Assistive Technology in Occupational Therapy

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Chapter 8

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Abstract

In this chapter, occupational therapists from leading specialists exploring ways they can collaborate with assistive technology (AT) users to help them get the most out of these devices. By gratefully acknowledging the advances in technology of the last century, people with disabilities can live independent lives, contribute to their communities, attend regular schools, and work in a career. This technological development means medically switching to a social model of technology presentation, where users are as much focused on social reintegration as their physical abilities. This change means that field workers will not be able to focus on delivering technology on their own but will have to go one step further and partner with consumers and communities to ensure that the aids are used in the best possible way.

Keywords: assistive technology, disabilities, performance areas, funding, disability

1. Introduction: assistive technology definition

Dictionaries provide the following definition of technology: (1) the science or study of the practical or industrial arts and (2) applied science and (3) a method, process, etc., for handling a specific technical problem. However, none of these definitions says anything about a *device*. We call an *assistive technology* for this important concept. It refers to a broad range of devices, services, strategies, and practices that are designed and applied to improve the problems of people with disabilities. One definition of an assistive technology device is used in public law of the United States as follows:

> *"Any items, piece of equipment or product system whether acquired commercially off the shelf, modified, or customized that is used to increase, maintain or improve functional capabilities of individuals with disabilities"* [1].

This definition comprises several important details like such as commercial, modified, and customized devices. But the most important that emphasizes *functional* capabilities of *individuals* with disabilities are the main topics of occupational therapy.

Technology has an important place in our daily life. Occupational therapy uses technology to increase the occupational performance and participation of their clients. Therefore, technology is an important application of occupational therapy services.

Assistive technology services include evaluating the needs, selecting the appropriate device, purchasing the device, providing support to the user and other interested persons in the process of adapting to the device, and training staff.

Occupational therapists use some evaluation methods like activity analysis in the therapy process in order to meet the activity demands of each client in context. They consider the tools used to meet their occupational demands and consider about the skills and abilities of the clients with which tools they use. These tools can be an assistive technology as a definition, if they increase, maintain, or improve someone's functional capabilities. If these tools typically used to improve the performance of the activity do not match the skills and abilities of the client, the therapist adapts or changes them, as he or she will use them. Therefore, providing assistive technology devices and services is an important element of occupational therapy intervention to support individuals, improve their performance, and increase their participation for their activities [2].

2. A historical perspective on assistive technology devices and services

Although industry of assistive technology is very demanding, important developments in this topic began to appear about 30 years ago. If you want to look at its root, it is needed to go old times. Let us imagine we are at the Stone Age; a friend broke his foot in the hunt. However, there was no plaster at that time; therefore, his foot is left to self-healing process. When he began to heal, he started to limp. However, he had to provide food to his clan. So that, he used a stick that would help him walk. In this way, the first assistive technology tool has come up. At that time, a special tool is named as high technology. As time passes, it is decided that assistive technologies respond to other needs also.

After the stick, it is discovered that empty animal horn can be used for loading to voice. Thus, it can be supported to fade hearing. As another example, the wheel that provides the transportation is an invention that is reinvented many times over the years. This device is the most important component of the current wheelchair. The most important thing in these devices at the past is that they were functioning extensively in terms of form or style. The stick that is used as a walking tool is similar with the todays' crutches and canes. The animal horn is only functionally related with the current hearing aids as well. The major point that will carry us to the next step in assistive technology is the similarity between the examples from the past and todays' assistive technology.

2.1. Evolution of the latest assistive technology

Assistive technology always is shaped according to the materials of the time. All the time, the functionality is more important than other features. Therefore, for many years, some applications have been modified little. The stick is an example; although its structure remains same, the material is modified. For sure, the other developments are only feasible as long as technologies are evolved. Over the years, some events that have happened have ensured these developments. For example, the Civil War in the United States especially provided the improvements in lower limb prostheses. In order to create a better fit and to be more functional outcome, sockets were enhanced. A socket developed by Parmelee in 1863 featured the first suction attachment of lower limb prosthesis [3]. Still, this kind of socket is used to prevent alignment problems and the risk of breakage at the joint. Though, there is a little similarity between the materials used in the past and today. As the current prosthesis consists of metal and plastic, Parmelee's component consists of wood and leather.

The miniature electronic circuits that were replaced with animal horn have been reached approximately in the last 35 years. Although this hearing aid was patented in the 1890s, throughout the years its actual function has not been changed. The only thing changed is its structure (fit in to the ear, amplify a wider range of sounds, and more effective). In the last 100 years, much progress has been made in comparison with the improvements made after 1890 with the horn hearing aid produced.

The development in electronics is the reason of gain today. In some conditions, the current assistive technology applications were not possible up to 15 years ago, and especially developments of the computers provide this situation. The biggest development is the existence of the microprocessor electronic circuit named as chip that reduces complicacy in computer design and structure. It is provided that room-sized devices are reduced by microprocessor up to affordable sizes that everyone can get. Moreover, microprocessors have become useful in our life such as microwave ovens and household appliances, not only in computer technology. These chips make possible developments in assistive technology such as synthesized speech, robotic aids, and computer graphics.

The recent improvements in assistive technology devices and the industrial developments in assistive technology have been affected by federal legislation in the United States, and the summary of this legislation is shown below.

2.1.1. Recent major US federal legislation affecting assistive technologies

- Rehabilitation Act of 1973, as amended
- Individuals with Disabilities Education Act amendments of 1997
- Assistive Technology Act of 1998 (replaced Technology-Related Assistance for Individuals with Disabilities Act of 1998)
- The Developmental Disabilities Assistance of Bill Rights Act

- American with Disabilities Act (ADA) of 1990
- Medicaid
- Early and Periodic Screening, Diagnosis, and Treatment Program
- Medicare

This legislation basically mandates the facilitate access to or the use of assistive technologies by providing structure to society by prohibiting discrimination and provides services that may include assistive technologies, in relation to assistive technology.

2.2. Developments in Turkey

In our country, the statistical institution of Turkey in 2002 carried out the first comprehensive research on the people with disabilities. The second research was done in 2010 and the results were analyzed. It has been found that the analysis results in basically five categories (physical, visual, hearing, speech, and mental) of disabilities and about 9 million of the total population.

Disability is not only the person who is experiencing this problem; it is a question that affects his/her family and the surrounding environment economically, socially, and psychologically; and each group with disabilities has different needs.

While it is a disadvantage for some to be advanced and expensive, for some, simple and inexpensive technological tools can reshape their way of life. On this account, their lives can be made more livable and sustainable. Thanks to today's advanced information and communication technologies, approximately one in every eight people in the community is able to survive on better terms, becoming both necessary and feasible for them and for the general health of the community.

