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Augmentative Communication News

January, 1989 Vol. 2, No.1

INSIDE THIS ISSUE . . .

UPFRONT

This issue highlights literacy, a topic that is receiving attention not only in AAC, but throughout the world. For individuals who are unable to speak, learning to read and to write is not just learning these skills. Literacy is a key to self-expression, a way to say exactly what is on your mind. Literacy provides access to language.

An 8 page newsletter can not begin to cover this extensive topic (**An understatement!**). The teachers, researchers, clinicians, and company representatives with whom I spoke, graciously and willingly have shared a wealth of information. Their research results, ideas, opinions, issues, concerns and references are synthesized and presented. It's a place to start.

In **Clinical News** you'll read about what we know, as well as what we wish we knew, about literacy learning. You'll learn valuable information from the experiences of individuals who use augmentative communication aids and their families in **For Consumers**. In the **Equipment** section look for desired features of literacy-related software and a list of existing materials and software to support literacy programs.

The **University/Research** section features the Microcomputer Centre at the University of Dundee in Scotland. In **Governmental** there's a brief update on U.S. progress implementing P.L. 100-407*(cont. pg. 2)*

The 3 R's Reading, Writing, & Reasoning

Literacy* has recently become a focus of AAC research. AAC specialists "know" more now than a few years ago about the face-to-face communication problems of individuals with congenital disabilities who are challenged by physical handicaps and speech impairments (PHSI). However, we know very little about how these individuals learn to read and write.

Theoretical frameworks and intervention approaches exist for other populations.[1] For example,

* Skill development approach (emphasizes phonics, decoding and encoding skills)
* Whole language approach (emphasizes meaning; whole word in context; language experience approach)

Teachers, clinicians, and researchers with whom I spoke (see resource list) have theoretical orientations that reflect these two major approaches to literacy learning. Being unable to speak or move about independently certainly makes the task of learning to read and write different and more difficult. Thus, AAC models for literacy learning will undoubtedly evolve. They will be based on what is already known about other populations, and on the results of research with individuals who use AAC techniques.

A full account of literacy development must consider not only the child's cognitive processes for acquiring literacy skills, but also the support systems provided by the family and social community for learning these skills.[2] *(cont. page 2)*

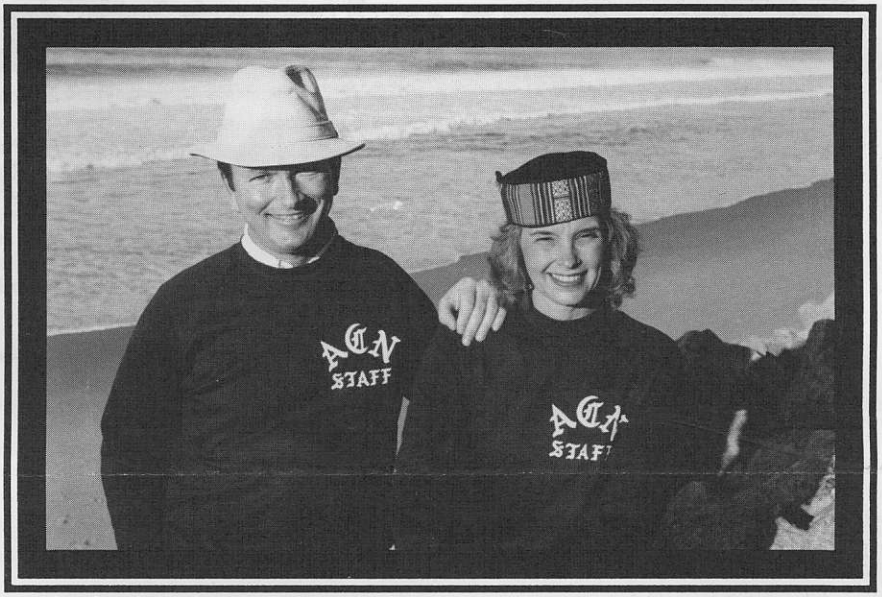
* Literacy refers to reading and writing, and thinking. Reading is a constructive process of building meaning from print; writing translates meaning into text. It involves an interaction between an author and a reader.

UPFRONT (from page 1)

at the state level.

Many thanks to those who have already renewed their subscription to ACN! For some, this could be your last issue. So, don't delay. If you find a renewal form enclosed, return it promptly. *Special thanks to those who honor copyright laws and do not photocopy the newsletter. Contact us for special rates on multiple copies of 5 or more to 1 address.*

Gary Poock and I look forward to hearing from you this year either on the Hotline (408) 649-3050, by mail, or during a visit to ACN headquarters in beautiful Monterey. Happy New Year to you and your families. Yes, that's us in the photo!



