EU-Assistant: Development of a VET curricula for Personal Assistant professional profile based on the European Framework of Qualifications

2016-1-ES01-KA202-025296

MODULE 10 – ASSISTIVE TOOLS AND TECHNOLOGIES

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1. MODULE DESCRIPTION

MODULE TITLE	Assistive tools/ technologies
KEYWORDS	Assistive tools, technologies for persons with disabilities, prosthesis limbs, adaptive and rehabilitative devices, assistive robots, etc.
TARGET GROUP	The target group of the module are people who want to obtain some knowledge to become a personal assistant for a person with disability
LEVEL	beginner
CAREER OPPORTUNITIES	Independent persons who want to become personal assistant for persons with disabilities
AIMS OF MODULE	This module provides participants practical, comprehensive knowledge, resources and networking opportunities on how to successfully start and operate as a personal assistant. The participant will learn about the new assistive technologies, prosthesis limbs, assistive robots etc. that can help the persons with disabilities and how to use some assistive technologies.
LEARNING OUTCOMES	Up on successful completion of the module the participant will learn what are the news in assistive technologies development, the development of new kind of prosthesis limbs and other technical support that can help the persons with disabilities in daily life.
PREREQUISITE(S) SKILLS:	use of basic ICT

PREREQUISITE(S) COURSE:	none
GUIDED LEARNING HOURS:	5 hours
COMPENTENCY	Learn about assistive tools and technologies that can help the person with disabilities in daily life
ASSESMENT	Assessment will consist of a multiple-choice test. Each test will consist of multiple-choice questions which will test candidates' knowledge and understanding across the learning outcomes.
CATEGORY	cost (cost optimization) time (efficient time management) s-quality (service quality) m-quality (management quality)
SUPLEMANTARY MATERIAL(S)	none

2. INTRODUCTION

Dear Participant,

Welcome to this Module! This module is created for people who want to become a personal assistant for persons with special needs. In this module you will learn about assistive technologies and tools who can help a person with special needs to perform some tasks alone.

The Module includes an introduction in the assistive tools, adaptive devices, rehabilitative devices, and other technologies that can help the person with disabilities/special needs in their daily life.

In the other modules you will learn about:
- the history of term: from handicap to disability and functional diversity;
- the philosophy of Independent Living;
- what is a Personal Assistant;
- communication abilities with disabled person;
- what is autonomy promotion and how to support the person with disability to develop his/her personal autonomy and build a self-positive image;
- to manage your working plan;
- how to provide primary care, first aid and feeding the person with disability.

After these modules, you will be ready start working as a professional personal assistant!

Warm regards,

EU-Assistant Project Team

3. ASSISTIVE TOOLS AND TECHNOLOGIES

3.1. What is an assistive technology

Assistive technology is a term that includes assistive, adaptive and rehabilitative devices that can be used by persons with special needs to offer them independence to perform different tasks.

The first adaptive device was a cane, and in the next pictures you can see some of the most known and used assistive technologies:

Hearing aid

Wheelchair

Walkers

Braille

Eye glasses

Prosthesis

3.2. Access –the key to become independent

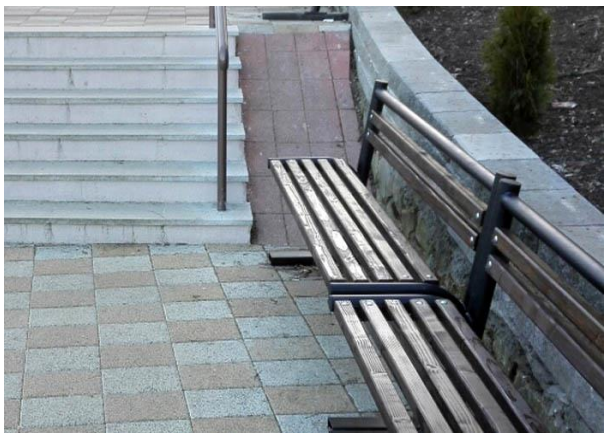
Information is the key to participation in society, education and employment. The importance of access to information is reflected in its recognition as a fundamental human right, supported by legislation.