In addition, many legal regulations introduce responsibilities for people with disabilities. The Constitution obliges the right to work, education and social security and similar rights of all members of the society directly and indirectly in the 17-I, 42-I, 49-I, 50-I and 50-II, and 61-I materials. The regulation of 61-I, "The state takes measures to protect the people with disabilities and their adaptation to the society's life" is the responsibility of the state to take measures to protect the people with disabilities and to ensure their adaptation to society. On the other hand, Article 5 of the Electronic Communication Law No. 5809 states that "The special needs of people with disabilities, elderly and other people in need of social protection, including the use of technological innovations, are taken into account." In addition, Article 5 of the Consumer Rights Regulation in the Electronic Communications Sector stipulates, "Visually impaired persons have the right to demand subscription contracts and invoices so that they can benefit from them." Again, in our Institutional 2010–2012 Strategic Plan, it was aimed to raise awareness among entrepreneurs in related fields, including how to make access to electronic communication services easier for people with disabilities, such as accessing products and services accessible to other consumers.

3. Ethics and standards of practice

"The study of standards of conduct and moral judgment… and the system or code of morals of a particular… profession" is ethics definition [4]. When applied to a field of professional

endeavor such as assistive technology delivery or a profession such as occupational therapy or rehabilitation engineering, the ethical conduct of practitioners is embodied both in code (or canons) of ethics and in standards of practice. Each assistive technology practitioner (ATP) must comply with the code of ethics for his or her discipline (e.g., rehabilitation engineering, occupational or physical therapy, speech-language pathology, or vocational rehabilitation counseling). The professional association serving a discipline generally develops the code of ethics for it. As discussed, ATPs have responsibilities in assistive technology service delivery that are not specified by their individual discipline's code of ethics. For this reason, it is important to have a code of ethics that addresses the specific issues related to the application of assistive technologies. Standards of practice differ from codes of ethics in that they describe more specifically what is and is not considered to be good practice in a given discipline [5].

A standard is a document. Professional practitioner can find everything in this document about providing requirements, specifications, guidelines, or characteristics that can be used consistently to ensure that materials, products, processes, and services are fit for their purpose. ISO standards are an important tool, because they give information about the specifications and guidelines on how to design products and services that are accessible to everybody, to manufacturers, service providers, designers, and policy makers. There are quite a few alternative methods for grouping assistive technology. The most well-known and official classification of assistive technology is the International Classification of ISO 9999 or its European Standard CEN 29999. ISO 9999:2011 establishes a classification of assistive products, especially produced or generally available, for persons with disability. Assistive products used by a person with disability, but which require the assistance of another person for their operation, are included in the classification. The following items are specifically excluded from ISO 9999:2011: items used for the installation of assistive products; solutions obtained by combinations of assistive products that are individually classified in ISO 9999:2011; medicines; assistive products and instruments used exclusively by healthcare professionals; nontechnical solutions, such as personal assistance, guide dogs, or lipreading; implanted devices; and financial support.

There are a number of different usability standards (Bevan 2001ab; Earthy, 2001); some of them are ISO 9241 series, ISO/IEC 9126 ISO 20282 Ease of Operation of Everyday Products, ISO 9241, ISO 14915, IEC TR 61997, ISO CD 9241-151, ISO 13406, ISO 13407, ISO 16982, and ISO WD 20282. These usability standards are about different issues such as a definition of usability; product quality, which defines usability in terms of understandability, learnability, operability, and attractiveness; the usability of the user interface of everyday products; ergonomic requirements for office work with visual display terminals; software ergonomics for multimedia user interfaces; and guidelines for the user interfaces in multimedia equipment for general purpose use [6–9].

3.1. Code of ethics for assistive technologies: the RESNA Code of Ethics

RESNA is an interdisciplinary professional association whose activities focus on assistive technologies. Its members come from many disciplines and a variety of settings, and their activities involve the full scope of assistive technology applications. In 1991 the RESNA Board of Directors adopted the code of ethics shown in **Figure 1**. This code is similar to those of other

RESNA Code of Ethics

RESNA is an interdisciplinary association for the advancement of rehabilitation and assistive technology. It adheres to and promotes the highest standards of ethical conduct. Its members and credentialed service providers:

- Hold paramount the welfare of persons served professionally.
- Practice only in their area(s) of competence and maintain high standards.
- Maintain the confidentiality of privileged information.
- Engage in no conduct that constitutes a conflict of interest or that adversely reflects on the association and, more broadly, on professional practice.
- Seek deserved and reasonable remuneration for services.
- Inform and educate the public on rehabilitation/assistive technology and its applications.
- Issue public statements in an objective and truthful manner.
- Comply with the laws and policies that guide professional practice.

Figure 1. RESNA code of ethics [9].

disciplines involved in rehabilitation and is based on several of them. However, it includes issues related to the provision of technology. It is presented as a reminder of the obligations that a practitioner in the assistive technology industry has to his or her consumers, others who work with and care for them, the general public, and the profession as a whole [10, 11].

Ethical levels	Techno-ethical considerations
Level 1: clinical/AT services*Operational context*Client-practitioner	• Educating consumers of AT services available • Clinical assessment matching consumer to device • Beneficence, non-maleficence, autonomy, fidelity
Level 2: clinical/interdisciplinary*Operational context*Practitioner-practitioner	• Information dissemination • Resource allocation, preservice and in-service training • Justice, fidelity
Level 3: institutional/agency*Operational context*Institution-member	• Adequate AT service provision • Efficient and effective service provision • Justice, fidelity
Level 4: social resourcesPublic policy*Operational context*Legislative-constituent	• Adequacy of resources • Periodic review and assessment • Legal issues • Reciprocal advocacy, justice

Table 1. Techno-ethical considerations within the four-level model prepared by Peterson and Murray.

3.2. Standards of practice

Because each assistive technology practitioner belongs to his or her own discipline, it is important that the standards are often the basis for professional certification programs. RESNA has developed the standards of practice accessed from http://www.resna.org/sites/default/files/legacy/certification/Standards_of_Practice_final_10_10_08.pdf for assistive technology practitioners and suppliers.

A hierarchical model of ethical practice that could be applied in education, supervision, and research is proposed by Tarvydas and Cottone [11]. Peterson and Murray defined that given the ubiquity of AT and its seemingly unlimited applications, a similar approach can be used to discuss ethical considerations with AT and its related applications; critical techno-ethical considerations related to each level are discussed and summarized in **Table 1** [12].

4. Assistive technology's effects on occupational performance areas: self-care, productivity, play, and leisure

The role of assistive technology with disabilities is not to compensate or to adapt for missing or delaying functions; it is also used to support for everyday living in targeted performance areas [13]. The role of assistive technology in performance areas defines the occupational therapy practice framework appropriately. It includes the analysis of the performance skills and patterns of the person and the activity demands of the occupation the person is attempting to perform [14].

