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ABSTRACT

This brief describes 23 computer-based adult literacy programs developed for instructional use in workplace and general literacy settings and 11 guides and research reports. Descriptions contain these types of information: area(s) taught or assessed; format; intended users; instructional objective(s); required hardware; cost; companion print materials; and source (name, address, and telephone number). The curricula and guides are divided into three types. The 10 work force/workplace literacy curricula are as follows: Basic Academic Skills for Employment; Aptitude Based and Interest Based Career Decision Tests; Reading in the Workplace, Math in the Workplace, and Solutions; Systems Approach for Workplace Literacy Assurance and Occupational Skills Analysis System; Education for Employment; Job-Trails; Mathkey; R.O.A.D. to Success; SkillWorks; and Workplace Literacy System. The 13 general curriculum/program development entries include the following: Autoskills Component Reading Subskills; BLS Tutorsystems; COMPRIS, INC.; Core Reading and Vocabulary Development Program; A Day in the Life...; Graffiti One, In the Print Shop, and Accent Improvement; Adult Literacy Word Processor; GOAL Series; MacEnglish; Pathfinder Learning System; Project STAR: Sequential Training for Adult Reading; Skill Bank Business Edition; and Interactive Modumath. The third section describes 11 resource guides, research reports, collected readings, and other guides. Descriptions discuss content, focuses, and findings on recommendations. Two articles: "The Case for Computers" (BCEL Newsletter, July 1985) and "Computer Update: Emerging Issues" (BCEL Newsletter, October 1989) are attached. (YLB)

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Brief

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Computers & Literacy: Curricula & Guides

The computer-based adult literacy programs listed below have been developed over the last few years for instructional use in workplace and general literacy settings. Most have been produced by commercial publishing houses. All have been reviewed by BCEL, found to be of possible use to businesses and/or literacy groups, and checked for current availability and prices.

Most analysts, including BCEL, advise against adopting any computer-based program or system without first previewing it and seeing an actual demonstration if possible. Moreover, computer-based systems are not a panacea. Whether as the sole means of instruction or as a supplemental aid within a program, they should be used only after a careful assessment of program and learner needs and following thorough consideration of other instructional options. To that end, it may be helpful to talk with business and literacy groups that have purchased one of the following systems to get a first-hand sense of their reasons for using it, the instructional use to which it is being put, and their experience with it. More generally, some of the guides and reports listed toward the end of this BRIEF will be helpful in examining the role of computers in adult basic skills programs.

[Note: BCEL's July 1985 Newsletter featured a still-relevant article called "The Case for Computers."The October 1989 issue carried another article, "Computer Update: Emerging Issues." Both articles are reprinted at the end of this BRIEF.]

Workforce/Workplace Literacy Curricula

1. **Basic Academic Skills For Employment** (BASE) is a computer-assisted program available from Educational Technologies, Inc. BASE is designed to teach reading, writing, language, and math skills in specific job contexts to adults with mid-range skills proficiency. It relates instruction to some 12,000 specific job titles, tracks progress and tests for competency acquired in the skills needed for those jobs, designs individualized programs of instruction depending on student selected job goals, and provides for easy management and evaluation of the overall program. It is designed for direct use by individual learners, has an open-entry, open-exit format, and requires some professional supervision. The program consists of 22 diskettes and print-related material. For further information or for hardware specifications contact Educational Technologies, Inc., 1007 Whitehead Road Ext., Trenton, NJ 08638 (609) 882-2668.

2 Also available from Educational Technologies Inc. are two occupational assessment tests designed to be used either separately or in conjunction with the above BASE program. **The Aptitude Based Career Decision** test assesses students' "clerical perception" (demonstrated by quickly and accurately determining if two numbers are the same or different), vocabulary, computation skills, spatial perception, and inductive and analytical reasoning ability. The results are used to match students' ability to occupations. The **Interest Based Career Decision** test uses

responses to 200 captioned pictures —which show aspects of various types of jobs —to identify occupations compatible with students' interests. (The pictures are available in a "Survey Book" or on A-V cartridges that require a special projector sold by the publisher.) Both tests come in computer and paper-and-pencil versions. For more information, contact Educational Technologies Inc. at the address and phone number given in item #1 above.

3. Educational Activities, Inc. has published three computer-based programs intended for workplace use. **Reading in the Workplace** is a reading comprehension program available in two versions — *Construction* and *Automotive* — for use in the building and automotive trades. Each version uses job-related passages to teach reading and critical thinking skills and to introduce relevant concepts and vocabulary. Each version is also available at three levels of difficulty (3rd-5th grade level, 5th-7th grade level, 7th-9th grade level). The program includes print materials for the teacher and reproducible worksheets. **Math in the Workplace** is a developmental math curriculum that incorporates activities from such job areas as agriculture, building trades, business, and health occupations. Here, too, there are multiple program units: *Using Graphs, Charts, and Tables; Measuring in Traditional and Metric Units;* and *Working with Lines and Angles.* Each software program is accompanied by print material for the teacher and reproducible worksheets. Educational Activities also offers a comprehensive math and literacy curriculum called **Solutions**. This program, which is designed for a wide range of age and ability levels, combines 14 of the company's instructional, management, and assessment programs, and a manual called *Options for Learners,* into one integrated system. For information about hardware requirements, preview material, prices, and ordering, contact Educational Activities, Inc., PO Box 392, Freeport, NY 11520, (800) 645-3739 or (516) 223-4666 in New York.

4. Educational Data Systems, Inc. has introduced two computer-assisted programs to help define and deal with workplace literacy problems. **A Systems Approach for Workplace Literacy Assurance** guides users through a systematic process to determine if employees have skills necessary to perform specific jobs. The software costs $155 and is for IBM PC and IBM-PC compatible hardware. An accompanying manual is $52.50. **The Occupational Skills Analysis System** ($2,995), for IBM PC and compatible hardware, contains a database for defining the skills levels required for specific jobs. The program aids in placing workers into specific jobs and training programs. Contact Educational Data Systems, Inc., 1 Park Lane Boulevard, Suite 701 West, Dearborn, MI 48126, (313) 271-2660.

