TELESEICT
Guide of Good Practices

Pedro Tadeu

Carlos Brigas

Erasmus+

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SYSTEMATIC INDEX

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3. ZUYD UNIVERSITY OF APPLIED SCIENCES, HEERLEN, THE NETHERLANDS - (REPRESENTING PARTNER UCLL - BELGIUM)

PREFACE

Rapidly changing development in technology requires new challenges of teaching and learning in school to meet the needs of all pupils. This book, *Guide of Good Practices,* highlights the importance of the balance between new technology and good pedagogy and is a part of the activities within the project *Teaching and Learning in Special Education with Information and Communication Technology* (TELESEICT 2016-1-PT01-KA203-022950), a three-year ERASMUS + project in the framework of Key Action 2 (KA2). This publication has been produced by the partnership and is a collection of formal and informal practices carried out in each partner country, especially in the field of special education.

The combination of knowledge from the partners of the consortium has given the necessary European dimension to the project and all participating institutions in Higher Education have contributed with their experience in different types of disabilities.

The main purpose of the project was to raise the awareness of the use of Information and Communication Technology (ICT) — digital competence, when creating good learning environments for pupils in need of special support, also referred to children with special educational needs (SEN). While there is much work to be done regarding technology, this is an excellent first step that can have a solid and sustaining impact for years to come.

Different activities have been carried out during the project time and the fulfilment of the main purpose has gradually been reached, culminating in several intellectual outputs, this book is one of them. The chapters reflect initiatives of different groups of practitioners, scholars, researchers, and governments, all people with a clear commitment to making a difference in the education of pupils in need of special support, and thus to develop the quality in the provision of services to children, young people and their families.

The book will be of interest to those working in schools, support services, policy makers, teacher educators, researchers, university students and vol-

untary organizations, and will contribute to deeper understanding of the importance of creating good learning environments and equity for all children.

There have been many opportunities in the TELESEICT — project to share experiences and knowledge in special education and ICT and this book is to be regarded as a source of inspiration in highlighting exemplary practices. Furthermore, the book is also an example of collaboration with colleagues from different countries and a proof of the importance of cooperation in order to adopt changes for the well-being-of humankind.

The TELESEICT members have challenged themselves to think, to produce evidence, and to look for new innovative solutions in order to understand ways of education in different cultures regarding SEN.

The book is not designed as a comparative study; instead it draws upon an approach through culture and context for the interpretation of suitable practice with technology in each country.

WE INCLUDE ALL!

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1.

KRISTIANSTAD UNIVERSITY, SWEDEN

KRISTIANSTAD — AN EXAMPLE OF GOOD ICT PRACTICE IN SWEDEN

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1. INTRODUCTION

The intention with this chapter is to present an example of good practice in Sweden, applicable to ICT and inclusive education. The good practice which will be illuminated is how a Swedish municipality organizes and works with ICT, in order to develop inclusive education. The activity illuminated is called School datatek (Skoldatatek in Swedish) and is an activity that exists in many Swedish municipalities, but the solutions may vary. For this activity the municipalities can get support from The National Agency for Special Needs Education and Schools (SPSM in Swedish[(1)]).

1.1. What is a good practice?

Questions to think about when discussing the definition of good practice could be — who and what determines what is good practice and from whose perspective? Is it from the school, the teachers', the students', regulation acts or maybe a combination of perspectives? This example of good practice in Sweden takes its starting point in inclusive education which in turn is based on different international and national acts that regulates the education/special education in Sweden. In addition, inclusive education could be based on different perspectives of special education.

(1) https://www.spsm.se/om-oss/english/our-mission/

Therefore we would like to start to position this good practice into a Swedish context where we illuminate international and national regulation acts for education and special education, definition of special educational needs (SEN) and special needs education (SNE), and finally a definition of inclusive education.

1.2. Regulation of education/special education in Sweden

FN

UN Convention on the rights of persons with disabilities (2008) says that the countries must work for that students with disabilities will, among other things, have the same access to inclusive education as other students in the country they live.