LITERACY (cont. from page 1)

Koppenhaver[3] recently summarized available research on the literacy learning characteristics of PHSI persons. He reported positive correlations between reading achievement and self-esteem, literate home and school environments, parental and teacher support and advocacy, and the number of decoding strategies individuals had developed; moderate correlations (.49 to .70 range) between intelligence and reading achievement; no correlation between disordered eye movements and reading achievement. Physical and speech impairments were negatively correlated with achievement.

Some PH children who use AAC aids/techniques may learn to read at the same time as their normal speaking peers. Master teachers describe these children as having minimal accompanying disabilities. They tend to be active users of their communication aids as preschoolers and may use strategies (such as "sounds like" "same color as" etc.) if provided on their communication boards. They show an *active interest in text* (literature, letters, etc.) These children need considerable support to enable them to participate fully in the "regular curriculum" along with their able-bodied peers.

Most PHSI children, however, are multiply handicapped and have special learning needs. They learn to read and write slowly, if at all, and with great difficulty. Obviously, literacy learning depends on many prerequisite experiences and skills. One critical decision point is when to shift the focus of training to traditional orthography (TO). If the shift is made too soon or is delayed, the individual loses precious time and will experience frustration and/or failure. McNaughton, Mann, and others feel it is not an either/or decision. Although some children go directly to TO, most use graphic symbol sets/systems as a bridge to literacy. Here are some considerations:

1. Has the individual developed problem solving skills? Literacy requires that type of thinking. Problem solving is at the top of a hierarchy of thinking skills, with others preceding, as follows:[4]

- Discrimination: making distinctions, perceiving differences
- Identification: naming objects, classes of objects, actions, etc.
- Concept-learning: generalization of a concept across classes
- Classification: classifying by physical characteristic or abstract property
- Rule-learning: responding to a class of situations with a class of performances because the stimulus and the performance are predictably related
- Problem-solving: learning new combinations and applications for previously learned rules

2. Does the individual's behavior suggest readiness?

Observe behavior for clues (e.g. see description of master teachers in column 1, this page). Formal and informal observations, as well as testing, can help.

3. Is there incidental learning?

For example, McNaughton[5] discovered 3 of 6 children could read 70 percent of the words on their Blissymbol board at the end of a school year even though TO was never taught. The other 3 children recognized no words. This certainly tells you something. Would it predict success? Sounds like a good research topic! Note procedures below:

1. Photocopy the individual's communication display.

2. Reposition the symbols (by cutting and pasting) onto a similar sized blank display.

3. White out or cover the symbols leaving only the words visible.

4. Ask child to show you____(say each word). Calculate # correct and analyze error pattern.

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Delineating the processes of literacy learning for PHSI persons will require much attention from researchers in AAC. In our clinics and classrooms, we can carefully explore the functions reading and writing have (or might have) in the lives of those unable to speak. Researchers describe a transition point between learning to read and reading to learn. This reportedly occurs sometime around the 4th grade and requires automaticity in decoding skills.[6] However, if compensatory strategies are available (e.g., large, readily accessible dictionaries), perhaps reading can be a tool for individuals learning about a world they have limited access to, even without such competencies.[7]

Writing may also serve different functions for PHSI persons than for able-bodied speakers. Slow rates may affect the form of written language, just as rates do during face-to-face dialogue, although less significantly.

Writing takes lots of practice and may be learned slowly even with ready access to technology. Writing means self-expression and exposure, a willingness to take a risk. Our literacy programs, therefore, will require emotional support, acceptance, encouragement, and compensatory strategies, as well as teaching encoding skills and rate enhancement techniques.[8]

In conclusion, the charts on this page summarize major needs in this area and offer guidelines for teaching. As I said, it's a place to start!

Literacy Issues Requiring Attention in AAC

Research

1. Need to conduct research on how individuals who have physical and verbal production problems learn to read and write. What are differences? Why are they occurring? Are teachers teaching differently? Need to study other AAC populations, as well as the physically handicapped.

2. Need to replicate studies across degrees of disability, ages, etc.

3. Professionals who do research need to publish it. Teachers, clinicians, parents, family members are hungry for data-based information.