Occupational performance areas occurred from routines, tasks, and subtasks performed by people fulfill the requirements of occupational performance roles. These include self-care (activities of daily living, ADLs), school/productivity, and leisure/play activities. Assistive technology assists a person that has functional limitations secondary to some pathology; they may not have the cognitive, motor, or psychological skills necessary to engage in meaningful activity. To assist means to help, aid, or support, not restoration of these activities. This supports an impaired function of the user without being expected to change the native functioning of the person. For example, a wheelchair replaces the function of walking or canes support independent walking but do not improve strength or not change the ability to walk without them [13].

4.1. Technology for daily living or self-care

The ADLs comprise typical tasks required for self-care and self-maintenance, such as hygiene, bathing, feeding, dressing, medication routine, socialization, and communication. Impaired occupational performance may trigger a process that frequently influences people's biopsychosocial context, impaired self-esteem, and the sense of independence. Technological support for everyday living is all pervasive. It is also about adaptive strategies and personal assistance services. Without some combination of this supportive service, a person with a disability may not be able to get out of the house and into bed, eat dinner, take a bath, or put on clothes. The supporting services used may vary according to the needs, time, and

circumstances of the person. In that way, this technology is the most challenging of all technological interventions [15, 16].

An individual's need of experience and practice with the devices that may become a part of his or her ongoing support system is frequently ignored. Professional rehabilitation intervention is often not continuing after rehabilitation process in the hospital is finished, usually because of the lack of funding. The distance of rural areas to an occupational service may be another complication. Individuals and families should be informed about the benefits and availability of professional services. Ideally, the process of technology teaching to client should be a part of the first rehabilitation in the hospital. The independent living skills training programs designed for people with disabilities and geriatrics for their social integration are important exceptions. These programs that focus on human-environment interactions should be widespread [16].

The everyday technology usefulness is not limited to any particular group of people. Everyone can use it and easy to understand design is important (**Picture 1**). Because everyone who is in contact with a person with a disability sooner or later touches his or her tool that he or she is using to live, caregivers, assistants, classmates and coworkers, and the everyday contacts should think before choosing the equipment. Another important thing about selection of equipment is that the device is perfectly fit for the person, but it causes stigmatization which creates an obstacle for interpersonal interaction for the people who use it. So everyday technology that works for everyone should be evaluated by occupational therapist in every aspect [17].

A careful match between the abilities and activities of people with disabilities for sensory perception, cognitive processing, and motor capabilities of assistive technologies ensures effective interventions [13].

A person can have different roles simultaneously, and the roles we hold during our lifetime can change such as being a student, parents, a son, a sibling, an employee, a friend, and a

Picture 1. Assistive technology for daily living activities.

homemaker. The life role of the individual influences the activities performed by the individual. As a part of our everyday lives, activities can be learned and are governed by the society and culture in which we live. The activities performed by an individual are determined by the roles of the individual. At the most basic level of daily living activity is the use of the upper extremities, especially fingers and hands for manipulation [18].

Daily living technology includes technological support systems in the following areas: shelter such as access and environmental control; interpersonal relationships such as communicating; personal care such as eating, hygiene, dressing, and health management; home management such as food preparation and cleaning; and functional tasks such as lifting, reaching, holding, and transferring [18].

Low technology for daily living:

General-purpose aids: mouth sticks, head pointers, and reaches

Special purpose aids:

Self-care: a variety of utensils with modified handles, modified plates, and removable rims that are attached to any plate. Zipper pulls, single-handed buttoning, quad grip handles, long handled shoe horn, manual razors, long handled sponges, curved handled brushes, and key holders

Work and school: book holders and mouth stick

Play and leisure: modified shutter release, modified grip scissors, or garden tools

Special purpose electromechanical aids: electrically powered feeders, page-turners, environmental control units, and trainable or programmable devices

Robotic aids: robotic arms, desktop vocational assistant robot, mobile assistive robots, and mobile vocational assistant robot

4.2. Technology for mobility

Mobility is fundamental of every person's quality of life and is necessary for participation in each of the performance areas: self-care, work or school, and play or leisure. The ambulation can be replaced by low-tech aids such as canes, walker, crutches, wheelchair, or systems of various types. Increased mobility can achieve goals such as independence, functionality, positive self-imagination, social interaction, and health care [19, 20].

Disorders that affect the musculoskeletal and neurological systems such as ankylosing spondylitis, osteogenesis imperfecta, osteoporosis, Paget's disease and cerebral palsy, traumatic brain injury, cerebral vascular accident, Guillain-Barre syndrome, Huntington's chorea, muscular dystrophy, Parkinson's disease, polio myelitis, spinal cord injury, stroke, spina bifida, and multiple sclerosis result in mobility disorders [19] (**Table 2**).

The degree of limitation in mobility are full ambulatory, marginal ambulatory can walk short distances; may need wheelchair at times; marginal manual wheelchair users (part of time

Medical condition	Characteristics of conditions	Seating needs
Cerebral palsy (spastic type)	Fixed deformity, decreased movements, abnormal patterns	Correct deformities, improve alignment, decrease tone
Cerebral palsy hypotonus	Subluxations, decreased active movement, hypermobility	Provide support for upright positioning, promote development of muscle control
Athetoid tone	Excessive active movement, decreased stability	Provide stability but allow controlled mobility for function
Muscular dystrophies (Duchenne)	Loss of muscular control proximal to distal	Provide stable seating base, allow person to find balance point
Multiple sclerosis	Series of exacerbations and remissions	Prepare for flexibility of system to follow needs
Spina bifida	Decreased or absent sensation	Reduce high risk for pressure concerns, allow for typically good upper extremity and head control
Spinal cord injuries	Partial or complete loss of function below level of injury, decreased or absent sensation	Reduce high risk for pressure concerns, allow for trunk movements used for function
Osteogenesis imperfecta	Limited functional range, multiple fractures	Provide protection
Poliomyelitis syndrome	Fixed or flexible	If fixed, support; if flexible, correct
Traumatic brain injury	Severity dependent on the extent of central nervous system damage, may have cognitive component	Allow for functional improvement, flexible to changing needs
Geriatrics	Decreased bone mass, decreased strength, incontinence	Provide comfort and visual orientation

Table 2. Conditions that require consideration of seating and positioning.

manual, part of time powered wheelchair users); totally mobility impaired users (dependent mobility base) [19] (**Pictures 2** and **3**).

Factors to consider when selecting a wheelchair:

1. Client's profile: disability, date of onset, size, and weight (**Table 2**)
2. Client's needs: activities, contexts of use, preferences, transportation, reliability, and durability
3. Physical and sensory skills: range of motion, motor control, strength, vision, and perception
4. Functional skills: transfers and ability to propel [19]

These factors need to be evaluated for wheeled mobility. The selection of a wheelchair is a process of matching characteristics to the person's needs and skills [19].

Picture 2. Mobility device for participation of people with disabilities.

Picture 3. Client's needs for mobility.

