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ABSTRACT

This final report describes the Technology Assessment Software Package (TASP) Project, which produced developmentally appropriate technology assessment software for children from 18 months through 8 years of age who have moderate to severe disabilities that interfere with their interaction with people, objects, tasks, and events in their environment. The 3-year, field-initiated project was conducted within Macomb Projects at Western Illinois University. The resulting software prototype, "Something's Fishy," was designed to assess task complexity and children's preferences for a variety of stimuli such as color, sounds, volume, movement, image size, image types, and visual or auditory stimuli. The software was designed to run on a Macintosh and to be accessed by switches, TouchWindow, adaptive keyboards, and mouse. A manual for the software will be available on the final version of the CD-ROM. The project also created a database of commercially available software which can be searched according to categories of stimuli assessed by "Something's Fishy" and which provides software suggestions that meet varying educational needs and goals. The report details the project's goals and objectives, project activities, problems, project impact, and future activities. (Contains 51 references.) (Author/CR)

Final Report

Technology Assessment Software Package

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Final Report: Technology Assessment Software Package

II. Abstract

The Technology Assessment Software Package (TASP) Project was funded from September 1994 through October 1997 by the United States Department of Education's National Institute on Disabilities and Rehabilitation Research to produce *Something's Fishy,* developmentally appropriate technology assessment software for children from 18 months through 8 years of age who have moderate to severe disabilities which interfere with their interaction with people, objects, tasks, and events in their environment. The 3-year field-initiated Project was conducted in a university setting within Macomb Projects, in the College of Education and Human Services at Western Illinois University.

The project sought to fill a gap created by the absence of dedicated technology assessment software for young children. The resulting software prototype *Something's Fishy,* was designed to assesses 1) task complexity, and 2) children's preferences for a variety of stimuli (e.g., color, sounds, volume, movement, image size, image types, and visual or auditory stimuli). The software was designed to run on a Macintosh and to be accessed by switches, TouchWindow, adaptive keyboards, and mouse. A manual for the software will be available on the final version of the CD-ROM.

The project created a database of commercially-available software which can be searched according to categories of stimuli assessed by *Something's Fishy* and which provides software suggestions that meet varying needs and goals. The database will be available on Macomb Projects' web site at www.mprojects.wiu.edu.

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IV. Goals and Objectives of the Project

Macomb Projects in the College of Education and Human Services at Western Illinois University received funding from the United States Department of Education's National Institute on Disabilities and Rehabilitation Research in 1994 for the Technology Assessment Software Package (TASP) Project. The project was designed to produce a developmentally appropriate technology assessment software prototype for children from 18 months through 8 years of age who have moderate to severe disabilities which interfere with their interaction with people, objects, tasks, and events in their environment. The project began in September 1994 and ended in October 1997.

Goals

TASP had three major goals. The first was to develop, field test, revise and disseminate an effective, useful, and interactive Technology Assessment Software Package, *Something's Fishy,* on CD-ROM for children from 18 months to 8 years of age. The second was to provide a manual that incorporates guidelines, recommendations, documentation, and related materials for using the technology assessment product. The final goal was to disseminate the Technology Assessment Software Package.

Objectives

Five objectives were designed to accomplish the Project goals. Specific tasks, persons responsible, time frames, and outcomes were delineated for each objective. Project objectives were

1. Develop an effective and developmentally appropriate Technology Assessment Software Package.
2. Conduct the technical procedures required to produce CD-ROM software which contains three assessment components.
3. Develop an effective manual to assist assessment teams to use the Technology Assessment Software Package in technology assessments.
4. Disseminate information and market the assessment software.

5. Evaluate objective accomplishment.

V. Conceptual Framework of the Project

Contemporary assistive technology applications, such as computers, alternative input and output devices, software, and augmentative communication devices, give children and adults with disabilities a set of tools to access people, objects, tasks, and events in their environment in ways that were not possible 20 years ago. Opportunities to "control" events via technology early in life provide young children with skills and expectations they seldom acquire if they have no means to access their world (Behrmann, 1984; Behrmann & Lahm, 1983; Brinker, 1984; Brinker & Lewis, 1982; Hutinger, 1987a; Spiegel - McGill, Zippiroli, & Mistrett, 1989; Rosenberg & Robinson, 1985; Sullivan & Lewis, 1988, 1990).

Assistive technologies provide families and professionals with ways to encourage children themselves to act on objects, people, and events, in effect to "head learned helplessness off at the pass" as children grow older. Unquestionably the advent of technologies such as more powerful and relatively cheaper computers together with alternative input and output devices offers children and adults with disabilities the means to do things they have not been able to do before. Young children with severe disabilities can use computer technology

- to produce interesting events (Butler, 1988; Rosenberg & Robinson, 1985; Robinson 1986a & 1986b);
- to manipulate contingencies (Butler, 1988; Brinker & Lewis, 1982; Sullivan & Lewis, 1988, 1990);
- to select activities or objects (Behrmann & Lahm, 1984a & 1984b; Locke & Mirenda, 1988);
- to interact socially (Buckleitner, 1994; Clements, Nastasi, & Swaminathan, 1993; Hutinger, Johanson, & Stoneburner, 1996; Lahm, 1995; Nastasi & Clements, 1993; Podmore & Craig, 1989; Spiegel-McGill, Zippiroli, & Mistrett, 1989);
- to operate devices in their environment and to communicate (Herman & Herman, 1989; Hutinger, 1986a & 1986b; Meyers, 1984, 1990; Muhlstein & Craft, 1986; Shane & Anastasio, 1989; Spiegel-McGill, Zippiroli, & Mistrett, 1989);

- to develop a sense of control over their environment (Hutinger, 1994; Parette, Dunn, & Hoge, 1995; Pierce, 1994);
- to gain a sense of competence, self esteem, and satisfaction (Barnes & Hill, 1983; Cohen, 1993; Haugland, 1992; Narodick, 1992; Swigger & Swigger, 1984); and
- to solve problems (Davidson & Wright, 1994; Hutinger, 1987b; Nastasi, Clements, & Battista, 1990; Wright & Samaras, 1986).