Salamanca

The Salamanca Declaration (2001) has had a significant role in the introduction of the concept of inclusion on international level.

Discrimination Act

The prohibition of discrimination in the Discrimination Act (Diskrimineringslag, 2008:567) is valid within all areas of society in principle, and the educational sphere is no exception.

Functional impairment and lack of accessibility are some grounds of discrimination. This means that students with functional impairments have the same rights as other students to take part in and complete their education.

Education Act

The Education Act (Skollag 2010:800), adopted by the Riksdag, regulates the education from preschool, compulsory schools, upper secondary education to adult education and other school forms. Special programs and special needs schools are separate school forms with their own curriculums.

Ordinances

An ordinance contains regulations and is adopted by the Government. There are a number of ordinances e.g. the School Ordinance, and the Ordinance on the Child's and Pupil's Participation in the Work of Establishing a Plan for Equal Treatment.

Curriculums

All curriculums are also ordinances. In the curriculums you can read about the fundamental goals and guidelines for the school. School forms such as special programs and special needs schools have their own curriculums.

Special educational needs

In Sweden, there is no legal definition of special educational needs (SEN). Education follows the principle of 'a school for all' and the focus is on what kind of support the student needs to get access to equivalent education for all.

This means that pupils in need of special support should not be treated or defined as a group that is any different from other pupils and their rights are not stated separately. The obligation for schools to attend to all pupils' needs is, however, emphasized.

Special needs education (SNE) in Sweden

Pupils in need of special support have the right to specialist provision. Special support shall be given to pupils who have difficulties in completing their education successfully. If a pupil needs special support, an action plan shall be drawn up (Skolverket, 2014).

The regulations regarding plans for pupils in need of special support have been further clarified. The pupil's need is to be assessed and the subsequent action plan shall contain information regarding the pupil's needs, what measures will be taken and how these measures will be followed up and evaluated. All education corresponds as far as possible to national curriculums, but with the emphasis upon meeting individual learning needs. Approximately 14 per cent of the pupils in compulsory mainstream schools have an action plan (Skolverket, 2014). The action plan is decided by the principal.

In a few circumstances, this provision is offered in special programs, e.g. special needs schools with sign language communication available for pupils with severe hearing impairments, and a special programs is offered to pupils with learning disabilities. The pupils' needs are assessed by a multi-disciplinary team. Medical, social, psychological and pedagogical tests are carried out. Once the statement has been completed, the pupil is allowed to attend these special programs. Attending a special programs or a special needs school is voluntary. If the pupil does not choose to attend a special programs

or a special needs school, the pupil attends the mainstream school with support and an action plan.

Inclusive education

Inclusion as a theoretical perspective can be defined in different ways. One way of understanding inclusion is by the inclusive values concerned by equity, participation, and respect for diversity. We strongly agree with Ainscow, Booth and Dyson (2006) when they suggest: «[T]the broad formulation of inclusion to which we subscribe may be used to reinvigorate the Education for all movement so that it is genuinely concerned with the participation in education of all within their local communities». Alternatively, with the words of Roger Slee (2001): «Inclusion is an aspiration for a democratic education and, as such, the project of inclusion addresses the experiences of all students at school». As we see it there is a problem when the concept is as wide as the concept of inclusion is, both in research and in practise. It is hard to make theory into practise and it is difficult for research to resonate in the field. As a consequence, the marginalization and the segregation of socially disadvantaged groups and ethnic minorities has increased in spite of the efforts done to be an inclusive school (Berhanu, 2011). Some of the fundamental needs that shape engagement are a sense of belongingness, a sense of connectedness and a belief that we are capable people who are able to learn. This makes engaging, caring, inclusive and participatory settings so important in school (Schaps, 2004). Engaged students are not likely to drop out of school and they are more likely to actively participate in school work and as a consequence the students achieve their educational goals and are not at risk of being excluded (Russell, Rumberger & Rotermund, 2012). In seeking to increase engagement in schools and to understand how to deal with low academic achievement and high dropout rate it is pivotal to try to define engagement and find ways to measure it. One way of doing so is to study what engages students in difficulties. How is it possible to motivate these children/students?