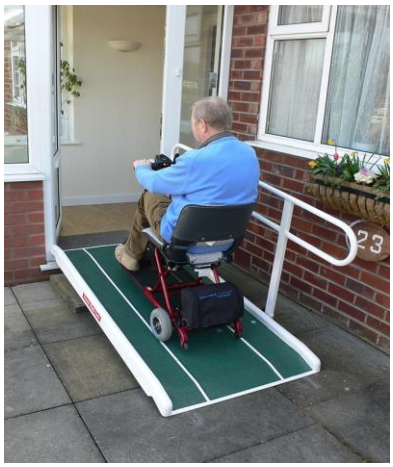
Sometimes access to information it is difficult especially for the people with special needs, who may be confronted with various barriers when they want to access some information:

- *Physical barrier*. We know that sometimes it is not so easy to go in some places that we want to visit, and if we think at a person with mobility impairment we can see that it's huge problem for him/her to travel and have access in some places and go up and down on stairs. So, someone who has mobility difficulties or who use the wheelchair how can have access where the resources are located? The most common solutions were to install some access ramps and a lift either via the staircase or a separate elevator. You can see the below pictures some examples (good or bad) of access ramps and stairs elevator.

YES

NO





In the last years there have been developed some battery powered tracked devices designed to offer to standard wheelchairs the possibility to climb the stairs up and down.
Some examples of this kind of tracked devices:

StairMax

Omida Lehner Lifttechnik

Antano: stair lifter wheeled and stair lifter tracked

- *Sensorial barrier.* For people with sensory disabilities we should have available information in alternative forms (e.g. text in large letters - "elephant letters", electronic formats, etc). The most popular formats are printed materials, electronic or audio books, processed Word documents, spreadsheets, Braille, Audio, Images, DAISY (Digital Accessible Information System- Worldwide standard to Facilitate the Creation of Affordable Content - in Audio Format), Dragon Speech (Speech Recognition Program and Print / Write In the user's place), or web pages. Adobe Reader (PDF format) provides access to screen readers (like "Jaws" software).

4. MOBILE TECH WHICH PROVIDES FLEXIBILITY FOR PEOPLE WITH SPECIAL NEEDS

4.1. Mobile devices, equipments which provide flexibility

In the last years, mobile devices (computers, tablets, telephones) become a part of our daily life and become very popular because they are portable (slim/small/lightweight) and offer access to Internet and to social networks. Moreover, all the computers and mobile devices have integrated accessibility features (screen readers etc.) that facilitate their use. For example, Apple offer for iPhone and iPad VoiceOver for iOS, a screen reader that can read aloud information while user use his/her finger over the text or pictures in the screen. Google have implemented in accessibility options a similar screen reader named TalkBack. Apple and Google offer the possibility to connect the mobile devices to external Braille keyboards.

AT professionals conclude that these devices offer to persons with special needs new possibilities of communication, flexibility and independence. So, with the help of mobile devices, the persons with special needs can improve their quality of life and can contribute more to the workplace.

4.2. Mobile devices for people with physical disabilities

In the following some examples of adaptations of mobile/portable ICT devices are repoted. It should be noted that a number of commercial products are available on the market with similar functionalities.

SimplyWorks for iPad provides completely wireless iPad and iPad mini access when used with any SimplyWorks transmitter.

Eyegaze Edge – created for persons with multiple sclerosis, enables people to control a computer using just their eyes.