4.3. Sensory aids

When a person has a sensory impairment such as seeing and hearing, assistive technology can provide assistance with information entry. In the case of the sensory aid, the human technology interface is a user screen, which depicts the sensory information for the human user. The processed information is presented to the user so that the alternative pathway can also be processed. For the visual pathway, this is a visible display such as a video monitor; for the auditory pathway, it is an audio display such as a speaker; and for the tactile pathway, it is a vibrating pin or electrode array through which pressure or touch data are provided to the user [21].

Hearing impairment is unique among disabilities and does not prevent an individual from performing an activity of daily living nor limit his or her ability to function effectively at a vocation. It is important to evaluate and use appropriate assistive technology for deafness or hearing impairment, because communicating with others affects social development or makes his or her life more difficult [22].

Assistive device for people with hearing impairment and deafness can generally be classified as either alerting devices or communicating devices. An alerting device often communicates some information to the individual, and a communicating device may well need to alert the individual that information is being communicated [23].

Alerting device may use sound, light, vibration, or any combination of these three to provide the alert. The modality selected for a given situation depends on the disability and preferences of the individual who will use the device, as well as on the environmental conditions. If the person's hearing impairment is not great, an amplified sound is impractical or ineffective; a light or vibration alerting device may be necessary. Because a vibration device needs to be contact with the body, a light-based device is preferable for a stationary device in an environment where the hearing impaired individual needs to move around.

Many assistive communication devices consist of a receiver and a transmitter. The person with the hearing impairment wears the receiver. The transmitter either is worn by the speaker or is stationary within a given environment. Three primary methods of transmission are used for these devices: infrared, radio frequency modulation, and inductive coupling.

Devices for daily living activities: these devices are helpful in using the telephone, listening television, and performing other daily living activities. A variety of sound within a home indicate things that require attention; among these sounds are doorbells, smoke alarms, alarm clocks, baby crying, and telephone ringing. Alerting systems similar to those that inform individuals who are hearing impaired or deaf of the ringing of a telephone are available for other sounds. Vibrating and flashing alarm clocks can be used to awaken an individual who cannot hear a standard alarm clock in their whole life.

The technologies produced for blind or low vision are mainly designed to provide access to information or provide safe travel. Determining the time on a watch, identifying money, reading today's mail, reviewing text on a computer screen, differentiating between black and white chess pieces, or preparing dinner without being burned access to information may mean accessing information. The information may be transmitted in tactile form, as synthetic or digitized speech, or through the use of some sort of visual enhancement such as optical or electronic magnification. People who are visually impaired typically have sufficient residual vision to permit them to perform most of their daily activities with the assistance of optical aids.

For people with low vision, increased illumination is frequently essential to their use of residual vision. Small tensor lamps placed near printed text can improve reading. Large bright light illuminates large areas; environmental adaptation or optical filters can help to provide the desired visual contrast. They can read books and magazines using computer technology. It is the most important tool for education, employment, and recreation for people with low vision. Use of Braille notetakers and Braille printers in lessons and exams is important for blind students and their teachers.

4.4. School and work aids

Assistive technologies can prove major benefits for children in education settings through all education life. Postural control or mobility systems allow children for maximal participation

in classroom activities. For the use of computer and other electronic devices, special purpose interface can be effective for speaking and writing. There are some manipulatives in education that can be used to independently manipulate real objects. However policy and rules make opportunities or barriers for reaching these technologies; these are the potentials for achieving a positive educational effect.

In order to discuss assistive technology for classroom, we need to understand educational activities first. And secondly necessary appropriate access between occupational therapist and school staffs for all these sources can be used affectively. Reading, writing, math, music, and art, all, require motor, sensory, and cognitive skills.

Reading primarily associated with as motor skills is positioning the material, turning pages, picking up a book, and opening it. If reading material is electronic, tasks include using mouse and keyboard, searching a word, and printing a part of or all text. For sensory tasks we use visual system such as visual field, visual acuity, and oculomotor function. For cognitive tasks, we use word identification, spelling, and comprehension.

Writing can be divided into three groups such as note taking, massaging, and formal writing. There are many alternative methods for writing by hand. Computer-aided writing can do word processing, recognize the screen, and edit and translate the task. Despite all these aids, writing needs more motor control such as pencil grip or producing the letters; sensory skills such as visual, auditory, and tactile monitoring; and cognitive skills such as thinking and reasoning. Thus occupational therapist must need to understand which process, hand use, or electronic alternatives are more affective for client in the education setting.

Music instruction involves basic rhythm and group participation. They need to learn instrument and listen to voice. *Art* activities need to fine motor skills and understand, imagine, and create shapes and colors.

Work is one of the three basic performance areas that many individuals participate daily. However in the community setting, there is barrier to participate in the work activities; it is an important life role to survive in life. There are two types of individuals that need to use assistive technology for access to employment. One is with typical disability such as spinal cord injury, arthritis, cerebral palsy, and visual impairment. Second population is at high risk for injury or has been injured while working. Disabilities most commonly seen in the second population are musculoskeletal disorders such as back pain, carpal tunnel syndrome, and tendonitis and shoulder injuries.

In order to discuss assistive technology applications in the work setting, we must define the activities that are performed in the workplace. There are three major activities that we use in the job: communication, manipulation, and mobility.

Communication includes all various information handling activities which include writing, reading, interacting with others, and using telephone. *Manipulation* also includes a number of different tasks such as filing, sorting, assembling, lifting, and moving objects such as books, documents, and equipment and using office machines such as copiers. Paperless office becomes much easier of this activity output. *Mobility* characteristics involve personal

movement to and from the work site and within the workplace. For many individuals, getting to work is the single largest barrier. For wheelchair users, accessible public transportation means booking pickup times with range of an hour or more and paying additional fees. Due to the special tax reduction policy, the modified private transportation means may be more advantageous for individuals with disabilities. Work environment can be a challenge for person with disabilities. Activities include entering and exiting the building safely, opening and closing doors, climbing the stairs, sitting and standing, postural control, pressure management, operating device, and manipulating objects at the same time. All these activities need motor, sensory, and cognitive skills [23].

4.5. Recreation or leisure and play

Recreation, *leisure*, *or play* is the last of the three basic performance areas that many individuals participate. It is essential to consider individual interests, goals, skills, and functional abilities in identifying appropriate and satisfying leisure pursuits. The identification of *recreational* interests should focus initially on the features of different types of activity, rather than the naming of specific hobbies or sports. Characteristics of activities may be competitive such as amputee football, creative such as art craft, individual or group, organized or unstructured, physically active or sedentary. One's activity needs to match with individual's ability and desire. A person's motor, sensory, and cognitive functions must be assessed adequately. Then assistive device must be selected for those people. Adaptation can be made to ensure satisfactory participation. Assistive devices for recreation can be categorized as personal, activity-specific, or environmental technologies. Personal technology is an equipment that they wear to participate in a desired activity such as racing wheelchair, dynamic prosthesis; activity-specific technologies enable them to perform specific types of activities such as hand bike, monoski, and tennis grips. Environmental technologies most often function to provide the daily living needs of people such as shelter, food, and water. Additionally environmental technologies also include maps, signs, and other means used to communicate accessible information for each environment [24].