4. Need to be upfront with theoretical frameworks used in research and intervention programs.

5. Need to collect longitudinal data to study the process of literacy learning.

6. Need to provide information to manufacturers/developers and assist in developing better tools.

7. Need to explore impact of symbol sets/systems on learning TO.

Clinical

1. Need to address immediate and particular literacy needs of individual adolescents, especially those who missed out in early years. Also, literacy needs of individual preschoolers and individuals with learning problems must receive the attention of AAC teams.

2. Need literacy specialists on our AAC teams, who also understand the unique problems and resources of individuals who use AAC.

3. Need to investigate the function of reading and writing in the lives of individuals who use AAC.

4. Need to recognize that PHSI persons may require a longer, less direct route to literacy. Need to observe the literacy learning process and map out the route.

5. Need literacy programs that are well integrated with academic and communication programs.

6. Need to document strategies that are and are not useful and adapt them, as needed.

7. Need to provide children, adolescents, and adults learning to read/write access to computers, software, and technical support. Technology is a tool, a means to an end. It is not an end in itself. Need to determine what technology (hardware/software) works under what circumstances, for which populations/individuals.

8. Need to develop literacy programs and literacy curricula, based on research, that take into account the special needs of specific AAC populations. Field tests with the target population are critical.

ACN's Guidelines for Teaching Literacy Skills:

1. Put away your red pencils! Appreciate and support attempts to read and write.

2. Stress and build upon language comprehension. (Note: Don't assume individual has the life experiences that will enable him/her to understand a story).

3. Insure the individual is an active, not a passive participant in learning.

4. Provide opportunities to practice. Skills must be practiced to be learned. Reading and writing are skills.

5. Integrate literacy training with other aspects of an individual's life & program.

6. During reading activities, individuals should be able to see the text. Read favorite books over and over.

7. Provide ways to read/look at books and scribble/draw/write independently. Technology is available to help (see **Equipment** section). Favorite books can be read independently by taking slides of the book and making a slide-tape version.[9] You might also use taped books.[10]

8. When reading to or asking an individual to read, tell him/her what to listen/look for. For example, "find out who the story is about?" Ask questions such as "what do you think will happen next?" to develop inferential skills. Gradually involve person more in interpreting text. With each successive exposure to a story introduce more complex ways of looking at text.

9. Don't waste time on activities that do not support literacy development. For example, worksheets do not correlate positively with reading achievement. Comprehension tasks and decoding strategies do.

10. During reading and writing activities, provide as much support as needed. Teach, don't test! Use a scaffolding approach to insure comprehension of material. Avoid materials and tasks that are too difficult so student does not experience success. Remember **Success precedes motivation.**

11. Put strategies on communication displays that allow and encourage the development of literacy related skills/problem solving techniques: (e.g., sounds like, similar to, opposite of, etc.)

12. Use an individual's communication board to teach left to right progression on a page and the concept that meaning can exist in print. Teach person to relate to words on their board (e.g., "is there a word/symbol on your board that sounds the same as the word you are trying to spell?")

13. Provide aural and visual feedback (e.g., speech synthesizer, tape, large print, graphics display). Auditory feedback via "talking" software has a beneficial effect on literacy development.[11]

15. To improve spelling, provide a curriculum that is appropriate. Lists can be obtained from vocabulary work in AAC field and other sources.[12]

16. Encourage students to keep journals: Diaries (personal feelings); Learning logs (summary of what was learned); Reading journals (responses to books, etc.)[13]

Consumers

Experiences & Reflections

The ability to read and write opens up opportunities for communication, education, employment, and independent living. Just as importantly for PHSI individuals, literacy is a tool which allows them to express their unique personalities, to learn, grow, and create.

A major influence on learning to read and write is the family.[14] Recent studies have begun to ask:
a) How do individuals who are unable to speak, develop literacy skills?
b) What effect does context and experience have on literacy development? This section focuses on what consumers and their families are telling us.

Three recent studies asked literate, adult consumers or parents of children who use AAC about the process of learning to read and write.

**1. Light and Kelford Smith[15] asked the parents of *able-bodied, speaking children* and *nonspeaking physically disabled* children (ages 2 - 6 years) to identify social and familial factors that may affect literacy development. Specifically, the two groups responded to questions about the nature and availability of printed and writing materials in the home, the function of reading and writing in the home, parental expectations for their children, the roles parents and children play during story reading activities, the support provided, and so on.

Preliminary results showed differences exist between the groups. All parents considered communication their highest priority. However, parents of able-bodied children ranked "making friends" as the next highest priority for their children; middle priorities were reading and writing; low priorities were feeding, toileting, mobility. In comparison, parents of children who use AAC listed feeding, mobility, and toilet training as high priorities. Low priorities were making friends, reading, writing, and dressing. Given the amount of physical care these children require, differences can be considered neither inappropriate nor surprising. Nevertheless, if parental priorities are different, early experiences of children may be also.