However, without an appropriate assessment, determining what technology applications a child could best use is, at best, a "hit and miss" process.

While many computer application options exist, not all are appropriate for the individual characteristics of each child's disabilities and developmental level. The applications must be individualized depending upon a number of conditions, including the child's preferences and skills, the nature of the disability, the child's developmental level, the family's wishes and expectations, available hardware and software, and many other factors. Although a team-based technology assessment helps sort out these factors, such assessments for children are few and far between.

Clearly, young children with severe disabilities benefit from computer applications, yet technology assessment with useful, accompanying software, has not yet become a part of the acknowledged comprehensive assessment process for several reasons. Tested procedures to conduct an early childhood technology assessment are scarce. Software specifically for technology assessment is seldom available, perhaps because the market for assessment software is small and, therefore, not commercially attractive. References to technology assessments in software catalogs and the literature are limited and do not target or focus on young children. Fragments of technology assessment procedures and materials are sometimes found; however, comprehensive technology procedures and software are rare. *Something's Fishy,* the software component of TASP was designed to fill a gap between assessment and children's use of technology.

In spite of the dearth of technology assessment procedures and materials, the best ways for children to access computers, switches, and accompanying input and output devices, as well as the most appropriate applications, should be determined by a *team* of professionals and family members

during a technology assessment. But this scenario is rare. Although tested technology assessment procedures are scarce, developmentally appropriate technology assessment software, especially designed to determine the child's ability to use varying levels of complexity with input devices and to isolate characteristics that stimulate a child positively, is virtually nonexistent. The software used when assessment does occur varies according to individual assessor's knowledge and competence. Assessment teams use several different software programs, depending on their own preferences and knowledge, when they do assessments. Sometimes software is interesting and engaging to the child, using a playful approach, but often it is not.

A research study reported by Wright, Seppy, & Yenkin (1992) compared children's preferences for animation or actual video in software. The study indicated that digitized images and video were preferred over animated picture graphics by nursery school children in a laboratory school. Another study by Dattilo (1986) reported on "computerized assessment of preference for severely handicapped individuals" (p. 445). Dattilo, using single subject design, found that the three children (ages 6 - 10 years) demonstrated the ability to choose preferences for auditory (music), tactile (vibration), or visual (video scenes) stimuli. Dattilo went on to study leisure preferences (1987a, 1987b), demonstrating that the preferences of children with severe disabilities could indeed be systematically assessed and analyzed.

Something's Fishy will meet the need for a single piece of software on a CD-ROM to assess different ability levels related to input, tasks, and preferences. Using the software eliminates taking parts from one piece of software or another depending on the assessor's interest and knowledge, time to collect software, or other extraneous conditions that may affect the assessment in a negative or idiosyncratic fashion. Additionally, the prototype provides a range of activities so a program does not have to be quit and another launched to meet the individual needs of children.

VI. Description of Project Activities

Target Population

Something's Fishy was designed to be used in computer assessments for children from 18 months through 8 years of age with moderate to severe disabilities. While children with relatively

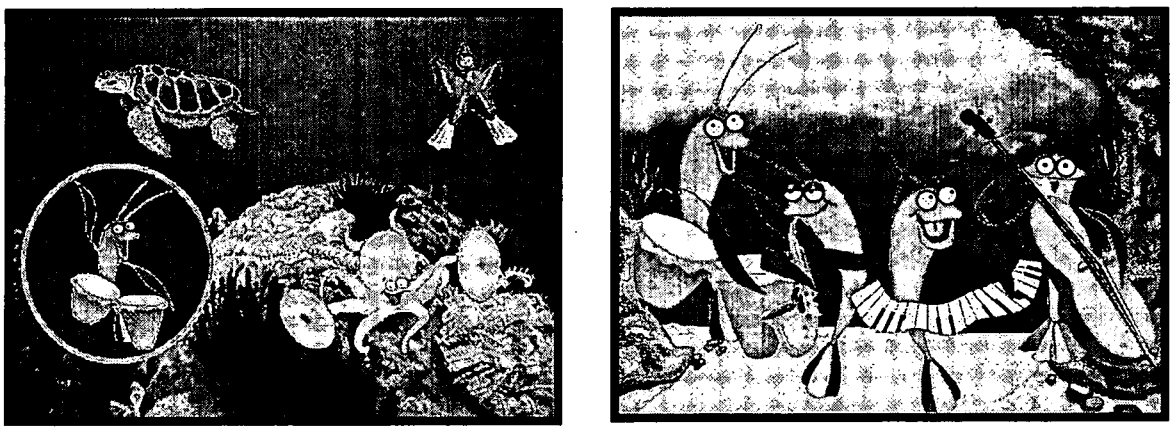
severe physical disabilities are primary candidates for the assessment software, its use will not be limited to one disability label. Children who exhibited multiple disabilities and a great range of individual differences were able to take advantage of elements of *Something's Fishy* during testing. However, this software is not intended to be used as technology assessment tool for children who are deaf-blind.

Assessment Software Content

The prototype contains two major segments: 1) Task Progression (*Anchors Aweigh*) helps determine the progression of complexity of tasks (see Figure 1); and 2) Child Preferences in Characteristics of Software (*Oh Buoy!*) determines elements of software content preferences (see Figure 2). The child's preferences for color (hues and intensity), size, sounds (mechanical, animal, human, music), volume, movement (animated drawings, video), image types (realistic, cartoon-type, adult and children's drawings, photographs), nature of stimuli (visual, auditory, combination) are realized as he or she uses *Oh Buoy!*