2. METHOD

In order to find out how the municipality in Kristianstad deal with that, we have interviewed the ICT-educator and the IT-developer in the municipality of Kristianstad. In the following we call them E and M. The interviews was performed as an informal conversation and we did not record the conversation, but interviewees sent us written material about their work. We have

also taken part of the information that is available on the website of municipality[2].

3. WHAT IS A SCHOOL DATATEK?

In Sweden the municipality organizes an activity which is called the school datatek. As mentioned above, supported by SPSM. The municipality is also responsible for the work with and the development of ICT and inclusive education. If the school datatek is going to be successful it is necessary that there is enough competency within the organization and among the staff. The school datatek is a pedagogical activity, where inclusive education and ICT-competency together aims to help teachers and students. The staff who works in the school datatek has to be familiar with the curriculum both locally and nationally. In the municipality of Kristianstad the school datatek is run by an ICT-educator and an ICT-developer.

3.1. Target group

According to SPSM (2018) the school datatek is mainly for teachers who teach students with special needs. From the beginning the support was mainly directly for students with problems with their concentration and students with reading and writing problems/dyslexia. Nowadays the school datatek is turning to a greater extent to all students, including students without disabilities (Branting, 2015). It depends on what problems the different schools have to work with.

3.2. Aim

The overall aim with school datatek is that students should be able to achieve the set goals, formulated in the syllabus (Branting, 2015). Further SPSM, (2018), suggests that the aim of the school datatek is to:

— Be a natural part of the municipalities student support

— Be part of developing inclusive solutions of how ICT can help in creating stimulating learning environments for all children/students.

— Give staff in schools a more profound competence in how to create stimulating learning environments for all students/children with the help of ICT.

(2) http://bufblogg.kristianstad.se/skoldatatek/

— Offer staff in school to try different alternative digital tools before buying.

— Evaluate news and spread information about ICT for the target group.

— Cooperate with parents, organizations and with SPSM, the National Agency of Education.

3.3. Activity

At the School datatek the staff should be offered:

— Showing of and testing of alternative, digital tools and software.
— Training in the use of alternative, digital tools and software.
— Technical and pedagogical support.

3.4. The demands for the municipality

The municipality who wants to start school datatek is recommended to:

— Provide a position for a special needs teacher with knowledge of ICT and besides that a position of an ICT-technician.

— Provide location and equipment.

3.5. The general mission and role of SPSM

At the SPSM, (2019), they work to ensure that children, young people and adults — regardless of functional ability — have adequate conditions to fulfil their educational goals.

This can be done through:

— special needs support
— education in special needs schools
— accessible teaching materials
— government funding

SPSM has broad knowledge of the educational consequences of disabilities. The support they offer involves individuals' learning and the work and activities of teachers, as well as organizational issues. Everyone, regardless of functional ability, has the right to a well-functioning education. The knowl-

edge and skills they offer are a complement to the resources of the municipalities and schools.

SPSM also works to bring research and practice closer together. One way is by disseminating the findings from special needs research. They cooperate with universities and other institutions of higher education in networks and participate in educational programs and courses. In addition, SPSM has regular contacts with the Swedish National Agency for Education and the Swedish Schools Inspectorate. SPSM also represent Sweden in The European Agency for Special Needs and Inclusive Education (SPSM, 2019.

4. KRISTIANSTAD — AN EXAMPLE OF A GOOD PRACTICE

Kristianstad municipality is chosen to represent an example of good practice in this chapter. As in many Swedish municipalities they work with school datatek. Via the school datatek and ICT there is an opening to develop inclusive education.