5. Based on extensive workplace interviews during the past several years, the Conover Company of Omro, Wisconsin has developed a comprehensive computer software program for use with students primarily in transition from school to work. Called **Education for Employment**, the program is arranged in 12 modules—in the broad areas of *Career Planning, Values & Self-Concept, Vocational Exploration & Assessment, Workplace Basic Skills, Workplace Math, Workplace English, Workplace Social Skills, Workplace Reasoning Skills, Employability Skills, Survival Skills,* and *Vocational Training.* Within each area, a series of programs, which may be used individually or as a linked series, focus on specific topics, competencies, and jobs. Each individual program and module is designed to motivate learning; increase student understanding of the skills, tasks, and behaviors needed to function effectively; and help the student assess what he or she needs to learn through simple practice exercises. Nearly all of the components consist of hands-on exploratory activities for the student and full remediation. The programs are designed for Apple II and IBM-PC systems. BCEL reviewed the programs for the job of cook, one of 31 occupations covered in the *Workplace Math* and *Workplace English* modules. We found them to be interesting, relevant, and fun. Because the breadth and depth of the program makes it hard to explain in capsule form, literacy or business groups wishing to consider any part of the program are advised to first request a catalog from The Conover Company, PO Box 155, Omro, WI 54963, (800) 933-1933.

6. **Job-Trails**, from Penn State's Institute for the Study of Adult Literacy, is a basic skills assessment system that evaluates skill levels in food service, health, maintenance, clerical, and retail occupations. Activities are coded according

to the CASAS Workplace Literacy Analysis-Individual profile. The software was designed for use by adults entering job training or basic skills programs. It offers some skills instruction along with the assessment activities and a means for exploring career options. An *Instructors' and Tutors' Guide* offers suggestions for creating instructional materials and links areas of skill need to commercially-available curriculum materials. Can be used on IBM, IBM-compatible, and Macintosh computers. The complete program sells for $564; a preview set is available for $25. Order from the Institute for the Study of Adult Literacy, 204 Calder Way, Suite 209, University Park, PA 16801-4756, (814) 863-3777.

7. **Mathkey** is a computer program designed for workforce/workplace job-related instruction. It consists of one diagnostic module and separate modules for addition and subtraction: multiplication and division; fractions, decimals, and mixed numbers; percents, averages, ratios, and rounding; measuring and metrics; and advanced problem solving. It runs on MS DOS computers with DOS 3 or higher. Individual modules are $500; the entire program is $1,800. For more information and a demo disk, contact Aztec Software Associates, Box 863, 24 Tulip Street, Summit, NJ 07902, (908) 273-7443.

8. **R.O.A.D. to Success**, from Penn State's Institute for the Study of Adult Literacy, is a comprehensive, computer-assisted basic skills program designed to prepare low-skilled commercial drivers to pass the written portions of the Commercial Driver's License (CDL) test. Based on the official CDL manual, the program is written at the 4th-7th grade level. It includes a *Software Reference Guide*, *Learning Activity Packets* (print materials that parallel the computer modules), *Instructor's Manual*, a *CDL Basic Skills Check* (criterion-referenced test), and an *Evaluation Report*. The program operates on IBM PC or compatible equipment or Macintosh systems. To obtain a preview set and price and ordering information contact the Institute for the Study of Adult Literacy, Penn State University, 204 Calder Way, Suite 209, University Park, PA 16801-4756, (814) 863-3777.

9. **SkillWorks**, from Imsatt Corporation, is a comprehensive computer-based basic skills program designed for general and workplace use with students reading at the 3rd-8th grade level. It contains some 75 hours of instruction in seven skills areas: grammar, spelling, punctuation, writing, capitalization, vocabulary, and comprehension. The course includes instruction, exercises, and games, as well as a strand of "dramatizations" that build "life skills" while showing students the real-life applications of the other skills they are learning. Students are able to hear words pronounced, go to a built-in dictionary for definitions, and hear most of the material they read from the screen. The program includes a pre-testing component and has a built-in diagnostic system to keep track of and report on a student's progress. It can automatically track students through their course work and produce appropriate homework assignments. It includes an authoring system, so that it can be customized to fit the specific needs of employers and literacy programs. In addition, Imsatt will help businesses and other users develop individualized versions. The program runs on the Commodore CDTV (with a CD-ROM). The hardware and software is sold as a unit and costs $3,000. Substantial quantity discounts are available. [Note: SkillWorks is a component of HOMER, a larger program embracing GED and higher level education courses.] For more information about SkillWorks (or HOMER) contact Nat Kannan, Chairman, Imsatt Corporation, 105 West Broad Street, Suite 301, Falls Church, VA 22046, (703) 533-7500.

10. **Workplace Literacy System**, from the Conover Company, is a complete workplace literacy curriculum with several components. *Learning Activity Packets* is designed to teach some basic math and English skills and demonstrate their importance in specific occupations. Separate packets are available for each of 15 occupations. *Math on the Job* provides practice in basic math in the context of a wide range of occupations from accounting clerk to waiter. *English on the Job* teaches students to apply communications skills to the same group of jobs. *Reasoning Skills on the Job* helps students develop the ability to use reasoning skills to solve work-related problems. It contains diagnostic and remediation modules for twelve career clusters and seven reasoning/critical thinking competencies. The above components are available in both print and computer formats, but two others are available in computer versions

only: *Social Skills on the Job* and *Learning How To Learn Series*. The first program enables students to practice "personal," "initiating," and "responsibility," introducing oneself, and following instructions. The second program contains modules on following directions, building memory skills, using sensory input, study skills, and test-taking. All components in the system are available in many configurations. For preview materials, and information about hardware requirements, prices, and ordering contact the Conover Company, PO Box 155, Omro, WI 54963, (800) 933-1933.

