

# INH@PTIC VET

## **Pedagogical models and cognitive learning strategies based on tactile experiences combined with ASMR audiovideo stimuli for VET students with sensory disabilities**

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## INDEX

Highlights of the project and description of the methodology used: desk and field research	4
Haptic experience definition in education with particular emphasis on people with disabilities	9
Educational areas and the haptic experience methods used	12
Threats to the use of haptic experience methods	14
Pedagogical models based on "tactile training" of students with selected disabilities	15
Available educational and technological resources in the field of tactile training	17
Good practices in the use of haptic experience methods in various areas of education and practical examples of learning paths that use the tactile experience to develop specific skills in the VET field	20
National Research results on the experiences of VET teachers working with students with sensory disabilities and learning disorders	21

## HIGHLIGHTS OF THE PROJECT AND DESCRIPTION OF METHODOLOGY USED: DESK AND FIELD RESEARCH

The project wants to develop and transfer to VET teacher and trainers an innovative teaching approach and tools for students with learning difficulties, exploiting the potential offered by Haptic training not yet applied to the VET system. The objectives of the project are, therefore, a response to the context and the problems mentioned above. In particular, the partnership intends to:

- H@ Develop Cognitive-Haptic Learning paths applied to vocational training, with the description of pedagogical models and cognitive learning strategies based on tactile experiences. This objective will be realized in the realization of the IN- Haptic-VET Handbook, with the description of models and learning strategies aimed at VET students with sensory disabilities and learning disorders.
- H@ Develop highly innovative and quality digital tools and content to be used in instructional design and teaching of students with disabilities in different modalities (traditional, blended and distance learning). This objective will be realized in the realization of the In-Haptic App, an application for the design of multimedia learning contents characterized by video, audio and tactile track and will allow its use on touch devices (smartphone/tablet) equipped with the haptic-vibrational component. In addition, ASMR and binaural acoustic streams will be used for learner learning enhancement.
- H@ Identify and describe the VET Teacher Competency Profile using instructional methods (know HOW to teach), materials, aids, tools (know WHAT to teach), and content (know WHAT to teach) targeting VET students with sensory disabilities and learning disabilities and based on the use and enhancement of tactile perceptions for inclusive learning.

H@ Train teachers/trainers/support staff for the use of digital tools in didactic design and teaching students with disabilities with particular reference to visually impaired/blind students and students with intellectual disabilities or autism. This objective will be realized in the design and testing of a training program for teachers to provide them with the specific skills to create tactile experiences aimed at learning with the help of digital tools and content created through the project (Tactile Application)

H@ Develop a pathway to assess VET teachers and trainers' competences by adopting a PERFORMANCE- BASED approach. This objective will be realized with the definition of a validation tool to guarantee that VET teachers and trainers carry out their tasks according to an optimum pre-defined level, supporting visually impaired/blind students and students with intellectual disabilities or autism.

Handbook describing pedagogical models and cognitive learning strategies based on tactile experiences combined with ASMR audio-video stimuli for VET students with sensory disabilities and learning disorders. ASMR technique collects all those contents, mainly videos that are able to stimulate the brain, generating relaxing and pleasant sensations related to listening to sounds, often associated with images. It comes from the needs analysis carried out by the partnership with respect to the use by VET teachers of learning models and strategies that can break down the barriers that still exclude some types of disabilities and limit their real inclusion. Current methods (concept maps, BYOD methodology and educational APPs, interactive educational e-books, etc) are still limiting and exclude visually impaired and blind, those who have a distorted perception of reality. For these people, Haptic perception combined with audio-video stimuli is a fundamental element to stimulate learning, but little has been done to date for digitization in the tactile domain, that is, for the development and provision of

digital tools and content to teachers/trainers that allow them to develop tactile experiences in favour of learning.

The first part of the work on the handbook was carried out on the basis of desk research. Project partners prepared a description of the following guesses:

- H@ Haptic experience definition in education with particular emphasis on people with disabilities.
- H@ Educational areas are the haptic experience methods used.
- H@ Examples of activities related to the use of "haptic experience" can be indicated.
- H@ Threats to the use of haptic experience methods.
- H@ Pedagogical models based on "tactile training" of students with selected disabilities.
- H@ Selected, available educational resources in the field of tactile training (multimedia stream, acoustic / vibrational input, etc.
- H@ Selected, available technological resources (computer programs, applications, etc.) supporting HP and the conditions of their use.
- H@ Good practices in the use of haptic experience methods in various areas of education and practical examples of learning paths that use tactile experience to develop specific skills in the VET field.

The second stage was the implementation of focus interviews with national experts.

The focus group research was carried out in all partner countries. Up to 5 national experts participated in each meeting. Each focus interview was carried out in accordance with the scenario approved by the partners, however, individual

partners were free to modify the scenario due to the specificity of the local situation. The partners were also free to conduct interviews. These could be face-to-face or online interviews. The key issues raised in the interviews were formulated in the form of the following scenario:

**PART 1 INTRODUCTION**

H@ Introduction of the moderators.

H@ Presentation of information about the project.

H@ Presentation of the purpose of the meeting.

H@ Information on the rules of the meeting (the principle of confidentiality, anonymity, security of the data obtained).

Duration: 10 minutes.

**PART 2 INTEGRATION**

H@ Inviting participants to introduce themselves

Duration: 15 minutes.