In Kristianstad live 84 151 Inhabitants. There are 40 elementary schools and 5 upper secondary schools. In the organization of the special needs students and school datatek on a municipality level, there is a cooperation between the ICT-educator and the IT-developer. In order to create the very best learning opportunities for all students in an inclusive classroom it is pivotal with this kind of cooperation. It is also necessary to involve all school leaders, teachers and paraprofessionals in working with digital tools.

4.1. Work descriptions

To make the organization work it is essential that not only the equipment is in place, it is also of great importance that all staff at the schools know how to use the equipment and why their students need it. The ICT-educator and the IT-developer work closely together to educate and inform their colleagues. Both E and M highlight the fact that all students get access to the digital tools, not only the students with disabilities. They put forward that it minimizes the risk of stigmatizing the students with disabilities. If all students have a Chromebook in the classroom the students with disabilities will not stand out.

When school datatek first was implemented in the municipality the focus was on students in special needs. The assignment was aimed at finding the best solutions of ICT for the individual student, for example for students with problems with their concentration and students with reading and writing

problems/dyslexia. This starting point could be understood as a categorical perspective on special education, which according to Dyson (2006) «individualises conceptualisations of children» (p. 4) with the result that this make the students in special needs different from their peers and the focus on the individual students draws attention from «the context in which difficulties arise» (p. 4). The starting point for the assignment of school datatek has changed over the years, from a categorical perspective to a relational perspective (Emanuelsson, Persson & Rosenqvist, 2001). In practice, this has meant that teachers and schools receive support for the opportunity to develop an inclusive education, aimed at all students in the municipality.

4.2. ICT-educator, School datateket [Central student health unit]

The ICT-educator belongs to a department in the municipality called central student health unit. In this department various professions works, for example special educator, school nurse, counselor and psychologist.

The assignment for the school datatek is:

— Working to improve the awareness of teachers and school leaders about inclusive solutions for student with special needs.
— Working to give the school staff knowledge about how to, from a special needs perspective, give student prerequisites to achieve their goals, with help from digital tools.
— Give advice and support concerning what digital tools might be suitable for individual students.
— Participate in networking groups for special needs teachers.
— Participate in different digital forums.
— Participate, if needed, in networking groups concerning digitalization.

The ICT-educator get the assignments from the principals from the different schools in the municipality. «If the need for supervision, consultation, investigation, lecture/ education or specific efforts of the Presence team is to be made». Application for contribution «shall be made in writing by the Vice-Chancellor / Preschool Director / Unit Manager».

4.3. ICT-Developer [IT-department]

The ICT-developer belongs to another department in the municipality, called IT-department. The assignments can come från teachers, principals or

the central administration and they are always based on the needs from the schools.

The general assignment for the IT-department is:

— Supervise employees in using and ordering digital tools and equipment.

— Keep up with the outside world and inform digitalization forums about digital tools and equipment.

— Participate in planning and implementing training connected to pedagogical digital tools plus putting forward educational materials.

— Plan and implement training and support to the IT-department technicians who support the teachers and the students.

— Participate in coordinating forums and give the information to the IT-department.

— Participate in digitalization forums and give the information to the IT-department.

— Participate in networking groups and give the information to the IT-department.

In order to work with ICT in an optimal way it is necessary to have accessibility to the equipment needed. In Kristianstad, the municipality has invested in technique that make digitalization possible. For instance in schools from 5th grade, all students get a Chromebook to work with, both in school and at home. The younger children get an iPad and Chromebook to work with in school. All teachers and educational staff have their own PC, provided by the municipality, to work with both at home and in school. Preschool uses iPads and Chromebooks.

Working with Chromebook and iPads demands that the schools have a network that is adapted to the need. Kristianstad municipality has fully developed network at all preschools and schools.

4.4. Resources and assistive technology

Different kinds of resources is presented on their websites:

G-Suite, own domain, about 23192 user

Google drive

Gmail

Google Calendar

Google docs

Google presentation

Google Classroom

ChromEx

Secure digital test

Using the resources makes it possible for the students and their teachers to work in the same document, if needed, and the student are able to work together with their class mates both in school and at home, which is an advantage, when for instance ill. Moreover it is for the student in general, but for the students with disabilities in particular, an advantage to be able to write their written tests on the Chromebook. In these digital tests it is possible for the teacher to let the students' use the assistive technology (AT) they normally use when working in school. In the following there are some examples of (AT) that student use[3].

