



# Reducing Overload in Students with Learning and Behavioral Disorders: The Role of Assistive Technology

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# Reducing Overload in Students with Learning and Behavioral Disorders: The Role of Assistive Technology

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## Abstract

The academic and social demands of school and classroom environments place unique demands on students with emotional and behavioral disorders (EBD). Assistive technologies provide a resource that largely remains untapped in the management of behaviors. This article outlines four tips teachers may use as they select from an array of assistive technologies designed to address specific learning and behavioral needs of students. In addition, the authors recommend available hardware and software teachers may use when teaching students with EBD.

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## Keywords

emotional disorders, behavioral disorders, assistive technology

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Students with emotional and behavioral disorders (EBD) have unique learning needs (Kauffman, 2005; Lane, 2004; Maag, 2006; Witt, VanDerHeyden, & Gilbertson, 2004). The challenges of academic tasks are so great for them that relative to their ability, this group of individuals represents the lowest achieving of all students (Allen-DeBoer, Malmgren, & Glass, 2006).

Students with EBD cope with a host of distractions and competing events. Many put considerable effort into a particular academic task (e.g., the physical process of writing; reading for comprehension), while they focus more effort on adjusting for their disability. When additional tasks are ‘piled on,’ a student’s ability to cope effectively is then compromised; frustrations and such behavior problems as, off-task behavior, frustration, and aggression often follow (Kauffman, 2005; Mattison, Hooper, & Carlson, 2006; Trout, Epstein, Nelson, Reid, & Ohlund, 2006). For many students with EBD, assistive technology (AT) holds the promise of reducing the effects of their disabilities (i.e., it is compensatory) and thereby allowing students to focus their ability on the specific demands of academic tasks of importance and successfully demonstrate acceptable behaviors that could not otherwise do without the AT (Edyburn, 2002; Peterson-Karlan & Parette, in press).

### **Purposes of Technology in Relation to Behavior**

When considering how the teacher or the student can use AT to manage social and academic behavior in the classroom, there are four general tips that should be considered.

Each of these is discussed in the following sections.

*Tip 1: Consider the background events (antecedents).* For any child expected to meet the demands of particular academic tasks, such as, writing, reading, or doing mathematical calculations, problem behaviors can often be caused by antecedents (or things that precede the problem behavior) and which interfere with the task performance. Examples of antecedents include child and teacher expectations, goals, and objectives. They include *triggers* of behaviors that prompt action and constraints that shape action, indicating what is and what is not acceptable behavior. AT may be used as an intervention that reduces potential triggers of undesirable behavior. Among the many tasks that may serve as triggers of frustration for students with EBD in academic settings are word recognition, spelling, handwriting, organization of materials, locating relevant materials, and assignment completion.

**If the students knew that a number of demands would be removed by using a tool... the potential for frustration might be markedly reduced.**

*AT tools.* Several devices are available to assist students to deal with antecedents and minimize the possibility of frustrations and related inappropriate behaviors occurring in the areas of reading, writing, and mathematics (see Table 1).

In the area of reading, text-to-speech software programs holds great promise as they allow screen presented text to be read aloud to the student, thus minimizing the challenges of tasks such as, decoding print. For example, the Microsoft® suite contains a free Reader allowing text to be highlighted

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and spoken with a keystroke by the user (Windows key + S). Other free programs, such as ReadPlease®, are easily downloadable for use on Windows operating systems.

In the area of Writing, three specific tools have particular applicability for student with EBD, including (a) talking word processors, (b) graphic organizers, and (c) speech recognition software. Talking word processors, such as, Write:Outloud, by Don Johnson, Inc.; Intellitalk 3 by Intellitools, Inc.; Aspire Reader 4.0™, by the Center for Applied Special Technology; Type & Talk, by Texthelp!® help students by eliminating or minimizing the cognitive effort required for processing multiple stimuli presented to a student during the challenge to create written products. Typically, writing requires multiple skills, including focused attention on the writing surface, such as, paper, or a computer monitor, thus visually scanning a keyboard and selecting appropriate keys needed to type words (or gripping a pencil and creating letters and words), checking spelling and punctuation, and other skills. Students who have had poor experiences in the past with the writing process may see any such tasks as a source of frustration given all the physical and cognitive demands associated with writing. However, if the student knew that a number of the demands would be removed by using a tool, such as a talking word processor, the potential for frustration might be markedly reduced. Hearing what is being typed during the writing process assists many students to produce more words, as well as check spelling and grammar using features built into many talking word processor programs.