**PART 3 INTRODUCTORY SESSION (opening question)**

H@ What gives satisfaction in working with students VET students with sensory disabilities and learning disorders?

Duration: 15 minutes.

**PART 4 OPEN QUESTION SESSION**

H@ Which is the biggest challenge in working with students VET students with sensory disabilities and learning disorders?

H@ How does the official education system provide methods of working with in working with students VET students with sensory disabilities and learning disorders?

H@ Where are you looking for additional working methods with students VET students with sensory disabilities and learning disorders?

H@ What are the methods in working with students VET students with sensory disabilities and learning disorders?

H@ Share one good practice in working with students VET students with sensory disabilities and learning disorders?

H@ What kind of support do you need in the development of your workshop?

(Note: depending on the course of the conversation, the moderator is free to add the necessary questions depending on the specifics and needs of the group of participants)

Duration: 45 minutes.

**PART 5** SUMMARY SESSION (concluding question)

H@ What are your suggestions for improving the efficiency of working with students VET students with sensory disabilities and learning disorders

(Note: depending on the course of the conversation, the moderator is free to add the necessary questions depending on the specifics and needs of the group of participants)



Duration: 15 minutes.

**PART 6** ENDING OF THE SESSION

H@ Acknowledgment for participation in the session,  
information on the process of developing the results and  
their delivery

Duration: XXXXXXXX minutes.

## **HAPTIC EXPERIENCE DEFINITION IN EDUCATION WITH PARTICULAR EMPHASIS ON PEOPLE WITH DISABILITIES**

In the teaching process, engaging many of their senses is of great importance for the education successes of the pupils. By engaging the sense of sight and hearing, students can explore the world more effectively. A very good solution is also to include in educational activities, also activities that stimulate the sense of touch.

Doing so maximizes students' multimodal learning of the world. Activating the sense of touch allows for learning through experience, and enables effective building of relationships with the learner's environment. "The word haptics comes from the Greek words haptesthai and haptikos (meaning "touch") and refers to both the perception of touch (or feedback) and force (kinesthetic feedback). Simultaneous exchange of information between man and his environment" (Nooshin J., 2016). The proposal assumes "inclusion" in communication of "touch" and the phenomena related to touch and kinesthesia in general. There is an advantage to such an inclusion that it is not intended to de-hierarchize the experience of seeing or to contrast it with a more ineffable "voice" or "tact", but to broaden the communicative experience as a way to broaden the possible experience. It is therefore a question of broadening, broadening and broadening the experience against the structure that limits it.

Haptics is a bidirectional sensory modality involving the simultaneous exchange of information between a human and his/her environment. It can provide a considerable amount of information to the individual about his or her surrounding environment. Haptic perception relates to the sense of touch through which one can distinguish and recognize objects, even without seeing them. Haptic perception in children develops through environmental exploration and object manipulation in their infancy and throughout their childhood, particularly in the context of play, and education.

Haptics is a wide field of science and technology that allows you to understand the world through the sense of touch. Haptics uses knowledge about the importance of the sense of touch for humans to create a connection between humans and technology. There are many examples of how the knowledge of touch can be used in technological applications, the simplest being, for example, vibrating phones.

Currently in education the space for In-Haptic experiences is limited due to the fact that technology isn't here yet in an accessible fashion. Furthermore, this is compounded with the fact that there hasn't been much testing. This resulted in a cycle where companies won't invest due to there not being enough evidence for profits and so forth. This area, however, does seem to benefit those with disabilities and those with difficulties in a 'traditional' learning experience. For students with disabilities, which are not learning disabilities, Haptic devices provide an experience that could become essential as it opens up a whole new plane of learning, especially those who are blind. For topics in the sciences there is great potential to use haptic devices to show blind students the structures of the objects they are learning (cell structures, molecular structures, resistance in physics). The haptic experience in education is not limited only and exclusively to people with disabilities and, particularly, blind people, but is part of the different methods and techniques of teaching and learning in the discipline of physical education as well as sport.

#### Haptics, haptic feedback, haptic technology

Tactile feedback is an element of haptics. Haptics covers the broadly understood field of science and technology, and tactile feedback is its element. Tactile feedback concerns the way of communicating with the environment, and more

specifically the sensory impressions related to the feelings of the user of a given device.

### Haptics and the sense of touch

Touch provides a person with a lot of information. It is a source of knowledge about the surrounding world, but also a source of pleasure. In the real world, effective interaction with objects relies on touch.

In the case of healthy people, all senses complement each other. A person obtains information from the environment through sight, hearing, smell, taste, and touch. When one of these senses, e.g. sight is damaged, touch has a chance to supplement the information that is missing in a person with a damaged sight. It turns out that there are compensatory neural mechanisms that enable visually impaired people to create representations of the world around them by touching.

This knowledge is used in creating virtual reality. Increasingly, in addition to visual and audio effects, VR technology also provides the user with associated tactile stimuli.

The development of VR technology is more and more often used in numerous areas of life, science, and education. It can be successfully used on site in work with people with impaired eyesight as well as in other areas of education.