Assistive technology

Audiobooks

Text to Speech

Dictation (Speech to text)

Word Prediction

Spelling

Structure with Pictures

Translanguaging

It is evident that engagement is an important factor whether students are going to succeed in school. When the settings in schools are engaging it seems like the students achieve their goals to a higher degree (Finn, 1989). According to Zimmerman (2002) the motivation of students can be enhanced when and if they use self-regulatory processes, such as close self-monitoring. Students who have the capability to detect subtle progress in learning will

(3) http://bufblogg.kristianstad.se/skoldatatek/category/alternativa-verktyg/

increase their level of self-satisfaction and their beliefs in their personal efficacy to perform at a high level of skill. In Kristianstad school datatek teachers can find ways of reaching students that is hard to motivate, by digital tools. Both E and M are referring to motivation and engagement when they talk about students' feelings when they are able to achieve their educational goals using digital tools.

Another way of approaching inclusive education is for teachers to implement an assortment of classroom strategies that empower their students and draw them into the learning (*engagement*) by providing choices, reducing anxiety, and rewarding effort. Those three concepts —representation, expression and engagement— are the cornerstones of UDL (Universal Design for Learning), and are the keys to planning motivating, accessible curriculum for the diversity of learners in inclusive classrooms (CAST, 2010). Additionally, the application of technology is a key underpinning of UDL, compelling teachers to make the acquisition of knowledge more accessible to students through such tools as voice to text software, interactive web programs, and electronic text. The thoughtful and well-designed application of technology is critical to implementation of UDL in the classroom (Edyburn, 2006).

When a child is absent from school for a longer period of time, the teacher may borrow a robot to have in the classroom. The robot can be the Child's eyes, ears and voice in the classroom.

4.5. Available and updated website

In order to develop inclusive education via ICT, it is important to make ICT available for teachers, school leaders and paraprofessionals. Therefore the ICT-educator and the IT-developer have blogs[4] to present news and

(4) http://bufblogg.kristianstad.se/pedagogisk-it/; http://bufblogg.kristianstad.se/skoldatatek/

instructional films for apps, programs and alternative tools. These blogs are updated regularly and consists of up-to-date and relevant information. On the blogs they also present good examples from different projects.

4.6. Conclusions presented as success factors

Finally we would like to do some conclusions of the good practice presented in this chapter. The conclusion will be presented as what we think of as success factors. In order to develop inclusive education, via ICT we think the following success factors are of importance:

— One important factor is the support from the school administration at the municipality level.

— Both a pedagogical and a technical perspective to overcome obstacles and opportunities for different solutions

— Through various municipal-wide licenses, all pupils are given the opportunity to use alternative tools. This means that students in special needs can get the support they need, without the feeling of being pointed out.

— By turning to the teachers, an inclusive education can be developed — instead of turning to individual students with a categorical perspective.

We can see many success factors, but would like end with a last example:

— The assignments can come from teachers, principals or the central administration and they are always based on the needs from the schools.

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2.

UNIVERSITY OF SEVILLE, SPAIN

SUPPORTING TECHNOLOGIES AND STUDENTS WITH DISABILITIES IN THE SPANISH CONTEXT

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1. NEW ROLE OF STUDENTS IN THE SOCIETY OF INFORMATION, COMMUNICATION AND KNOWLEDGE

The key of the current society is the ability of transforming information into knowledge required for change the environment, seeking greater freedom, equality and solidarity among people, thanks to the development of technologies.

