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“Write” Tools for Students Who Are Visually Impaired



Angie Bourdeau (left), a high-school sophomore who is visually impaired, uses her portable Braille 'n Speak™ to take notes while working on a project with her classmates.

Feedback and the Writing Process

Sighted writers depend heavily on visual feedback during different phases of writing. When they write on paper or enter text into the computer, they look at what they have written to be sure that the words make sense and are spelled correctly. When they compose or revise, they frequently look back at previously written sections and insert, delete, or revise text; reorganize paragraphs; or make marginal notes. They also depend upon printing their work in the same writing system used by most of their readers.

Lacking visual feedback, writers who are visually impaired frequently use alternative means of displaying text which rely on other senses. The glossary on page 4 highlights some of the ways assistive technology uses braille, speech, and magnification to assist writers who are visually impaired.

Technologies Address Individual Needs

Meet Rebeka

Rebeka Schiess is an energetic nine-year-old who loves cats and horseback riding. Rebeka was born with cerebral palsy and uses a wheelchair. She is fully integrated into a third-grade classroom outside of Rochester, New York.

Rebeka has limited vision and is an avid reader using braille. She has trouble using a braille keyboard to write, however, because of the motor difficulties associated with her cerebral palsy (braille keyboards have nine keys and require the user to press two or more keys down at a time). As an



"It is critical that Rebeka (pictured) and other writers using braille have a tactile document that can be shared, held, cherished, and hung on the refrigerator door," said the father of Rebeka Schiess, a nine-year-old who is visually impaired.

alternative, Rebeka uses an Apple IIGS™ computer with braille letter overlays on the standard keyboard. An Echo™ speech synthesizer names each letter as she types. In order to monitor structure and meaning while revising her work, Rebeka can use the synthesizer to listen to her sentences and paragraphs.

Rebeka's computer has braille conversion software that allows her to print out her work on a braille embosser at school.

Meet Angie

Angie Bourdeau is an enthusiastic fifteen-year-old sophomore from Chicopee, Massachusetts. She loves music and divides her spare time between singing in a chorus, playing piano, and practicing Kung Fu. Angie has been blind since birth and has always participated fully in mainstream public schooling.

Introduced to braille at the age of four, Angie is a very proficient braille reader and writer. In the eighth grade she began using a Braille 'n Speak™, a portable device about the size of a large wallet that combines braille input and speech output.

Using the Braille 'n Speak (which she can carry in her pocketbook), Angie can write class notes, homework assignments, and short papers in braille. The device also provides speech feedback so that Angie can monitor what she writes. After she has completed work, she can either load her files onto a desktop computer or connect the Braille 'n Speak directly to a printer. The device has braille conversion software that enables Angie to print out her work on either a braille embosser or conventional printer.

Angie finds the Braille 'n Speak more convenient to use than a standard personal computer because it capitalizes on her facility with braille and has the flexibility of pen and paper.



Wherever she goes, Angie Bourdeau carries her Braille 'n Speak, a portable device that can "speak" directional information from its files.

Reflecting on his sometimes arduous path to educational success, Adam Linn, a junior at Harvard University who is blind, said "Human support is infinitely more important than technological support."

School and Family Participation Is Key

Rebeka and Angie are successful writers because their vision specialists, school administrators, teachers, and parents have all worked together to find technology that is well suited to these students' needs.

Rebeka's vision specialist, Arlee Valentine, works closely with Rebeka's teachers to adapt computer technology and other materials for Rebeka's use. Throughout the year, she consults frequently with Rebeka's parents, who are always investigating new technology and other materials and sharing this information.

The third-grade teachers meet to plan instructional activities for all their students and to brainstorm ways to make these accessible to Rebeka. Administrators support teachers in this effort by providing release time for weekly meetings.

Angie's mother, Diane Bourdeau, stresses the importance of open and honest communication among all those involved in the education of a student who is visually impaired. To achieve this goal, each spring she and Angie's vision specialist, Kathy McNamara, meet with all of the teachers who will have Angie in their classes the following year. At the meeting, the challenges and rewards of having Angie in a class are discussed and teachers are encouraged to share their fears and concerns. Some teachers embrace the opportunity to have Angie in their class, while others are more apprehensive. Diane Bourdeau reports, however, that once teachers have Angie as their student, their fears dissipate and they take great pleasure in her unique strengths and sheer love of learning.

Technologies Meet Changing Curricular Needs

As students who are visually impaired progress through school, they must have independent access to flexible technology that can address their changing needs.

Rebeka Revisited

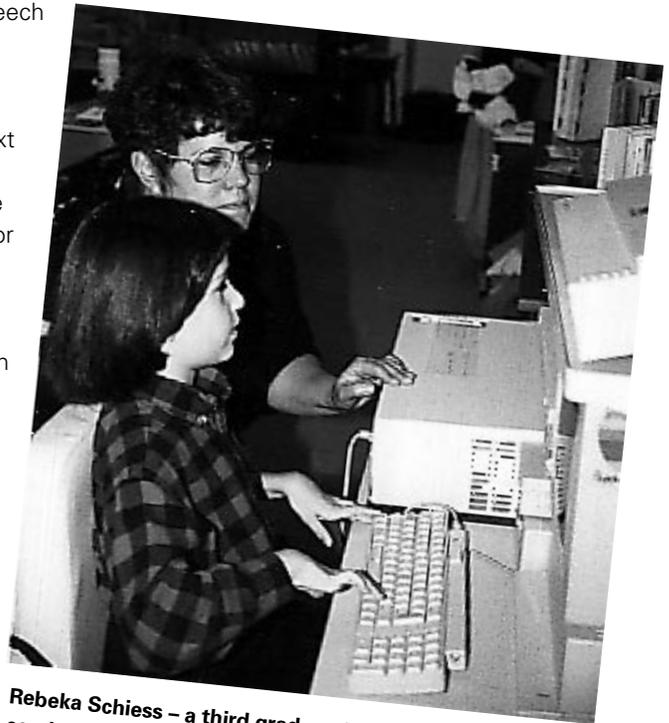
Because Rebeka has been learning the fundamentals of writing in first and second grade, she has done most of her writing in the classroom. Using her desktop computer, speech synthesizer, and braille embosser, she has been able to participate in all classroom writing activities including daily journal writing, story and poem drafting, peer and teacher conferencing, and revising.