Children in both groups had access to literacy materials at home. Differences, however, were noted in the frequency and duration of the sessions during which materials were used. Children using AAC interacted with literacy materials 2-3 times per week (for comparatively longer sessions), while able bodied children had daily access. Parents indicated AAC users seldom had access to writing/drawing materials.

When reading stories together, parent's reported their able-bodied children asked questions or were asked questions. AAC users, however, reportedly played a more passive role, looking at pictures. One probable explanation is few of the children used communication aids during literacy-related activities.

AAC parents held "mother" primarily responsible for the literacy development of their PH children (2nd was teacher, then father). Given the already heavy time demands on mothers caring for multihandicapped children, parent's perceptions were surprising. Parents of able-bodied age-matched peers gave the job first to teachers, then to mom and dad.

**2. Koppenhaver, Evans, and Yoder[16] recently completed a retrospective study of PHSI adults (age 16 or older) who had functional reading skills. The purpose was to examine environmental influences on literacy learning. They were interested in whether literate adults shared similar childhood experiences as children that might account for their success. Questionnaires were mailed to AAC professionals in the U. S. and one province in Canada. These professionals conducted face-to-face interviews with 11 females and 10 males (average between 16 years and 55 years. All were current users of technology. Most used direct-selection electronic communication aids and had completed some college; one-half were still in school. Approximately 1/3 lived at home, 1/3 in apartments and the rest had other living arrangements (e.g., dormitories). Of those no longer in school, more than half were unemployed. Three had part-time jobs; only one had a full-time job.

These individuals reported learning to read at about 6 years of age (4-8 year range). Most had learned to read from the beginning using TO. They attributed their success to parental support, high expectations and their own persistence and talents rather than the educational system. Given their ages, it is not surprising that only one had used a computer to write as a child. All agreed access to technology as children would have been beneficial.

These individuals recalled regular opportunities at home to read, be read to, and observe others reading. Half reported reading to themselves throughout childhood. Most had owned their own books as children, had visited bookstores and libraries, and subscribed to magazines. In all cases, writing received much less attention. Less than half had drawn pictures or practiced letters of the alphabet at home.

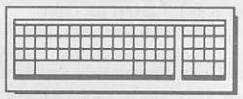
At school they recalled both recreational and assigned reading as regular parts of their school day. Most received direct instruction through the 6th grade. They read or listened to stories on multiple occasions and responded to questions. They recalled new vocabulary being taught prior to reading. Most had opportunities to discuss reading and writing with their teachers; however, few recalled doing so with peers. Despite their success at achieving literacy, most recalled being unhappy and frustrated at school, although reasons for this were not explored in the survey.

**3. A third study by Kelford Smith, Thurston, Light, Parnes, & O'Keefe[17] investigated the writing activities and skills of 6 PHSI adolescents and young adults who developed literacy skills "late" in their academic careers. All had been Blissymbol users. Results showed they wrote at home for a rather limited number of purposes (mostly homework). All currently demonstrate difficulties with written language syntax. Researchers raised questions about the possibility these individuals had language-based deficits. They also felt more research was needed to determine the impact on literacy of using graphic systems, which are content rather than form based.

These studies suggest that the early literacy experiences of physically handicapped, nonspeaking children are likely to be quantitatively and qualitatively different from those of able-bodied children. The implication is not that parents are failing. Quite the contrary, it is parental support and their positive expectations to whom literate adult AAC users partially attribute their success. All studies suggest PHSI children will require additional support upon entering school. They also suggest individuals can and do develop functional literacy skills as adolescents/adults if ongoing support is available! When it comes to literacy, "Better late than never!"

Hints for Families

* 1. Respond enthusiastically if child shows an interest in print.
* 2. Read to your child on a regular basis. Make sure the child can see the text as you read. Reread stories over and over.
* 3. Encourage child to play an active role during reading/story telling activities.
* 4. Use symbols books or make books that use child's symbol set/system.
* 5. Expect children to use their boards, not only to respond, but to ask questions, predict what will happen next, etc.
* 6. Play with sounds as you read and during other activities.
* 7. Provide opportunities to scribble, draw, write either assisted by a person or (more optimally) by a computer.
* 8. Encourage independent reading/writing. (e.g., books on tape).