General Curriculum/Program Development

1. **Autoskills Component Reading Subskills** is a computer program designed to diagnose students' specific strengths and weaknesses, prescribe and provide suitable remediation while reinforcing their strengths, and track and evaluate their progress. The program has separate components for reading (visual matching, audiovisual matching, and oral reading), reading comprehension, and writing. Instructors can tailor the program to their students' needs by editing or adding new reading comprehensive passages. Students go through each subskill area in a particular domain, mastering that before proceeding to the next higher level. Although originally designed for use in schools, components have been added to make the program suitable for adults. It can be used with ESL, learning disabled, and general literacy students. Its best use may be in conjunction with other materials that promote an interest in reading. The program has won awards from the International Reading Association, the Orton Dyslexia Society, and the International Correction Education Association, among others. It runs on Macintosh computers and on IBM MS-DOS and compatible computers with an added voice adaptor (Artisoft or Street Electronic). A single copy of the program is U.S. $1,495, and network versions vary in price depending on number of people served at one time. Training is available at an additional cost. For further information, contact one of the following sources: Autoskills International, 331 Cooper Street, Suite 201, Ottawa, Ontario, Canada K2P 0G5, (613) 235-6740 or (800) 265-7633; or New York Entry Publishing (Lynn Glasner), 27 West 96th Street, New York, NY 10025, (212) 662-9703.

2. **BLS Tutorsystems** is a computer-based math, reading, and grammar program designed by CTB-McGraw-Hill. It is a comprehensive system of ten courses, built to move a person from 4th grade to GED competency, which are correlated to the goals of the TABE and CAT standardized tests. Each lesson is self paced and oriented to particular life skills, with the computer instruction reinforced by reproducible worksheets. Mastery Tests are built into every lesson so that students can assess and demostrate what they have learned. Also included in the system is a management component that permits students' progress to be tracked as they move through the program. All courses are available for Apple and IBM compatible computers, in stand-alone, "lab pack," or network configurations. Prices range from $100 to $18,600 depending on how many program elements are purchased and for what computer configuration. For more information contact BLS Inc., Woodmill Corporate Center, 5153 West Woodmill Drive, Suite 18, Wilmington, DE 19808, (800) 545-7766.

3. **COMPRIS, INC.** produces educational computer courses accompanied by related audio tapes. Twenty courses are available including *Spelling, Reading and Understanding, Reading for Life I and II, ESL, Punctuation, Grammar, Report Writing, Critical Thinking, The Literacy Experience*, and *Business Communications Skills*. Most of the programs require at least a 7th grade or higher reading level. Courses range in price from U.S. $250 to $750. They can be used in schools, prisons, businesses, at home, and in other settings. For more information contact Ted Davis, President, COMPRIS, 352 Elgin Street, Ottawa, Canada K2P 1M8, (613) 563-8000, FAX (613) 563-4728.

4. **Core Reading and Vocabulary Development Program**, from Educational Activities, Inc., is a five-level interactive computer program for adult beginning readers and ESL students. It can be used with Apple II, IBM PC, IBM compatibles, and TRS-80 hardware. Each lesson in the highly-structured tutorial program is made up of nine sequenced activities that engage the student in reading, recalling, writing, and spelling, and in checking their understanding of words in context. The program includes reproducible supplementary activity worksheets. It is available

in English and Spanish, and a speech component is available for the English version. The Primer-First Level includes two disks and is $79. The Pre-Primer, First, Second, and Third Levels, each containing four disks, are $159 each. The entire program is $650. Backup disks are included at no charge. For price information about the speech component contact the publisher. Educational Activities, Inc., PO Box 392, Freeport, NY 11520, (800) 645-3739. In New York call (516) 223-4666.

5. **A Day in the Life...** is a computer program designed by the Institute for the Study of Adult Literacy at the Pennsylvania State University for teaching basic skills to adults reading at the 5th to 8th grade level. The skills, which are keyed to CASAS, are taught in a job context, helping to prepare students for entry-level jobs in five occupations: food service, health, maintenance, retail, and clerical. Students move through scenarios in which they perform true-to-life job tasks with basic skills lessons embedded in them. While performing a task, students have recourse to job manuals and other aids to help them complete it successfully. As in real life, the tasks require the use of reading, writing, math, and organizational and thinking skills. When a task is completed, the student receives an evaluation from "management" and can take advantage of a personalized "training package" to improve any deficiencies. Appealing graphics and interactive features that allow students to manipulate the scenes make the program fun. The program includes a module that introduces the students to computers, preparing them to use the program independently. It comes with an instructor's manual and contains "learner data disks" for instructors' use in tracking and recording student progress. **A Day in the Life...** is available in both IBM and Macintosh formats. For more information, prices, and demo disks contact Curriculum Associates, Inc., 5 Esquire Road, North Billerica, MA 01862-2589, (800) 225-0248.

6. **Graffiti One** and **In The Print Shop**, from SpeakWare (formerly LinguaTec, Inc.), combine digitalized sound and graphics. Intended for low-skilled and intermediate ESL adults, the programs consist of simple stories, using an interesting and sometimes playful comic-book format, with reading comprehension and vocabulary exercises built around them. Also available from SpeakWare is **Accent Improvement**, a program to improve accents and increase understanding of spoken English. The three programs are part of a series designed for the Macintosh computer. Literacy groups are advised to first purchase demo disks ($21.50) for the three programs from Larry Statan, SpeakWare, 2836 Stephen Drive, Richmond, CA 94803, (510) 222-2455.