The ability to create mental images, to visualize, is linked with success in engineering and technology fields of study. Coursework including sketching and the use of manipulatives, along with other haptic or hands-on activities, has been shown to increase the spatial skills of university level engineering and technology students who scored below the expected mean on the Purdue Spatial Visualization Test (PSVT) (Study N. E., 2006). Previous research also indicates that students entering the STEM fields tend to have higher haptic abilities than the

population as a whole. In one of those studies, a sample of over 200 freshman engineering students was found to have haptic abilities at one standard deviation above the mean expected for neurotypical adults over the age of 18 (Study N. E., 2001).

### Types of haptic technology

Touch technology is e.g. in phones. This is possible thanks to the micro-vibrations generated by the devices inside the phones. However, more and more often we are dealing with non-contact touch technology. And this is thanks to the use of ultrasound or laser technology.

## **EDUCATIONAL AREAS AND THE HAPTIC EXPERIENCE METHODS USED**

Tactile methods can be incorporated into any educational area, thus activating all student modalities and maximizing educational success. It seems necessary to strengthen remote education with a greater number of people involved in the learning process of modality. Therefore, it is necessary to create a space for tactile interactions. Expanding the modality of experience may also be important from the perspective of people with disabilities and cognitive deficits. Tactile matrices can be effective at various stages of the learning process, e.g. haptic feedback.

Haptic feedback can be valuable because it is:

- H@ Available.
- H@ Non-invasive.
- H@ Supports the training of motor skills as well as entertainment (Schneider O., 2017).

Using haptic experiences also strengthens motivation (Fernandez C., 2016).

Haptic devices have been used primarily in medical training and education. Visuo-haptic simulators have been developed to perform medical operations such as surgeries, sutures, and dental procedures (Escobar et al. 2016). In this way, students can practice as many times as necessary without the need to use

corpses or animals. On the other hand, various visuo-haptic simulators have been developed in various educational institutions for teaching Physics concepts, both in the area of Classical Mechanics and Electricity and Magnetism (Hamza-Lup & Baird, 2012; Han & Black, 2011, Neri et al., 2015). For example, at Purdue University, a visuo-haptic simulator has been developed to understand the relationship between the frictional force exerted by a flat surface on a block, with the mass and size of the block.

Exteroception also involves sensations of touch (haptic sense), pressure, vibration, temperature, pain, etc., to the occipital cortex (visual sense) and to the parietal cortex (auditory sense), previously passing through the pons and thalamus nuclei.

Adaptation to the aquatic environment is a good example of a haptic experience that can be used transversally throughout the life cycle, from the new-born to the elderly through the mediatization process in and through the aquatic environment, in which water is a second skin, touching and being touched, the technical team is one of the objects of haptic experience, as well as the didactic-pedagogical material resources.

#### Examples of activities related to the use of "haptic experience"

BendableSound: An elastic multisensory surface using touch-based interactions to assist children with severe autism during music therapy Highlights: - BendableSound is an elastic multisensory surface to assist music therapy sessions. - BendableSound has the potential to provide a more natural and intuitive multisensory experience. - Elastic multisensory surfaces promote the discovery of new tactile experiences. - BendableSound helps children with autism to maintain their attention during therapy - BendableSound could have therapeutic benefits regarding motor development.

- H@ Create a more fun and powerful VR experience with Immersion haptics. Haptics bring the sense of immersion to mobile gaming and VR, amplifying the whole experience. Haptics intensifies the thrill of racing and the excitement of competition creating the illusion of being in the game. Add haptics to the controller features in mobile phones' game mode or VR settings to create new commands just for gaming.
- H@ The Use of Haptic and Tactile Information in the Car to Improve Driving Safety
- H@ Another example is a goalball. Goalball has no parallel in conventional or regular sport and no similarities in relation to specific or adapted modalities for people with disabilities. The activity is aimed at the rehabilitation and inclusion of blind people, in and through sport, whose design eliminates the preponderance of vision in terms of eligibility and classification criteria, norms, structure and game dynamics, focusing participation on the haptic sense and hearing. The intervention both in the field of Psychomotricity and in High Performance and Paralympics reinforces the theory and practice of inclusive Goalball based on tactile and sensory information, contributing to the development of Haptic Perception and Multisensory Supplies in Social Equity.

## THREATS TO THE USE OF HAPTIC EXPERIENCE METHODS

The main threats to the use of haptic use lies in three key areas. The first is the lack of research. This is the crucial step to improving the use of haptic devices, academics have voiced their opinions on this factor. (Noguez, 2021) Without this necessary factor being taken care of haptic use will remain almost at a standstill. However, the only people who suffer from this are the innocent, the students who



could be benefit from these technologies so there is a sense of urgency around this. Secondly, the opinion of teachers would be something that would need to be accounted for as this would result in a change of their methods in order to accommodate. This shouldn't be a major issue; however, the accompanied training and haptic device cost are a speed bump that must be subsidised. Finally, there is a need for improvements to the technology itself. Currently the use of handheld haptic devices is adequate for a limited set of applications. The threat here is that due to the lack of profits in primary education with an underdeveloped technology which also has a lack of research is that for profit companies, which drive technological innovation, have no interest in funding a potentially profit empty venture.

Prevention in the face of threats to the use of haptic experience methods would be to frame this method in the concept of Edu communication, a concept in which educational communication and communicational education intersect and naturally intertwine with each other, forming a type of behaviour and action. , of relationship and interaction, in which both are inseparable in any interpersonal context, whether at the interlocutory level or in any other model of interaction, configuration or communicational form, adopting the necessary and appropriate specific procedures and always with the aim of eliminating socio cognitive in the establishment of understandings and consensus, as universally accepted as possible.