Nowadays, it is common to consider *play* a child's work. For children with physical conditions that limited their opportunities to explore play materials and their play possibilities, the purpose of intervention and assistive technology must bring the opportunities to them not to direct their play but to make intrinsically motivated activities and play pleasurably as possible.

There are two important areas for play: environment (indoor and outdoor) and toys. Every child's bedroom and play areas have the same four things: walls, floors, ceiling, and openings such as windows and doors. There are many ways to match an individual child's developmental needs with the home's physical environment. Most of the following ideas are simple, inexpensive, or free and are just a starting point to stimulate thinking. It is important to keep in mind the child's developmental changes, the family's life style, and the child's siblings and friends. There are many ways to use assistive technology to make an outdoor play area fun for children with a disability. For them there are some important challenges such as safety, gates, water play, ground, trees, and commercial play structures [25].

5. Interaction of setting and context and assistive technology

In the models used before the 1950s, only the disability was focused. Later, with the developing models, it was observed that the person with a disability has environmental factors as obstacles that hinder the person from doing the activity, and the awareness in this subject has increased. It has been seen that the lives of people with disabilities are greatly facilitated by person-environment harmony. In relation to this, there are many approaches that define and regulate the environment. These models include:

- Human Activity Assistive Technology (HAAT) model [5]
- Matching Person and Technology (MPT) model
- Comprehensive Assistive Technology (CAT) Model [26, 27]
- Needs Analysis and Requirements Acquisition (NARA) framework
- USERfit methodology (USERfit) [26]

Accomplishing the procedure of NARA has several loops of four steps: gathering information from users like dealing with groups and interviews, using the information to obtain requirements, producing a paper-based mock-up or low fidelity prototype that carries out the requirements, and evaluating the guidelines for accurate implementation, usability, and relevance. The new groups of assessment activities, which are advanced from procedure that is the former one, are applied to a new sample of end users.

The MPT and USERfit are also having a well-developed questionnaire structure for getting end-user data.

The HAAT and CAT models have a hierarchical structure with four components of person, activity, technology, and context at the top level (**Boxes 1** and **2**). They could be used for knowledge obtained in the format of questionnaires or interviews [27].

The CAT model consists of main categories that are similar to the HAAT model; hence, the CAT model is almost identical to the HAAT model. Both models are appropriate for applications

Context	
Cultural and social context	Wider social and cultural context
	User's social and cultural context
National context	Infrastructure
	Legislation
	Assistive technology context
Local settings	Location and environment
	Physical variables

Box 1. Context in the CAT model.

Context	
Setting	Individual home
	Group home
	Employment
	School
	Community
Social context	Familiar peers
	Familiar nonpeers
	Strangers
	Alone
Cultural context	
Physical context	Light
	Sound
	Heat

Box 2. Context in the HAAT model.

of device design and development, guidance of the service delivery process, and outcome evaluation. However, the supporting description separates both models. The interaction that is more dynamic is hypothesized by HAAT model. The CAT model, on the other hand, presupposes more description of the individual categories.

In this part, we will observe the context closely according to the model of HAAT.

Setting: Setting not only is the location but also a combination of an environment, a set of governing the tasks, tasks to be done, and a level of good feeling.

The settings are listed in **Box 1** and **2**.

Many people with disabilities live in their own homes. In order for these individuals to be able to survive independently, some modifications are required within or outside the home. Group houses are houses where a large number of individuals with the same needs are present unlike individual houses. On the one hand, group houses are not enough for some requirements such as lack of privacy, degree of interaction with other consumers who can help in developing strategies of use, and the availability of organized recreational and educational activities. On the other hand, they have some principles and security system [28]. Thus, all of them should be taken into account.

The three settings that we differentiate significant to the application of assistive technologies outside the living situation are employment, school, and community. Work requires to be completed in a timely and accurate manner, and assistive technologies can influence the conclusion for a handicapped person in a vocational or educational setting. All those

places that recreation, leisure, shopping, and entertainment occur are surrounded by the community setting. Why it is hard to characterize it specifically is that this setting is so different. In this setting, the variety also causes requirements being placed on the assistive technology. For instance, the use of an assistive device affects mobility of blind people in order to observe the type of terrain and existence of obstacles. In a home or employment setting that travel paths are used regularly and objects are fixed in, obtaining this orientation is relatively straightforward. However, ignorance of environment and travel is more difficult in a shopping mall, restaurant, or theater, which is an unusual place to visit for blind person. The type of setting dictates the characteristic of the assistive technology system, and a system is successful in one environment, whereas the system is not successful in another [29]. Additionally, the requirements of devices change according to terrain such as a manual wheelchair is okay around the house with hard rubber tires, but it is not for rough outdoor terrain.

5.1. Social and cultural contexts

We should deal with the social context that this performance takes place in because we deal with helping human performance in communication, manipulation, and mobility, so social context is important. Handicapped people may be stigmatized by reason of their disability; thus, using the assistive devices may cause further isolation and contribute to the labeling. For instance, a person who has hearing handicap may not want to wear a hearing aid, but the person is unlikely to have same claim not to wear glasses for reading. In the environments that the activity will be well performed, why it is crucial to conduct assessments and technology trials is that main subject in assistive technology use is likely social context.

Social and cultural contexts may be almost identical; especially, it is for people who form part of dominant cultural and social contexts except members of minority groups, including people with disabilities. Variables of interest in both the user's and wider social and cultural context include language, other cultural factors, and attitudes to people with disabilities, and attitudes to assistive technology. Why language and other cultural factors are very important is that many features of assistive technology devices that can be used are only provided in English and sometimes a small number of European languages, whereas both speech output, if any, and documentation and manuals need to be in the local language. Furthermore, the device requires designing and presenting in a way that is culturally relevant. This consists of the choice of symbols or other labels for controls that are simple in the cultural context.

5.2. Physical context

Physical context is simply environmental situation that means the system is used. Heat, sound, and light are the usual measured parameters that most directly influence the success of the assistive technologies. The temperature influences some materials. For instance, the features of gels and foams used in seat pillows can alter under hot or cold conditions. The temperature influences monitoring of liquid crystal like existing light.

In the environment of classrooms or work, the use of assistive technologies depends on existing light. In situation of bright light, some display reverse light and are better. On the other hand, others give out light and are better in low light.

Penetrability of voice recognition systems or speakers can be affected by existing sound. For instance, in a classroom, some devices that generate sound such as powered wheelchairs, computers, and printers may upset classroom attention.