Equipment

Software & Materials for Literacy Programs

This article focuses on software for desk top computers and materials that may facilitate, remediate, and/or compensate for literacy learning. Issues of positioning, seating, and access are not discussed. Switches, expanded keyboards, the Adaptive Firmware Card, other keyboard emulators (e.g., communication devices and TouchWindow), etc. now allow essentially all individuals to access a computer once supportive seating is established.

Thanks to the teachers, clinicians, manufacturers, and researchers who shared their ideas and opinions about desirable features of software programs for literacy learning and suggested useful products. Consider the following only a partial list of features to assist in selecting or developing literacy software for PHSI users.

ACN Checklist of Desirable Features

____1. Supports learning rather than subskill practice, i.e., should be more than an electronic workbook. Note: Don't assume children can use subskills learned during drill and practice activities.

____2. Encourages risk taking, exploration, expression.

____3. Provides instant access to data in a variety of forms so support is always available. For example, flexible, well organized vocabulary lists/dictionary to support reading and writing activities; spoken instructions and prompts; animated graphics to illustrate meaning, and so on.

____4. Offers intelligible speech output.

____5. Allows user to preview and review parts of lesson/story.

____6. Offers enlarged text options.

____7. Sets up meaningful simulations (e.g., interactive video). Provides meaningful, age-appropriate illustrations.

____8. Allows authoring.

____9. During writing tasks, permits access and selection of whole words and phrases.

____10. Provides auditory and visual feedback at the letter, word and sentence level (not just one line at a time). Highlights word at the cursor.

____11. Permits user to be independent.

____12. Stores and "publishes" work.

At this time the AAC field does not have a comprehensive literacy development or remediation program. However, they do exist for "normal, at risk" populations/individuals. AAC professionals can benefit from what others have done when developing literacy programs and curriculum. Here are a few examples:

1. **Listening to Learn, Writing to Read.** Teaches pre- and early literacy skills. Well documented and field tested. Software is part of each program. IBM Corporation, Information Systems Group, 3113 W. Beltline Hwy. Madison, WI 53713.

2. **Reading Recovery Program** targets "at risk" children enrolled in the first grade. "At risk" is defined as the bottom 20 percent of any class. The program originated in New Zealand and is now mandated for all their first graders. It is also used in Australia, in Ohio, and is being implemented in Illinois. Based on work by Marie Clay, it uses a whole language approach. Children read and write text, learn to predict, self monitor, and search. Longitudinal research in New Zealand and the state of Ohio show children maintain improved performance years after the program ends. The average length of the program is 15-18 weeks, 5 sessions per week, 1 on 1 with trained teacher. Teacher training takes 1 year. (Note: Contact Jan Gaffney at Center for the Study of Reading, 51 Gerty Dr., Champaign, IL 61820 or Carol Lyons, Ohio State University, 29 W. Woodruff, Columbus, OH 43012)

3. **Reading Realities.** A reading comprehension/creative writing program for "at risk" junior and senior high school students reading at a 2nd-6th grade level. Software, lesson plans, extension activities, bibliography of high interest/low vocabulary literature related to topics on disks. Optional speech capability. Three packages available: Real-life dilemmas (issues facing teens); Career Preparation (biographies of how people prepared for varied careers); Jury Series (student becomes juror; actual court cases). Each has 5 disks.Software available for 30-day preview. Apple II, IBM, Tandy 1000; Echo; Slot buster. Teacher Support Software, 1035 N.W. 57th Street, Gainesville, FL 32605. (800) 228-2871 or call collect in Florida (904)371-3802.

Companies that support AAC recognize the need for software and materials in the literacy area. However, creating materials given the paucity of research (and researchers) is risky and will take some time. For now, we must continue to apply products developed for PHSI individuals as *(cont. pg. 6)*

(Equipment cont. from page 5)
well as adapt products developed for able-bodied persons in our literacy intervention programs.

One recently published program from Communication Skill Builders was developed specifically to address the literacy needs of AAC users:

Cue-Write (Beukelman, Garrett, Lange, & Tice). **Apple II with 5 1/4" disk drive; Echo IIb/Cricket Speech synthesizer optional. $49. 3 disks; 48 page manual; adaptive firmware card.** A simplified, menu driven word processing program for children and adults who require spelling assistance and practice during writing exercises. A spelling cue window displays words and a speech synthesizer speaks words or sentences. When a letter is typed, a list of words beginning with same letter appears on screen. In the Assist mode, the list remains so individuals can copy the entire word. In the Tutor mode, the list disappears after the 2nd letter is typed. The word list holds up to 2000 words and can be individualized and updated.

