TECH-NJ 2010

Assistive Technology for People with Disabilities

The College of New Jersey, School of Education
Department of Special Education, Language and Literacy
Volume 21

College Professor Creates Tactile Diagrams for Blind Student

by Adela Katkic

This is a true adventure story about a professor of computer science, a college student who is blind, push-pins, and a bag of chocolate bars. It illustrates what can be accomplished when a person approaches each day as a learning adventure.

Computer science is the study of theoretical foundations of information and computation; the understanding of programming languages and algorithms; and the creation of new programs. It presents learning challenges for many students, and instructors rely heavily on elaborate diagrams to illustrate the relationships among complicated factors. These diagrams, however, represent a formidable obstacle for students who are blind. Screen readers, the type of software that can read aloud text on computers, cannot understand or speak diagrams. This was the problem facing Dr. Peter DePasquale in his CSC 230 course at The College of New Jersey in the spring of 2009.

Providing Access to Diagrams for a Blind Student

Cory Samaha, a recent transfer student who was enrolled in Dr. DePasquale's course, approached the professor after class one day because he had had difficulty understanding the day's lecture. The lecture had revolved around a diagram that Cory could not see, and Dr. DePasquale struggled to explain it verbally. When he realized that the verbal explanation did not clarify the issue, Dr. DePasquale glanced around the room, spotted a bag of mini-chocolate bars and a box of push-pins, and tried a different tactic. Over the course of a few hours he built a 3-D diagram with the chocolate bars and push-pins that Cory could feel with his fingers. This tactile set-up enabled Cory to understand the relationships within the programming concept.

This chocolate bar/push-pin arrangement was a good short-term solution, but clearly it would not be feasible as the diagrams got more complicated and Cory would need to refer to them more than once. Dr. DePasquale reached out to his colleagues on the listserv of the Association of Computing Machinery's Special Interest Group on Computer Science Education, seeking to find a solution for a similar challenge elsewhere in the field of computer science. Unfortunately, although a handful of his fellow computer scientists had encountered students with disabilities, most had opted to make accommodations in their course expectations rather than find an access solution. Several K-12 teachers suggested low-tech solutions such as applying Elmer's glue on the outlines of diagrams or using popsicle sticks to recreate the diagrams to provide tactile versions. These ideas can work for simple diagrams but presented the same problems as the chocolate bar/push-pin arrangement.

Opportunities Arise from Flexibility and an Open Mind

Disappointed but not deterred, Dr. DePasquale reminded himself of his own teaching philosophy, which he articulates clearly on his website: Learn new technologies constantly; always learn more and do better; understand that the field of computer science is always

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The College of New Jersey

TECH-NJ is written by students, staff and faculty in the Department of Special Education, Language and Literacy at The College of New Jersey. It is designed to support professionals, parents, and computer users in their efforts to use technology to improve our schools and to enhance the lives of people with disabilities. In order to facilitate local networking, emphasis is placed on resources and innovative practices in and around the New Jersey region.

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T E C H - N J 2010

Assistive Technology for People with Disabilities
Volume 21

EDITORIAL

We are very pleased that the Adaptive Technology Center for New Jersey Colleges, along with six other Regional Centers, has been awarded support from the New Jersey Commission on Higher Education to continue operation for another five years. The regional center at Bergen Community College specializes in accommodations for students who are deaf or hard of hearing, and the other five regional centers provide comprehensive supports to college students who have learning disabilities. The Adaptive Technology Center, through information dissemination, training, and an equipment loan program, focuses on the use of assistive technology to help students with disabilities meet the academic demands of college. All seven centers are able to provide information and technical assistance to colleges around the state. Contact information for all seven Regional Centers is provided on the back cover of this *TECH-NJ*.

To celebrate the continued support of the New Jersey Commission on Higher Education's Special Needs Program, this 2010 issue of *TECH-NJ* highlights the important role assistive technology can play in making college accessible to students who have disabilities. The User Profile on page 3 describes how assistive technology, coupled with a reourceful mentor, is enabling a young man who is blind to pursue a career goal in computer science. The mentor, Professor Peter DePasquale, is the focus of our cover story – the first time *TECH-NJ* has featured the efforts of a faculty member. Dr. DePasquale is a perfect example of what can be accomplished when a person does not question *whether* something can be done, but instead, focuses his efforts on figuring out *how* it can be accomplished.

The topic of assistive technology in college is also addressed in the article on pages 8-9 of this issue. The Quality Indicators for Assistive Technology in Post-Secondary Education (QIAT-PS) present a helpful framework for considering the responsibility of students to advocate for themselves and of college personnel to encourage self-advocacy as it relates to assistive technology use. No matter how dazzling new gadgets and gizmos may be, technology in isolation will not increase a student's success in college. Appropriate technology tools must be combined with strong self-advocacy skills and a campus culture of inclusiveness and technical support.

The new products highlighted in this issue of *TECH-NJ* hold tremendous potential for college students with disabilities, as well as high school students and adults. *Ginger* is a ground-breaking software program that corrects spelling, grammar, and word use in one package. *MindView* is a sophisticated graphic organizing program from Denmark, and the *Livescribe Pulse SmartPen* offers a powerful option for taking notes in class and reviewing them at a later time.

Readers who are interested in learning about the laws that relate to students with disabilities in college are directed to an earlier *TECH-NJ* article that is available at www.tcnj.edu/~technj/2004/transition.htm. Readers who would like information on planning for the transition from high school to college will find the following articles helpful:

Gaining Confidence for College: One Person's Journey
www.tcnj.edu/~technj/2004/horne.htm
Planning for College Success
www.tcnj.edu/~technj/plancollegesuccess.htm
Moving On: Three New Jersey College Students Make the Transition
www.tcnj.edu/~technj/2007/makingtransition.htm
Advice for High School Students
www.tcnj.edu/~technj/2007/advice.htm

A. G. D.

USER PROFILE

Blind College Student Accesses Computer Science Curriculum

by Jessica Miller

Cory Samaha hopes to graduate from The College of New Jersey in 2011 with a B.S. degree in Computer Science. His career goal is to work in the field of programming to make all software accessible to individuals with disabilities, especially computer users who use screen readers. This focus stems from the fact that Cory himself is legally blind and has personally encountered the frustrations and problems that arise when a screen reader cannot read aloud a website or software program.

Early Years

Cory has used assistive technology since his early school years. He began learning Braille at the age of three, and by the time he was in kindergarten he was using a *Perkins Brailler*, which is a manual typewriter-type device that embosses Braille on special paper. Then, in third grade he was introduced to a *Mountbatten Brailler* with a Braille keyboard. A *Mountbatten Brailler* is an electronic Braille writer, notetaker, and embosser. With this technology he was able to build literacy skills at the same pace as his peers.