The occupational therapy approaches are not considered without context. Because the occupations is affected by context is no static. The assistive technology is used in education or work that are most important occupational areas. The assistive technology is important for people with disabilities to facilitate the changing life.

6. The use of assistive technology for the people with disabilities: sensory, perceptual, cognitive, and motor control and other functions

Assistive technology is an umbrella term for assistive, adaptive, and rehabilitative devices for people with disabilities. It also includes the process of selecting, positioning, and using these devices. It is used to provide transportation to the house, to the interiors, or to the buildings. They provide access to community spaces, home, education, recreation areas, transportation, and jobs. By changing or improving the tasks that people have failed before, they are able to greatly increase their independence and contribute to health and well-being. Greatly increase their independence, and contribute to health and well-being. It can be used to protect, maintain, or increase the independence of people. Assistive technology allows people to learn, play, act, work, communicate, and participate as their peers [30, 31]. In short, it opens the gates of the world to the people.

Assistive technology can be any tool or product that enhances the individual's involvement and functions. These devices may be particularly developed for the use of a specific person or may be accessible to the whole community, developed for all, that can also be used by persons with disabilities. These tools may be products that are simple to design and use (such as clothing aids) and may also be very high-tech (bioelectrical orthoses) products. It facilitates interaction with the environment for everyone. The proper use of assistive technology reduces the help from other people to minimal level and can support people's independent living in the community. Assistive technology transport greatly enhances the quality of life for both people with and without disabilities. In addition to the people with physical, sensorial, and cognitive impairment, disadvantaged populations such as seniors and pregnant women are the most beneficiaries [31–35].

It is a common mistake to consider the assistive technology as equipment, which compensates the impaired body parts and/or functions. In the leadership of one of the mainstream occupational therapy models, Person-Environment-Occupation (PEO) model [36], an occupational therapist must remember that it is not only the personal factors that have a contribution on occupational performance but the contexts of the environment and the occupation itself. This leads us to two points: (1) expanding the assistive technology assessment and interventions,

including environmental, and occupation, and (2) personal factors are not the only reason of decreased activity performance and/or participation. The first aspect is being argued in the future part of this chapter. The latter aspect, however, is the point that has to be stressed in this case. An individual who so called "healthy" may be suffering from decreased occupational performance due to either environmental or occupational factors. Although it is ideal to have a universal design in the physical environment, which is something that makes the surrounding available for the individuals in the community, the universal designed tools are not the most suitable media for everyone since they are not created for individual. And of course it has an impact on the performance of the people. Last but not least, the occupation itself can lead to the need of assistive technology. Tasks such as requiring inactivity, putting too much pressure to the human body, and forcing human body's function boundaries make the assistive technology support indispensable. Imagine an office worker, who is a 25-year-old female, consults an occupational therapy practitioner complaining about excessive fatigue and tiredness in her back during her working hours. A neurologist referred her and there was no specific problem with the medical examination. The role of occupational therapist as an assistive technology practitioner is to evaluate the both physical environment and the tasks in occupations besides the personal factors [35, 37–39].

There is something very important that needs to be underlined when talking about this subject. Assistive technology is not all about the recovery but a protection and maintenance, too. That is, assistive technology should not only be regarded as a method in the rehabilitation phase but should also take place in the previous phases of healthcare systems [31, 35, 40].

6.1. Assistive technology types

As mentioned above, wide range of devices could be applied to improve and maintain performance and functionality. In literature, there are different ways of classification for all of these products [31, 35, 41, 42]. These could be:
Low tech: communication cards made from cards
High technology: special purpose computers
Hardware: prostheses, mounting systems, or positioning tools
Computer hardware: special keys, keyboards, and pointing devices
Computer software: screen readers and communication programs

If assistive technology is available and appropriate for the people, they can benefit from living independently, enjoy self-management and decision-making skills, and be able to benefit from educational facilities, carrying on a meaningful career, being fully involved in general economic, political, social, cultural, and educational contexts.

Benefits of assistive technology in individuals can be summarized as follows [42]:

- Reduce or eliminate participation restrictions.
- Promote inclusion.
- Equal opportunity to participate.
- Contribution to quality of life.

- Increase independence and self-care.
- Provide an environment free of hindrances at home, at school, at work, and in communal areas.
- Build confidence and self-confidence.

Assistive technology seems quite useful for both children and adults. However, every assistive technology tool received is unfortunately not always used for a long time. One of the main reasons of this consequence is ignoring to get the opinion of the client. And also, some machines are easy to get. This can lead to quick purchases, without having to worry much enough when making a purchase [43]. No matter how easily a device can be reached, the occupational therapist must make a detailed assessment in order to be able to combine and meet the advantages of the assistive technology to the needs of the person. Another reason is that a person thinks they can get this device easily without consulting the therapist for evaluation and application. In addition, evaluation and training are also important to make use of and benefit from the purchase of the product. And of course, a change in the priorities of the client may cause the disuse. At that point, it is important to remember an assistive technology is a tool that fills the gap among the person, environment, and occupation. Any change in them may cause a change in the need for assistive technology. For example, a child using a wheelchair, who is a student, would be in need of a ramp builder for the stairs in front of the school building until the elevator is built. When the building becomes available for that child, there will be no need for that specific tool, but rather a need auditory support for the use of the elevator.

7. Service and maintenance in assistive technologies

The steps of the service process in assistive technology (AT) are referral, need analyses, recommendations, implementation, and follow-up. In referral step, the person specifies a need about assistive technology intervention and consults a therapist or AT provider. The need analyses step is an evaluation phase of human's need, skills, and functions. In recommendation step, it is important to justify funding and make the recommendations based on the results of assessments. In implementation step, fitting and training of the AT device or system should be done. Finally, in follow-up, maintenance and repair needs of AT device or system should be considered, and the effect of AT use should be evaluated [44, 45]. If these steps of the service process in AT are not considered by the therapist or provider of AT, the barriers to use the AT device may occur [44–49]. Below, you can find barriers, which may affect the use of AT device (**Table 3**).

7.1. Assistive technology assessment and intervention principles

The first step of the AT intervention is assessment of the person. Because through results of the assessment, the person is understood and analyzed by the therapist, and then the intervention plan is conducted. For the assistive technology process, many models are developed and used [49–51]. You can find these models in the AT field below (**Table 4**).

Barriers to use AT
• Staff training issues
• Training of consumer issues
• Availability problem of AT
• Funding problem of AT
• AT assessment issues (all components should be assessed)
• Planning issues such as nonstructural programs
• Selection of inappropriate AT device

Table 3. Barriers which may affect the use of assistive technology.