Other software programs developed for individuals who use AAC aids and techniques can be adapted and integrated into literacy curricula by skilled professionals. For example, Mayer-Johnson has two new programs that support their *Picture Communication Symbols* (PCS) making it easy to develop materials for symbol users (e.g., miniboards for reading groups, story books, etc.)

Boardmaker. $249. **MacIntosh™ 512E, Plus or SE. 10 megabyte hard disk; McDrawTM (or other).** Allows user to select and arrange symbols from the PCS Books I and II (1700 symbols). Symbols can be made any size. Words above the symbol may be removed or changed, with some difficulty. Boards may be saved, modified, and printed.

Board Builder. $149 MacIntosh™ SE or MacIntosh Plus with 1 megabyte memory. Hypercard (version 1.2 or later). Selects and arranges 1 1/4" PCS I and II symbols (note: use copy machine to enlarge or miniaturize). Words above pictures are easily changed (e.g., Spanish, French). Allows user to save and print displays.

Several companies offer books, language experience materials, and software easily adapted by a skilled reading specialist/teacher/speech pathologist team for early or remedial literacy programs.

1. **Mayer-Johnson Co.** (P.O. Box 1579, Solana Beach, CA 92075). Read-A-Bol symbol books for children offer 3 levels. Symbol books also available for older individuals. See also Life Experience kits (Food, Holiday, and Zoo Kits); Listen to This; Lotto games.

2. **Blissymbolics Communication Institute** (24 Ferrand Drive, Don Mills, ON Canada M3C 3N2). Lots of materials and resource books that support learning Blissymbols can be applied to literacy learning programs. Talking Blissapple, a software program allows individuals to "write" with Blissymbols (Apple IIs).

3. **Communication Skills Builders** (P.O. Box 42050, Tucson, AZ 85733). Lots of ideas in the PACT (Partners in AC Training) program, e.g., worksheet activities. The language materials Read to Me, Talk to Me and The Magic of Sentence Sense also have ideas. They also distribute a range of software, some of which are listed below.

4. **Don Johnston Developmental Equipment, Inc.** (P.O. Box 639, Wauconda, IL 60085 (312) 526-2682). Books and a range of hardware and software to support AAC intervention programs, including literacy learning. They distribute Laureate Learning System Software., PEAL Software. Also Point to Pictures (Cooper & Nielson); Symbol Writer (Smolin & Brink); TouchCom (Smolin & Brink), an authoring program, can be used in literacy programs.

Finally, the following list of "good" software comes from the field (mostly for Apple IIs). Some are designed for individuals with PH; most are not so check carefully. The list is not comprehensive. Let me know what you think!

Early Language Software for PHSI

Laureate Learning Systems- 110 E. Spring St., Winoski, VT 05404 (800) 655-4755.

PEAL Software - 5000 N. Parkway Calabasas, #105, Calabasas, CA 91302.

UCLA Intervention Project programs - 1000 Veteran Avenue, 23-10 Rehab., Los Angeles, CA 90024. (213) 825-4821.

Reading/Stories.

Reader Rabbit - The Learning Co., 6493 Kaiser Dr., Fremont, CA 94555 (800)852-2255.

Stickybears ABC and Stickybear Reading - Weekly Reader Software, Xerox Educ. Pub., Middletown, CT 06456.

Sound Ideas (Houghton-Mifflin, P.O. Box 683, Hanover, NH 03753 (800) 258-9773.

Create with Garfield: Deluxe Ed. - DLM, One DLM Park, Allen TX 75002 (800) 527-4747.

Explore-a-Story - D.C. Heath & Co., 125 Spring St., Lexington, MA 02173.

Drawing

Delta Drawing - Spinnaker Software Corporation, 1 Kendall Square, Cambridge, MA 01239 (800) 826-0706.

Keyboarding skills

Junior Typer - Aquarius People, P.O. Box 128, Indian Rocks Beach, FL 33535 (800) 282-4198.

Type to Learn - Sunburst, 39 Washington Ave., Pleasantville, NY 10570 (800) 431-1934.

Stickybear Typing - Weekly Reader Software (see above)

Keytalk - Peal Software, 5000 N. Parkway Calabasas, #105, Calabasas, CA 91302 (818) 882-7849.

Word Processing

Kidwriter - Spinnaker Software Corporation, 1 Kendall Square, Cambridge, MA 01239 (800) 826-0706.

