

Assistive Technology within Community-Based Assessment

Assistive Technology within Community-Based Assessment: Case Studies of Two Women

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Abstract

Using the community and the workplace as settings for collection of assessment data offers the opportunity to implement realistic device trials, allows evaluators the opportunity to garnish the support of employers, job coaches, case managers, and support staff as well as providing an actual job setting in which to assess the functionality of AT modification on tasks and activities. This study reviews the adjustment of two women. The subject Suzanne requires computer access and ergonomic modifications to her current work environment while Cynthia requires both computer access modifications and a job that suits her skills and interest in computers. Through the integrated efforts of an AT professional and a vocational evaluator working in concert, the wide-ranging needs of these consumers are addressed.

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*Introduction*

Viewing the assessment progression on a continuum, the vocational evaluation identifies potential vocational goals, the assistive technology evaluation identifies potential means to achieve completion of specific tasks, and the community-based assessment integrates the selection of occupational goals, the technology selected to perform the task, and the performance of simulated or real work in a community setting. Current trends in rehabilitation dictate the necessity to provide services that are comprehensive, timely, and cost effective. Assistive technology (AT) is any device, whether commercial or hand-crafted, that increases one's

Bus/Taxi / Family/Friends / Have License / Have Car

## Mobility:

Walks independently / Walks assisted (describe) □ FORMTEXT □ □ ion of one's goal that is within reach. In turn, community based assessment offers real-life opportunities for work experience and an opportunity to apply assistive technology. In order to achieve full assimilation into today's workplace and communities, persons with disabilities have the right to gain access to assistive technology (McAlees, 1999). Vocational evaluation, like assistive technology device selection, is a process. Similarly, the consumer is always the most important person in either. The vocational evaluation specialist often uses a variety of quantitative measures, in addition to file review, clinical interview, and observation. File review reveals educational background and performance, as well as medical history including stability and progression, and the areas in which the consumer has had vocational experiences. This data serves as a springboard to discussion with the consumer regarding likes and dislikes and cooperative analysis of any underlying reasons for these preferences. Use of an initial interview checklist may be helpful in outlining these preferences (Appendix A). Breaking down specific tasks required to complete a

vitally important for critical skill examination, leading to a more structured opportunity to provide accommodation through the integration of AT in areas of difficulty.

For example, standardized testing that is administered in both the timed and power methods congruently offers a more realistic portrayal of one's potential to succeed on a given activity. Although straying even further from the likelihood of score comparison to normative data providing any empirically significant results, alternative formatting of the particular instrument such as large print or computer administration, there are often greater interpretive benefits than what may be gleaned from the actual "test" itself. These benefits include, but are not limited to: item analysis, and tenacity, opportunities for client involvement in making decisions regarding his rehabilitation program, the chance to try new access methods which may or may not include AT as is it formally known, and observations of test-taking behavior, strategy, and tenacity. Vocational evaluators have such a unique opportunity to affect people's lives in a relatively brief period of time. This is a time to assist each consumer in his personal growth by guiding him to learn about aptitudes, strengths, interests, and temperament through provision of a summary of the results in a prescriptive list of recommendations and suggested goals. Ideally, AT is interwoven into this process. Taking the evaluation one step further by pursuing one or more collaborative community based assessments serves to supplement initial findings, incorporate AT, and generate more realistically applicable evaluation findings. The consumers' potential for success is greatly enhanced by the integration of assistive technology into the vocational evaluation via community based assessment. As demonstrated using the case studies of Suzanne and Cynthia, this paper addresses how vocational evaluation and assistive technology processes compliment one another and can dovetail into unique outcomes for consumers.

*Choosing Assistive Technology: Consider These Things*

Selecting appropriate assistive technology for a consumer is a process. It involves considerations that lead the consumer to technology that serves his current needs yet addresses future ones. It takes into account aspects of the person, their environment, and the tasks that they will be performing. Although device trials are vitally important, technology sometimes finds its way to consumers through means that fail to involve these critical factors. Unsuccessful matches can be disappointing and costly mistakes.