Matching Person and Technology (MPT) model	It was developed for use in persons with disability aged 15 years and older. The purpose of the model is to facilitate the selection of the suitable AT in regard to the human's perspectives and abilities, the details of the AT, and the environmental conditions [49–52]
Framework for modeling the selection of ATD	There are no instruments directly based on this framework. The aim of the model is looking for a good outcome in terms of the best match between AT, the person, and the environment [49–53]
Human Activity Assistive Technology (HAAT) model	In this model, AT is defined as extrinsic enablers. It has four components: the human, the activity, the context, and AT. It does not provide any assessment [49, 50]
Model of AT user's career	This model focuses on the different phases during time-dependent AT use and the factors that may influence the use or nonuse of AT. It does not provide any assessment, and it is not an appropriate model for the selection of AT [49, 54]
Social cognition model	This model is not an AT-specific model. Therefore, it is not an appropriate model for the selection of AT directly [49, 54]
The social cognitive model of assistive device (AD) used in older persons	It is a social cognitive model adapted to the AT field. It is not an appropriate model for the selection of AT [49, 54, 55]
Perceived attributes theory	It is a social cognitive theory and it is not an AT-specific model. This theory defines AT as a new product for a person to adapt daily life [49, 54]

Table 4. Models are used in assistive technology field.

According to a research study, we are focusing on environmental components especially physical environment much more in the AT studies [56]. Therefore, these models are important for focusing all parameters related to AT. Consequently, principles which are important for systematizing assessment and intervention in AT are represented below. These principles may provide significant support for the aim, selection of the models, standards, and types of assistive technology [50].

- Assistive technology assessment and intervention should include all components such as person, activity, and environment.
- The aim of AT should be maintaining the function which is impaired, not remediating the function. So AT should be an enabler for the function.
- Assistive technology assessment and intervention should be collaborative.
- Assistive technology assessment should be perpetual.
- Interpreting the assessment and the outcomes of intervention is important for the selection of AT [44, 50].

7.2. The Human Activity Assistive Technology (HAAT) model

The Human Activity Assistive Technology (HAAT) model, which is designed by Cook and Hussey in 1995, is a framework about assistive technology for people with disability. The model is created to guide assessment and clinical intervention and evaluate the outcomes. The HAAT model is a well-known model in assistive technology (AT) field [50, 57].

Some of the research studies mentioning the HAAT model suggest its extensive use in research and clinical applications [45]. According to a survey which is done to rehabilitation clinicians and by Friederich et al. [51], even though clinicians expressed that they are not using any framework for their practice, it was found that HAAT model was the only specific assistive technology model which is used [53]. Also the model is used as a reference in several research studies [56, 58–61].

7.3. Components of the HAAT model

There are four components in the model: the human, the activity, the assistive technology, and the context (**Figure 2**). There is a dynamic relation between three components, and the context has effect on these three components.

The human component contains cognitive, physical, and emotional elements. Cognitive abilities include problem solving, attention, alertness, and concentration, and they have effect on emotional abilities. Physical abilities include balance, range of motion, strength, and coordination. It is very important to know these abilities about human because they probably affect the use of assistive technology. Therefore for the effective use of assistive technology, a match between human abilities and the requirements of assistive technology is needed. Also AT may provide assistance in the area, which the person has problems such as hearing or visual. For example, in hearing problems AT can provide a device for hearing and provide the person to maintain this ability again.

The activity component contains self-care, productivity, and leisure activities. Self-care activities include dressing, eating, hygiene, mobility, and communication. Productive activities are educational and vocational activities and home management. Leisure activities include relaxation or enjoyment such as watching TV, resting, reading books, or dancing. These activities may require many abilities such as cognitive and physical. If the person has no capacity to

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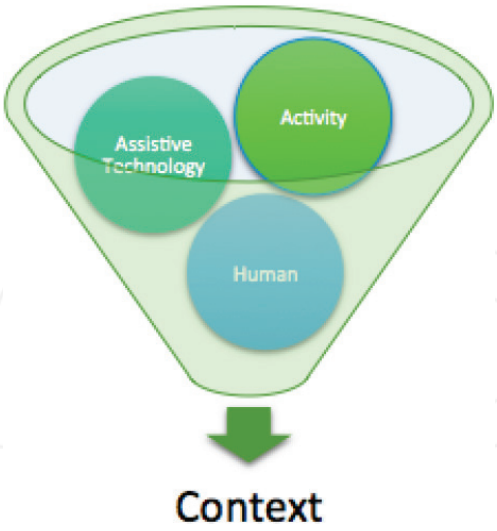

Figure 2. HAAT model [5].

do an activity, with the use of an assistive technology system, the person may gain his/her performance on this activity again.

The context contains cultural (pattern of behaviors, values, attitudes) physical (natural and built surroundings such as home, school, workplace, or parks), institutional (religious, educational institutions), and social (family, friends, strangers). Facilitators and barriers in the environment are very important for the selection, evaluation, and use of the assistive technology system.

The assistive technology is described as extrinsic enablers because they provide the performance, which is blocked by disability. Choosing or designing an AT system should be done through considering needs, skills, and goals of the person. Therefore a detailed assessment about functions, activities, and environment is needed before determining the AT system for the person [50, 57].

8. Funding assistive technology services and systems

Most consumers have problem about evaluation, implementation, and maintenance and repair of assistive technologies because of not having the adequate financial resources available to purchase the necessary services and equipment. Funding by third-party sources is appropriate for individuals to procure assistive technology services and equipment. Funding for many assistive technology services and devices is widely available, and accessing that funding is generally a matter of following a straightforward process. As a service provider, the occupational therapist's role is assisting with the acquisition of this funding.

In most countries assistive technology services and devices are financed by numerous sources instead of by a system only dedicated to the funding of assistive technology services and equipment. For any given individual, equipment and services may be financed only by one source or a combination of sources. Funding for assistive technology is usually rendered through agencies that have been primarily developed for the provision of other types of health, education, or social services programs.

In this part funding for assistive technologies in several countries (the United States, Australia, Canada, and Turkey) is described. Funding programs in these countries are representative of those in many other countries with local modifications of elements of the programs. The various funding sources can be categorized as public and private.

8.1. Public sources of funding

8.1.1. US public sources of assistive technology funding

Public funding sources for assistive technology in the United States include federal, state, and local government agencies; several public sources of funding are listed in **Box 3** [62].