7. **Adult Literacy Word Processor** (for the Apple Macintosh) is a simplified word processing program designed to supplement literacy instruction. Available ($75) from the Institute for the Study of Adult Literacy, Penn State University, 204 Calder Way, Suite 209, University Park, PA 16801-4756, (814) 863-3777.

8. The **GOAL Series**, from Davidson & Associates, is a two-part computer-based program that teaches critical thinking skills and reading and writing to adults at the 2nd-6th grade equivalency level. Both segments—*GOAL Reading Comprehension* and *GOAL Vocabulary*—contain reading passages focused on life skills, health, the workplace, and fictional and human interest stories. They are designed for use with IBM or IBM-compatible computers. For preview materials and information on prices and ordering, contact Davidson & Associates, Inc., PO Box 2961, Torrance, CA 90509, (800) 556-6141, or in California (310) 793-0600.

9. **MacEnglish** is an ESL program for use on a Macintosh computer with a CD-ROM drive. Three programs are available: *Inform 1: Daily Living, At Work, Culture & Customs*; *Inform 2: Entertainment, Sports & Leisure, Travel*; and *Pronunciation Plus*. The two Inform programs contain three types of activities: "Articles" about each topic, "Dialogues" in which students play one part, and "Reviews" that contain reading and listening comprehension questions. Students can read and/or listen to the text, and they are able to record, play back and compare to the model within the program. *Pronunciation Plus* is specifically for Japanese students and teaches English pronunciation at all levels of proficiency. All three programs are accompanied by an Instructor's Guide and Student Workbooks. For information about system requirements and prices or a free CD-ROM demo disk, contact MacEnglish

Learning Systems, 205 Mason Circle, Concord, CA 94520, (800) 765-4375.

10. The **Pathfinder Learning System** is a curriculum and management system for youth and adults. It is competency-based and includes a program to assess learners and assign individualized lessons based on their skill levels and goals, a reading and writing module, and optional modules in math, social science, general science, and employment/life skills. A library of books, cassettes, and computer software is built into the system and referenced to the instructional program—some 350 items for the reading and writing module and 2,000 overall. Users can add additional materials. The system runs on an IBM or IBM-compatible network in conjunction with various peripherals and IBM software. Hardware costs range from U.S. $20,000 to $50,000. The Pathfinder Learning System, including the reading/writing module and math modules, installation, training and ongoing support, and the first year's license fee, ranges from $39,000 to $104,000 depending on how many and which optional modules are purchased. Prices for optional modules alone range from $12,000 to $16,000. Contact Georgia Requa, Pathfinder Learning Systems Corporation, PO Box 1722, Mount Vernon, WA 98273, (206) 428-3643.

11. **Project STAR: Sequential Training for Adult Reading** is a computer-based adult learning program that allows instructors to evaluate students and plan individualized, self-paced study courses for them. The program ranges from 0 reading level to GED. It includes "application" modules to teach adults to use their skills in everyday settings. To preview or for more information, contact Hartley Courseware, Inc., 133 Bridge Street, Dimondale, MI 48821, or call (800) 247-1380 (517-646-6458 in Michigan).

12. **Skills Bank Business Edition** is a computer-based basic skills program in language, reading, writing, mathematics, and analysis skills. The system contains some 286 lessons and over 100 quizzes and tests on 77 disks. Lessons are straightforward, with a statement of a rule or principle, followed by examples and questions. Students get feedback for both right and wrong answers and are able to access "hints" before responding. The program produces reports on student progress and either chooses lessons for students automatically or allows students or instructors to do so. For computer requirements, prices, or demo disks, contact Skills Bank Corporation, 6350 Presidential Court, Fort Myers, FL 33919-3570, (800) 222-3681.

13. **Interactive Modumath**, produced by the Wisconsin Foundation for Vocational, Technical, and Adult Education (VTAE), Milwaukee Area Technical College, and Waukesha County Technical College is a multi-media basic math program comprised of 39 interactive lessons covering whole numbers, fractions, decimals, percents, and signed numbers. The complete package consists of 20 double-sided videodiscs (which may be purchased separately), computer software, a Study Guide, and an Instructor's Guide. The program is individualized, self-paced, and competency-based. It includes a diagnostic test, drill-and-test sequences for each lesson, a record-keeping system, and an authoring program to permit adaptation to local need. **Modumath** is in use in many of Wisconsin's technical colleges, industries, and schools, as well as in programs outside the state. For information about prices and hardware requirements, contact the VTAE, 2564 Branch Street, Middleton, WI 53562, (608) 831-6313 or (800) 821-6313.

Guides & Research Reports

1. **Adult Basic Education Resource Guide**, from the Apple Computer Company and List Services, describes seven diverse adult basic skills programs that use the latest Macintosh or Apple computer technology for instruction. In addition, the guide gives an overview of the role of technology in adult basic education, identifies characteristics of useful software, and lists organizational and material resources. Available for $15 from List Services, Inc., 10810 Harney Street, Suite 202, Omaha, NE 68154, (402) 334-4991.

2. **Computer Applications in Reading**, by Jay Blanchard of Texas Tech, George Mason of the University of Georgia, and Dan Daniel of the Houston Texas Independent School District, is a chronicle of research, programs, and uses of computers in reading. Among the topics covered are software evaluation, readability and text analysis, and reading readiness. Available

for $8 ($5.25 for members) from International Reading Association, 800 Barksdale Road, PO Box 8139, Newark, DE 19714, (302) 731-1600.

3. **The Job Training Partnership Act & Computer-Assisted Instruction** is a research report undertaken by the Education Turnkey Systems, Inc. for the National Commission for Employment Policy. The study explores how JTPA programs use computer-assisted instruction and examines obstacles to its wider use, such as lack of understanding about computers and lack of funding. Major recommendations include the creation of a one-time funding approval line for technology investments and of a national technology resource center. Available at no cost from the National Commission for Employment Policy, 1522 K Street, NW, Suite 300, Washington, DC 20005, (202)724-1545.