The biopsychosocial, multisensory, and human development, as well as the consequent progress of the global world, is dependent on a type of conciliation (which should be natural) of theoretical/empirical and human synergies around the concepts of feeling and acting, promoting and implementing wills and achievements in an Edu communicational, pedagogical and cultural perspective.

## **PEDAGOGICAL MODELS BASED ON "TACTILE TRAINING" OF STUDENTS WITH SELECTED DISABILITIES**

The "tactile training" of students with disabilities are used successfully for example in four areas of intervention in physical education, sport and physical activity, namely:

- a) sports and Therapy aimed at improving functional capacities through different therapies (occupational, physiotherapy, psychomotricity, kinesiotherapy, etc.)
- b) Sport and Education within the scope of the discipline of physical education and school sport aimed at the development of competences.
- c) Sport for All informal practice as a means of personal development, socialization and social inclusion.
- d) Competitive and High-Performance Sports with the objective of performance and sporting excellence.

An example of a specific program successfully applied in this area is The Effect of Programmable Tactile Displays on Spatial Learning Skills in Children and Adolescents of Different Visual Disability: Vision loss has severe impacts on physical, social and emotional well-being. The education of blind children poses issues as many scholar disciplines (e.g. geometry, mathematics) are normally taught by heavily relying on vision. Touch-based assistive technologies are potential tools to provide graphical contents to blind users, improving learning possibilities and social inclusion. Raised-lines drawings are still the golden standard, but stimuli cannot be reconfigured or adapted and the blind person constantly requires assistance. Although much research concerns technological development, little work concerned the assessment of programmable tactile graphics, in educative and rehabilitative contexts. Here we designed, on programmable tactile displays, tests aimed at assessing spatial memory skills

and shapes recognition abilities. Tests involved a group of blind and a group of low vision children and adolescents in a four-week longitudinal schedule. After establishing subject-specific difficulty levels, we observed a significant enhancement of performance across sessions and for both groups. Learning effects were comparable to raised paper control tests: however, our setup required minimal external assistance. Overall, our results demonstrate that programmable maps are an effective way to display graphical contents in educative/rehabilitative contexts. They can be at least as effective as traditional paper tests yet providing superior flexibility and versatility.

## AVAILABLE EDUCATIONAL AND TECHNOLOGICAL RESOURCES IN THE FIELD OF TACTILE TRAINING

### Typhlo-didactics tools

Teaching aids aimed at increasing the tactile exploration's ability in visually impaired and blind people. Among these tools are tactile boards with raised representations and titles both in a bigger font size and in Braille alphabet. They can be made in different materials and through different techniques, but what is at the base of their efficiency is the correct design of the tools depending on the learning needs of the people for which they are realized

### Haptic media

Examples of the use of haptics can be mentioned in the case of, for example, games. Tactile sensations in this case are more and more advanced, they concern borders, textures, experiencing various interactions, etc. (Steam Store, 2015).

More and more often, touch technology is also incorporated into virtual reality. These types of solutions are undertaken by the largest technology giants, e.g. Microsoft (Strasnick, 2018; Whitmire, 2018). Haptic feedback can be enhanced with haptic styluses that provide additional stimulation to the user (Stein berg, 2007). There are more and more additional accessories, such as gloves or entire clothes - overalls that enhance the haptic experience of the user (Virtual Motion Labs, 2018; VRGluv, 2017).

### Visually-Impaired specific-devices

There are also a number of implementations of tactile equipment designed specifically for people with visual impairments. One example is the Graphiti device. (Graphiti, 2018). Another example is the BrainPort V100 (Wicab, 2018) that provides raw geometric information from the real world based on inputs from a wearable camera via a dongle inserted in the mouth that provides electro-tactile stimulation of the tongue. BLITAB has created a Braille touchscreen tablet that uses "tixels" that dynamically float above the display surface and can convert text to Braille (Blitlab, 2018). This system has been successfully used in the field of education.

#### Potential learning applications

"Today, the most common approach is vibrotactile (VT) feedback, where vibrations stimulate Pacinian corpuscles in the skin, e.g., smartphone vibrations. VT actuators can take many forms. Eccentric mass motors ("rumble motors"), affordable but inexpressive, are commonplace in mobile devices and game controllers. More expressive mechanisms such as voice coils offer independent control of two degrees of freedom, frequency and amplitude. Piezo actuation is a very responsive technique that is typically more expensive than other vibrotactile technology. Linear resonant actuators (LRAs) shake a mass back and forth to vibrate a handset in an expressive way; a common research example is the Haptuator (Yao and Hayward, 2010). Currently, LRAs are increasingly deployed in mobile contexts (e.g., the Apple Watch Taptic engine). (Schneider O., 2017, p.8)"

An example of the use of the haptic methodology in conjunction with the VR methodology is the process of building prototypes of workstations (Grajewski D., 2015)