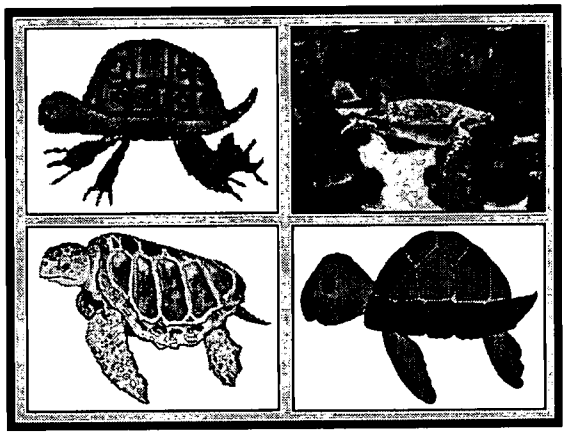
Content for *Something's Fishy* was developed by a team who have extensive experience working on a TTAP technology assessment team. The team included an expert in technology applications for

Figure 1. Screens from an *Anchors Aweigh!* activity

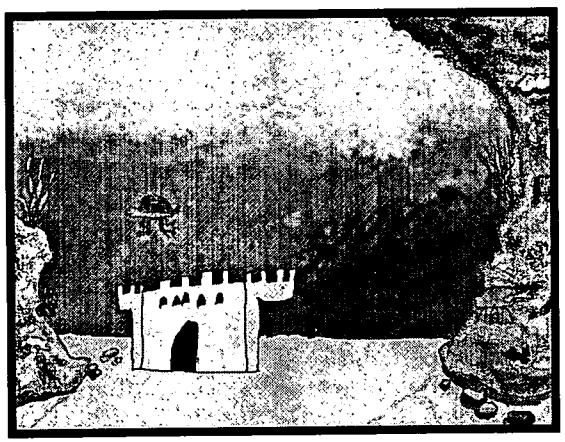


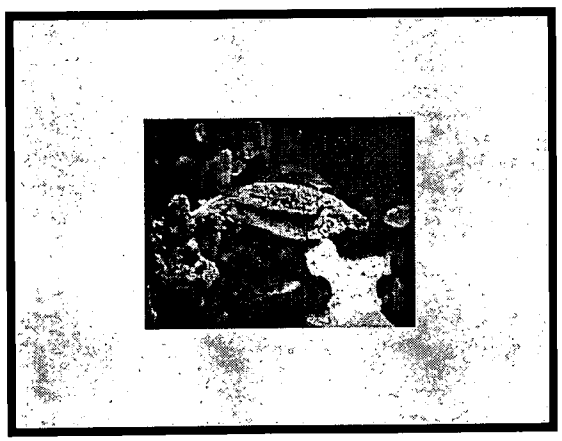
The number of images to be scanned was set at "4" for this activity taken from *Anchors Aweigh!* Selecting the highlighted shrimp will result in an animation. In this example, a shrimp band performs.

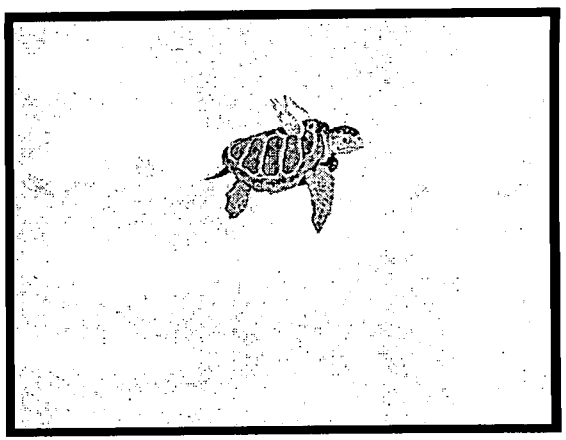
Figure 2. Screens from an *Oh Buoy!* activity



Presented with a screen containing four different representations of the same animal, a child chooses one of the four. The image selected indicates a preference for a particular type of image whether it be an image produced by a child, a realistic image, a simple drawn image, or a photographed image.







Any image selected will result in an animation or a short video segment featuring that particular image. These examples show single frames from an animation or video that follows a child's choice.

children with severe disabilities, an early childhood specialist, an occupational therapist, a communications specialist, and a family member.

Software content was based on best practices in early childhood (Bredekamp, 1987) which stressed developmentally appropriate, experience-based activities for children from 18 months to 8 years. Incorporated elements of play, humor and surprise engaged children and maintained their attention. The sections of the software and the sequence of assessment activities were based on conversations with experts in the field and on the practical experience of TTAP (Hutinger, 1993, 1998), a nationally recognized assessment model for young children with moderate to severe disabilities.

Something's Fishy initially was planned with a section called *Splish! Splash!* , which dealt with input assessment. However, as we gathered input from teachers, therapists, individuals with experience providing technology assessments, Macomb Projects staff not involved in the project, and project staff, we discovered that *Splish! Splash!* confused many individuals. They had difficulty seeing the difference between this part of the software and the task complexity activities found in *Anchors Aweigh!* They thought the activities in *Anchors Aweigh!* required the same skills the child was expected to use in *Splish! Splash!* and also suggested the overall design of the software streamlined the process of determining which input device worked best for each child. Their feedback encouraged us to eliminate the *Splish! Splash!* portion of the software, leaving *Anchors Aweigh!,* which provides information about the complexity of task a child is able to complete, and *Oh Buoy!,* which indicates the preferences a child has for various stimuli such as sound, image size, movement, color, and type of image.

The contents can be used in different ways by children of differing developmental levels. Children can enter the software at any point. The assessment team decides which element of the program to begin with. Some children start in the preference software, *Oh Buoy!,* while others might start with *Anchors Aweigh!* The starting point is dependent on the individual's characteristics and experience with technology as well as the assessment team's considered judgment. The design permits a child to move from a beginning level to a more advanced level in the software with a short transition time

between activities. Since the child does not have a long wait time between activities, his or her interest level and willingness to participate tend to remain at a high level, and fatigue does not seem to greatly affect behavior. The software is interactive in nature so that it can be child directed when possible.