My Words and Dr. Peet's Talk/Writer - Hartley Courseware, Inc., P.O. Box 431, Dimondale, MI 48821 (800) 247-1380

Magic Slate - Sunburst, 39 Washington Ave., Pleasantville, NY 10570 (800) 431-1934

Bank Street Writer (Plus) - Broderbund Software, Inc., 17 Paul Drive, San Rafael, CA 94903.

MindReader - (IBM) Businesssoft, Inc., 703 Giddings Ave., Annapolis, MD 21401

A proliferation of equipment, materials and information is available. Teachers suggest using a variety of software on one level, as well as group activities, so children have varied experiences. If you feel confused and confounded by it all, you are not alone! Resources I find most helpful are: *Trace Resource Books* (S-151 Waisman Center, Univ. of Wisconsin, 1500 Highland Ave. Madison, WI 53705); *Apple Software Reference Guides* (Apple Computer, 20525 Mariani Avenue, Cupertino, CA 95014, *Closing the Gap Resource Directory* (P.O. Box 68, Henderson, MN 56044), and of course, AAC colleagues!

HINTS

From: Gail VanTatenhove, an AAC specialist and subscriber from Orlando, Florida, U.S.A.. **Re:** Issue #5 (article on Auditory Scanning devices)

The ScanWOLF has a feature that permits auditory scanning in a linear scanning format through a display configuration of 2 to 36 targets. When the user hears their message, they activate their switch and the message is spoken a second time. For more information contact ADAMLAB, Wayne, MI (313) 467-1415. Thanks Gail!

Microcomputer Centre

The University of Dundee, Scotland

The Microcomputer Centre at Dundee University in Scotland conducts research in the use of microcomputers in rehabilitation and therapy.[18] Research within the Centre reflects an interdisciplinary team approach. The team includes engineers, computer scientists, programmers, psychologists, speech pathologists and occupational therapists. Centre research has applications for individuals with and without disabilities; the common thread being man-machine interaction. The Centre's work is closely linked with the University Medical School, the Tayside Rehabilitation Engineering Service and the University's School of Biomedical Engineering. The Centre staff maintains close ties to local industries. Collaborative university relationships exist outside Scotland, specifically with Queens College in New York City.

Research groups

Industrial applications and computer vision. Primary activities include consulting to local industries, developing university products to a point where they may be transferred to the private sector for commercial purposes, and applying low-cost computer vision systems.

Applications of microcomputers in occupational therapy. This group is designing therapeutic software for the remediation or development of perceptual-motor and other skills. Certain populations (e.g., head injured, psychiatric, and multiply handicapped children) are targeted. Software is field tested in clinical situations and marketed by a local software company.

(Note: Software for Occupational Therapy and Remedial Education and training videos ("Microcomputers in occupational therapy") are available from Lochee Publications, Dundee, Scotland.)

Speech technology. This group investigates the application of speech recognition by machine in office environments. They are particularly interested in dictation and text creation applications.

Communication systems for the disabled. Major projects relate to issues of effective interfaces for physically disabled individuals and of rate enhancement software. Their ongoing projects include:

1. **Microcomputers as Communication Aids for Disabled Children and Young Adults** (with Tayside Rehabilitation Engineering Service. Professor Alan Newel, Director of the Centre, Dr. Arnott, Mr. Condie, and Mrs. Roy are evaluating the effectiveness of certain features of communication aids. Specifically, word prediction techniques (available in their Predictive and Adaptive Lexicon (PAL) communication aid) and speech synthesis. In collaboration with the Dundee Limb Fitting Centre, project staff will also design suitable switches for specific groups.

2. **Machine Shorthand Based Speech Prosthesis.** Dr. Arnott is working on a speech prosthesis for manually dexterous individuals with impaired speech. With this stenotype shorthand machine keyboard connected to a speech synthesizer, skilled stenotypists actually have carried on conversations at low natural speech rates. The system may be used with the British Palantype or an American Stenograph Keyboard. The project aims to increase present rates and improve the current quality of synthetic speech by adding prosodic features. In a related project, Dr. Arnott, Professor Newell and Mr. Murray are developing ways to expand the range of vocal types and modes of expression in speech synthesizers.

3. **Applications of Conversation Analysis to the Design of Communication Aids.** Dr. Arnott, Professor Newell, and Mr. Alm are developing a set of guidelines for manufacturers and developers of communication aids to allow them to model natural conversation behaviors. Differences between spoken and written language; the role played by speech rate, rhythm, and intonation in conveying meaning; the importance of speech acts, which accomplish interactive goals as opposed to messages which relay information; the ritualized nature of a large proportion of daily communication; and the predictable structural features of discourse, as well as ritualized scripts are being considered. Mr. Alm will then apply this work to the design of computer-based systems for the speech impaired.