Workplace modifications require just such judicious consideration. Vocational evaluation can work in concert with assistive technology evaluation through collaborative teamwork, with each member of the team, providing valuable and often creative input toward reaching a functional solution.

*Aspects of the Person*

Aspects of the person should receive initial attention (Figure 1). Each individual comes to this process with unique characteristics. These characteristics such as temperament, frustration tolerance, intelligence, and maturation influence the way in which new technology is learned and integrated into daily life. The standard vocational evaluation, combined with any included file information from psychological or mental health documentation provides insight to the aspects of the person. Vocational evaluators are trained in behavioral observation and its factual documentation.

Some consumers have prior experience with assistive technology coming in to the evaluation setting. Taking the time to explore what proved useful and what didn't work could prevent wasting time and money on technology that was previously unsuccessful or not properly implemented.

The nature and degree of an individual's disability can influence a number of factors when choosing assistive technology. Generally, multiple disabilities often require complex, multi-faceted assistive technology. A person with cerebral palsy and mental retardation may require accommodations in areas of computer access, aids to daily living, adaptive learning devices, and environmental adaptations. Associated mobility problems might require wheelchairs and environmental access such as ramps. Computer access may involve software that compliments the user's cognitive ability and input devices that allow for effective and efficient access. Aids to daily living may be as simple as a device that assists with picking up and moving papers or other objects. The degree of disability also influences the amount of time needed to evaluate the most appropriate technology. Loan programs such as the one sponsored by North Carolina Assistive Technology Program are used to borrow devices and try them out in the settings in which they are proposed. Through these trials the user has an opportunity to gauge the effectiveness of devices without making any financial commitment.

#### *Aspects of the Environment*

The environment into which technology is introduced is a critical factor in its successful implementation (Figure 2). Technology can be selected for use in one or more settings. It is important to consider other persons in the consumer's environment. Other people in the environment can add or detract from the success of an assistive technology intervention and should be figured into the formula for integration. It is also prudent to consider other technology that may already be in use. New technology can be integrated with old technology and skills learned with one piece of technology may be transferable to another.

### *Aspects of the Task*

All persons execute numerous tasks on a daily basis that contribute to our sense of productivity. Each time assistive technology is selected with a consumer, it is important to focus on the actual tasks a person may engage in throughout the day.

What is this individual doing during the day that needs augmentation? How many steps or parts does this task have and how difficult is it to perform? In the final analysis, selecting appropriate assistive technology comes down to the task, its difficulty, and its complexity (Figure 3). Training should be a part of the overall plan and it should be thorough enough and long enough to insure success. Distributed practice over time is also an essential part of the element of training. Memory is supported with continued supervised practice over a prescribed period of time.

### *Summary*

Selecting assistive technology is not a matter of choosing a device for an individual. It is a process through which a match is made, taking into account the aspects of the person, environment and task that shape an effective intervention. The function of loan programs in the process cannot be under emphasized. Trying devices before you buy them can prevent a waste of time and money.

Assistive technology can be used as a part of the rehabilitation process, to assist and individual in executing the demands of daily life, or to augment, accommodate, or modify their work experience. Assistive technology can be high or low tech, it can take the form of appliances and tools, and it can serve as the user's assistant or teacher. Selecting the appropriate technology for the individual is a well-considered process that grows out of this understanding of its characteristics.

*Subject One: Suzanne*

Suzanne has a full-time job working for a rehabilitation facility and lives at home with her parents. Suzanne has Baccalaureate degrees in Psychology and Spanish and a Master's degree in Rehabilitation Psychology and Counseling. Ophthalmologic reports indicate that Suzanne developed vitreous and intracranial hemorrhaging in 1990 resulting in visual field deficits on the left half of both eyes. She also experiences "islands of blindness due to vascular damage". She has no central vision in the right eye, relying solely on peripheral vision in this eye. Visual acuity in her right eye is 20/100 and 20/20 in the left with the decreased visual field in both eyes as referred to previously. Additionally, Suzanne struggles with the effects of left hemiparesis leaving her with limited sensation in her left-hand. This often results in her left-hand falling off the keyboard. Recommendations for computer modifications were suggested by her ophthalmologist and included auditory output from the computer, enlarging print, adjusting color and contrast to the background, and the option of looking down to read hardcopy.