4. **Keystrokes to Literacy: Using the Computer as a Learning Tool for Adult Beginning Readers,** by Antonia Stone, is a manual designed to help adult literacy providers incorporate computers into their programs. Instructors need no previous knowledge of computers to use the guide. Available for $21.95 plus shipping and handling from National Textbook Co., 4255 West Touhy Avenue, Lincolnwood, IL 60646-1975, (708) 679-5500.

5. **Software Buyer's Guide**, 1991 edition, describes and evaluates computer software for adult basic education programs. It contains listings for instructional software in math, language, life skills, and reading, and for support software, such as word processing programs. All programs have been evaluated by the Oregon/ Washington Adult Literacy Skills Technology Consortium. Available for $8 from Barbara Wright, ABLE Network, Seattle Central Community College, 1701 Broadway, Seattle, WA 98122, (206) 587-3880. (Make check payable to ABLE Network.)

6. **The Technology For Literacy Project Evaluation**, edited by Terilyn Turner and Stacey Hueftle Stockdill, is a history and evaluation of the Technology for Literacy Center in St. Paul, Minnesota, where adults are taught basic skills on computers located in a shopping mall. The report analyzes every aspect of program design and operation with special attention to recruitment, achievement, retention, and training. Available for $26.40 from ERIC Document Reproduction Service, 7420 Fullerton Road, Suite 110, Springfield, VA 22153-2852, (800) 443-3742. Specify publication # ED-295-028.

7. ***Using Computers in Adult Literacy Instruction,*** an article by Eunice Askov and Cindy Jo Clark in the March 1991 issue of Journal of Reading, offers guidance on how to select software for literacy programs. The article reviews the advantages and disadvantages of computer-based instruction; recommends outstanding programs for teaching vocabulary, writing, and math skills; identifies programs that allow instructors to create individualized lessons; highlights software suitable for both general and workplace settings; and lists software publishers and distributors. Back issues of the Journal are available for $6 prepaid from International Reading Association, 800 Barksdale Road, PO Box 8139, Newark, DE 19714, (302) 731-1600.

8. **Using Technology in Family Literacy Programs** describes the first year of a computer-based family literacy project carried out by the National Center for Family Literacy with support from Apple Computer and the Microsoft Corporation. In the project, computers were introduced into several of the Center's family literacy programs around the country. The computers are used in two ways—as an instructional system for parents and children, and as a linked network for information exchange. The instructional component permits adult learners to make up their own content, using word processing and other software programs for real-life tasks such as writing letters. The project has been judged so successful that Apple and Microsoft have donated additional hardware and software for still more Center family literacy sites. Available for $5 from the National Center for Family Literacy, 401 South 4th Avenue, Suite 610, Louisville, KY 40202, (502) 584-1133.

9. **SALSA Pilot Project Research Report** details the gains and limitations of a six-month project in which Motorola plants in Tempe and Mesa, Arizona, experimented with the use of unsupervised computer-based instruction to improve employees' reading skills. The project, conducted from July to December 1990, was carried out in cooperation with

Rio Salado Community College. Factory workers already enrolled in company reading classes were given the use of Macintosh computers in their homes. It was hoped that the supplementary computer experience would accelerate the improvement of reading skills applicable to their jobs. The computers were linked via satellite and interactive telecommunication to NovaNet, a software library at the University of Illinois in Urbana-Champaign. The report is free from Karen Mills, Associate Dean of Instruction, College and Adult Literacy, Rio Salado Community College, 640 North First Avenue, Phoenix, AZ 85003, (602) 223-4280.

10. **Lessons Learned: Job Skills Education Program Final Report** is a May 1990 report prepared by the National Alliance of Business for the U.S. Department of Labor (DOL). It is an evaluation of the Job Skills Education Program (JSEP), a computer-based basic skills program developed in 1982 by the U.S. Army and adapted to civilian use. Several "adaptation" pilot projects were funded by DOL at various sites around the country and this report assesses two of them: a three-way partnership among Peavey Electronics Corporation, Meridian Community College, and the State of Mississippi; and a specially-created site in White Plains, New York. The study found that, while JSEP has many strengths and can work well in civilian settings under the right conditions, there are a number of serious barriers to its widespread use. These include the high cost of the MicroTICCIT hardware, incompatibility with other computer systems, lack of technical support for both the hardware and software components, too little flexibility to customize the software to specific instructional settings, and certain "degreening" problems. A free copy of the report is available from Gary Moore, National Alliance of Business, 1201 New York Avenue NW, Suite 700, Washington, DC 20005, (202) 289-2888.

11. **Evaluation of the IBM PALS Program for the Massachusetts Board of Library Commissioners** is a 1990 study by Evaluation Research, Inc. It examines the effectiveness of PALS in a program of the Brightwood Branch Library in Springfield and in one for inmates of the North Central Correctional Institute in Gardner. The program was judged a failure in the prison program and only moderately useful in the library program. A major conclusion was that for PALS to work effectively in a variety of settings (with adults having diverse needs), major theoretical and practical revisions are needed. The report is available for $20 from Evaluation Research, 130 Warren Street, Newton Center, MA 02159.

THE CASE FOR COMPUTERS

As computers come into widespread use in education, from kindergarten to the university, their role in adult basic education demands attention. Given the large gap between the millions of adults in need of basic literacy skills and the shortage of teachers, tutors, and funds to serve them, the potential of computer-assisted instruction (CAI) clearly needs to be explored. Can computers help to reduce the gap? If so, how? To what extent are they currently being used in adult basic skills programs? For what purposes? With what success? If adult basic education were "computerized," could we affect more people more quickly at equal or lower cost?