4. Gesture Analysis/Pattern Recognition. Mr. Cairns plans to develop a Computer Vision system, using computer recognition and analysis of human gesture and motion, that will recognize and respond meaningfully to the gestures of people (particularly those who are severely physically handicapped).

Additional projects being carried out under the supervision of Centre staff include

1. **Computational Linguistic Techniques in Computer Systems for the Speech Impaired.** This project investigates various computational linguistic and discourse analysis techniques as applied to communication systems for those with severe physical limitations.

2. **The Application of Artificial Intelligence Techniques for the Disabled.** Ms. Broumley is investigating ways to develop rule-based techniques for inducing spelling transformation and to apply natural language processing techniques to communication systems for the physically disabled.

3. **Development Production and Assessment of Movement Training and Assessment Systems using Microcomputers.** Miss MacKenzie and Mrs. Shearer are developing software to encourage, monitor and assess manipulation of the wrist and hand (flexion, extension, supination, and pronation).

4. **Application of Microcomputer Techniques in Special Education.** Special educators will examine the applications of Microcomputer Centre hardware and software to special education populations.

For further information about the Microcomputer Centre, specific projects, and study or research opportunities, contact Professor Alan Newell, Microcomputer Centre, University of Dundee, Dundee, DD1 4HN Scotland.

Governmental

Update on P.L. 100-407

Don't expect the regulations for P.L. 100-407 to be published any time soon (see last issue of ACN). Washington is apparently "on hold" until after Bush assumes the presidency.

The good news is that states have more time to develop their plans and prepare a good proposal.

Cohen now estimates the final "Regs" will be developed in late spring, 1989. So . . . proposals will probably be due sometime between May and August. For additional information, call Carol Cohen (315) 455-7591.

NEWS ITEM

The 4.0 version of the **Adaptive Firmware Card** (AFC) for Apple 2 GS computers will be available in February. Cost = $480. New features not only enhance physical access, but enhance cognitive access! For example, speech can be added to programs now without it; scanning displays can be placed anywhere on the screen in 20, 40, 80 column arrays; mouse emulator; and much more. Supports ECHO, Votrax, DecTalk synthesizers. For those without the know how or inclination to develop setups for the AFC, "Don't worry. . . Be happy." With 4.0, you will receive pre-existing setups developed for the following programs: **Reader Rabbit, Writer Rabbit, Sickybear Reading, Gingerboy, Muppetville, KeyTalk, Printshop, Edmark Reading Program, Explore Story, Create with Garfield, Printshop,** and others. Additional setups will be available from independent developers. All registered owners of the current G-32 card will get a free upgrade. For information call Don Johnston Developmental Equipment, Wauconda, IL (312) 526-2682.

Resources

Beukelman, D., Barkley Memorial Center, University of Nebraska, Lincoln, NE. (402) 472-5463.

Cohen, C. Enable, Syracuse, NY (315) 455-7591.

Corely, P. Communication Enhancement Clinic, Children's Hospital, Boston, MA (617) 735-6466.

Follansbee, B., Communication Enhancement Clinic, Children's Hospital, Boston, MA (617) 735-6466.

Gaffney, J., Center for the Study of Reading, Champaign, IL (217) 328-0957.

Hartman, P., Communication Skill Builders, Tucson, AZ (602) 323-7500.

Johnston, D., Don Johnston Developmental Equipment, Wauconda, IL (312) 526-2682.

Johnson, R. and Johnson, T. Mayer-Johnson, Solana Beach, CA (619) 481-2489.

Koppenhaver, D., University of North Carolina, Chapel Hill, NC (919) 966-2343.

Light, J., also Kelford Smith, A., Hugh MacMillan Medical Center, Ontario, Canada (416) 425-6220.

Lyons, C. Ohio State University, Columbus, OH (614) 292-0711.

Mann, K., L.D. Program of Toronto Bd. of Educ., 75 Inniscross Crescent, Scarborough, ONT, Canada M1V 2S8.

McNaughton, S. Blissymbolics Communication Institute, Don Mills, Canada (416) 421-8377.

Sperling, M. Center for the Study of Writing, University of CA, Berkeley, CA (415) 642-9592.

Shane, H. Communication Enhancement Clinic, Children's Hospital, Boston, MA (617) 735-6466.

Yoder, D. University of North Carolina, Chapel Hill, NC (919) 966-2343.

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