Braille Technology

The *Mountbatten Brailler* was a good intermediary device between the manual *Perkins Brailler* and the high-tech *Braille Lite* (Freedom Scientific) because they use the same Braille keyboard layout, but the *Braille Lite* offers the advantage of being a lightweight portable device. Whereas the *Mountbatten* produced Braille hard copies but was not portable, the *Braille Lite* needs to connect to a computer or an embosser to get a hard copy of produced work. Cory's high school acquired a Braille embosser so his aide could print out his Braille work for his itinerant teacher of the visually impaired. Using Braille translation software, the aide printed out his work on a standard printer for the general education teachers. Cory described his aide as being very creative when adapting materials for him, especially for math and science classes. For example, she made DNA models in biology and representations of different graphs in math classes.

Screen Reading Software

Since Cory became familiar with technology at such an early age, the transition away from Braille-based systems to systems that would provide him with more independence was a natural progression. At the age of eight, Cory informally oriented himself to the standard QWERTY keyboard on computers, and in a short amount of time he was typing at competitive speeds. He has used several different screen-reading software programs since that time, including *JAWS* (Freedom Scientific), *Window-Eyes* (GW Micro), and *VoiceOver* (Apple, Inc.). He currently has two computers at home, one a Windows desktop with *Window-Eyes,* which is Cory's screen reader of choice, and a MacBook that uses the built-in accessibility option, *VoiceOver.* Cory needs to use the PC for some of his schoolwork, but when he has a choice, he prefers his Mac with *VoiceOver*. These software programs allow Cory to search the web, read electronic copies of his textbooks, join and participate in social networks, and access many other applications that the computer offers. The computer has been a very important part of Cory's life and is the inspiration for what he intends to do in the future.

Using computers is at the very essence of Cory's future goals and he needs to be able to access them in order to fulfill his dreams. Screen reading software has made that possible for him. However, there are limitations to this remarkable software. He has found that screen readers cannot access some websites and programs like *Quicken* (Intuit), for example. The field of computer science utilizes different operating systems such as Linux, which is a free Unix-type operating system used in some classes. Cory's screen reading software, or any screen reading software for that matter, does not work with Linux. His teachers accommodate for this by allowing Cory to use his MacBook that has Java software on it to complete the same tasks as his classmates.

Screen-reading software programs such as *JAWS*, *Window-Eyes*, and *VoiceOver* allow Cory to search the Web, read electronic copies of his textbooks, join and participate in social networks, and access many applications that the computer offers.

Access to College Textbooks

To access his college textbooks, Cory either listens to them on CD's from Recordings For The Blind and Dyslexic (RFB&D) using a portable device called the *Victor Reader Classic Plus* (Humanware), or obtains electronic copies of the textbooks from the publishers which he listens to on his computer with the *Window-Eyes* screen reading software. He prefers an electronic copy of his more technical textbooks because with *Window-Eyes*, he can listen to a quick overview of the text by turning off the punctuation and then turn the punctuation on to go through all of the programming codes he needs to know. He prefers using the *Victor Reader*

One problem in particular could not be solved by screen reading software: providing Cory with access to all the charts, graphs and diagrams that are found in computer science textbooks. The solution to this is described in the article on page 1.

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College Professor

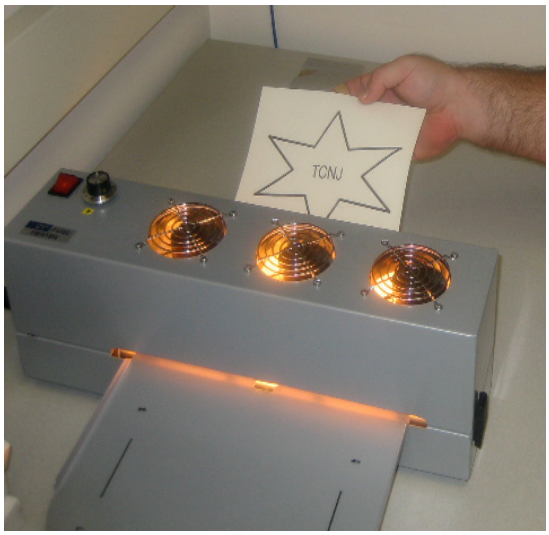
(continued from page 1)

evolving; and remember that your best opportunities are a result of flexibility and an open mind. He recognized that this was an opportunity to practice what he preached.

Dr. DePasquale developed his solution by thinking about one of the low-tech solutions offered. He needed to find a technology that could recreate the Elmer's glue effect without the mess or extended time needed for drying. He researched and then received funding for a *Zy-Fuse Heater* (Zychem Limited). This heater expands laser printer ink through a chemical reaction when it is printed on *SwellTouch Paper* (American Thermoform Corporation). This special paper runs through a laser printer like standard paper, but when it is then heated, the ink swells and produces raised print lines and symbols. With this set-up he would only need to recreate the diagram on a computer, convert the text labels to Braille, print out the document and run it through the heater. Out of the heater would come a tactile diagram that Cory could feel with his fingers.

Creating Tactile Diagrams

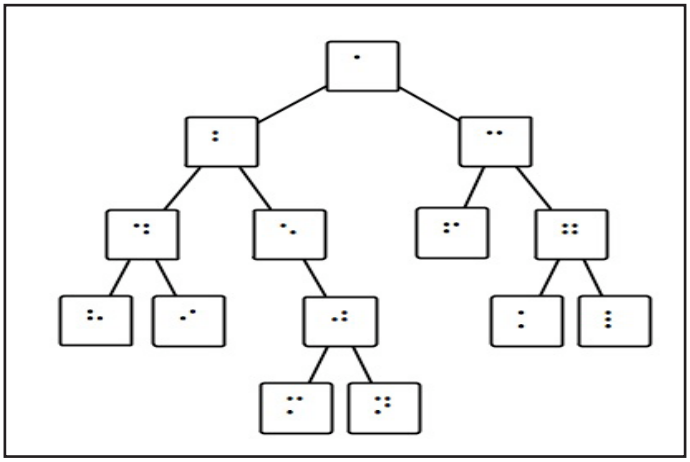
The key to success for this use of technology turned out to be careful preparation. Dr. DePasquale hired student-workers to follow a step-by-step process to create the tactile diagrams. Roughly three weeks in advance of class, student workers recreated the necessary textbook diagrams, including the image, text and numerals, using the drawing software



The *Zy-Fuse Heater* creates a raised image on SwellTouch paper.

Visio (Microsoft Inc.) *Visio* allows for the conversion of text to different fonts including Braille. The document was then printed on the *SwellTouch Paper* and run through the *Zy-Fuse Heater* three times to produce the embossed diagrams that Cory can understand.