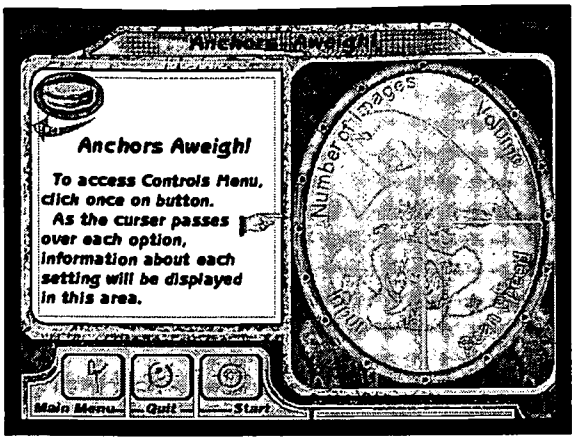
Direct select activities and scanning capabilities are incorporated in the input options available. Visual cues and auditory cues are built into the software. Choices available to the assessing team include method of input, delay time, choice of activity, scan speed, and volume. The examples shown in Figure 3 demonstrate the options available in the software.

Survey results. Since psychologists are often responsible for comprehensive assessments, we gathered information about technology assessments and features important for assessment software, in a survey sent to all members (982) listed in the 1995 directory of the Illinois School Psychologists Association. The survey asked them to evaluate their training for and participation in assistive technology assessments and their knowledge of assistive technology. Three hundred seventy five (375) members returned surveys. Only 41 (11%) had conducted assistive technology assessments, and only 24 (6%) reported being active members of evaluation teams. The survey results indicated that relatively few of the psychologists surveyed in Illinois felt they had been adequately prepared for completing an assessment of assistive technology needs of the students in their districts with severe and multiple disabilities. The majority of respondents (330 [88%]) stated they would be interested in receiving some training to increase their knowledge of assessment of assistive technology needs and appropriate interventions.

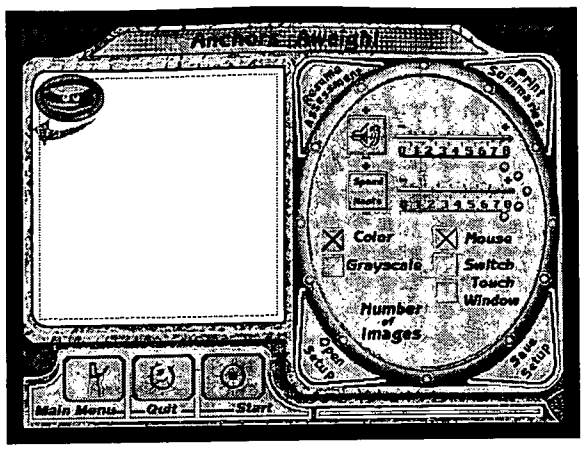
Respondents made suggestions for assessment software:

- It should have a lot of visual and auditory stimuli and some way to assess visual/motor functioning.
- It should be easy to operate and have the capacity to recognize a verbal response.
- It should have accommodations for different ranges of abilities.
- It should evaluate the child's capability to use assistive devices rather than just trying software in a random fashion.

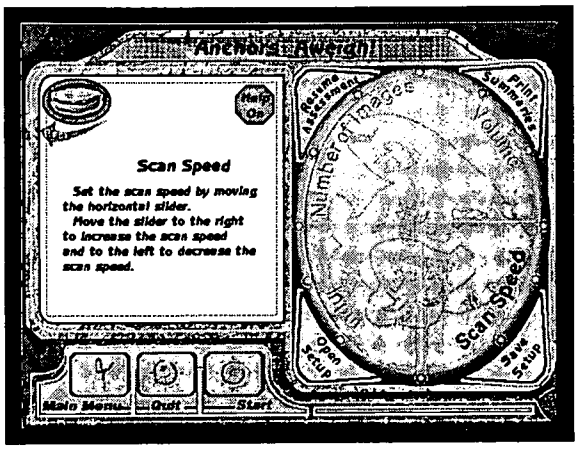
Figure 3. Control screens from *Anchors Aweigh!*

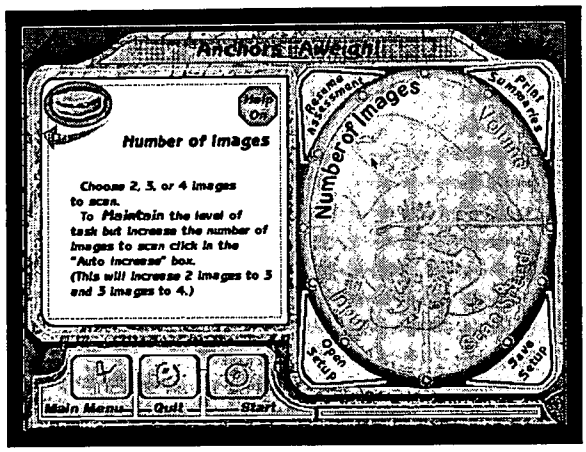


The information screen displayed when *Anchors Aweigh!* is accessed.



This screen displays the control settings for the various options in *Anchors Aweigh!*





Information for "Scan Speed" and "Number of Images" is displayed when the cursor is moved over those areas of the option button. Help information for the "Volume" and "Input" control options is also displayed when the cursor is moved over those areas.

- It should be user friendly, with clear directions and easy to read displays.
- It should have multiple input capability.
- It should have readable manuals and a valid, reliable statistical background.
- It should give both diagnostic and resource information.

A review of the literature was conducted during July of Year 1, and again in Years 2 and 3, to provide the project with current information available on assessment procedures in general and technology assessments in particular. We also explored technology assessment processes used by organizations other than Macomb Projects' TTAP. We contacted the Technology and Inclusion

organization from Austin, Texas, to discuss their assessment tools and strategies and to determine if their assessment methods would be compatible with *Something's Fishy*. The group developed the *Portfolio Assessment of Students with Severe Disabilities*, which is used with the *Grady Profile* as a shell; however, the process was not designed to assess very young children. They have also developed the *Assistive Technology Screener*, which is used in a team setting. All members of the team pool what is known about a particular child and recommendations for that child are made. The child is not present during the screening process.

Software characteristics. We consulted with personnel working on an Early Education Programs for Children with Disabilities (EEPCD) Outreach project (Project TTAP—Technology Team Assessment Process) who provided a list of commercial software used during their technology assessments. We completed a review of current literature in October 1994 and consulted with colleagues across the country about possible software that would be appropriate for assessment purposes. As new early childhood software was marketed, we reviewed the programs to assess their usefulness for a technology assessment.