- H@ Vibration App – A true vibration spectrum analyser using the built-in accelerometers and gyroscope inside the iPod Touch and the iPhone.
- H@ Core Haptics (For Devs) – Compose and play haptic patterns to customize your iOS app’s haptic feedback.
- H@ Android Haptics (For Design) – Haptic guidelines to enhance interactions and convey useful information to users through the sense of touch.
- H@ Android Haptic Constants (For Devs) – Constants to be used to perform haptic feedback effects on Android devices.
- H@ Haptic Feedback Generators (For Devs) – Explore haptic patterns generated by Apple’s Taptic Engine (by Jesus Guerra) (<https://medium.muz.li/haptic-ux-the-design-guide-for-building-touch-experiences-84639aa4a1b8>)
- H@ For VETs there is an introductory course available on <https://www.learnhaptics.org/> that gives a brief overview on information regarding to general haptic systems. this would be an essential piece of information as the teachers will be required to know about the main topics of haptic engineering, human perception, and force feedback tech. For further information/interest there is a free online course on offer from Stanford too. <https://online.stanford.edu/courses/soe-yhaptics-introduction-haptics>

Academics have greatly supported the combined use of virtual reality (VR) in combination with the use of a haptic device. (Hamza, 2018) The use of these devices in tandem allows for an almost unlimited application. The ability to design an object in VR then have the student explore through it by moving their VR character around the learning object and use a haptic device such as the “Phantom Omni” allows for a fully immersive and interactive experience.

As mentioned before, HaptiChem is a potentially viable resource in the field of chemistry however, their website is unavailable and there hasn't been any evidence of the company existing after 2014.

## GOOD PRACTICES IN THE USE OF HAPTIC EXPERIENCE METHODS IN VARIOUS AREAS OF EDUCATION AND PRACTICAL EXAMPLES OF LEARNING PATHS THAT USE TACTILE EXPERIENCE TO DEVELOP SPECIFIC SKILLS IN THE VET FIELD

H@ Glove One. The company Neurodigital Technologies has developed a glove for virtual reality games and simulators whose objective is to capture the movements of the hand so that they are sent to the game itself and, at the same time, reproduce the sensation of touch by means of vibrations of different power. the different virtual items displayed in the game.

H@ SHAREM: haptic robotic system for rehabilitation with modular design.

H@ Malaga-born OWO and her revolutionary sensitive vest  
<https://www.diariosur.es/tecnologia/owo-chaleco-haptico-americanas-20220107180446-nt.html>

H@ The TacPic system developed as an online platform to create tactile educational materials (TEM) based on the image inputs of users who do not have prior experience in tactile photo development or 3D printing.

H@ Sport and Physical Activity have a vast and rich experience, which apply to learning in general, for any and all people and which, in particular, is enhanced for certain populations.

a) The “physical-material models”, for example articulated dolls for learning certain skills related to the body that are useful but are poor in terms of psychomotor and mediatization.

b) The “human models” according to three dimensions:



- H@ In which the learner uses his own body as a living relational instrument, with objects, with other people and in the interaction with the world.
  - H@ Second, the educator’s body is used.
  - H@ Thirdly, it is a specific and enriching feature of the sport in which an “Athlete-Guide/Sports Technical Assistant” is used in the teaching-training and social participation process. Specifically in athletics, running for the blind, the student-practitioner carries out his learning path through the Athlete-Guide who also accompanies him in both informal and formal activities in the field of sport and physical activity.
- c) The third good practices are specific activities such as goalball, or swimming and other conventional sport and physical activity.

## **NATIONAL RESEARCH RESULTS ON THE EXPERIENCES OF VET TEACHERS WORKING WITH STUDENTS WITH SENSORY DISABILITIES AND LEARNING DISORDERS**

This chapter presents the results of focus interviews that were carried out in groups of experts from individual countries. The applications are broken down by country due to their specific nature.

### SPAIN

What does work with people with disabilities give me?

It is a daily challenge, and not because that challenge is negative or problematic, quite the opposite. Every day is different, and the "story" of each person is different. If to be a teacher you have to teach with passion, with a person with a disability,

even more so. And, if you learn from teaching a student, one with a disability, even more so. You learn, even, in a much more beautiful way.

Each day, your mission is to teach that person so that, by the end, they will be a little more independent. Teach, help, support.

You do not work, or teach, special students due to their disability; you do it with special people because they are special in themselves. It is a reward to be able to do it.

You never get bored. Every day is different, it is continuous learning. Permanent personal growth.

What job future awaits a student with a disability?

The data from the latest survey of the active population (according to the EPD 2020 of the National Institute of Statistics) is offered.

The most important fact regarding this group is their low participation in the labor market. In 2020, its activity rate increased 0.3 points and stood at 34.3%, 41.8 points lower than that of the population without disabilities.

Fortunately, there is progress, there are recognized companies that collaborate and offer job opportunities to the group of disabled people, but there is a long way to go to achieve greater integration.

In addition, there is a very important issue in relation to training (not so much in terms of subject matter, but in terms of personal feeling) such as the fact that there are disabled people who perceive their situation as a stigma and, therefore, their quality-of-life decreases. And this fact is perceived even more in female groups as a double stigma: one, for being disabled; second, for being a woman.

These people must be specifically helped to understand that disability is not such a stigma at all; it is a thought that weighs them down and severely harms them.

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Being teachers of disabled people is not a job. It is something wonderful that allows you mutual help and satisfaction to be able to help them grow and integrate into a society that, at times, does not make it easy for them, neither socially, in studies, nor in employment.