Although Cory and Dr. DePasquale are encouraged by this initial problem-solving success, they both view it as only a temporary solution. Cory is able to comprehend the diagrams presented to him now, but in the future he feels he will need accessible diagrams to communicate his ideas to other computer science professionals. Dr. DePasquale has concerns from a financial and efficiency perspective. The *SwellTouch Paper* is expensive and student workers need to be paid for the five hours a week they spend preparing the diagrams. The diagrams will become increasingly more complicated over Cory's final semesters and their complexity may not translate well within the confined print area of the *Zy-Fuse* heater.



A sample diagram from a computer science class that has a raised image and Braille labels.

Experimenting with an Inexpensive 3-D Printer

Therefore, Dr. DePasquale continues to seek a long-term solution to providing Cory with full access to the computer science curriculum. He is now building a three-dimensional printer with a *CupCake CNC Basic Kit* (MakerBot Industries) that can produce plastic objects sized at 4 x 4 x 6 inches. He hopes to produce three-dimensional tiles imprinted with Braille by May 2010 that Cory can use to build his own diagrams in addition to helping him comprehend the more complex diagrams he has yet to encounter. Dr. DePasquale is also in preliminary discussions with a colleague at Virginia Tech to develop a program tailored to creating software engineering diagrams that can support screen readers. This type of advancement in programming would eliminate the diagram comprehension challenges for students like Cory who rely on technology to succeed independently in higher education.

As a college student who is blind, Cory has faced a number of challenges that he has overcome by seeking and finding appropriate assistive technology (see companion profile on Cory on page 3). In Dr. DePasquale he has found an innovative problem-solver and mentor who is eager to work with him to find new solutions to making all instructional materials accessible to all students.

For Additional Information:
CupCake CNC Basic Kit
MakerBot Industries
www.makerbot.com

SwellTouch Paper
www.americanthermoform.com

Visio
http://office.microsoft.com/en-us/visio/default.aspx

Zy-Fuse
www.zychem.moonfruit.com

Dr. Peter J. DePasquale's website
www.tcnj.edu/~depasqua/

Adela Katkic is a staff member of The Adaptive Technology Center for NJ Colleges at The College of New Jersey.

College Student

(continued from page 3)

to read novels and less technical texts.

Finding electronic copies of his computer science texts has been made easier by the fact that one of Cory's professors is the author of some of them. Dr. Peter DePasquale of TCNJ's Computer Science Department has been working closely with the college's Office of Differing Abilities to solve Cory's access issues. One problem in particular could not be solved by screen reading software, and that was providing Cory with access to all the charts, graphs and diagrams that are found in computer science textbooks. Dr. DePasquale's solution to this problem is described in the cover story of this *TECH-NJ*.

Loves His iPhone

Cory is not afraid to try any new type of technology to discover the parts of it that are accessible and the parts that need improvement to become accessible. This past summer he purchased an *iPhone*, because he "wanted to see how accessible it was." He shared with me that he thought it was a neat gadget and most of its applications were accessible, but he did find that some were not. He also found that the touch screen keyboard takes some time getting used to. The *VoiceOver* screen reader and accessibility options on the *iPhone* allow him to press a letter once to hear the letter, and then a second tap inserts the letter. He stressed that all of the applications available on the *iPhone* out-weigh any of its accessibility drawbacks.

An Advocate for Access

While certainly a technology-enthusiast, Cory has been inspired to advocate for change by the limitations of the assistive technology he has used. If he notices that his screen reader does not work with a particular application, he notifies the producers of that application. And not only does he inform them that their application is not accessible, but he also offers a possible solution. When he graduates he hopes to find a job in the computer science field that will allow him to continue this important work.

The computer has been a very important part of Cory's life and is the inspiration for what he intends to do in the future.

For Additional Information:
BrailleLite
Freedom Scientific, Inc.
www.freedomscientific.com

JAWS
Freedom Scientific, Inc.
www.freedomscientific.com

VictorReader
Humanware
http://www.humanware.com

VoiceOver
Apple, Inc.
www.apple.com/accessibility/voiceover

Window-Eyes
GW Micro
www.gwmicro.com/window-eyes

Jessica Miller is completing her M.A.T. in special education at The College of New Jersey in May, 2010.

Resources for the Blind

National Federation of the Blind (NFB)

The *National Federation of the Blind* (NFB) sponsors the International Braille and Technology Center (IBTC). Located in Baltimore, MD, this is a comprehensive evaluation, demonstration, and training center with over $2.5 million worth of tactile and speech output technology.

www.nfb.org/nfb/IBTC1asp?SnID=371395866

The NFB website also hosts a Product and Technology section with valuable information about assistive technology and services for consumers, employers, and information technology and rehabilitation specialists.

www.nfb.org/nfb/Products_and_Technology.asp?SnID=371395866

American Foundation for the Blind (AFB)

The *American Foundation for the Blind* (AFB) has a section on its website on assistive technology. Here individuals can get information on topics such as:

- Video magnifiers
- Screen magnification programs
- Screen reading programs
- Braille technology
- Optical Character Recognition (OCR) programs
- Cell phone technology
- Web accessibility

www.afb.org/Section.asp?SectionID=4&TopicID=31

FamilyConnect.org

www.familyconnect.org is a website that provides information, videos, personal stories, event announcements and blogs to support parents of children who are blind/visually impaired.

Trends for 2010: e-Readers

by Tammy Cordwell

Will 2010 turn out to be the Year of the e-Reader? Companies like Amazon.com with its *Kindle*, Barnes and Noble with its *Nook*, and Sony with its *Sony Reader* lead the market, while other companies are unveiling new e-readers this year.

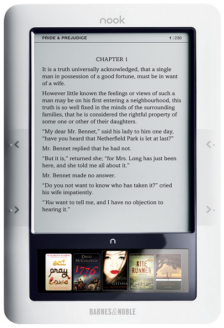
What is an e-Reader?

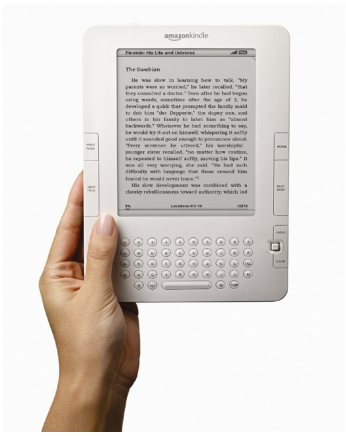
Also known as an e-book reader, an e-reader is a light-weight portable device that displays digital content of books, newspapers, and magazines. Most have wireless capabilities for easily downloading e-books, and most can store hundreds of titles, eliminating the need for a person to carry multiple items. Many allow the reader to add annotations and bookmarks. Some are the size of a paperback book so they resemble their hard-print version, while others offer a larger screen for more comfortable reading of newspapers and other traditionally larger texts.

The most popular e-readers use e-ink technology. E-ink is a material that provides an easy-on-the-eyes display that is comparable to newspaper print. It is made up of thousands of microcapsules. Once the e-ink is charged, it will stay to the top or bottom of the microcapsule so there is no need to refresh the screen. Presently, displays are limited to black and white with some shades of gray, although leaders in the industry are experimenting with color.