Suzanne indicated that her occupational performance issues center around difficulty seeing details on the computer screen and being unable to monitor the movement of her left-hand. Her level of concern peaked when she was asked to participate in an online database program at work and she grew concerned that she might not be able to access these changes. Suzanne would like to be able to use voice activation software as well as other peripheral devices to meet these new job demands.

Suzanne's job at a local rehabilitation hospital involves the placement of outpatients in post-rehab facilities in the community. She facilitates two support groups and uses her skills in Spanish as a translator. For these duties she uses a PC with a Windows '95 operating system. Software used gives her the capability to send and receive email, use basic Office applications,

and browse the Web. Suzanne's interface was difficult, if not impossible, for her to see and her workstation was inadequate to meet her physical needs.

In evaluating the true nature of Suzanne's visual and physical impairments, it became clear that the workstation issues needed to be addressed first. Due to left hemiparesis, Suzanne is unable to rely on her left hand and arm to respond with the consistency she needs for typing. One-handed keyboard access seemed prudent to her and she was interested in exploring her options in this area. The same motor issues often made sitting for periods of time difficult and she complained of some low back pain and stiffness in her neck and shoulders. Suzanne had difficulty working with hard copies. Copy placement made it visually difficult to transfer information without making errors. Additionally, Suzanne's monitor was located out of her visual field.

Goals for Suzanne include the need for an ergonomic workstation that accommodates the intricate characteristics of her visual impairment. Multiple forms of input would also reduce some of the stress that may necessarily fall on the right hand. Modifications may abate some of Suzanne's expressed concerns about work shared by many persons with visual impairments that require computer modification in the workplace. The common anxiety associated with the sometimes-complex computer access issues is compounded by worries about cost, reactions of the fellow employees, and the like. Adele Crudden (2002, p. 615) in a collective case study of persons with visual impairments that are returning to work reflects this idea.

“A prevalent theme throughout the case studies is the impact of computer technology on job retention. Although the participants generally thought that computer technology has had a profound positive impact on their lives, they experienced stress associated with it. For example, they were anxious when there were delays in obtaining equipment, when they were asked to perform tasks without ample time to learn how to use their equipment efficiently, or when the equipment provided was incompatible with an employer's system.”

Suzanne has experienced all of these concerns and is further challenged with how to make her

accommodations more mobile. Currently Suzanne works in a position that does not take best advantage of her unique skill set. An overall goal that addresses the need for a system of accommodations that can move with Suzanne from job to job as her career prospects increase is appropriate given the underutilization of her skill set in her current position.

Multiple visits were made to Suzanne's place of business. Initially low or no cost solutions were implemented at her workstation. High contrast settings were applied to her browser using Window's Accessibility Options. Suzanne showed a preference for white letters on a black background. Additional display setting such as larger icons and active title bars were set to assist with targeting. Freeware was installed to allow increased cursor visibility for tracking. Additional Windows accessibility settings that benefit Suzanne are StickyKeys and Toggle Keys. The keyboard configuration was changed to Dvorak for the right hand and her standard keyboard was re-labeled with large print adhesive labels. Exercises using the new keyboard layout were supplied for Suzanne to practice. These settings are designed to complete one-handed operations when executing such functions as capitalizing a letter, and other allowing the user to receive auditory feedback from the computer when activating the Caps Lock, Num Lock, and Shift Key. The employer supported initial recommendations to install keyboard/mouse tray and ruled document holder for ergonomic positioning and facilitate horizontal visual tracking.