There must be greater involvement of governments in supporting these groups. each one with its specific situation; specific situations, adapted solutions.

Therefore, the day-to-day life of people with disabilities must be improved. Much has been done, but there is still a long way to go.

There is a great challenge ahead.

## ITALY

The following evidence emerged from the comparison with VET teachers and trainers. The main reported challenge facing a VET trainer in working with students with sensory disabilities and learning disabilities is that relating to the need to find a valid support network. In the absence of a collaborative network, the

training path is perceived as solitary and an end in itself and not included in a path that unites the different realities.

On this point, the difficulty of finding precise educational tools and settings in which to carry out the various training activities is also pointed out, so that teachers often find themselves having to face entire situations by adapting the interventions to the context and not vice versa.

A further notation that emerged is that relating to perceiving diversity as richness and pouring this element into the path. There is also a need for students with sensory disabilities and learning disabilities, to bear the burden of school they need teachers to understand how difficult it can be for them.

As regards the offers of working methods with students with sensory disabilities and learning disabilities by the official education system, a bleak vision emerges: according to all teachers, the official education system still provides too few working methods suitable for specific cases. To ensure adequate training and promote the development of potential, compensatory measures are needed such as: calculator, recorder, multiplication table, etc. formative.

As regards the search for further methods of working with students with sensory disabilities and learning disabilities, continuous updating is reported and the online support network created with various colleagues, through groups on social media, in which the possibility is enhanced. to exchange opinions, advice, materials, experiences.

With regard to working methods for sensory disability, the need emerges to structure a work setting and an environment that is as accessible, welcoming and functional as possible to the person with disabilities: first of all it is important to limit the situations that hinder movement and "orientation of the student by intervening in advance on the elements (furniture, objects, structural and architectural barriers), so it seems appropriate to accompany the student to

discover the environment before the start of educational activities (a few days before and, possibly, more than one time). This should potentially help him to compensate for the information that the sighted student grasps with a single glance and will put him in an emotional condition of greater tranquility. All paths within the educational environment must be marked with tactile references. Consequently, the activities that are carried out must also be centered on the use of touch as a means of communication and learning.

As regards DSA, since the visual channel is the preferred channel for those subject to DSA, to facilitate learning it is possible to use everything related to visual memory, through the use of images, imaginative mnemonics, multimedia concept maps... The use of cooperative work with other students is also fundamental, the use of computers, and the dictation by recorder.

Further information on the working method is offered. From the point of view of the school work carried out in the classroom, the teacher should allow the student longer time for written tests, for the study and execution of school tasks, as well as allowing the student to make use of support tools, such as for example a calculator, a computer, a recorder, but also and above all to help him in the construction of cognitive schemes and maps that can support and facilitate the study of a subject. The involvement of the whole class is very important: explain different cognitive functioning of the pupil, asking them to support him to facilitate his learning.

Respect the needs of the child: avoid activities that can create anxiety for the child, as well as hostile reactions. For example, the fact that most children like finger paints is no reason to force them to use them. Rather, it may be useful to provide the child with a tool to place between his hands and the colors, such as a brush or a sponge, etc.

Adapt your behaviour: Positive reinforcement, valuing even the smallest successes and avoiding pointing out what has not been completed; keep a low tone of voice, as a tone of voice.

## GREECE

According to the questions addressed to the participants, who are currently involved with VET learners with disabilities and learning difficulties, the following information was drawn:

What gives you satisfaction when working with VET students with sensory disabilities and learning disorders?

A major factor of satisfaction is the unpredictability that follows the interaction with those students. Contrary to popular belief, those students show a great deal of emotion, abilities, internal motivation, and learning willingness, as well as great improvement throughout their learning journey. That leads to a significant raise of prejudice towards them and makes educators feel that they offer more to them, especially when the results of the learning process bring more results than initially expected. There was even the term „transcendence of expectations” mentioned. It is very common to notice that students overcome boundaries and burdens, and most important integrate in a group. That makes the unpredictability of the students a significant step towards raising prejudice and discrimination.

Which is the biggest challenge in working with VET students with sensory disabilities and learning disorders?

The biggest challenges mentioned were:

H@ Having enough empathy towards students.

H@ Satisfaction with the learning process.

- H@ Staying away from negative feelings and approaches as an educator.
- H@ Difficulty in communication and interaction with students.
- H@ Heterogeneous classrooms with students of many different needs, which requires much more time than what is available.
- H@ Learning how to handle each student and their different needs.
- H@ Non-existent different curriculum for VET students students with sensory disabilities and learning disorders of Greece.
- H@ Not enough time and/or resources to research the differentiated needs and difficulties of the students.

How does the official education system provide methods of working with in working with students VET students with sensory disabilities and learning disorders?

There are primary schools established specifically for students with special needs in Greece, though they are mostly found in urban areas. Integrated programmes are also found within mainstream primary schools to accommodate special needs students. There are now 23 Special needs education schools. Among these are nine special needs vocational high schools in Athens, Orestiada, Kavala, Messolongi, Kastoria, Skydra, Rethymno, Loutraki-Perachora-Ag. Theodoroi and Kalamata. Greece has ratified most of the major international conventions with provisions relating to access to education and employment for people with special needs. The Greek Constitution ensures that all citizens receive free education and obliges the State to provide support to students with special needs.