Public programs	Low-interest loans
Medicare	Private foundations
Medicaid	Service clubs
Required and optional services	Special state appropriations
Intermediate care facilities for persons who are mentally retarded	State bond issues
Early and periodic screening, diagnosis, and treatment	Employee accommodations program
Home- and community-based waivers	Equipment loan program
Community-supported living arrangements	Corporate-sponsored loans
Maternal and child health	Charitable organizations
Maternal and child health block grant to states	US TAX CODE
Children with special healthcare needs	Medical care expense deduction
Special projects of regional and national significance	Business deductions
Education	Employee business deductions
Individuals with Disabilities Education Act state grants (Part B)	Americans with Disabilities Act credit for small business
IDEA programs for infants and toddlers with disabilities and their families (Part H)	Credit for architectural and transportation barrier removal
State-operated programs	Targeted jobs tax credit
Vocational education	Charitable contribution deduction
Head start	Private health insurance
Vocational Rehabilitation	Health insurance

State grants	Workers' compensation
Supported employment	Casualty insurance
Independent living Parts A, B, and C	Disability insurance
Social security benefits	Civil rights
Title II: Social Security Disability Insurance	Americans with Disabilities Act
Title XVI: Supplemental Security Income	Rehabilitation Act, Section 504
Work incentive programs	Universal access
Developmental disability programs	Rehabilitation Act, Section 508
Department of Veterans Affairs programs	Decoder Circuitry Act
Older Americans Act programs	Telecommunications
Alternative financing	Telecommunications for the People with disabilities Act of 1982
Revolving loan fund	Telecommunications Accessibility Enhancement Act of 1988
Lending library	
Discount program	

*Received from Cook and Polgar [5].

Box 3. The public funding sources in the United States*.

8.1.2. Canadian provincial and territorial sources of assistive technology funding

In Canada the delivery of health services is the responsibility of the provinces and territories. Although there are federal programs, most of assistive technology funding is allocated and managed at the provincial/territorial level. Most of the federal programs have clauses about funding only what the provinces and territories do not fund. The Canadian federal programs that fund assistive technologies were listed in **Table 5**. Canadian public funding sources by province or territory are changed by funded assistive device, special conditions, or program features and eligibility [62].

8.1.3. Australian state government funding schemes

The funding programs that are provided through the state governments of Australia have been designed specifically to provide for people with disabilities and include assistive technology in the lists of approved items. The state programs have evolved quite independently in each Australian state or territory and therefore are not uniform. The schemes are administered through various state government departments and are funded from state/territory sources. Although all these programs have similar objectives, there is variation in the level and range of assistance that they provide to people with disabilities. These programs also vary in their level of means testing. The Australian state funding schemes are summarized in **Table 6** [62].

Program	Assistive devices funded	Special conditions or program features	Eligibility
Aging and seniors	Depends on province or territory	Benefits related to provincial/ territorial programs	
Workers' compensation board	Devices necessary for return to work	One for each province and territory	Workplace injuries including work-related accidents or diseases that require medical treatment or time away from work
Health Canada-First Nations and Inuit Health: noninsured health benefits	A variety of mobility devices, aids to daily living items not listed on the benefit list may be considered on a case-by-case basis with written medical justification	Device is listed by program; intended for use in a home or other ambulatory care settings; not available through any other federal, provincial territorial, or private health or social program; prescribed by health professional licensed to prescribe; provided by a recognized provider	Canadian resident and one of the following: (1) registered Native Canadian according to the Indian Act, (2) Inuk recognized by one of the Inuit Land Claim Organizations, or (3) infant less than 1 year of age whose parent is an eligible recipient
Veterans' affairs	Aids to daily living, canes, walkers; foot boards, over bed tables, raised toilet seats, bath benches	Available devices may vary by province	Group "A" clients: pension from Veterans Affairs CanadaGroup "B" clients: established eligibility for treatment of non-pensioned conditions, established health need, benefits not covered by the province

*Received from Cook and Polgar [5].

Table 5. Canadian Federal Programs That Fund Assistive Technologies*.

State	Assistive technology funding program name	Managing authority
New South Wales	Program of Appliances for People with disabilities	New South Wales Department of Area Health and Community Services
Victoria	Victorian Aids and Equipment Program	Department of Human Services
Western Australia	Community Aids and Equipment Program	Disability Services Commission
Queensland	Medical Aids Subsidy Scheme	Queensland Health
South Australia	Independent Living Equipment Program	Disability Services South Australia
Tasmania	Community Equipment Scheme	Department of Health and Human Services
Northern Territory	Territory Independence and Mobility Scheme	Department of Health and Community Services
Australian Capital Territory	Australian Capital Territory Equipment Subsidy Scheme	Aged Care and Rehabilitation Service

*Received from Cook and Polgar [5].

Table 6. Australian funding programs by state*.

8.2. Turkey state government funding

In Turkey, the assistive technology is termed as medical device which means any instrument, apparatus, appliance, software, material, or other articles, whether used alone or in combination, including the software intended by its manufacturer to be used specifically for diagnostic and/or therapeutic purposes and necessary for its proper application and intended by the manufacturer to be used for human beings for the purpose of (1) diagnosis, prevention, monitoring, treatment, or alleviation of disease; (2) diagnosis, monitoring, treatment, alleviation, or compensation for an injury or handicap; (3) investigation, replacement, or modification of the anatomy or of a physiological process; and (4) control of conception, which does not achieve its principal intended action in or on the human body by pharmacological, immunological, or metabolic means, but which may be assisted in its function by such means [63].

Health Application Notification (HAN) (Sağlık Uygulama Tebliği—SUT) is a document in which price ratio is listed. The HAN was issued within the framework of the Social Security Institution Law No. 5502, the Social Insurance and General Health Insurance Law No. 5510, and the General Health Insurance Transactions Regulation published in the Official Gazette dated August 28, 2008 and numbered 26981. The purpose of HAN is services related to health insurance, social security institution, general health insurance and establishment obligations, health services financed by the institution, methods for utilizing the road, and daily and attendant expenses, and the procedures related to the procedures are stated in the Health Services Pricing Commission [64].

8.2.1. Private sources of funding

In addition to public sources, there are private sources of funding such as self-funding, private health insurance, and others. These vary by economic condition or person. For instance, the Solidarity Association for the people with physical disabilities in Turkey provides their citizens who have physical disabilities or financial difficulties in order to facilitate their lives and to participate in life and to be liberated by making wheelchair aids with the priority needs. World Eye Foundation in Turkey provided 300 "smartphones" designed for the high school students with visually impaired to help them function independently and utilize information in their daily lives easily, support their educations and facilitate their access to information.

8.2.2. Private health insurance in Turkey

Financing of the public health insurance system in Turkey is covered by employee and employer premium. Participation in the general health insurance system, which has been implemented since January 10, 2008, is mandatory and essential. The private health insurance that "completes and supports" the general health insurance is a voluntary insurance type and secondary. In Turkey, there is no possibility of making a substitute private health insurance. For this reason, private health insurance in our country can be referred to as "voluntary health insurance" or "complementary and supportive health insurance." Health insurance is defined in article 1513 of the Turkish Commercial Code No. 6102. According to this, health

insurance and insurer give a guarantee for (1) the end of the disease if necessary, including any medicinal treatment, pregnancy, and birth; (2) for costs determined for the early diagnosis of diseases, including consecutive studies, (3) in cases where it is necessary to perform medically inpatient treatment, (4) for the daily allowance for the insured's unavailability of earnings due to ill-treatment, (5) if the insured is in need of care, costs incurred due to care, or agreed daily care allowance [65].

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