheer mental power, other low achieving students without access to technology). Finally, they argue that we should prevent Nick from ever using WebMath because this form of technology will not be allowed on the state's high-stakes test.

Notice how contentious the conversation about technology enhanced performance has become? The notion that technology can be used to enhance performance challenges traditional roles (i.e., entitlement) held by those who can complete a task and claim that their performance (naked independence) is superior to performance that is enhanced through technology. Hehir (2005) describes this situation as "ableism," an insidious form of discrimination that creates barriers for individuals with disabilities based on the cultural attitudes of the able-bodied.

Concluding thoughts

Given the current expectations that all students will achieve grade level standards by 2014, I believe it is time to critically examine the role of assistive technology in learning. While technology can facilitate access and participation, we must look seriously at issues of challenge and engagement. Further, we may need to rethink assistive technology service delivery systems to consider how performance support tools might be provided to everyone.

For more information, contact Dave Edyburn, Dept. of Exceptional Education, University of Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, WI 53201; E-mail: <edyburn@uwm.edu>.

References

Cook, A.M., & Hussey, S.M. (2002). Assistive technology: Principles and practices (2nd ed.). St. Louis, MO: Mosby.

Edyburn, D.L. (in press). Technology enhanced reading performance: Defining a research agenda. Reading Research Quarterly, 42(1).

Edyburn, D.L. (2007). Technology enhanced reading performance: Defining a research agenda. Reading Research Quarterly, 42(1), 146-152.

Edyburn, D.L. (2006). Failure is not an option: Collecting, reviewing, and acting on evidence for using technology to enhance academic performance. Learning and Leading With Technology, 34(1), 20-23.

Edyburn, D.L. (2005). Technology enhanced performance. Special Education Technology Practice, 7(2), 1 6-25.

Edyburn, D.L. (2002). Cognitive rescaling strategies: Interventions that alter the cognitive accessibility of text. Closing the Gap, April/May, 1, 10-11, 21.

Hehir, T. (2005). New directions in special education: Eliminating ableism in policy and practice. Cambridge, MA: Harvard Educational Publishing Group.

King. T.W. (1999). Assistive technology: Essential human factors. Boston: Allyn & Bacon.

Rose, D., & Meyer, A. (2002). Teaching every student in the digital age. Alexandria, VA: ASCD.

Tomlinson, C.A. (1999). The differentiated classroom: Responding to the needs of all learners. Alexandria, VA: ASCD.

For more information, contact the author: Dave Edyburn, Dept of Exceptional Education, University of Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, WI 53201; E-mail: <edyburn@uwm.edu>.