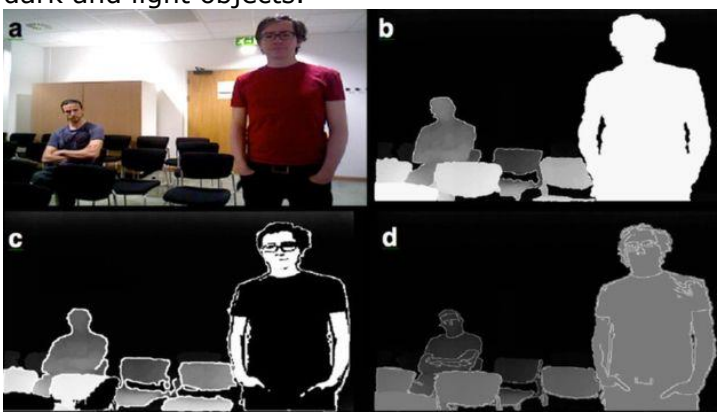
HeadMouse Nano – enables people to control a computer wirelessly using head movements.

4.3. Mobile devices for people with low vision

In the following some examples of adaptations of mobile/portable ICT devices are repoted. It should be noted that a number of commercial products are available on the market with similar functionalities.

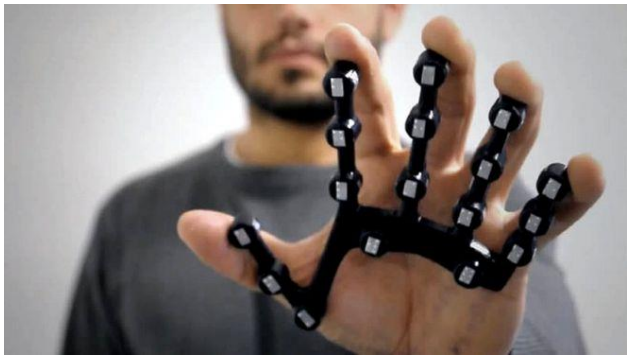
Wearable Finger Reader – convert text into speech. The FingerReader is just a research prototype at this point, but we may explore turning it into a product in the near future.

Smart Glasses accentuate the contrast between dark and light objects.



4.4. Mobile devices for deafblind persons

In the following some examples of adaptations of mobile/portable ICT devices are repoted. It should be noted that a number of commercial products are available on the market with similar functionalities.



dbGLOVE Talking hands - Deafblind people can communicate using tactical alphabets - pressing or pinching different parts of the hand represents different letters

5. REHABILITATION AND ASSISTIVE TECHNOLGIES

"Rehabilitation helps to maximize functioning and support independence" - WHO

5.1. Rehabilitation

Through rehabilitation the people with disabilities who have limited functions, have the possibility to remain and/or to return in their home and community, participate in the education, labour market and live independently.
The access to rehabilitation will decrease the consequences of diseases, and will improve the health, quality of life and will reduce the use of health services.

Rehabilitation for people with disability can be done through:

- Rehabilitation of person with disability with the community help,
- Providing orthopedic, visual or hearing device and other assistive device
- Training and capacity development of rehabilitation personnel (AT specialist, orthopedic technicians, physiotherapists, etc.)
- Policy development on disability and action plan on behalf of person with disabilities

5.2. Prosthetics limbs and assistive service robots

We are going to present some research results that are rapidly coming available on the market. Most of the robotic devices are not usable for the ADL, but just in rehabilitative settings (one of the main problems is the power consumption).

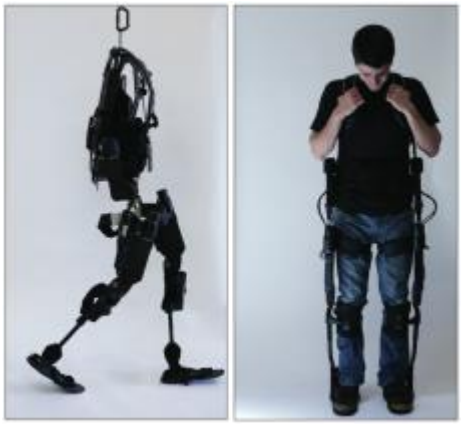
Probably the most know person with prosthetics limbs is the Summer Olympics and Summer Paralympics runner Oscar Pistorius, who have both legs amputated below the knee since he had 11 months.