The distinctive feature for the first industrial revolution seems to have been the substitution of human or animal energy for mechanical power. The second industrial revolution, also known as the cyber revolution, is creating processes which result in a type of extension of the human mind. Indeed, there are ways to enable people to increase their mental capacity in similar proportions as mechanical tools increased their physical strength during the first industrial revolution. An era is being lived in which transitions are outlined between the great spheres of human creation: between the different scientific disciplines and between them and culture.

The speed of processing, as well as the almost unlimited storage capacity, allows the transmission of information in an ever-increasing amount and in a smaller amount of time and space each day.

Indeed, what the information society really represents is a paradigm shift-focused from industrial to cultural production, with cultural production based on concepts, ideas and images (not tangible objects) as genuine items of value. This new paradigm is characterized by a set of features and effects connected to each other such as (Briceño, 2012):

— Construction of knowledge related to interdisciplinary fields of knowledge.

— Profusion of information and knowledge at high speed.

— Global economic processes, as well as cultural ones.

— Constant technological development and more well-equipped, but unequal societies.

— The use of the digital communication network is virtual for everyone, but not everyone has the economic capacity and infrastructure to access it.

— Transformation of the concept of citizen identity.

— Reconstitution of subjectivities (the subject, roles and institutions).

— Consumption as the core of urban life and social exclusion as subproduct.

— Difficulty to construct intersubjectively individual and social senses.

This is changing the citizens' lifestyles and affecting educational institutions, despite the resistance of educational systems to integrate them. Information and Communication Technologies (ICTs) began to produce changes in teaching methods and even expanded the curricular content, with the consequent reworking of the educational objectives for today. The information society itself demands a new training suited to new requirements. Thus, the stimulation of technologies in education is now being placed at the core of governments' and international organizations' concerns.

In the field of education, teachers play a leading role, hence all attention is focused on them. The teaching role is becoming more important each day in the new cultural and educational environments that are being created and that must be created using Information and Communication Technologies. The methodological innovation and the abundance and enrichment of teaching activities are key points towards a world under construction.

Children assume as normal the presence of technologies in society. They live with them and adopted them without difficulty for their daily use. In this regard, teachers must promote an education according to their own time,

making new teaching proposals and introducing necessary tools for this purpose.

It is necessary to know and understand in depth how they use them, for what purpose and how often they do it, as well as the importance they have in their day-to-day life. It is also interesting to know how these technologies mediate their interpersonal relationships with colleagues and adults (parents, teachers, etc.).

Within the social context, students are closely involved with ICTs because they have become a powerful tool that provides them access to information, communication and enhances the development of skills and new ways of constructing knowledge.

ICTs such as computers, Internet and mobile phones have brought about innovative and speeding changes in our society, mainly because they are interactive. People, through their use, can interact with other people or media while offering opportunities that were previously unknown.

The use of these technologies in the classroom is not about transferring specific information, but about teaching lifelong learning. Educational schools have to prepare their students not only to have access to information, but also to know how to «create» knowledge based on this information. They must know how to select, value, judge, criticize, refuse and properly use the information to which they have access from their school posts.

Definitively, these hasty changes imposed by the society based on information in the productive and communicational spheres require deep and flexible transformations in the transfer of knowledge. More than curricular content, what is required is to generate a general willingness to change in the ways of learning, communicating and producing. The professional future, «warns Alain Touraine, "is so unpredictable, and will involve such major gaps in terms of learning for the majority of those who attend present-day schools that we must, first of all, ask the school to prepare them to learn to change, rather than to train them in specific skills that are likely to be obsolete or useless for most of them in the short term" (Touraine, 1997, p. 328)».

2. SUPPORTIVE TECHNOLOGIES, ICT AND ACCESSIBILITY

Technological advances open up a wide range of opportunities for all people to participate and perform everyday tasks. In education, ICTs are a great help for students to access information and interact with each other.

Supportive technologies or assistive technologies are all those products (including devices, equipment, instruments, technology and software) that enable people with functional diversity due to disability to interact with their environment, increasing their functional capabilities or at least improving them.

The World Health Organization (WHO) believes that people with disabilities can improve their skills with the use of these technologies and hence are better able to live autonomously and participate in their societies.