The reality, though, shows an image far from ideal, even though there are designated educational forms for this field of education. According to the educators, the schools mainly do not have enough personnel, meaning that the number of educators is not enough to cover the needs and numbers of the

students. That often leads to classrooms with way more students than an educator can handle and taking into account the nature of the students, that can be a major issue. A few of suggestions for improvement include more focus on experiential learning, encouragement and gamification of the learning process. Another problem is that there is a lack in resources for this field of education, whether it be learning materials or building structures.

Where do you look for additional working methods with students VET students with sensory disabilities and learning disorders?

The educators mentioned that looking for additional working methods can be a very personal experience. Even though the curriculum and the programmes established by the Greek legislation provide with some guidelines, there is always the need for additional information and methods. Most educators look for information by discussing with fellow educators, who also work with VET students with disabilities. Also, keeping themselves informed about current trends in special needs education plays a major role. Last but no least, taking into account the experiences that they gain year by year is valuable.

What are the methods in working with students VET students with sensory disabilities and learning disorders?

According to the educators the basic methods of working include:

- H@ Experiential learning.
- H@ Personalisation of content delivery.
- H@ Making sure that the learning environment is inclusive.
- H@ Differentiated instruction.
- H@ Alternative teaching methods according to the students' needs.



H@ Working with specialized personnel (psychologists, social workers, psychiatrists, ergo therapists, occupational therapists, etc.) to have the correct approach towards students.

Share one good practice in working with students VET students with sensory disabilities and learning disorders?

The good practices mentioned by educators included:

- H@ Focusing more on the outcomes of the instruction, rather than the methods instructed by the curriculum.
- H@ Provision of extra instructional time every day for students who struggle.
- H@ Ensuring that content-strong staff provide interventions and support.
- H@ Provision of social-emotional or behaviour supports to students.
- H@ Focus on case-management responsibilities.
- H@ Working closely with the students' families.

What kind of support do you need in the development of your workshops and what are some proposals for improvement of the effectiveness of working with students VET students with sensory disabilities and learning disorders?

The most common answer among the educators was the reformation of legislation and the curriculum for VET students with sensory disabilities and learning disorders. The educators feel that there is a strong necessity for extra education and instructions for the educators themselves. They feel that there should be more seminars, working groups for educators and community building. Apart from those factors, there is a need for smaller classrooms with fewer students, as well as specialized personnel. The lack of special equipment is also a problem, along with the lack of special tools (technology tools, instructional handbooks, etc.). To have the best results possible, there needs to be a reformation to the way VET education is regarded.

It is of major necessity to provide educational forms with specialised technology tools to facilitate VET students with disabilities and learning difficulties.

There is a serious lack of education and resources in the Greek educational forms of special needs education.

### POLAND

What gives satisfaction in working with VET students with sensory disabilities and learning disorders?

Among the experts there are enthusiasts of their work who appreciate it and derive satisfaction from it and inspiration for development.

“The satisfaction is mainly due to the fact that the student develops, educates in what he likes, what he is passionate about.”

“Satisfaction is when someone says it is impossible and thanks to your commitment you manage to achieve success.”

Which is the biggest challenge in working with VET students with sensory disabilities and learning disorders?

Based on the opinions of experts, it can be said that they do not treat working with people with special needs as a challenge. The challenge is to deal with the education system, while the work itself gives a lot of satisfaction and joy.

“Working with students with special needs is very rewarding, but like any job in education, if it is not done passionately, it will not be done well.”

“The challenge is to deal with equipment deficits, irrational regulations, etc., but not the students themselves”.

“The challenge is the lack of hardware, the lack of money for the right software for the job. Working with people who suffer from sensory deficits and learning

difficulties also requires the possibility of an individual approach, possibly working in very small groups. This is often difficult in public institutions.”

How does the official education system provide methods of working with in working with VET students with sensory disabilities and learning disorders?

As experts pointed out, the role of the teacher is to properly prepare for work with people with sensory deficits and learning difficulties. The participants of the survey indicated that a teacher working with people with special needs must have appropriate substantive preparation in the form of studies, postgraduate studies, and then must constantly participate in courses and training. Normally upskilling is possible and funded by schools, but it is very difficult to choose high-quality courses.

“Currently, the market is flooded with a wave of free courses and training, a small part of which is of high quality”.

“It is not that the education system provides anything. Yes, you can use the financing of training by the school, but it is the role of the teacher to develop”.

“In recent years, schools have been well-equipped with equipment such as multimedia boards and work programs. Of course, private institutions are better equipped”.

Where are you looking for additional working methods with students VET students with sensory disabilities and learning disorders?

Experts indicated that they most often look for new work methods on their own. They look for courses and trainings that can raise their qualifications and enrich their workshop.

What are the methods in working with VET students with sensory disabilities and learning disorders?

Experts have listed the different working methods they use.

The methods include, for example:

- H@ Smartphone applications.
- H@ Computers programmes and applications.
- H@ Sensory toys.
- H@ Board and strategy games.
- H@ Peer mentoring.

What kind of support do you need in the development of your workshop?