Many types of graphic organizer approaches are available to teachers of students

with EBD (see e.g., Graphic.org, n.d.; North Central Regional Education Laboratory, 1988). Computer-based graphic organizers, such as DraftBuilder™ (Don Johnston, Inc., 2005), enable students to deal with antecedents by reducing or eliminating frustrations that might arise resulting from the anticipation of having to organize thoughts prior to composing a written assignment. Using stepwise, structured approaches, the software provides students with a framework for visually organizing their thoughts, thus reducing the challenges involved in the task of writing. DraftBuilder™ and other computer-based organizers encourage students to think about information in new ways by removing the words and thus allowing them to focus on the connections between thoughts, clarify their thinking, and edit their thoughts prior to the writing task (Lamb, 2003).

Speech recognition is a powerful tool that has yet to be fully used in public school classrooms, though it holds great potential to remove multiple challenges for a student with EBD during the writing process. Many tools are available (see Table 1), including speech recognition capabilities within the Windows® XP operating system or the Microsoft® Office software application. Using a microphone and speech recognition software, a student simply talks and his/her words are automatically typed and presented on the computer monitor. Knowing in advance that the challenges of typing (or handwriting) will be removed from the writing process can minimize or eliminate frustrations with which some students with EBD must contend.

**AT may be used as an intervention that reduces potential triggers of undesirable behavior.**

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When presented with the possibility of having to engage in Math tasks, many students with EBD approach their assignments with hesitation, due to their preconceived notions of task demands. They are often uncomfortable with the anticipated demands of knowing operations for math problems, being able to check answers, and other related tasks. Certain types of calculators hold great potential for helping students who have antecedent based challenges. An example is Edmark calculators archived at the Panhandle Area Educational Consortium Web site (see Table 1). Using the Calculator Collection software, students can ‘simplify’ math values and problems by getting visual presentations of proportions of a whole and seeing steps in a problem. For example, if the student types the fraction ‘ $\frac{3}{4}$ ’ and clicks the ‘simplify’ button, a visual presentation of the fractional part is presented using shaded areas in both a circle, a rectangle, and grid array. A decimal representation of the fraction is also presented. When typing a problem (e.g.,  $\frac{3}{4} + 1\frac{2}{3}$ ), the student would be presented with steps in solving the problem, as well as a conversion to a decimal equivalent. In using the Algebra Calculator, the student can create algebraic equations and control the values of variables within the equation, as well as being presented with all steps in the process of solving the problem. Other special calculators are available commercially and vary markedly in cost depending on the task they perform for students.

**[The best tools] do not draw undue attention to the student.**

*Tip 2. Tracking and measuring behavior.* Classroom teachers and their students with EBD generate data for a variety of reasons. Due to the demands of their daily rou-

time, they continually seek easier and better ways to develop data generation systems that are easy to use in their busy classroom environments. Furthermore, students can learn how to monitor their own behavior (Alberto & Troutman, 2006). There are a number of tools that can help meet the demands associated with monitoring classroom behavior.

*AT tools.* Four specific tools may be used by both teachers and students to assist them with the task of monitoring behavior during assigned classroom tasks. These include (a) stop watches, (b) hand-held counters, (c) Palm devices, and (d) computer devices.

There is an array of stop-watches that may be used during tasks that require an understanding of the passage of time and the ability to complete tasks within assigned time intervals. A stop-watch can relieve the burden of having to deal with time-management, thus allowing him/her to focus more directly on the academic task at hand. Awareness of inefficiencies in managing one’s time can minimize the possibility of frustrations arising, and a stop watch allows individuals to focus their energy on the assigned task while having a constant visual ‘prompt’ or ‘cue’ regarding the passage of time.

Hand-held counters can assist with the cognitive task of counting words, paragraphs, math problems, and other tasks related to academic assignments. For students who have memory problems or who have difficulties tracking/counting in a cumulative manner, hand-held counters allow students to focus on other aspects of an academic assignment, while providing an ongoing tally

of specific student task achievements. Also, as with the stop-watch, they do not draw undue attention to the student.