In Spain, the «Spanish Strategy on Disability 2012-2020» represents a qualitative step forward in the development of human rights models in the area of disability. This Strategy has a double reference: the Convention on the Rights of Persons with Disabilities and the «European Strategy on Disability 2010-2020», adopted at the end of 2010.

The «Spanish Strategy on Disability 2012-2020» stands out in the field of ICT support technologies, since in recent years they have acquired special relevance and development, making the benefits and potential derived from their use unquestionable. Likewise, in the 2nd report on technologies and disability, ICTs have a direct impact on improving the standard for living of people with functional diversity due to disability.

But the technologies were not designed with people with functional diversity in mind. This is why many people face multiple barriers to their use (e.g. accessibility, cost-effectiveness and training).

The use of ICTs by people with disabilities in Spain has been studied by the National Statistics Institute (INE) through the EPDFVE 2013 Survey, where the common idea among people with visual, hearing and mobility disabilities that it is necessary to continue innovating in order to have adapted ICT devices and accessible applications and that incorporating ICTs facilitates the day-to-day life of people with disabilities and increases their employment possibilities is highlighted (Abril & Pérez Castilla, 2014).

It also shows that one of these people' barriers to ICT access is their limited real incorporation of content related to accessibility and design for all in the training of professionals. It is necessary to establish solutions to adapt it to people, so they are able, as far as possible, to use all resources and programs on their own.

In the school context, the main object of learning is the possibility of using the resources and programmes themselves.

Today, support products which were designed 20 years ago coexist with sophisticated systems which use artificial intelligence and which are sometimes even free of charge. Big ball mouse, such as the PC-Track model, in 15 years have only changed the connection interface, from RS-232 at the beginning to USB at present. At the same time, free facial recognition software, such as Enable Viacam, enables people who can only move their heads to operate the computer as though it were a conventional mouse or the PC-Track itself.

More sophisticated products, such as gaze-recognition systems, have also come into the market, allowing people who only have control over eye movements to use the computer, although at a higher economic price.

The most remarkable thing in recent years has perhaps been the development of free software applications, both for personal computers and for mobile devices, including telephones and tablets, which have been widely distributed, both in computer access (virtual keyboard VirtualKeyboard or the facial mouse Enable Viacam) and in Augmentative Communication (Plaphoons, e- Mintza In-TIC Mobile).

According to authors, such as Abril and Pérez Castilla (2014), among the lines of action to make access to ICT a reality for all are found:

Awareness and sensitization. Awareness of diversity and the importance of respect for the rights of all people, addressed to the whole society and in the educational context from the first levels.

Promote the establishment of networks to share information on products and services between users.

ICT training. Create programmes to improve the motivation of people with functional diversity due to disability towards ICT and increase the level of digital knowledge.

Incorporation of ICT in schools, accompanied by changes in the educational process, equipment and structures.

Accessibility and design for all. Training at university levels should result in all professionals producing goods and services knowing how to apply the principles of design for all to ensure accessibility.

Access to technology and supporting products. Making a reasonable cost commitment, on the part of the industry, from the very ideation of the product or service, taking into account that its installation, use and maintenance is attractive and affordable for users.

Knowledge of users' needs. Ensuring that the needs of people with disabilities and older people are taken into account in the development of ICT-related products and services.

Policies in favour of accessibility. Within national policies and within the framework of the European Union, promote the use of ICTs to enable people with functional diversity due to disabilities to live independently and increase their active participation in society.

Legislation and technical standards. Extend legislative activity and technical standardisation to areas and themes of ICT in which it has not yet been developed, for example, in relation to accessibility in video games.

By way of example, we can mention different types of assistive technologies depending on the functional diversity due to disability that can be found:

— Assistive technologies for hearing impairment:

There are different technologies that work together with hearing aids to make hearing impaired people hear better. These devices are:

— FM systems that use radio-frequency modulated waves to improve hearing when there is background or distance noise.