BCEL thought it timely to begin looking at these questions, especially as scattered reports from literacy providers relate strong positive experiences with the use of computers. To be sure, problems abound in the field, but the initial evidence does suggest that there is a potent, highly significant role for computers in addressing the distinct needs of adult illiterates.

The Merits

Holding Power. Computers are more than just another tool in the repertoire of instructional technologies. For many users they have a compelling fascination—a "holding power" that makes it difficult to put them aside. Teachers report that children compete for access to them, often staying hours after school to use them. Literacy workers tell of elderly women climbing flights of stairs at a center to practice on them. The appeal of computers is increasing student participation and motivating students to stay with instruction.

Positive Learning Environment. For adult non-literates especially, the computer provides a mode of learning that is untarnished by childlike overtones or the failures associated with their traditional school experiences. The most dramatic results have been with people who have been defeated by other methods and who thus believed that they could not read, write, or learn.

Learning About Computers. Adults who learn basic skills on a computer also learn in the process *about* computers. The operational techniques absorbed as a by-product of instruction become in themselves marketable skills. These adults stand a better change of competing for entry-level word processing jobs and job-training programs.

Enhancing Teacher Productivity. Computers can boost teacher productivity in two ways: by improving the ratio of teachers to students and by performing management chores. When students work on computers by themselves, supplementing work given by teachers, teachers are freed to serve more students and to address the students' personal needs and concerns. With the use of computer-managed instruction (CMI), teachers are twice freed: testing, diagnosing, placing students at appropriate levels of instruction, tracking progress, and record-keeping are time-consuming chores efficiently performed by the machines.

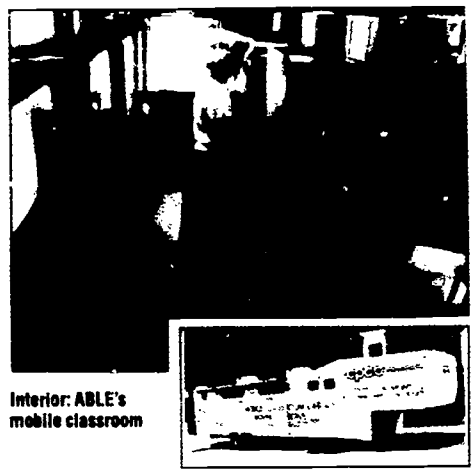
Instructional Effectiveness. Another characteristic of the computer is its ability to engender intense concentration. As interactive instruments requiring response by the user, computers produce a high level of task management and they increase attention span. They also provide individualization, self-pacing, and patience. Their capacity to store and retrieve information permits students to interact with material geared to their greatly varied individual levels and rates of speed, and to receive instant feedback. Computers also can repeat the same question endlessly, react without impatience or irritation, and provide the privacy that protects from embarrassment. These features are especially important for illiterate adults. Finally, CAI programs can offer instruction that otherwise would not be feasible. Combined with interactive videodiscs, for example, they can bring reality to the learning situation. Real-life images and sound can be added to the courseware, making it possible to incorporate vivid examples that show how things being learned fit into the daily lives of students.

Reducing Attrition. Drop-out rates often reflect scheduling conflicts due to job and family duties. With computers available for a portion of the program, rigid scheduling can be eased. If a tutor misses a session or a student has extra time, the student can drop by the literacy center and work independently. This flexibility even makes it possible to offer instruction in locations where teachers are not available at all.

Notable Models

A prime example embodying many of these elements is ABLE, the Adult Basic Literacy/Education program of North Carolina's Central Piedmont Community College. ABLE uses a total of 32 microcomputers at four off-campus learning centers. One is in a shopping mall, another in a neighborhood center, and still another in a mobile van serving church and prison populations. Now in its third year, ABLE has served 1,300 persons. The computerized core curriculum in reading and math rests on the PLATO Basic Skills Learning System developed by Control Data Corporation and the University of Illinois. The curriculum is supplemented by Apple software, print and other media, and work with teachers and tutors. For students at the fourth to eighth-grade reading levels, the computer software constitutes 80 percent of the total instructional package. At these levels, the teacher acts as a guide, facilitating the student's progress through the CAI program. At zero to fourth-grade levels, the weight is on one-to-one tutoring, with the CAI component used for about one-third of the program.

The results show a clear advantage over the traditional classroom or tutoring situation. ABLE students advance an entire reading grade-level in 20 hours. In contrast, it takes 150 hours to achieve this in conventional adult basic eduction classes at North Carolina's community colleges. "Beyond the actual time saved," notes Central Piedmont's president, Dr. Richard Hagemayer, "consider what it means in terms of incentive. If you're 35 years old with two children, reading at a fourth-grade level, to put in 150 hours you've got to go to a traditional



Interior: ABLE's mobile classroom

class two nights a week, two hours a night, for 37 weeks. And if you want to qualify for a job training program that requires an eighth-grade reading level, you'd have to go for three years. Compare that with 60 hours."

ABLE administrators credit the success of the achievement rate to the individualization of the program and the intense concentration evoked among students working on the computers.

Another notable model is the U.S. Navy's Wisher-Duffy system, currently being tested at a number of civilian sites, among them the Enoch Pratt Free Library in Baltimore, Maryland, and the Mary H. Weir Library in Weirton, West Virginia. (See News In Brief item, Learning From The Navy.) This system, developed for the navy by cognitive psychologists Robert Wisher and Thomas Duffy, is based on information-processing theories that evolved from research in the 1970's on the nature of the reading process. It improves on presently-available software in significant ways, and has been validated with low-literate naval recruits reading below a sixth-grade level, The recruits improved their reading comprehension in half the time and their vocabulary scores in one-third the time as those conventionally taught, and they retained what they learned about twice as well.