A variety of Palm devices are currently available that enable a range of monitoring strategies for numerous classroom behaviors. These hand-held devices can be programmed with a series of questions related to the performance of a specific academic task, coupled with feedback to the student who responds to the question. For example, a Palm device could be programmed to present a series of steps to the student for completion of a classroom assignment. In each step, the student would (a) receive information regarding what was required, (b) be prompted to get additional information if there were questions, (c) input information/data regarding his/her performance of the task, (d) receive textual and auditory feedback regarding completion of the task, and (e) present the student with a record of his/her performance for that assignment and compare it to performance over time.

A software application enabling a student to measure his/her behavior while completing academic tasks is available using Microsoft® Excel. Teachers can create spreadsheets that allow students to enter performance data as it is obtained, and have charts or graphs displayed immediately, such that student progress can be visually presented.

*Tip 3. Use self-monitoring.* Many students with behavior problems have difficulties related to self-regulation of their behavior during academic task performance (Kern-Dunlap, Dunlap, Clark, Childs, White, & Stewart, 1992). However, teachers can use a number of strategies and tools with these students and allow them to assume responsibility for managing their own behaviors (Alberto & Troutman, 2006). Tools that may prove helpful with self-monitoring can be divided into three categories: (a) visual/auditory prompting devices, (b) visual/auditory cueing devices, and (c) self-graphing devices.

**Table 1: Assistive Technology Tools**

Rule	Tool	Description	Resource/Contact
<b>Consider the background events</b>			
<i>Reading</i>	Text-to-speech (TTS)	Type of speech synthesis application used to create a spoken sound version of the text in a computer document. TTS can enable the reading of computer display information or may simply be used to augment the reading of a text message.	<a href="http://www.readplease.com">http://www.readplease.com</a> <a href="http://www.softplatz.com/software/text-to-speech-software">http://www.softplatz.com/software/text-to-speech-software</a> <a href="http://www.magnifiers.org/links/Download_Software/Text-To-Speech_software/">http://www.magnifiers.org/links/Download_Software/Text-To-Speech_software/</a>
<i>Writing</i>	Talking word processors	Programmable typewriters or computer programs providing auditory feedback to help students compose, format, sort, and rearrange text upon command and sometimes perform other related functions such as correcting misspelled words.	<a href="http://www.donjohnston.com/catalog/writoutd.htm">http://www.donjohnston.com/catalog/writoutd.htm</a> <a href="http://atto.buffalo.edu/registered/Tutorials/IT2/index.php">http://atto.buffalo.edu/registered/Tutorials/IT2/index.php</a> <a href="http://www.synapseadaptive.com/textHELP/TT/type_&amp;_talk_1.htm">http://www.synapseadaptive.com/textHELP/TT/type_&amp;_talk_1.htm</a>