When Rebeka progresses to fourth grade, the curriculum will include more writing activities that she must work on at home as well as in school. She will, for example, be expected to write book reports and longer compositions. During the following year in fifth grade, Rebeka will change classes throughout the day for the first time.

Because of these evolving demands, Rebeka's parents and teachers agree that Rebeka needs a more efficient and portable writing system. After extensive research, they ordered a Keynote Gold™ system – an integrated system that includes a portable computer with a standard

keyboard, built-in speech feedback, and braille conversion software that allows users to print their work in text and braille formats. Rebeka's parents are also seeking funds for a braille embosser Rebeka can use at home.

Rebeka's vision specialist, Arlee Valentine, will help Rebeka adjust to the new system. So that Rebeka might eventually feel comfortable using computers in any setting, Arlee would like to reduce Rebeka's dependency on braille stickers for keyboarding.



Rebeka Schiess – a third grader with limited vision and cerebral palsy – can participate fully in all classroom writing activities using a desktop computer, a speech synthesizer, and a braille embosser.

Angie Revisited

Moving from one class to the next throughout each school day, Angie needs the portability, flexibility, and speed provided by a Braille 'n Speak.

In addition to using this tool in the classroom, Angie occasionally uses the Braille 'n Speak to navigate in the community. For example, when Angie forgets the location of a certain store in the mall, she calls up a file on her Braille 'n Speak that lists mall locations. Once the file is accessed, the device speaks this information to her, and off she goes.

Angie is looking ahead to college, where she hopes to major in music. Because she will be required to write papers of increasing length in the next few years, a portable external disk drive with more storage capacity has been ordered for her Braille 'n Speak.

To increase Angie's access to a broad range of materials, including encyclopedias, dictionaries, and databases, Angie's parents have acquired a CD-ROM drive and speech card for Angie to use at home.

To learn more, watch *The "Write" Tools for Angie* on the enclosed NCIP videotape.



A Braille 'n Speak can be connected directly to a conventional printer or braille embosser. Files created on a Braille 'n Speak can also be easily transferred to a desktop computer.

Technologies That Provide Sensory Feedback

Braille/Tactile

Braille Keyboard: A nine-key device that enables users to “braille in” text. A braille keyboard may serve as an alternate keyboard for a standard computer or may be an integral part of a computer-based assistive device.

Braille Keyboard Conversion

Software: Software that converts a standard keyboard into a braille keyboard. Nine specified keys on the standard keyboard are used to “braille in” text.

Braille Keyboard Labels/Overlays:

Labels with braille letters that can be placed on individual keys. Alternatively, braille dots can be placed directly on keys with a liquid substance that hardens after application.

Tactile Locators:

Tactile stickers or other materials can be strategically placed on the keyboard to identify important keys and facilitate positioning for touch typing.

“Refreshable” or “Paperless” Braille

Displays: A hardware template that can display braille as it is being written. As each letter is typed, pins corresponding to braille dots pop up on the template to form braille letters. The braille display is refreshable because it can be altered as the text is changed and advanced letter by letter or line by line (depending on the size of the display). Refreshable braille displays can be a separate component or part of an integrated system. Software may be required to translate standard text to braille.

Braille Embossers: Sometimes called braille printers, these devices emboss documents in braille. Braille embossers typically have blunt pins that punch dots into special 100-pound weight paper.

Speech

Speech Output Software: Software that translates standard text into a phonetic code that can be “spoken” by a speech synthesizer. Speech output can be integrated into a specific application, such as a word processing program.

Screenreaders: Software that works in conjunction with other applications and converts the text on screen into speech output. Some personal computers come with built-in screenreaders.

Speech Synthesizers: Hardware that produces speech output. This can be an external unit that connects to a computer, or an internal chip or circuit card.

Visual Magnification

Magnifying Lenses for Monitor:

Sometimes called optical aids, these portable lenses can magnify text up to twice its original size. They are designed to fit over many standard computer monitors.

Magnification Software: Software that allows users to enlarge text on the computer screen, sometimes up to sixteen times its original size. These programs run in conjunction with other applications and usually have features that facilitate cursor navigation.

Magnification Hardware: A special magnification card that replaces the existing video card in the computer.

Additional Resources

More about Assistive Technology on NCIPnet

- Descriptions of a wide variety of technology that can help students who are visually impaired
- Names and addresses of vendors who distribute technologies
- Organizations that provide technical assistance
- Vignettes of students using various technologies
- On-line support and assistance from teachers, parents, and administrators
- On-line discussion events featuring experts on assistive technology for students who are visually impaired

Be an active member of the NCIPnet Community!

Log on to NCIPnet and:

- Share information about products and teaching approaches
- Discuss technology adaptations that address individual needs
- Share your experiences – successes and problems – implementing assistive technology for students who are visually impaired



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