Categories of e-Readers

Proprietary Devices with Electronic Ink Displays: Devices that use an electronic paper display are plentiful. We have seen the success of three devices using e-ink technology: the Amazon *Kindle*, the Barnes and Noble *Nook*, and the *Sony Reader*. In addition to their ease of purchasing and downloading books, these e-readers stand out for the large selection of titles they offer. Amazon's *Kindle* boasts over 420,000 available titles. The *Sony Reader*, with its Google Books, and the *Nook* have over 1,000,000 titles.





Clockwise from top:
Amazon *Kindle*, *Sony Reader,*
Apple *iPad*, Barnes and Noble *Nook*

Devices Based on a Tablet

Apple's *iPad*: Building on the success of the iPhone, the *iPad* uses a touch screen whose size resembles that of a standard book. The 9.7-inch LED-backlit display with In-Plane Switching can be viewed at many angles without loss of the color's brilliance. The *iPad* will run the same apps as the *iPhone*, plus those that are being designed exclusively to utilize the bigger screen. To use it as an e-Reader, users can download books through a new online store called iBooks, similar to the way users have downloaded music through iTunes. Books will appear on a bookshelf after offering readers an optional preview of the book. Users can then choose the book they wish to read by tapping the screen.

After a book has been downloaded from iBooks, pages of the book can be displayed as a one-page view or a two-page view. Graphics and pictures will be included in color. Fonts can be changed to the user's liking. Pages are turned by pressing a button or swiping the screen with a finger.

HP *Slate* and the Dell *Mini 5*: Both of these devices are in production and are expected to be released in Spring 2010. The HP *Slate* will run a Windows 7 platform and the Dell *Mini 5* will run the Google Android operating system. The *Slate* will have a 10 inch screen and the *Mini 5* will have a 5 inch screen. *Slate* users will be able to download software like Amazon's *Kindle for the PC* and will be able to open books in full color from the Amazon bookstore. Google's Android operating system on the Dell *Mini 5* will utilize the Google Books library with over a 1,000,000 titles. The Android operating system is an open design similar to Apple's operating system on the *iPad* which means that developers are able to create apps for it. It is expected that many apps will become

available soon that will enable the *Mini 5* to serve as an e-reader.

e-Reader Software

Users who want the advantages of electronic reading but do not want to purchase another gadget can choose to display e-books on their personal computers using e-reader software. Several publishers are now partnering with technology companies to provide their books in a program that will allow readers to interact with them. Readers can add video, and notes, change the chapter order, and view diagrams separately.

***Dynamic Books*:** Macmillan has developed its own software to offer books to students and teachers called *Dynamic Books*. While we have seen e-books offered by textbook publishers in the past, they remained static and were very similar to their hard print counterparts. This new e-book format will allow instructors to edit the text to their liking and add media content such as videos. Dynamicbooks.com is expected to display on laptops, PCs and on the iPad.

***Blio*:** *Blio* will be a download from Kurzweil that is said to convert any tablet or computer into an e-reader, eliminating the need for an additional device. Books will maintain their structure to resemble the printed book, complete with graphics and page turning on the screen. Tools that have been available in Kurzweil scan/read products, such as highlighting and marginal notes, will be available. Users will also be able to add content similar to D*ynamic Books*. *Blio* will developing their own library with publishers but will also work with any pdf file. If a school requests a book in alternate format from a publisher and receives a pdf file, *Blio* should be able to do the necessary conversion. This should eliminate the time-consuming editing that is now needed to convert a book or pdf to an accessible format.

As e-books become more available and interactive, it is important to consider whether they will be accessible to students with print disabilities.

Accessibility and e-Readers

As e-books become more available and interactive, it is important to consider whether they will be accessible to students with print disabilities. Users who are blind or visually impaired need an accessible navigation system and need to be able to use screen reading technology to access e-books. *VoiceOver,* which is the screen reader built into the Macintosh operating system, also works on the *iPhone* and *iPad,* making those touch screens accessible to blind and visually impaired users. Users can use voice control and gestures to navigate all menus and features. Users can also utilize the *iPhone*/*iPad*'s zoom and high-contrast features.

It is expected that similar screen reading technology will work on the other computer/software combinations mentioned above, but there are serious concerns about the accessibility of the stand-alone portable devices. Amazon built text-to-speech into its *Kindle* but subsequently allowed publishers to choose whether to make it available for individual titles. Without text-to-speech, e-readers will not be accessible to students with learning disabilities who need auditory support. In addition, the National Federation of the Blind is calling on Amazon to make the *Kindle*'s navigation system accessible to blind users. Other disability groups are concerned that e-readers do not permit connection to devices like trackballs and switches, thereby making them inaccessible to users with physical disabilities. Disability rights advocates need to work to raise the awareness of e-reader companies and call their attention to the importance of accessibility to *all* readers.

Tammy Cordwell is the AltFormat specialist for the Adaptive Technology Center for New Jersey Colleges at The College of New Jersey.

AccessText Network

Although the most recent reauthorization of IDEA (2004) includes a provision to ease the problem of procuring textbooks in alternate formats for students with disabilities in grades K-12, there is no such legal requirement for publishers of college textbooks. However, in 2009 the Association of American Publishers (AAP) and higher education textbook publishers founded the Access Text Network to support the nationwide delivery of alternative files for students in higher education who have diagnosed print-related disabilities.

The AccessText Network is a membership exchange network that serves as a distributor of publisher-provided alternative textbook files. The following college textbook publishers provide financial support for the network: Bedford/St. Martin's, W.H. Freeman, Worth Publishers; Cengage Learning; CQ Press; McGraw-Hill Education; Pearson Education; Reed Elsevier Inc.; John Wiley & Sons; and W.W. Norton.

Disability support offices at colleges and universities are offered free membership in the AccessText Network. Upon approval and completion of a training course, they may request books in alternate format on behalf of students who attend their institutions and who meet the qualification of having a print-related (i.e. mobility, visual and/or reading) disability.

Students, disability service providers, faculty and publishers can visit the AccessText website to obtain answers to the following questions:

* Who is qualified to receive alternative media services through AccessText?
* What file formats are available?
* How does one decide which textbook file format is best for a student?
* What technology is needed to access the content?

For additional information:
www.accesstext.org

HIGHER EDUCATION

Quality Indicators for Assistive Technology in Post-Secondary Education (QIAT-PS)

by Russ Holland, Bryan Ayres, Janet Peters and Dawn Wilkinson

The QIAT Consortium is a grass roots effort that has been working for over 10 years to create benchmarks for assistive technology service provision in public K-12 education. This effort has generated some remarkable work, including a conceptual framework of quality provision of assistive technology services that is well respected, validated and used by school assistive technology teams, administrators, districts, and states to improve services for students with disabilities. One of the categories of the Quality Indicators for Assistive Technology (QIAT) is Transition, which deals with the factors related to assistive technology that require attention any time a student changes environments, for example, when moving from elementary to middle school.