After these initial modifications, Suzanne was evaluated for use of automatic speech recognition software. The application used was Dragon NaturallySpeaking 6.1, for which Suzanne is currently undergoing a seven-part evaluation and training in a lab setting. She has had previous success with earlier versions of the software and wishes to incorporate the software in her work. Most recent recognition proficiency measures are 90.7% for speed and 94.5% for accuracy. In addition to lending Suzanne an articulating arm monitor stand that can be positioned as needed, it

was determined that Suzanne would benefit from magnification software. Her preferred software package provides auditory feedback in addition to magnification up to sixteen times while allowing her to maintain her limited field of view with her existing 15 inch monitor.

Suzanne has received approval from Vocational Rehabilitation Services for the purchase of speech recognition software, magnification software, a lumbar support for her chair, and an articulating monitor arm. Suzanne's employer will be approached by the technology specialist and VR counselor regarding a computer that is adequate to meet the system requirements for the software purchased by Vocational Rehabilitation Services. If these negotiations are successful, Suzanne will have a set of accommodations that can be moved to another position if the need arises. A meeting was arranged with a representative from a state support service for Hispanic persons. Suzanne was offered a job shadowing opportunity to determine if her skills as a vocational counselor and Spanish translator are a good fit with this organization and ones like it. A job placement specialist was recently enlisted for team support in the provision of interviewing skills coaching and resume-writing tips to enable Suzanne to better market her skills.

*Subject Two: Cynthia*

Concerns regarding Cynthia's neuromotor development began at the age of six with reports of poor balance and coordination. Between the ages of six and thirteen Cynthia experienced increased problems with balance and coordination, poor posture, and accidents from falling. At the age of thirteen, Cynthia was diagnosed with severe progressive scoliosis. Harrington rod surgery was performed and after her recovery she was diagnosed as having Friedrich's Ataxia. Cynthia is now 45 years old and has experienced continued neuromotor degeneration over the years. Cynthia has experienced other health problems that include cardiac problems, hypertension, aspiration and resultant pneumonia, borderline blood sugar, and depression.

Cynthia resides in an apartment living program operated by an area non-profit organization. She lives with one roommate. Round the clock staff provides the necessary support services for Cynthia. Cynthia currently relies on a manual wheelchair. She is no longer able to propel herself and relies on staff to push her. Motor degeneration leaves Cynthia with few resources to perform most daily living routines. Cynthia does continue to have slow, deliberate movement of her hands and uses them to operate a laptop computer. She does so through the use of a software product call EZKeys, a product of Words+, and a double switch array that allows her to use the scanning functions of this software. Cynthia uses her EZKeys to communicate with synthesized voice and to operate her computer. Although Cynthia's input is very slow, about one word per minute, according to a recent computer access evaluation, she is accurate and very proficient in the use of this software. She is also very confident in her ability to operate this device. Despite her physical limitations, Cynthia has average cognitive skills and is quite personable. Currently, Cynthia wishes to apply her computer skills to some form of work.

Cynthia's desire for work is complimented by some impressive computer skills. Cynthia uses a double switch array and an on-screen keyboard allows her to use a laptop to communicate, type recipes, to send email and surf the Internet. The laptop system with hardware voice synthesizer is attached to a tray. The tray is loosely strapped to her wheelchair. In addition to the wheelchair setup, Cynthia has a donated desktop machine. Another on-screen keyboard is installed on the desktop unit and she uses a glide pad for mouse access. The glide pad is operated principally with her thumb and sits flat on the tabletop. On both computer systems, Cynthia has keyguards, using a pencil to activate keys. When using the EZKeys software to communicate, it is observed that Cynthia tends to type out each thing she wants to say as opposed to using pre-programmed phrases. Cynthia does not currently use an icon or picture symbol system to enhance

communication speed.

Cynthia is proficient in the use of her EZKeys software but the sluggish output will not make her competitive in jobs that depend on rapid input skills. Mouse emulation through EZKeys is effective but inefficient. Cynthia understands and is able to use her glide pad on the laptop and the desktop computer; however, she principally uses a raking action with her thumb. Again, this is effective but time consuming. Funding is usually a consideration but more so for Cynthia; daily living needs consume most of her funds.