The list of characteristics of developmentally appropriate software was expanded during Year 1, based on reviews of current literature, consultations with staff members of other assistive technology projects and with early childhood curriculum experts, and discussions with other professionals at assistive technology conferences.

Such characteristics of the software include:

- Opportunities for the child to control the process
- Animation, video, graphics, sound, and color incorporated into components of the software
- Activities that stimulate the child's interest
- Feedback that is effective and non-threatening
- Content that is recognizable by the child
- Choices that are straightforward and not misleading (for either the child or the adult interventionist)
- Transitions that are accomplished quickly

In addition, informal interviews and surveys were completed by early childhood teachers, program assistants, and parents that provided insight into characteristics they considered important in children's software. Flash and dazzle were not features adults looked for in software. They were impressed with programs that seemed easy for children to use and they wanted titles that allowed children to make their own choices, explore, and create. They looked for titles that had icon based menus rather than programs that required children to recognize words or read. They also thought the software should include a variety of sounds, music being the most popular. Teachers, program assistants, and parents all agreed that children like things that move and they wanted software that included animation or short clips of video. These same individuals thought good software should have non-threatening reinforcement, that children should not be "buzzed" if they offered an inappropriate answer. They also preferred software for their children that contained "hot spots" that triggered reactions that either contributed to the content or provided humor and surprise. It came as no surprise that the results of contacts with teachers, program assistants, and parents were consistent with the choices children made when they had the opportunity to make their own choices.

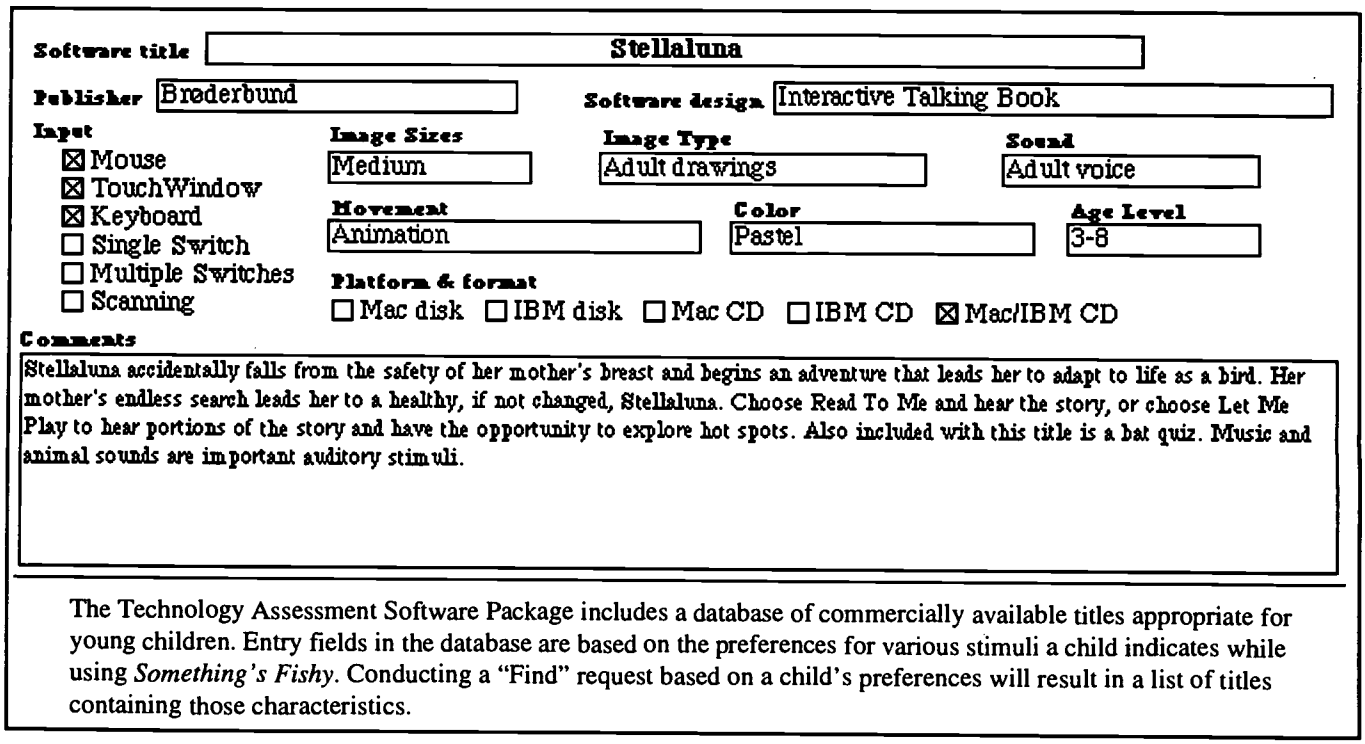
These characteristics were considered as we made plans for the content and format of *Something's Fishy*. In addition, we contacted individuals from various related professions (Speech and Language Pathologists, Early Childhood Special Education professionals, Physical Therapists, and others) to review *Something's Fishy* and to field test portions of the software with young children with disabilities.

Software Database

As we reviewed commercial software, we set up a database which categorized the software according to input recognized by the program; types of images used (simple drawings, photographs, adult drawn, child drawn); movement incorporated (animation or digitized video); type of dominant sound used; variety of colors; and developmental appropriateness. Objective comments for each title in the database were also included. The programs in the database can be identified by any of the child's preferences or by the method of input.

Following an assessment, questions often arise concerning the availability of commercial software that "fits the bill" for a child's particular identified needs. The software database is an important component of the assessment package since it organizes pertinent information about commercial software, simplifying the tasks of compiling a list of software that would meet the needs of a child and satisfy that child's individual preferences. For example, a database search for software containing mechanical sounds would display titles in the database containing mechanical sounds. Because of the interest shown by families, teachers, speech and language pathologists, occupational therapists, and physical therapists, and others the database is accessible from the Macomb Projects site on the World Wide Web (www.mprojects.wiu.edu) and on a disk. Figure 4 shows a sample page from the data base.