The Need

One of the greatest changes in environment, however, is the transition from public school to post-secondary education [See Bowser, G. (2009) Transition Planning + Self Determination = AT for Independence. *Closing the Gap*, 28(4)]. Not only is college a drastically different environment with different teaching styles, student expectations, and often living arrangements, but also the rules change. While IDEA is an entitlement law that guarantees similar rights and procedures for all K-12 students, post-secondary education does not fall under this law. Instead, the relevant laws in college are the Americans with Disabilities Act (ADA) and Sections 504 and 508 of the Rehabilitation Act which are at heart civil rights laws. Students with disabilities in college are basically dealing with an eligibility law that is based on self-disclosure and driven by self-advocacy.

In college students need to advocate for themselves. Independent decision making, strong communication skills, and the ability to understand one's disability and one's rights and responsibilities directly contribute to success in the post-secondary environment.

Often in the high school setting, parents, special education and general education teachers, and other school personnel work together to ensure that accommodations and assistive technology are in place. In college, however, students need to advocate for themselves. Independent decision making, strong communication skills, and the ability to understand one's disability and one's rights and responsibilities under a different set of laws directly contribute to success in the post-secondary environment.

Developing QIAT-PS

Building on the success and impact of the QIAT process in the K-12 world, some of us within the QIAT Leadership consortium recognized a need to facilitate the consideration of a "QIAT-like" model of indicators that could support success in post-secondary education. QIAT-PS is the result of these efforts.

The development of the QIAT-PS indicators has been an open-source collaboration with hundreds of professionals participating. An extensive literature review was conducted, and face to face presentations and collaborative input sessions took place at several national conferences. A survey was developed and distributed nationwide to former students with assistive technology needs in post-secondary settings and students with current assistive technology needs. The results indicated that in addition to the need for post-secondary schools to improve their service delivery, the student bears a high level of responsibility for the quality and effectiveness of the integration of assistive technology in higher education settings. Therefore QIAT-PS added a ninth set of indicators called Self-Advocacy and Self-Determination.

The Product

Two major documents have emerged from this work. The QIAT-PS Student Guidelines are intended to serve as a tool for students and families as they consider the transition from high school to the college environment. The Student Guidelines should also help those working in the college environment guide prospective students who are considering the transition. The seven Student Guidelines are organized by 1) a quality indicator; 2) questions students should ask themselves to see if they meet the indicator; and 3) other tasks that relate to the specific indicator.

The QIAT-PS College Guidelines are intended as a tool for college personnel as they develop, articulate and implement policies and procedures that contribute to the successful transition and inclusion of students with disabilities in all areas of college life. These guidelines correspond and are complementary to the Student Guidelines.

The summary table on the next page highlights the relationship between the Student Guidelines and the College Guidelines. The seven quality indicators are the same for both, but the questions that need to be asked by students and those that need to be addressed by college personnel differ. To see the complete QIAT-PS Student Guidelines and QIAT-PS College Guidelines, visit www.qiat-ps.org.

Next Steps

Open source work on all categories of QIAT indicators and guidelines is ongoing. All are invited to contribute on the wiki at http://qiatgrowsup.pbworks.com and the website http://www.qiat-ps.org.

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Quality Indicators in Assistive Technology – Post Secondary (QIAT-PS)
Self-Advocacy & Self-Determination Indicators

Indicator	STUDENT Questions	COLLEGE Questions
1. Self Awareness: The student is aware of the various factors of his/her disability and is knowledgeable about needed accommodations.	Can I accurately describe my disability and its impact on my educational process, including educational achievement and participation in academic and campus life activities?	Are our disability support staff and others trained to work with students with disabilities and assistive technology needs to assist in defining their disability and determining their accommodations?
2. Self-advocacy: The student understands that under ADA and other federal and state laws, s/he is responsible for disclosure of a disability that requires accommodations in order to gain access to the curricula and materials.	What do I want to disclose about my disability, and to whom?	Does the college have a campus culture of inclusiveness that facilitates self-advocacy and provides professional development to staff to enable student-faculty collaboration regarding accommodations and assistive technologies?
3. Communication: The student has the communication and interpersonal skills to communicate with faculty concerning confidentiality, documentation, evaluation and grievance procedures.	Can I communicate my needs to the appropriate people in a timely manner?	Are our marketing materials, course catalogs, procedures, and Web resources accessible and assessed frequently regarding their appropriateness? Do staff have open communication policies?
4. Self-Advocacy and Leadership: The student makes a self-advocacy plan to guide staff in the provision of AT and accommodations that allow access to the curriculum and aid independence.	Do I have a plan regarding the assistive technology I need both for daily living activities and educational success?	Do we promote an inclusive campus culture and encourage and actively seek input from students with disabilities in assistive technology planning and implementation on campus, in campus living environments, and in online/distance learning environments?
5. Self-evaluation and Self-Determination: The student evaluates his/her use of AT and makes adjustments to goals when necessary, including justifying and acquiring any new technology needed.	Do I understand the difference between my use of AT for daily living and AT for academic use, and what the college will legally provide?	Do we work with students to make timely changes to assistive technology supports and accommodations that may be necessary for different academic tasks and environments?
6. Student Initiative and Decision Making: The student independently chooses the appropriate AT for each situation and makes long-term decisions about assistive technology device acquisition and supports.	Is the assistive technology I need, or have been using, different than what the college provides?	Do we support the integration of personal assistive technology into the classroom and labs when appropriate, including the provision of professional development when needed?
7. Assistive Technology Problem Solving: The student identifies problems with AT use, is able to identify the AT supports and services needed to solve AT problems, and communicates these solutions to instructors and disability services staff	Do I have a plan to deal with assistive technology problems that may arise?	Do we promote collaboration between the student, various support services and faculty in solving AT challenges and problems?

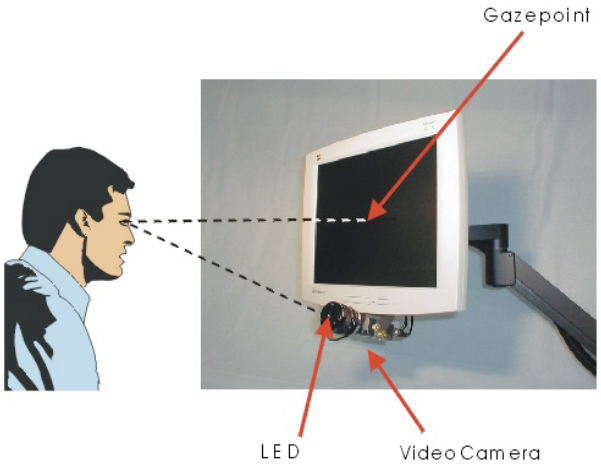
COMPUTER ACCESS

Eye gaze systems provide a means of computer access for individuals who do not have use of their hands, feet or head. Simply by focusing their gaze on keys displayed on a computer monitor, users can browse the Internet, access augmentative communication systems, type, and use environmental controls.