An important pioneering feature of the system is that it enables instructional personnel with no prior knowledge of computers and with a minimum of training to design CAI programs tailored tc individual student interests and needs. The "content sensitive" system allows the teacher or tutor to feed the computer any material, in whatever language they please, by simply typing it on the keyboard. In this way the lesson can be tailored to a particular subject of interest to the student—i.e. urrent events, career or health information, or sports. The lesson can be scaled up or down by using simple or difficult words and shorter or longer sentences. The material is then converted by the computer into a series of exercises which require the student to interact with the step-by-step elements of the reading process.

A major objective of the two library projects is to test the attitudes of librarians and tutors as well as their ability to master the system. After a half dozen orientation sessions totaling 15 hours, library staffs and volunteer tutors, all new to computers, were able to produce their own specifically-targeted programs. The subjects include money management,

vocational information, income taxes, driver education, and consumer affairs. Extensive evaluations and further development are being conducted by Dr. Duffy at Carnegie Mellon University.

Extent Of CAI Use

The extent to which CAI has penetrated the adult basic education community is unknown. No data have been systematically collected and there is no central communications network. Fragments of information point to great variation from one literacy-providing sector to another. These range from the virtually non-existent use of technology among the voluntary providers to a very limited use by corrections, job training, and state ABE programs, to the military at the top. Some random examples follow:

• In 1980, more than $70 million was spent by the military for basic skills education and training, with a significant portion for CAI. According to 1984 Department of Defense figures, one-third of all new recruits read at or below the eighth-grade level. These enlistees have to digest information that will enable them to operate and maintain sophisticated, costly, and dangerous equipment. It is no surprise, then, that the military is the most advanced in software and systems development.

• In the correctional system, a 1981 Ford Foundation study found that computer-related learning experiences were available to some 40 of the nation's 600 federal and state prisons. The number is thought to have grown substantially since then. To gather solid data, the Correctional Education Association is about to launch a $200,000 survey of the nation's prisons to determine the extent and nature of computer instructional uses. In addition, between 1984 and 1985, some $1 million in grants to 15 states will have been made by the National Institute of Corrections to enhance or develop such programs.

• In St. Paul, Minnesota, a $1.3 million community CAI program was opened in a walk-in storefront earlier this year. Called TLC for Technology Literacy Center, the program is funded by a consortium of foundations and the St. Paul Public Schools. Among its goals are to train educators and to conduct research on applying the technology to basic literacy instruction.

• Under Section 310 of the Adult Education Act, states are required to spend at least 10 percent of their federal ABE funds for innovative efforts. A review of these activities reveals that in 1984 and 1985, only 17 and 23 states respectively sponsored computer-related basic skills projects. CAI projects made up less than 15 percent of all pilot programs funded. The 1983 and 1984 expenditures for such CAI efforts was less than $250,000 a year. This sum increased in 1985 to over $650,000, and brought with it a shift in emphasis from computer-assisted to computer-managed instruction. Fortunately, these negligible ABE figures do not reveal the entire story. A few states have moved toward more extensive CAI for adult basic skills. Massachusetts, for example, has a statewide plan to introduce computers into its ABE program, and more than half of ABE's learning centers already have them. Other more advanced states are Florida, New York, and the four-state Northwest Consortium of Oregon, Washington, Idaho, and Alaska. In California, Illinois, and Michigan computer technology is part of the adult basic education scene but the prevailing use has been for instructional management.

With so few overall facts available on the state of the art, BCEL consulted experts in the field and asked them to estimate the total extent of CAI usage for basic skills instruction among all literacy providers in the nation. On a scale of one to ten, not a single response exceeded two.

Issues For The Future

What elements impede the wider use of computers to teach adult basic skills?

Hardware. Access to hardware is not the serious barrier that might be supposed. Microcomputers are quickly becoming commonplace in American society. Their growth in the public schools has been explosive, doubling annually since 1981. Of 700 school administrators recently surveyed, 94 percent reported that their students had access to school computers. (Apple had a commanding lead as of 1983 with 49 percent of the school market; Radio Shack at 21 percent and Commodore at 15 percent were the next most popular.) Hardware prices have fallen dramatically. A microcomputer and printer can be bought today for $700 to $1,000 and the median price for a program is presently around $43. Manufacturers, vying for superior position, have donated thousands of machines to school districts, with a market value in the millions of dollars. Some observers believe the razor/razor-blade principle may soon apply: manufacturers may give the machines away in order to sell the software.

This does not mean that access is universal. Many populations are still deprived of the opportunity to use computers, especially disadvantaged groups. But this problem can be overcome if there is a will to do so. The Houston Independent School District, for example, runs a program called "Computers Can," which lends for home use 4,500 school computers and then trains parents in their use. The target populations are economically disadvantaged. Another Houston project, "Compu-Buy," lets parents buy the machines at district-negotiated bulk prices and provides a lending library of educational software. The district also cooperates with the local college ABE program, providing adults with nighttime access to its computers. In another example, the Boston Computer Access Council—comprised of representatives from business, education, ABE, job training, and the handicapped—meets monthly to explore ways to facilitate access to the thousands of computers in the city for disadvantaged citizens. The Houston and Boston approaches can easily be adapted elsewhere. And libraries and community organizations have by their nature a capacity to make both computers and computer services available to neighborhood residents.

Software. Far more difficult is the problem of quality software. It is a well known axiom that computers are only as good as the programs that feed them. According to EPIE, the Columbia University Educational Products Information Exchange (which evaluates computer programs for the schools), 60 percent of educational software "is not worth the money." (It is estimated that $20 million was spent by the schools in 1983 for software, with another $110 million spent on educational software for the home.) Most of the material fails to exploit the computer's capacity to develop problem-solving and independent reasoning skills in the user. Drill and practice programs, for instance, make up half the inventory, and tutorials another quarter. These serve a useful purpose for adults learning basic skills, but they do little to foster independence of thought. Simulations and the higher order problem-solving programs represent less than a fifth of the inventory.