Figure 4. Entry from the Technology Assessment Software Package Database



The Technology Assessment Software Package includes a database of commercially available titles appropriate for young children. Entry fields in the database are based on the preferences for various stimuli a child indicates while using *Something's Fishy*. Conducting a "Find" request based on a child's preferences will result in a list of titles containing those characteristics.

Even though the project has ended, newly released software continues to be reviewed and information about each title entered into the database. Only programs that are developmentally and

age appropriate are included. Software programs that are no longer distributed are not removed from the database since they may exist in the school or agency software library.

Input skills. TECH ACCESS (Hutinger, Johanson, Robinson, Schneider, & Whitaker, 1992) indicates the following skills a child needs for using various input devices. To use a mouse for input, a child should be able to visually discriminate between activating areas, grasp, move and control the mouse, and click the mouse button to make a choice. To use a TouchWindow for input, a child should be able to visually identify activating areas, assert appropriate pressure to activate the touch sensitive tablet with a clenched or open hand, multiple fingers or with a single finger. The child must also be able to lift his or her hand off the tablet after activation. To use a switch for input, a child should have reliable movement or control with foot, leg, head, hand or some other part of his or her body. In addition, it would be important for the child to be able to focus and watch the monitor, accomplish some visual discrimination, and be able to press a switch with possible intent.

As we reviewed commercial software, we examined methods of input for using the software. Most commercial software commonly requires mouse, TouchWindow, or keyboard input. Software not especially designed for switches can be accessed via switches through IntelliKeys or *Discover:Kenx*. Based on these considerations, we selected switch, TouchWindow, adaptive keyboards, and mouse as input for *Something's Fishy*. Practical elements contributing to this decision included 1) input methods common in commercial software, 2) the cost of various adaptive devices, and 3) the availability of adaptive devices in school settings.

Designing the Software

Literature reviews, consultations with CD-ROM manufacturers, and contacts with others involved in producing a CD-ROM were among the steps we took to make decisions about the design of *Something's Fishy*. We discussed a variety of design features available and determined which to include. Since technology advances rapidly and frequently, we were aware of the need to be flexible and that decisions made one day might have to be changed the next week when new

technology features became available. A great deal of time was taken to discuss and determine the audio and visual materials to include in both parts of the software.

The design and format of *Something's Fishy* was mapped from the beginning of the project. The team remained flexible throughout the project period on minor design features that could be changed, based on desirable characteristics found in commercial software programs. Classroom observations in ten early childhood classrooms were conducted to determine the software titles children choose when they have the opportunity to make their own choices. We assumed that the children's reactions and responses to the software indicated areas of interest. The titles preferred by children, *Kid Desk, Millie's Math House, KidPix,* and selections from the Living Book series suggested a variety of characteristics. Children's "top" choices indicated that they enjoyed using software that offered the opportunity to be in control. Their exploration of the variety of activities such as the e-mail, voice mail, note pad, and talking clock offered in *Kid Desk* and various drawing tools, colors, erasers, and stamps in *KidPix* demonstrated their desire to develop individual ideas and produce original designs. The activities in *Millie's Math House* illustrated the children's willingness to accept challenges. When the children used a Living Book program, such as *Harry and the Haunted House* or *Just Grandma and Me*, they activated hot spots by clicking with the mouse or activating the TouchWindow and frequently exhibited enthusiasm when they shared the unexpected, and often humorous, results of their choices. Based on the results of the observations, we incorporated design features such as elements of surprise and humor and opportunities to make choices, explore, experiement, and create into *Something's Fishy.*

Video, photographs, sounds, child created art, adult drawings, computer generated art, and animated drawings were collected and integrated into the prototypes. Photographed backgrounds were isolated to be used in the software. Artists created computer generated backgrounds and images. The project team incorporated short clips from 62 video segments, each lasting 8 - 12 seconds, gathered from vacation spots, zoos, and wildlife settings. More than 800 photographed images were scanned and a large number included in the CD-ROM. Appropriate sounds and music were difficult to obtain and copyright free material was used. The artists were challenged when

they animated the children's drawings. Every effort was made to maintain the integrity of the original work. To accomplish this, the artists were limited to producing simple animations.

Content was expanded when we recognized the need for wider variety in the animations. As work on the separate pieces that comprise the software was drafted, each was reviewed by Project team members, Macomb Projects' technology trainers, Macomb Projects' TTAP staff, and classroom teachers and parents with whom we have a working relationship. Recommendations from these individuals were considered and appropriate revisions made.

Selected elements were pressed on a CD-ROM. The inexpensive format was easy to transport between sites and was a reliable method for pilot testing. The low cost for pressing CD-ROMs allowed us to quickly prepare multiple copies of a prototype and test it. From the feedback garnered, changes were made, content added, and the CD-ROM was revised.

Product Development

Producing a multimedia software package is a time-intensive team process which requires both content and technology expertise. Technical processes used include: planning and developing a story board, mapping overall progress through the material, scripting, determining needed visual images, acquiring permission to use images and music, producing images, capturing video, producing screens, narrating script, obtaining necessary sound, organizing sound and images, revising and editing the software application, incorporating all data into the software on a hard drive, and finally, producing the prototype. All this is accompanied in conjunction with ongoing meetings among team members together with continual evaluation and revision. Decisions were made about color, font, image size, video speed (frames per second), sound compression.

We developed the prototype for the Macintosh platform because we own interactive software development tools (equipment and development environments) for Macintosh computers. During development, we did not have the equipment necessary to develop software in an MS-DOS/Windows environment, although that capability is now feasible. We hold an Apple Developer Apple Multimedia Program license and maintain the most recent state-of-the-art knowledge and skills in multimedia development and software programming through attendance at developers conferences and regular on-

line communication. At the time the original proposal was submitted a marketing report noted that Apple had 60 percent of the market share for programs from early childhood through adolescence (Gistics Inc., 1993, p. 91).