During the history, man created different devices that can help him. Starting from a simple stick, today man creates something that can looks like science fiction: exoskeleton HAL5 and ultra-advanced bionic limb (Luke arm created by DEKA - DARPA).

Luke arm - DEKA

HAL5 Exoskeleton

The HAL5 exoskeleton is a cyborg type robot used to support and expand the human capabilities. HAL can make the people with physical disability to rise from a chair, to walk or to lift various weights.



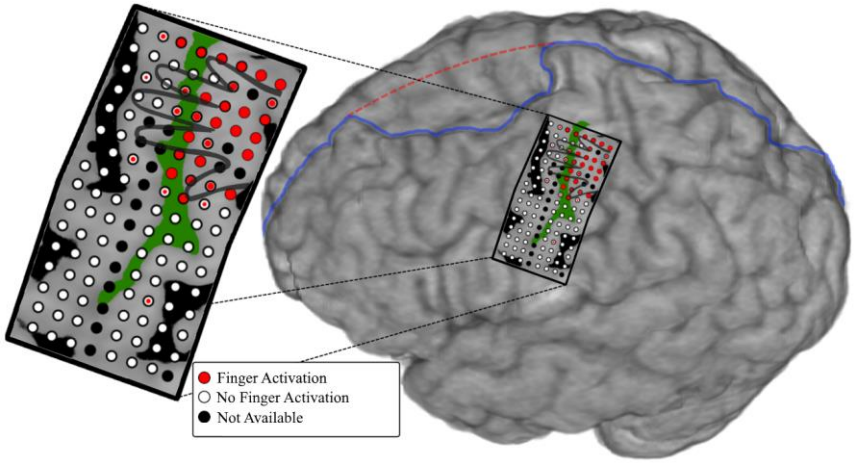
Before HAL5 exoskeleton, the Berkeley Bionics created in 2011 an eLEGS exoskeleton, a bionic battery-powered wearable device that enables people with paralysis to stand up, walk and flexion the knees.

In the below picture you can see a student with paraplegia using the eLEGS exoskeleton and walk:

John Hopkins University, DEKA and Touch Bionics with the advanced of 3d-printing and bio-electronics creates prosthetic limbs that helps persons with disabilities (most of them war veterans) to be independent. They have created bionic prosthetic hands that can be controlled

via mobile app (Myo hand in 2014) or through the mind - implantation of an electrode on subject's brain (in 2016).

Myo hand - J.H. University



Mind controlled arm –J.H. University

Vanderbilt University created a prosthetic intervention for the lower-limbs amputees.

A robotic prosthesis for transfemoral amputees

A robotic prosthesis for transtibial amputees

Some other institutions or universities developed assistive robots that can sense, process sensory information and can do physical actions (pick up, open, close, etc.).
There are different kinds of assistive robots:

- Fixed robots (workstations, bedside)
- Mobile robots:
    - Autonomous – mobility support; fetch and carry
    - Wheelchair – autonomous navigation; manipulator arm

KINOVA Robotics, created robot arms and arms support that help persons with physical disabilities to be independent. They can perform any physical task with this robotic controlled hand. "Assistive Robotics empowers people with disabilities to push beyond their current boundaries and limitations".

Dean Kamen (who create Luke bionic arm) creates a stair-climbing wheelchair named iBot. iBot aims to give to wheelchair-bound individuals the freedom to navigate as any terrain.

Wheelesley is an electric wheelchair with computer and sensors which allow the user to issue general directional commands and to rely upon the robot to carry out the low level routines such as object avoidance and wall following. The wheelchair offer the following issues:

- Outdoor navigation using a vision system
- Customizing user interfaces for people of varying abilities, using the same underlying navigation system,
- Seamless movement between indoor and outdoor environments

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