Eyegaze Edge

LC Technologies, Inc. (www.eyegaze.com), which markets the *Eyegaze Edge*, uses a pupil-center/corneal-reflection method of determining where the user is looking. They offer the following explanation of how this wireless system works:

An infrared-sensitive video camera, mounted beneath the System's screen, takes 60 pictures per second of the user's eye. A low power, infrared light emitting diode (LED), mounted in the center of the camera's lens illuminates the eye. The LED reflects a small bit of light off the surface of the eye's cornea. The light also shines through the pupil and reflects off of the retina, the back surface of the eye, and causes the pupil to appear white. The bright-pupil effect enhances the camera's image of the pupil so the system's image processing functions can locate the center of the pupil. The *Edge* calculates the person's gazepoint, i.e., the coordinates of where he is looking on the screen, based on the relative positions of the pupil center and corneal reflection within the video image of the eye. Typically the *Eyegaze Edge* predicts the gazepoint with an average accuracy of a quarter inch or better.



Tobii

Sweden-based Tobii Technology (www.tobii.com) markets an augmentative communication device called the *My Tobii P10* which integrates a 15" monitor, eye control device and computer into one unit. It can be used as a desktop system or mounted on a wheelchair. The *My Tobii* comes with VS Communicator software and onscreen features such as the SymbolStix symbols for communication, a Text Editor and Document Browser program for writing, and an Internet browser for Web surfing. The Windows environment can be navigated by eye control of the mouse cursor. Tobii Technology also offers an eye gaze option on its *Tobii C12*, which is a smaller portable augmentative communication device.

A young woman uses her *My Tobii* text editor to request help making change.

Tobii Web Browsing Screen

EyeMax

Dynavox (www.dynavoxtech.com) offers the *EyeMax* system for its *Vmax* augmentative communication device. The *Vmax* is a fully functioning Windows XP computer that provides the user with Internet access, text messaging, eBook reading features, and environmental control capabilities, in addition to serving as a speech-generating device. The Navigator pages of this system are alphabet-based and are designed for literate communicators. *EyeMax* users can access the buttons on the screen by either blinking or dwelling. For a video demonstration of the *EyeMax* system go to www.dynavoxtech.com/success/als/details.aspx?id=56.

The *EyeMax* system showing the Navigator Page.

EyeTech TM3 and TM4

The *EyeTech TM3* from EyeTech Digital Systems (www.eyetechds.com) is a portable eye tracker that can be installed on most laptop computers with screen sizes up to 17". The camera sits on the keyboard. It can also be installed on most standard widescreen computer monitors up to 19" by mounting it on the front, or it can be pre-installed on a 19" monitor. The *TM3* is powered by either fire wire or an AC adaptor.

***EyeTech TM3* eye tracker**

The new *TM4* can be connected via a USB port.

Just introduced by Eye Tech Digital Systmes is the *TM4*. Offering even more flexibility than the *TM3*, the *TM4* connects to most desktops, laptops and tablet PCs via a USB port. This eliminates the need for an external power supply since it is powered by the computer's battery.

RESOURCES

National Center on Accessible Instructional Materials at CAST

The National Center on Accessible Instructional Materials, hosted by the Center for Applied Special Technology (CAST), serves as a resource to educators, parents, publishers, and others interested in learning more about accessible instructional materials (AIM) and the National Instructional Materials Accessibility Standard (NIMAS). Its website provides information on acquiring and creating materials in alternate formats to support access to the general curriculum by students with print disabilities.

Under the "Learn" tab visitors to the website will find information on AIM basics, from determining who qualifies as having a "print disability" for AIM to various forms of AIM and information on which students would benefit most from one particular format(s) or another. The website is also a valuable source for updated information on AIM policies on the federal, state, and local levels.

The "Experience" tab provides tutorials on AIM products and services for use in classrooms and at home, and offers detailed, practical instructions on the use of AIM. The AIM Navigator found here is a tool that uses a question-and-answer format to guide users through the selection and use of AIM by IEP teams. The Technologies for AIM and NIMAS section focuses on the production and use of AIM in a variety of formats and includes information on content development, creating NIMAS files, conversion services, digital talking books, and hardware and software for AIM. A section entitled AIM Across the Curriculum addresses products and solutions for access to the general curriculum categorized by content area, including Math, Science, English/Language Arts, Social Studies, and Reading.

For additional information:
http://aim.cast.org

The Faculty Room at DO-IT University of Washington

The DO-IT Faculty Room is a website for college faculty and administrators to learn about how to create classroom environments and academic activities that maximize the learning of all students, including those with disabilities. Key areas of interest include:

Accommodations and Universal Design

Strategies for creating and modifying academic environments and activities to maximize the learning of students with a wide range of abilities and disabilities.

Rights and Responsibilities

The rights and responsibilities of faculty, campus services, and students with disabilities regarding academic accommodations.

Faculty Resources

Resources to help instructors more fully include students with disabilities in course activities.

Resources for Trainers, Staff, and Administrators

Resources for staff and administrators who support faculty in making their academic offerings accessible to students with disabilities.

Searchable Knowledge Base

A searchable database of frequently asked questions, case studies, and promising practices related to how postsecondary faculty can fully include students with disabilities in their courses.

For additional information:
http://www.washington.edu/doit/Faculty

Digital Talking Books at the NJ Library Talking Book & Braille Center

The New Jersey Library for the Blind & Handicapped is now the New Jersey State Library Talking Book and Braille Center (TBBC). The services of TBBC are available without charge to anyone living in New Jersey who for any physical reason cannot read regular printed books. Individuals served by the TBBC include: people with a physical disability that prevents them from holding a book or turning its pages; people who are legally blind or totally blind; and individuals who have a learning disability that is certified by a medical doctor.

TBBC offers digital talking books on flashdrive cartridges that are playable on book players that can be borrowed from TBBC. Library users can get digital talking books on cartridges through the mail or they can download books and magazines over the Internet, save them to their own flashdrives, and then play them on TBBC's book players.

For more information on membership, or to be added to the waiting list for the book players, call TBBC at (800)792-8322 or visit their website at www.njsltbbc.org.

Camera Mouse

Available as a free download, *Camera Mouse* was developed by researchers at Boston College and Boston University to help people with disabilities use the computer. The main audience for this program is people who do not have reliable hand control but who can move their heads. *Camera Mouse* is a mouse replacement system for Windows computers. Requirements are Windows 7, Vista, or XP and a standard USB webcam.