More to the point, there are virtually no programs available that have been designed specifically for adult basic education students. PLATO's is the only comprehensive basic skills cirriculum designed for adults, yet even it is not geared to mature persons and their daily lives. The content was designed chiefly for 16-21 year olds and most adult students are much older. The average age of students in the ABLE program is 36. Moreover, a third-grade reading level is required to use PLATO at all, and many adults have a lower level of achievement.

Throughout the field the critical need for appropriate software is stressed over and over again. But program development is extremely costly, and software publishers are either uninformed about the size of the adult basic education market or not willing to risk the investment.

It should be noted that Senator Albert Gore has introduced into Congress a bill calling for establishment of a $150 million revolving fund to support venture capital organizations in developing educational software. It is to be hoped that where the focus is on adult basic skills, researchers, literacy providers, and the software developers will come together to plan needed curricula.

Other Barriers. The other main elements that impede forward movement have to do with prevailing attitudes among educators, lack of training, and poor patterns of communication. Educators are historically resistant to adopting new techniques, and the idea of computers for adult basic skills is not yet sufficiently included in their thinking. Beyond that, professionals need training to be able to work with computers and feel comfortable with them, to evaluate and select software, and to articulate computers with the rest of their instructional program. And volunteers, too, must be involved in these activities. Furthermore, the lack of a central communications network for gathering information about computers in basic skills and for sharing experience leaves practitioners isolated and without support for improving current programs or developing new ones.

The problem of adult illiteracy is too massive to be solvable in traditional ways alone. Most experts agree that to sharply increase the numbers of adults being instructed, as well as to achieve economies of scale in the long run, the use of computers and other technology will be vital. Thus it behooves those interested in advancing adult literacy in the U.S. to investigate further and seek avenues for promoting the greater use of computers. And it should be kept in mind that as computers become more commonly used in adult basic education a goal should be to assure that persons most in need of educational help have access to them. Otherwise, the gap between the "knows" and "know-nots" will be enlarged.

As a next step in exploring some of the issues only touched on in this article, an invitational conference is now being planned that will bring together literacy practitioners in the U.S. who have experience using computers in their programs. The conference, tentatively scheduled for the fall, will be sponsored by the Gannett Foundation with the participation of BCEL, B. Dalton Bookseller, and others. BCEL itself is planning a full-length monograph on computers and adult basic skills to be available by the end of the year.

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COMPUTER UPDATE:
Emerging Issues

The third national Adult Literacy and Technology Conference held in Louisville in July drew 400 people and featured a total of 54 workshops and 42 vendor exhibits. Among the workshops offered were 12 on how to integrate computers and interactive video into general basic skills programs, four on intergenerational literacy, and eight on the use of computers and video in workplace programs. What is significant about these facts is that they show an explosive interest in the use of computers for adult literacy since BCEL first highlighted the issue in its July 1985 newsletter feature and then joined a small invitational conference of seven people later that year to plan the first national conference. At that time the primary goal was to get out the message that computers have a potentially powerful and vital role to play in extending basic skills services.

In the short time since then, a new sub-field in adult literacy has taken root, with People's Computer Company in California now functioning as the coordinating center for national activities in this area. Commercial vendors who earlier shied away from basic skills software development because of its presumed unprofitability are now in heavy competition with one another for the adult literacy market. Apple Computer, for example, today has a full-time person in charge of this market and a separate department devoted to adult literacy. Curriculum development and demonstration activities are in process or under development in several academic settings and elsewhere around the country. Literacy groups and a growing number of businesses are adopting or experimenting with the use of computers in their basic skills programs — both for instructional and management purposes. And the role of computers is explicitly recognized in some of the important new legislation being introduced in Congress.

In short, the computer literacy field has taken off. The question is, have the new developments made full use of what is known about the ingredients for effective instruction in different adult learning situations, and do we know enough about what those ingredients should be? According to the prevailing thinking at the Louisville conference, which echoes thoughts that others in the field have had for some time, there are serious misgivings about these matters. Among the many concerns expressed were these:

- **Too Much Too Soon.** The field is in its infancy at the same time that it is on a fast track. Vendors rather than educators are driving the system. They are hungry for direction, but literacy professionals have been slow to understand and communicate their students' needs.

- **Software.** Most of it is not very good. Much of it relies heavily on general drill and practice, which research shows to be inappropriate in many adult settings. Most of it also fails to recognize the importance of building programs that are context-specific and take into account the prior knowledge of adult learners.

- **Interactive Video.** The availability of this technology has increased dramatically, in the past year alone. Video is passive, computers interactive. When linked, they can provide a powerful combination of text, images, and sound, all easily manipulated. It is presently unclear, however, just how they should be linked and for what purposes. Moreover, those in the forefront of research stress that to be effective, the new technology should put students in direct control of their own learning, not simply extend the dictates of teachers. Yet many of the new systems rushing to market are duplicating the traditional classroom format.

- **Putting All Eggs In One Basket.** Many current literacy programs, both job-specific and general, are built exclusively in the computer mode. Military experience suggests that this is unwise, that whenever technology is used, it should be in conjunction with other teaching methods. There is still limited appreciation of this matter.

- **Workplace Literacy.** Many provider groups are not equipped to deal with workplace literacy programs, with or without the use of computers. In addition, the extent to which workplace programs should be generic in nature or customized to particular jobs and groups of jobs is still unclear.

- **Family Literacy.** The concept of family literacy is still new and even newer is consideration of how computers and related technology fit in. This is an area especially ripe for research. There is much talk about integrating technology into the curriculum, but often there is no curriculum, or where there is, curriculum developers are still finding their way. Among the topics in need of research is the question of how to design software that recognizes and responds to the separate roles of parents and children.

- **Research.** Too little research is being funded. The field is moving ahead without a solid base for understanding how best to build computer-assisted programs and for evaluating what is being done. ■