Something's Fishy was programmed using *Macromedia Director 4.0* and segments of the prototype were produced on a CD-ROM since that medium provided the storage capacity needed for the graphics, movies, animation, and sound used. The software was designed for the Macintosh platform running OS 8. System requirements include a minimum of 8 megabytes of RAM memory and a 14 inch color monitor.

Product testing. The pilot testing and field testing environment was appropriate because it was conducted in sites attended by children from 18 months of age to 8 years with moderate to severe disabilities, using the same kind of computers and devices for which the software was intended. Both pilot and field testing occurred in TTAP team assessment situations with appropriate aged children with disabilities.

The Manual

A manual, the written guide for assessment teams, will be incorporated in a "Read Me" file on the *Something's Fishy* prototype. Not only does this reduce the bulk in disseminating TASP, but it also assures that the information critical to the process is not misplaced. Including the manual on the CD-ROM gives each user the option of printing a copy of the documentation for *Something's Fishy.* The Manual also includes a description and discussion of the tasks included in each section, together with statements regarding the significance of a particular task to the child's use of computer applications. Also included is information outlining various tasks children can do with technology tools (i.e., drawing, communicating, playing games, moving robots) and an analysis of the skills (partially assessed by the software) children need to accomplish these tasks.

Evaluating Project Activities

Project staff met on a formal basis monthly, or more frequently when needed, to review progress. During those meetings, we examined tasks accomplished during the previous month, discussed delays and strategies for dealing with them, scheduled tasks for the coming month and

reviewed, revised, and made decisions concerning the content and format for each part of *Something's Fishy.* Less formal exchanges of information were constant and included conferences about problems and successes at any time.

Content and Design were under constant review by staff on both a formal and informal basis. Because the team was flexible, adjustments were made to incorporate the verbal and nonverbal recommendations of children, families, and professionals. Data collected from multiple sources such as anecdotal records, written observations, surveys, and informal interviews was used to make decisions related to product development, pilot testing, implementation, and field testing, in particular to identify strong and weak points of the strategies used and to suggest solutions.

In the early months of the Project, we developed a preliminary instrument, the *Classroom Observation Form*, to collect data from the pilot testing. The instrument was tested on two occasions unrelated to pilot testing of our software. Revisions were made, and the instrument was ready to use during product pilot testing.

A database was created for the *Classroom Observation Form.* The information contained in this database was used to determine the software titles young children selected when they had the opportunity to make independent choices from the titles available to them. The most popular programs used animated sequences and provided children the opportunity to control the software, make their own choices, explore, experiment, and create. We incorporated such attributes into the design of *Something's Fishy.*

Our determination that children control the software as much as possible using the input device worked best was reinforced by their apparent desire to use software that let them be in control. Realizing that the children accepted new challenges supported our strategy to present them with increasingly more difficult tasks. When we observed their pleasure in establishing distinct design characteristics, we developed a task for children who had limited opportunities to draw. With a single switch press, children are able to "re-draw" images previously drawn by other children. Observing the delight of unexpected reactions to a TouchWindow press or a mouse click reinforced he importance of including elements of surprise and humor in unanticipated places.

Field and Pilot testing. We were fortunate to have Macomb Projects staff not involved in the project test the software on an ongoing basis. Their involvement made it possible to initiate changes quickly. Following their suggestions we then offered *Something's Fishy* to individuals outside Macomb Projects. *Something's Fishy* was pilot tested by participants during training sessions for TTAP assessment procedures in the Fall of 1995. Pilot testing also occurred during April and May 1996 with children and teachers from four early childhood preschool classrooms located in west central Illinois. Interventionists from a birth to three program reviewed the software early in 1997.

In addition to the positive feedback following pilot testing, suggestions were made that were incorporated into the final product. Feedback indicated the software ran too slow on a classroom machine with 8 megabytes of RAM. That concern was corrected by reducing the bit depth from 16 bit to 8 bit. Some sound files were compressed further to make the software run at an acceptable speed on computers with 8 megabytes of RAM. Another tester questioned the erratic sound on her machine. By reducing the size of the sound files we eliminated the source of her concern. Following a demonstration of the software, one participant suggested the incorporation of grayscale images and the increased meaning for children with autism. Her comments reinforced our early decision to include grayscale as a viewing option. Additional feedback suggested that images presented to a child in *Oh Buoy!* be positioned randomly thereby eliminating the possibility that choices were limited by his or her ability to reach the upper portion of the TouchWindow. This feature was part of our original design plan, and the comment suggested the necessity of including it in the final product. A valid suggestion we were unable to incorporate dealt with the sound. We were asked if the sounds could be calibrated for pitch and decibels to accommodate the wide range of hearing abilities children have. What we did do was include a wide variety of sounds that had different pitches and provided a control to adjust the volume.

Children's responses were positive. Those who could speak, make comments such as "Cool" or "Look! Look!" when trying to draw a friends' attention to the program. Children who were

unable to communicate verbally exhibited interest in the content by their behavior. They continued to use the program, smiled, and pointed to the screen during the animations.

VII. Problems

Staff Turn-over

TASP was beseiged by staff turnovers. Three positions—Director, Coordinator, and Multimedia Production Specialist—remained constant from the beginning to the end of the Project. One person named on the Project resigned before it began to take an new job. The two positions of Multimedia Specialist were held by six different people between January 1, 1995 and August 30, 1997. Nearly every major problem the Project faced was related to a staff member's resignation. One staff member resigned for health-related reasons; one resigned because his spouse's new job required the family to relocate; one resigned to go back to school, and three resigned to take new jobs. Whatever the reason, resignations meant time had to be spent searching for qualified candidates for the position. And once a new staff member was hired, that person had to be trained, not only to use the equipment and software, but also to understand the basic philosophy and goals that drove the project.

Equipment Difficulties

Other problems were related to equipment difficulties. Systems crashed; equipment orders were unfilled; and budget transfer approvals were delayed. All contributed to delays in Project workscope.