Keeping in mind that the goal is to find part-time homebound employment for Cynthia, some steps need to be taken to increase her rate of output. The effects of ataxia make learning new motor patterns difficult and tedious. Cynthia is understandably reluctant to commit to change and needs a great deal of encouragement and support when learning new skills. Adjustment to new methods for access should be undertaken with care to avoid the possibility of abandonment. Andrew R. Beigel (2000, p. 237) indicates that the failure of assistive technology occurs when those evaluating the consumer fail to “consider the learner's ideas and desires for the purposes and uses of the device.” Cynthia reports being very comfortable with the use of her current on-screen keyboard and it should be utilized for work or home in concert with new means of access. Overall goals for Cynthia include: designing an alternative means of input that may increase her rate of output; selecting, designing or carving jobs that require minimal inputs or input speed; and to seek or develop occupations that do not require a high rate of production.

After trying numerous input devices, the glide pad appeared to be the best form of access for Cynthia with some modification. It was noted that if Cynthia used her index finger on the glide pad that she moved the cursor more swiftly (.07 seconds) from target to target on the desktop. Dwell functions were used to supply the clicking action needed to open programs and operate the

on-screen keyboard. A ball-bearing feeder supplied support for Cynthia's arm at an angle that allowed her to move with greater range of motion and use her index finger on the glide pad. Cynthia will need time to acclimate to the use of the support device and operating her computer using the glide pad in this way. Polyvinyl Chloride (PVC) pipe was used to build a mount for the glide pad. A mount could also be fashioned to the arm of the wheelchair. The on-screen keyboard is a frequency of use arrangement. The software allows the consultant or technology specialist to author a keyboard that can reduce software tasks like cutting and pasting, enlarging font, and the like to single button clicks. The dual switch area on the laptop can be used for typing tasks that are not dependent on high rates of output. The laptop will require some refurbishing to help it operate smoothly.

Cynthia's original vocational evaluation report identifies a single vocational goal, Braille Translator. However, further interpretation of the in-house evaluation report identifies tested and expressed interests in biological sciences, mathematics, and dealing with people and animals. Successful educational experience in accounting is also included. Opportunities for homebound employment, due to Cynthia's transportation limitations resultant to her health care needs, exceed a single potential job goal. For example, job opportunities may be carved out and developed in altering brochure formats to make them more accessible to persons who cannot access regular print in English (i.e., large print, Spanish, and Braille translations) for public agencies and businesses. Also, with her demonstrated affinity with numbers and accuracy, Cynthia may perform well in administrative support capacity, auditing time and travel forms or preparing work schedules. Considering her keenness for work with animals, the North Carolina State University Veterinarian School, near Cynthia's home, may be an ideal jobsite to approach regarding these potential roles. Cynthia's service team recently met and the results of her

evaluation were presented. The first item that the team offered was a job working for a non-profit that involves data entry. There are no production demands so the job is a good fit for Cynthia's laptop setup.

### *Conclusion*

Each of these consumers borrowed devices from the North Carolina Assistive Technology Program's equipment loan program and used the devices for periods in excess of two weeks. In Cynthia's case, loaned equipment is used for training purposes. Data is being collected to determine the how well these device assist Cynthia in meeting her goals. Suzanne is taking advantage of the same loan program to bear out the effectiveness of an articulating monitor arm and a lumbar support. She continues to train and be evaluated for voice recognition software. Suzanne is demonstrating to her employer and coworkers that these interventions contribute to improved work conditions and productivity.

The consequences of an integrated approach to vocational evaluation and assistive technology access within the community-based assessment are demonstrable. For two individuals whose collective time on the vocational rehabilitation caseload exceeds thirty years, the exhibited benefits derived in a matter of months is indicative of a measure of success. Although intervention and supports are ongoing with both subjects at present, successful vocational placement is ultimately envisioned for both Suzanne and Cynthia.