For additional information:
www.cameramouse.org

NEW PRODUCTS

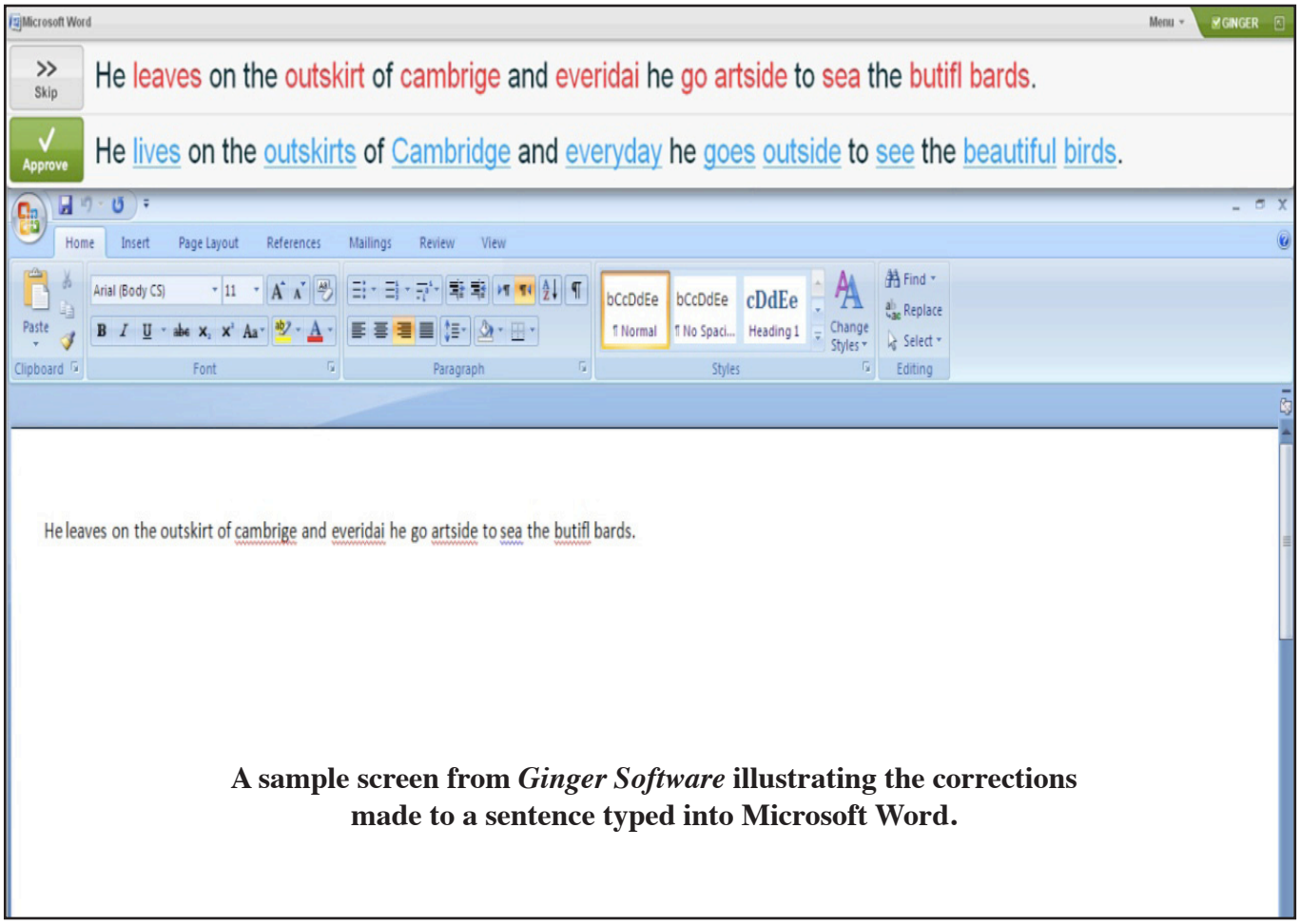
Ginger Text Correction Software

Ginger Software, Inc.'s writing software takes spelling and grammar correction to a new level. This downloadable program features an online spelling/grammar checker that corrects errors of spelling and grammar based on the context of each sentence. It corrects misused words, grammar and spelling mistakes in *Microsoft Word*, *Outlook* and *Internet Explorer*. An Internet connection is required to access the online database. *Ginger Premium* adds text-to-speech and progress reporting. Text-to-speech enables users to hear sentences before and after correction, and the progress report feature tracks mistakes to monitor student progress and personalize instruction.

The difference between *Ginger* software and other correction programs is that *Ginger* reviews entire sentences and makes the most appropriate corrections for spelling mistakes, typos and grammar errors based on the context. See the example in the screenshot below. Unlike standard spell checkers, *Ginger* can tell when a correctly spelled word is misused and replaces it with the right word. When *Ginger* is unable to determine the proper term, it suggests the most probable corrections. Each option is presented with a sample expression, allowing users to consider the usage and to choose the correct word.

Ginger is available in a Windows-only version for single users or on a district or school-wide basis. Monthly subscriptions are another option. A free 14-day trial is offered.

For Additional Information:
www.gingersoftware.com



A sample screen from *Ginger Software* illustrating the corrections made to a sentence typed into Microsoft Word.