<b>Table 1 (Continued). Assistive Technology Tools</b>			
	Graphic organizers	Tools enabling visual representations of information used for constructing meaning in reading, writing, and speaking.	<a href="http://www.ncrel.org/sdrs/areas/issues/students/learning/lr2grap.htm">http://www.ncrel.org/sdrs/areas/issues/students/learning/lr2grap.htm</a> <a href="http://www.graphic.org/goindex.html">http://www.graphic.org/goindex.html</a> <a href="http://www.donjohnston.com/catalog/draftbuilderd.htm">http://www.donjohnston.com/catalog/draftbuilderd.htm</a>
	Speech recognition software		<a href="http://www.speechstudio.com/commercial/speech.htm">http://www.speechstudio.com/commercial/speech.htm</a> <a href="http://www.microsoft.com/windowsxp/using/setup/expert/moskowitz_02september23.mspx">http://www.microsoft.com/windowsxp/using/setup/expert/moskowitz_02september23.mspx</a>
<i>Mathematics</i>	Calculators	Includes wide array of devices for performing numerical calculations.	<a href="ftp://ftp.paec.org/pd3/calculator_collection_setup.exe">ftp://ftp.paec.org/pd3/calculator_collection_setup.exe</a> <a href="ftp://ftp.paec.org/pd3/algebra_calculator_setup.exe">ftp://ftp.paec.org/pd3/algebra_calculator_setup.exe</a> <a href="http://www.bizrate.com">http://www.bizrate.com</a> <a href="http://www.shoplet.com/">http://www.shoplet.com/</a>
<b>Track and measure behavior</b>			
	Stop watches	Devices used to measure and evaluate performance by monitoring results as a function of time.	<a href="http://www.stopwatches.com/">http://www.stopwatches.com/</a> <a href="http://www.weplay.com/track/stopwatches/">http://www.weplay.com/track/stopwatches/</a> <a href="http://www.school-tech.com/watches.html">http://www.school-tech.com/watches.html</a>
	Hand-held counters	Devices that keep a record of the number of times something happens.	<a href="http://www.amazon.com/">http://www.amazon.com/</a> <a href="http://www.1.shopping.com">http://www.1.shopping.com</a> <a href="http://tallycounterstore.com/">http://tallycounterstore.com/</a>
	Palm-based devices	Personal computers small enough to fit in the palm of a person's hand.	<a href="http://www.overstock.com/">http://www.overstock.com/</a> <a href="http://www.amazon.com/">http://www.amazon.com/</a> <a href="http://www.nextag.com/">http://www.nextag.com/</a>
	Computer devices	Software to create spreadsheets and record-keeping documents to assist students with tracking and recording their performance.	<a href="http://www.jimwrightonline.com/php/tbrc/tbrc.php">http://www.jimwrightonline.com/php/tbrc/tbrc.php</a> <a href="http://www.iepware.com/BIP.html">http://www.iepware.com/BIP.html</a> <a href="http://www.polyxo.com/documents/">http://www.polyxo.com/documents/</a> <a href="http://www.interventioncentral.org/htmldocs/interventions/behrtcd.shtml">http://www.interventioncentral.org/htmldocs/interventions/behrtcd.shtml</a> <a href="http://kidtools.missouri.edu/index.php?Content=KidToolsPrograms">http://kidtools.missouri.edu/index.php?Content=KidToolsPrograms</a>
<i>Use self-monitoring</i>	<i>Visual/Auditory Prompts</i>	Devices that provide speech, visual and/or auditory prompts regarding student behavior or steps to be completed in an academic task, rules, and other importance sequences.	<a href="http://www.attainmentcompany.com/">http://www.attainmentcompany.com/</a> <a href="http://www.ablenetinc.com/">http://www.ablenetinc.com/</a> <a href="http://www.timetimer.com/index.php">http://www.timetimer.com/index.php</a> <a href="http://www.classsource.com/teacherAids/index.html">http://www.classsource.com/teacherAids/index.html</a>
	<i>Self Graphing</i>	Devices that present visual information regarding student performance.	<a href="http://www.jimwrightonline.com/php/tbrc/tbrc.php">http://www.jimwrightonline.com/php/tbrc/tbrc.php</a>
<b>Table 1 (Continued) Assistive Technology Tools</b>			

<i>Promote social behavior</i>		Cards presenting a brief scenario to explain how a hero of special interest has encountered and solved a particular problem of relevance to a student.	<a href="http://www.specialconnections.ku.edu/cgi-bin/cgiwrap/speconn/main.php?cat=behavior&amp;subsection=pbs/casea&amp;scene=4">http://www.specialconnections.ku.edu/cgi-bin/cgiwrap/speconn/main.php?cat=behavior&amp;subsection=pbs/casea&amp;scene=4</a>
	<i>Social Stories™</i>	Textual or auditory presentation of a situation, skill, or concept in terms of relevant social cues, perspectives, and common responses in a specifically defined style and format.	<a href="http://www.thegraycenter.org/socialstories.cfm">http://www.thegraycenter.org/socialstories.cfm</a>

*Self-graphing.* Students can be taught to record and graph their own data, whether it is on-task behavior or monitoring social and academic tasks (Gunter, Miller, Venn, Thomas, & House, 2002). In addition to the Excel strategies previously described by Gunter et al., several tools are available to assist students with meeting the demands of managing their own behavior. Available at jimrightonline.com is teacher-generated behavior report card that can be customized for specific students and sent home daily or weekly. The teacher can add his or her own behavioral items to be assessed, or select from behavioral checklist items online. Each item is evaluated using a dropdown rating list in which point values can be assessed regarding the behavior of concern. Monitoring charts of assessed performance over time are also available for screen display.

*Tip 4. Promote social behavior.* Students with EBD frequently have difficulty with acquiring or executing appropriate social behaviors. Whatever the cause of the social problem, it is recognized that AT can help children manage behaviors associated with social components of classroom activities and learn the skills deemed important.