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Appendix A

## Vocational Evaluation Intake Form

Name \_\_\_\_\_ Today's Date \_\_\_\_\_

Mailing Address \_\_\_\_\_

Date of Birth \_\_\_\_\_ Phone \_\_\_\_\_ SS# \_\_\_\_\_

### Background Info:

Diagnosis \_\_\_\_\_ How long? \_\_\_\_\_

Progressive? Yes / No Explain: \_\_\_\_\_

Highest Level of Education: H.S. / Technical / College / Higher / Graduate? Yes / No

Field of Study: \_\_\_\_\_

Favorite Classes: \_\_\_\_\_

Favorite Job Roles: \_\_\_\_\_

Do you consider yourself a "people person"? Yes / No / Unsure

Is your Home Accessible? Yes / No      Is your Bathroom Accessible? Yes/ No / NA

Any Vision Problems (describe): \_\_\_\_\_

Wear Glasses? Yes / No      Hearing Aids? Yes / No

Describe Any Hearing Problems: \_\_\_\_\_

Live Alone / Others in Home (list): \_\_\_\_\_

Do you feel comfortable asking members of the household for assistance if needed?  
Yes / No / Sometimes (describe) \_\_\_\_\_

Transportation: Drive / Use Bus/Taxi / Family/Friends / Have License / Have Car

### Mobility:

Walks independently / Walks assisted (describe) \_\_\_\_\_

Doesn't Walk -- Power chair or scooter / Manual Chair / None

Self Propel? Yes / No      Laptray? Yes/ No

Hand function:

Right-handed/ left-handed Weakness, tremor, paralysis, or other problems?

(describe) \_\_\_\_\_

Holds a pen? Yes / No

Feeds Self? Yes / No / Need Help

Write Legibly? Yes / No

Point with one finger? Yes / No / Sometimes

Wiggle Fingers? Yes / No

Dressing/Grooming? Yes / No / Need Help

Communication:

Speech impairment? (describe)\_\_\_\_\_

Can use phone independently? Yes / No Use Speakerphone? Yes / No

Cognition:

Any problems with memory? Short Term / Long Term / Unsure

Ever get lost in an area you know? Yes / No / Occasionally

Any trouble following directions? Rarely or never / Occasionally / Often

Any trouble concentrating or sticking to a task? Rarely or never / Occasionally / Often

Read Well? Yes / No

What was your favorite subject in school? \_\_\_\_\_

Computer Accessibility

Any work with computer at home? Yes / No Any trouble typing? Yes / No

What gives you trouble? \_\_\_\_\_

Hobbies and Leisure Activities: Gardening Fishing Bowling Reading TV Puzzles

Shopping Computer Games Movies Other:\_\_\_\_\_

Describe any use of AT that is currently in use. \_\_\_\_\_

\_\_\_\_\_

What are you not able to do now but would like to be able to do? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Please Attach Extra Sheets if Necessary