MindView

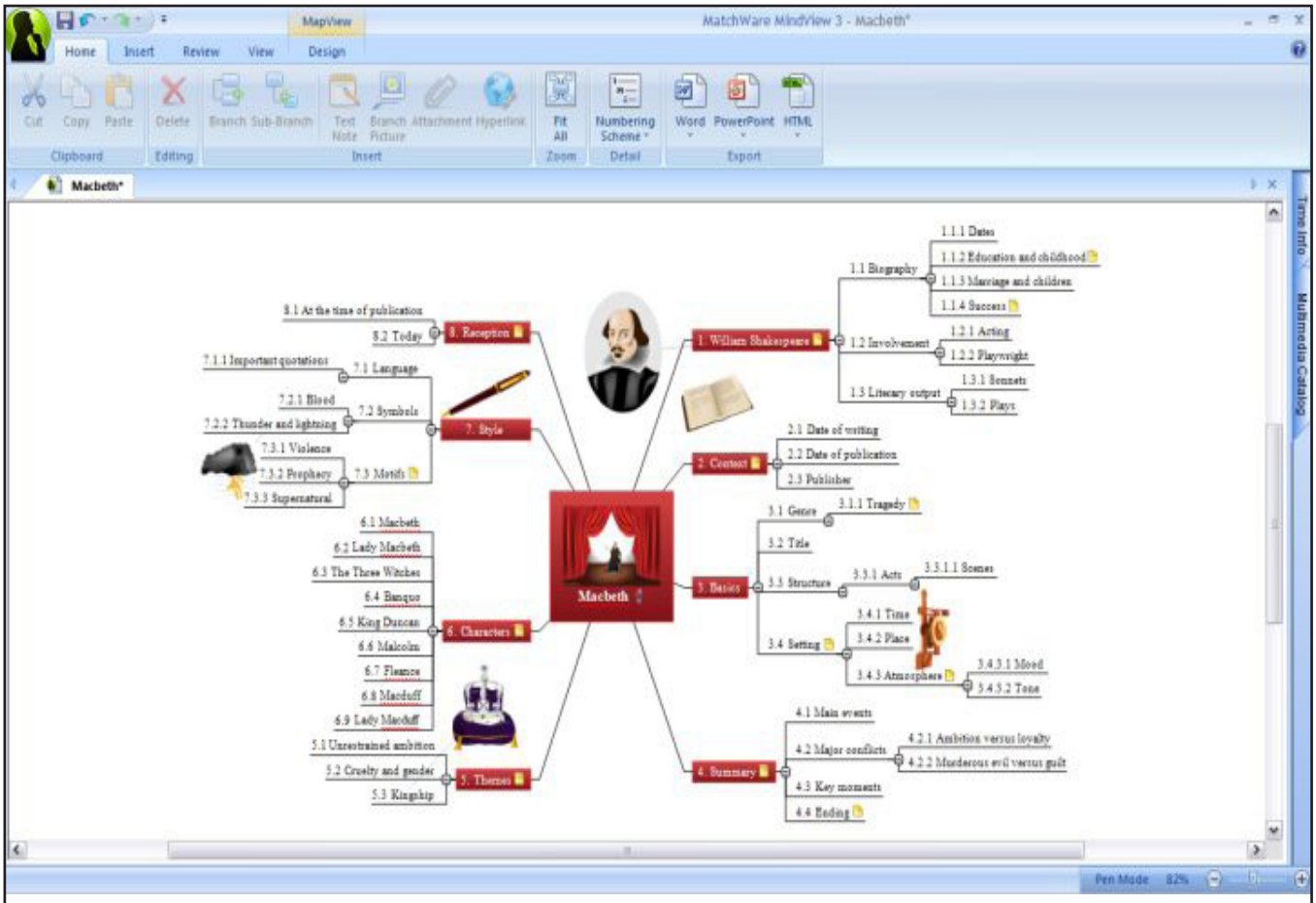
MindView software by MatchWare enhances students' ability to visualize, organize and present information. Interactive mind mapping and visual organization, also known as graphic organizing, can help students who have learning disabilities improve their reading comprehension, facilitate research, structure written assignments, and enhance study skills. Students can organize their thoughts using visual graphics and color coordination.

MindView's interface features large, uncomplicated icons to minimize the learning curve and unclutter the screen for students who may have difficulty focusing. Information can be displayed in six interchangeable views including Outline, Timeline, Left/Right and Top/Down. The program contains 80 curriculum-based, customizable templates.

Thoughts and ideas are entered and then presented in branches. The ability to rearrange the branches allows students to drag-and-drop the order of their branches, enhancing brainstorming effectiveness and visual relationships. Branches can be color coded to demonstrate visual relationships. Students can access *MindView*'s multimedia catalog of more than 1,500 images, and they can include branch attachments containing custom images, Web links, text notes, sound files, video files and document files. A Focus Mode lets students zoom in and focus on a group or individual branches. A built-in Timeline feature enables students to easily create timelines for presentations or action plans. Students' mind maps can be exported to or imported from *Microsoft Word* ®, *Microsoft Power Point* ®, *Microsoft Excel* ®, and *html*.

MindView is sold to educational institutions in 3 year subscriptions that include free home use for all students, teachers, and staff.

For additional information:
http://matchware.com/en/



A mind map developed using a template for a study of Macbeth.

Livescribe Pulse Smartpen

The Livescribe *Pulse Smartpen* is a pen-sized computer that offers a new option for note-taking. The *Smartpen*, which is sold as a mainstream product, has enormous potential to help students with disabilities succeed in high school and college. Students are expected to perform many functions simultaneously in a classroom setting, including listening to lectures, identifying key information, and taking notes. This is challenging for all students, but is particularly so for students with learning disabilities.

After taking notes in the Dot Paper notebook, a student can upload the notes to a computer to edit, replay and share with other students. The *Smartpen* charges on a USB cradle.

The *Smartpen* captures both handwriting and audio recordings. To ease the burden of note-taking during a lecture or discussion, the *Smartpen* records the audio and digitizes the handwritten notes that a student takes on Livescribe's on "Dot Paper." It then synchronizes the handwriting with the audio. This paper is printed with micro-dots that facilitate a Dot Positioning System (DPS). The *Smartpen* has an infrared camera at its tip that takes 72 snapshots per second, giving it the ability to capture and recreate handwriting based on the dot patterns at the pen's location. What this means for students is that when they open their notebooks to do homework or study, they simply tap the pen any place within their notes, and the *Smartpen* will replay the audio from the moment the note was written. Additionally, the notes and audio can be uploaded to the Internet so they can be saved, replayed, edited and shared with other students.

For Additional Information:
www.livescribe.com

CalcuScribe

CalcuScribe (www.calcuscribe.com) is a battery-operated word processing device that doubles as a calculator. Its small size and light weight make it a useful classroom notetaking device. The word processing feature has a spellcheck and allows students to cut, copy and paste. Students can write math expressions directly in the math-editor to solve complex problems. *CalcuScribe* auto-computes the results. What makes the *CalcuScribe* unique is that students can revise and correct their mistakes as they would in a word processor, and *CalcuScribe* automatically computes new results as if the student were using a powerful spreadsheet.

Two models are available. The *CalcuScribe Uno* has a 4 line display of 12 point text, and the *CalcuScribe Duo* can display 4 to 8 lines of text depending on the font size.

NJ Regional Centers for College Students With Disabilities

The Special Needs Grant Program of the New Jersey Commission on Higher Education
funds a system of seven regional centers to provide support services for students with disabilities.

For All Students with Disabilities

Adaptive Technology Center for New Jersey Colleges at The College of New Jersey
http://adaptivetech.tcnj.edu

For Students with Learning Disabilities

Project Assist at Cumberland County College
http://www.cccnj.edu/projAssist
Regional Center at Fairleigh Dickinson University
http://www.fdu.edu/studentsvcs/rcsld.html
Central Regional Connections at Middlesex County College
http://www.middlesexcc.edu/projcon/control.cfm
Project Mentor at New Jersey City University
http://web.njcu.edu/programs/oss/Content/project_mentor.asp
Project Academic Skills Support at Ocean County College
http://www.ocean.edu/campus/student_services/drc/pass.htm

For Students who are Deaf & Hard of Hearing

Center for Collegiate Deaf Education at Bergen Community College
http://www.bergen.edu/pages/3961.asp

THE COLLEGE OF NEW JERSEY

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Ewing, New Jersey 08628-0718

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