*AT tools.* Two useful AT solutions that can assist students with EBD include Power Cards (Gagnon, 2001; Keeling, Myles, Gagnon, & Simpson, 2003) and Social Stories™ (Gray Center for Social Learning and Understanding, n.d.). Power Cards are visual aids developed by educators and parents to help students make sense of social situations, routines, the meaning of language, and the ‘hidden curriculum’ embedded in all environmental settings. A brief scenario is used to explain how a hero of special interest has encountered and solved a particular problem. Then a trading or business card size Power Card is created that summarizes the strategy and contains a picture of the special interest (Gagnon, 2001).

Students with EBD may gain increased access to social skill development through social stories (Gray, 2000). Using assistive technology students may write their own social stories. Social Stories™ describe “a situation, skill, or concept in terms of relevant social cues, perspectives, and common responses in a specifically defined style and format” (Gray Center for Social Learning and Understanding, n.d.). A Social Story™ is used to share accurate social information in a patient and reassuring manner that is easily understood by its audience. These stories are AT when they compensate for a student’s difficulty un-



derstanding a social context and the behaviors that are appropriate within these contexts. Half of all Social Stories™ developed should affirm something that an individual does well. These stories are typically comprised of (a) descriptive sentences that provide information about the setting, subjects, and actions; (b) directive statements about the appropriate behavioral response; (c) perspective sentences that describe the feelings and reactions of

others in the targeted situation; and (d) control statements that provide analogies with related actions and responses (Gray, 2004). Gray imposed additional structure on Social Stories™ (Gray Center for Social Learning and Understanding) by recommending a ratio of two to five descriptive, perspective, and/or control sentences for each directive sentence. Social Stories™.

**Figure 1: Sample Power card approach using the Powder Puff girls.**

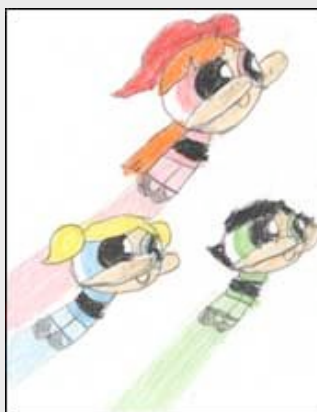
The Power-Puff Girls like to play games. Sometimes they win the game. When they win games the Power Puff Girls feel happy. They might smile, give each other a high five or say "yea!" But sometimes they lose the game. When they lose games the Power-Puff Girls might not feel happy. They might take a deep breath, say "good job" to their friend or say, "maybe next time."

The Power-Puff Girls" want every one to have fun playing games. They want you to remember these three things when playing games the Power-Puff way:

1. Games should be fun for everyone.
2. If you win a game you can; smile, give a high five, or say, "yea!"
3. If you lose a game you can: Take a deep breath, say, "good job" to your friend or "maybe next time."

A laminated POWER CARD with the steps to play a game like the Power-Puff Girls was also developed. This card consisted of the three steps listed in the scenario and a picture of the Power-Puff Girls.

Source: Keeling, K. (2001). *The Power Card Strategy: The Power Puff girls play a game*. Retrieved November 16, 2005, from the Autism Asperger Publishing Company website at: [http://www.asperger.net/newsletter\\_dec01keeling\\_print.htm](http://www.asperger.net/newsletter_dec01keeling_print.htm). Used with permission.



Power Cards are visual aids developed by educators and parents to help students make sense of social situations, routines, the meaning of language, and the 'hidden curriculum' embedded in all environmental settings. A brief scenario is used to explain how a hero of special interest encountered and solved a particular problem. Then a trading or business card size Power Card is created to summarize the strategy and it contains a picture of the special interest (Gagnon, 2001; See Figure 1).

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## Conclusion

Students with EBD who have difficulty managing the plethora of academic and social demands of schools today can benefit immensely from the array of tools discussed in this article. Teachers' decisions regarding AT for students with EBD are guided by the principles of good teaching practice. Considerations of antecedents to behaviors, the basic importance of observing and measuring behaviors, teaching students to manage their own behavior, and promoting positive social behaviors undergird educational programming for EBD. Teachers who try these tools with their students realize the benefits of removing specific task demands. When students with EBD use these tools, we may anticipate more focused and academically successful behaviors.

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