Experts suggested that it would be good to have a database of good methods and tools as well as high-quality training. Participants emphasized that there are online forums for the exchange of good practices, there are also platforms built by state institutions that constitute the basis of good tools and methods, but there is no single place that would collect all these issues,

Conclusions from the study:

Teachers and trainers participating in the study willingly shared their experience in working with people with special educational needs. They indicated that it was a demanding and satisfying job. It is important that the teacher is constantly improving his qualifications. Despite the fact that there are many training and course offers, it is difficult to recognize those that are really of high quality. It is important to build a network of contacts and a database of good practice so that teachers can share their experiences.

## PORTUGAL

Although a contextualization about the focus group had been carried out, at the beginning the group did not seem to be in the same way. Some elements were

more relaxed than others. For example, the Sports trainer was more relaxed and showed no anxiety levels. On the other hand, the trainer/psychologist was more withdrawn and more apprehensive. As it progressed, the group members became more relaxed. Everyone was very participative. The trainer in Arts and artistic expression showed a lot of enthusiasm in her answers, showing that she was very happy to participate, since she mentioned that, often, her area of work, in formal education, is placed in the background, when compared with other areas considered basic, such as mathematics or Portuguese.

All showed a lot of motivation for their area of work and showed to be very dedicated to working with students with sensory disabilities and special needs. They also showed that, despite the legislation being advanced, the work in a real context does not always reflect this evolution. Overall, everyone agreed that not all trainers have the ability, profile or skills to work with students with sensory disabilities or special needs. All underline the importance of training to become increasingly specialized in working with these audiences.

All argued that every teacher needs to know how to make accommodations and modifications to their environment, materials and activities. Also, every teacher needs to advocate for the needs of all their students and their families, regardless of individual differences. And everyone can advocate for students and special education programs that support them. They also underlined the importance of partnerships or co-work. The same for co-teach by working in unison with special educators and sharing joint responsibility for students as well as co-ownership of classroom decisions and spaces.

The trainers present in the focus group shared their feelings of satisfaction for being able to support these young people as they overtake their limitations and enhance their abilities. They gladly take the challenge of innovating, adapting and

developing active methodologies for reaching personal, social and professional capacitation, being aware that results can emerge in small victories.

Exploring the challenges that we can find working with students with learning disorders and sensory disabilities; all the trainers shared the need of having the students in the centre of the learning process, with having the profiles, rhythms, limitations and individual potential analysed, so the methodologies that are going to be applied fit the group being fundamental. Beyond the methodology management, professionals have to deal with expectations and to contribute with the definition of realistic goals. Formators highlight the importance of having professionals that have or develop characteristics as flexibility, sensitivity and emotional intelligence.

The official education system in Portugal provides programs, specialized teams, and students are included in regular education with specific support from these professionals. Therefore, it is important that teachers have training and awareness of the different disabilities to adapt the methodologies to the class. All reinforce the importance of exchanging knowledge and experiences between professionals and institutions, and there should not be a work closed in on itself, enabling the sharing of processes, good practices and new methodologies.

With regard to the search for additional working methods, the trainers reinforce the importance of constantly updating knowledge. It is possible to resort to books, training courses, workshops, seminars, research on scientific studies, multidisciplinary meetings and involvement in various projects. It is essential that the professionals are aware of the need for this constant updating and sensitivity to filter information that fits or not the work to be developed, taking into account the group.

Regarding working methods with students with sensory disabilities and learning difficulties, it was possible to perceive that although each professional within their

training area developed a specific method, the need for all methodologies to be adapted to the group and its students was highlighted again. In parallel with group work, it is essential to develop individual work, explore the difficulties and skills of each one, in order to later adjust the sessions and respective methodologies. Therefore, it is necessary to involve the student in the learning process, resort to more practical methods, pedagogical visits, promote the stimulation of different senses and experiences for each one to have the possibility of discovering new skills or improving existing ones. That said, for this individual and group work to be successful, it is essential that the different professionals involved work in a multidisciplinary way.

Regarding good practices in this work, some examples were presented, but they share the importance of work between different institutions and professionals; the involvement of young people in the process to understand the activities and their different stages of development: construction, execution and evaluation. The provision of different experiences for the possibility of exploring new concepts and the possibility of discovering new interests. Taking advantage of technologies and using them as new tools for teaching, using them as captivating instruments, as well as reinforcing stereotypes, promoting self-knowledge and the development of new emotional skills, taking advantage of any process of personal, social and professional training.

Concerning the necessary support for the development of the workshops, the urgency of human resources, available volunteers, sensitized and aligned emerged. The professionals and entities being flexible, the brief availability of differentiated and adapted material to facilitate the learning and experimentation process.

Finally, the trainers present share as suggestions to improve the work with students with sensory disabilities and learning difficulties: the openness and availability to share practices between professionals and institutions; reinforce teacher training; development of new methodologies; use of non-formal activities such as art, music,

sport, among others; bringing new technologies to the educational process; adapting and exploring different forms of communication; innovating traditional methods and letting creativity emerge.

At the end of the session, each trainer was asked to mention two or three relevant adjectives to define the profile of a teacher working with this audience and the following emerged: flexibility, sensitivity, adaptability, involvement, innovation, curiosity, open mindedness, empathy, dedication, vulnerability, creativity, respect and solidarity.

Having said that, throughout the focus group, it is concluded that, regardless of the training area, the active involvement of young people in the learning process and an adaptation of the methodologies used are essential. Professionals must also identify themselves as an integral part of this process and invest in their training and promote and/or improve the acquisition of specific personal skills.