The delay of approval of a budget transfer request and the Year 1 carryover request began a series of problems. On June 1, 1995, we requested approval to transfer unused money in the insurance line to the equipment line. We intended to purchase a new Macintosh system to speed the Project's work since the system we had kept crashing because it did not have the speed and memory to run the programs we used. We lost both time and artwork due to the crashes. On June 28, 1995, we sent in a request for carryover. When both the letter and carryover request received no response by August, we contacted our Grants and Contracts Officer who began a search for the documents. She had sent them to the Program Officer for approval; however, that person had

resigned and the documents were misplaced. At any rate, we did not receive approval for our carryover request until October, 23, 1995, when we were already almost two months into the Project's second year.

Work was delayed as a result of delayed carryover approval. The equipment we requested in our June 1 letter had been discontinued and was no longer available. The new computers had only a PCI slot and were not compatible with our NuBus monitor. Since we had not budgeted funds for a PCI NuBus card, we put many tasks on hold while we sought an alternative means for obtaining a compatible monitor. We waited to see what Apple would market and eventually purchased a Macintosh 9500 and a large monitor. The new computer took forever to arrive and, when it did, we discovered that the new hardware and old software (*Director*) were not compatible! Another delay resulted when we had to wait for the *Director* patch to correct the compatibility problem. Finally, we purchased *Director 5.0* and a new version of *SoundEdit* only to discover we needed more RAM to make it all run. We purchased the necessary memory and all was going well until the hard drive used for storing all the completed images and animations went down. Fortunately, we did not lose any of the saved work. The drive went in for repair and, in the mean time, we obtained another, larger drive so work could continue.

VIII. Project Impact

Products

A videotape was produced from the May 1997 APPLES Magazine, an interactive satellite broadcast produced by Illinois' regional early childhood technical assistance project, STARNet Regions I and III. Project activities, goals, and products were discussed during the one-hour broadcast. The videotape is available from Macomb Projects.

The database of commercial software titles was developed in *FileMaker Pro 4.0* and organized to coordinate with the preferences targeted in *Something's Fishy.* The characteristics of commercial software were identified and entered into the database which has and will serve as a guide in the search for titles that match a child's method of input and the preferences indicated. In an effort to support the continued use of *Something's Fishy*, the database will be updated periodically. Current

editions of the database will be available on disk from Macomb Projects. Internet users will also be able to access the database from Macomb Projects site (www.mprojects.wiu.edu).

Circumstances beyond our control, such as those mentioned in Section VII, caused delays in production of the final version of *Something's Fishy.* It is being completed as resources permit.

Dissemination Activities

Press releases from Macomb Projects and Western Illinois University were printed in local newspapers. A brochure about the Project was developed in the Spring of 1995 and a single page flier was prepared and printed in the Winter of 1996. The brochure contained information about the project and the flier contained information specifically about *Something's Fishy.* The brochure was distributed through awareness mailings, and both were made available during poster sessions and at state, national, and international conferences by Macomb Projects staff who attended those events.

Shortly after the Project was funded, an announcement of the Project was posted on SpecialNet. A poster about the Project displaying a variety images contained in *Something's Fishy* was developed and displayed at the 1995 ACTT VI and 1996 ACTT VII Conferences, at the 1996 Western Illinois University Sponsored Projects' poster session, at the 1997 Macomb Projects-sponsored early childhood technology conference, at state wide gatherings of educators, at a mini-conference sponsored by the WIU College of Education and Human Services, and during a 1997 poster session conducted for a U.S. Congressman, his staff, and broadcast media representatives.

Information about *Something's Fishy* has been disseminated during workshops in places as close to home as Danville, Illinois, and as far away as Middle Island, New York. Information was also shared with early childhood professionals at meetings in Indiana sponsored by NEC*TAS (National Early Childhood Technical Assistance System) and informally with colleagues at meetings and inservices. Project information was disseminated about this Project and its product, *Something's Fishy,* on the May 1997 APPLES Magazine, a one-hour interactive satellite broadcast that is produced monthly by Illinois' regional early childhood technical assistance project, STARNet Regions I and III. The broadcast was available to viewers across the United States.

The project team developed informational pages about the Technology Assessment Software Package that was included in the Macomb Projects' World Wide Web pages (www.mprojects.wiu.edu). As a result, information about the Project is available to a worldwide audience. As information about the project changed, the web pages were updated. Our web site attracted requests for further information from individuals in Costa Mesa, California, Stockholm, Sweden, and Singapore. The individual from Costa Mesa was an assistive technology specialist and intended to disseminate the information to others. A mailing to our Project from the National Center for the Dissemination of Disability Research (NCDDR) provided us with information about an electronic source for marketing information for our Project and product.

Publications

The Summer 1994 issue of *ACTTive Technology* featured an article, "Technology Assessment Software Project Receives Federal Funding" which introduced the project and outlined the project goals. Following the completion of teacher surveys and questionnaires an article titled "Teachers Identify Important Characteristics of Children's Software" was published in the Winter 1997 issue of *ACTTive Technology*. The results referred to in the article influenced some of the content for *Something's Fishy*. The information was also used as part of a book chapter about software and young children (Hutinger & Johanson, in press).

IX. Future Activities

The most current version of the software database will be available on disk and accessible on the Internet from the Macomb Projects site on the World Wide Web, www.mprojects.wiu.edu. The database will be maintained and kept current. It is a valuable tool for individuals searching for software to meet a child's specific needs and individual preferences.

The final version of*Something's Fishy* will be completed and marketed through the avenues available to Macomb Projects.

X. Assurance Statement

A full copy of this report has been sent to the ERIC Clearinghouse on Handicapped and Gifted Children. Copies of the title page and abstract were sent to NEC*TAS, the National Clearinghouse for Professionals in Special Education, the National Information Center for Children and Youth with Disabilities, the Technical Assistance for Parent Programs Project, the National Diffusion Network, the Child and Adolescent Service System Program, the Northeast Regional Resource Center, the MidSouth Regional Resource Center, the South Atlantic Regional Resource Center, the Great Lakes Area Regional Resource Center, the Mountain Plains Regional Resource Center, the Western Regional Resource Center, and the Federal Regional Resource Center.

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