Figure 1

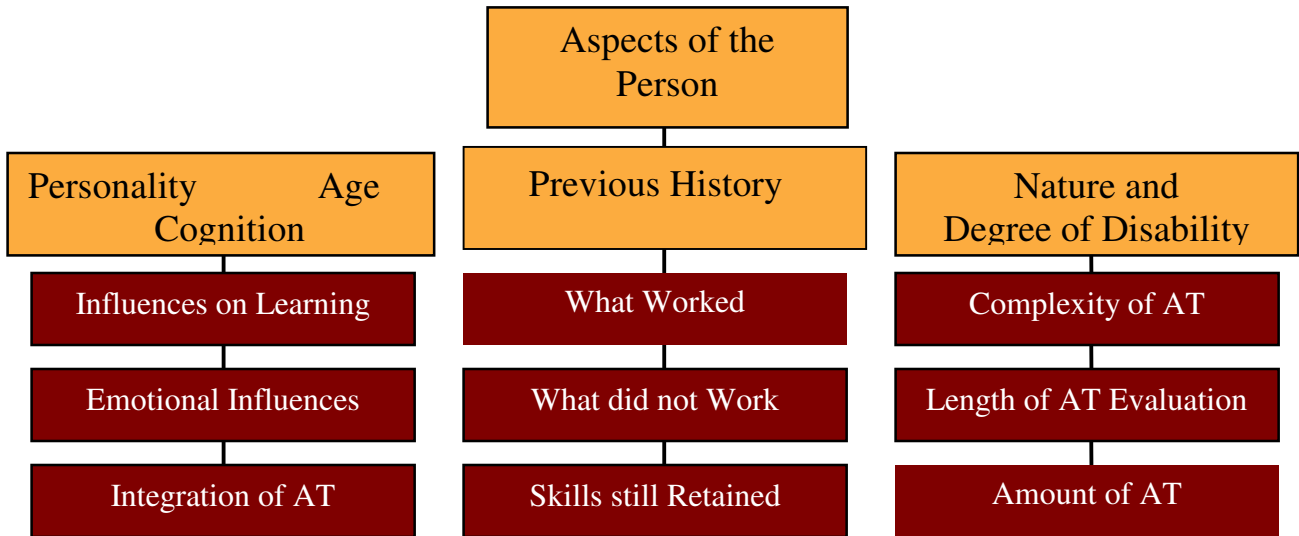


Figure 2

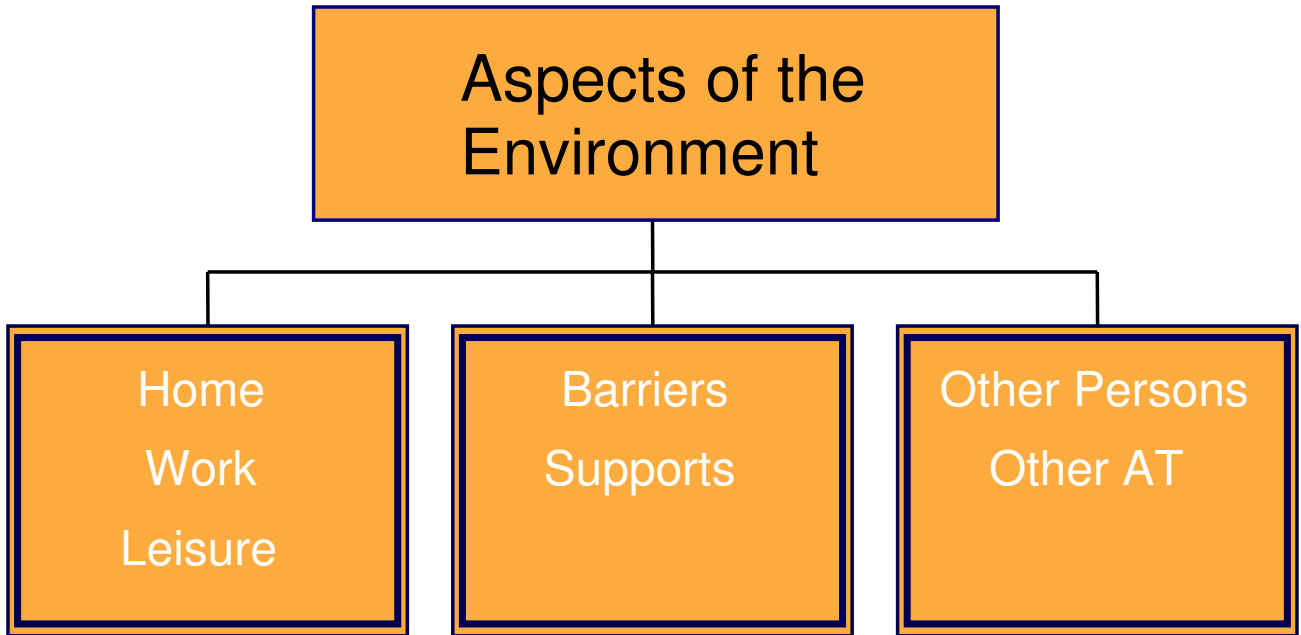


Figure 3