— Loop systems that pick up specific sounds using a strategically placed microphone.

— Headphones and subtitle services for television.

— Telephone technologies to improve hearing when using the telephone (they amplify sound to be able to hear effectively).

— Assistive technologies for visual impairment

These programs allow the exploration of the desktop and the access and use of the different programs installed in the computer through synthetic voice. They work through keyboard commands that replace the mouse and contain functions that allow reading characters, words, paragraphs... In addi-

tion, these programs allow access to Internet browsers, participation in forums, chat, social networks, blogs...

3. GOOD PRACTICES WITH ICT AS SUPPORT FOR STUDENTS WITH DISABILITIES. PROJECTS AND TECHNOLOGICAL RESOURCES IN SPAIN

3.1. Projects in Spain

a) H@z Tic Project

Practical guide of digital learning of reading-writing using Tablet for students with Down syndrome. The H@z Tic project, developed in collaboration with the Spanish Ministry of Education, Culture and Sport, explores how the use of tablets affects the process of acquiring knowledge (https://www.sindromedown.net/proyecto-down/proyecto-hz-tic/).

Despite all the progress made in the development of ICTs oriented towards education, until now there were barely any studies relating them to people with Down syndrome. This project pretends to encourage the use of ICTs by students with Down syndrome or other intellectual disabilities. It seeks to improve the educational response of these students by providing access and use of new technologies such as tablets — portable digital devices with the features of PCs and functions of interactive whiteboards and digital screens — with the applications and possibilities they offer. All this to help the student progress in skills, cognitive, language, and logical and mathematical learning. They benefit from its use, due, among other aspects, to its ease of use and additional motivation. Some of these benefits are:

— Increased motivation, learning and self-esteem by being able to enjoy much more eye-catching and colourful training times in which collaborative learning is encouraged, discussions and the presentation of their own work to their peers, encouraging self-confidence and the development of social skills.

— It encourages and facilitates a more significant learning in accordance with the current society.

— Facilitates comprehension through the power presented by this resource to reinforce explanations using videos, simulations and images with which it is possible to interact.

— Adaptation of texts and images to their level of development, as well as the possibility of manipulating objects and symbols. Hearing and

information processing difficulties are promoted due to the possibility of using visual presentations.

— Improved motor and psychomotor coordination.

— Promotes communication and interaction.

b) In-ICT Project for people with disabilities

In-ICT (Integration of Information and Communication Technologies in Disabled People) is a project that intends to use technology for the benefit of people with disabilities, particularly those with communication difficulties.

It is a free-of-charge application that seeks to offer accessibility and use of ICTs independently of the needs and physical, mental or sensory capacities of these groups.

The personalization characteristics, computer access and communication for computers and mobile phones, along with its free distribution, makes In-TIC an unique program, because there is no application of these characteristics available to groups of people with disabilities.

All the information and free download in the In-TIC portal

In particular, it enables people with functional diversity to improve their personal autonomy in two ways:

— Simplified access system to technology: It enables the creation of personalised environments for simplified access to computers and mobile phones, configuring those applications required by users according to their preferences. Through the creation and configuration of virtual keyboards personalized for each user, it is possible for people with physical, cognitive or sensory difficulties to use the computer, access the Internet or the mobile device's basic functions, execute specific applications, games, etc.

— Dynamic communicator: People who have not acquired oral language or have difficulties in the development of reading and writing skills can use in ICT as a communicator (augmentative and alternative communication), both in conventional computers and laptops, tablet PCs and mobile phones, creating templates with text and images that reproduce personalized sound files or using the voice synthesis capabilities of the environment for interaction itself.

The computer interaction is also simplified by the possibility of integrating different technical aids or supporting devices (hardware) such as mouse emulators, pushbuttons or touch screens, with which In-ICT is compatible.

In addition, to facilitate the creation and personalization of keyboards and templates, In-TIC integrates a Multimedia Library with the image collections of ARASAAC (Aragonese Portal of Augmentative and Alternative Communication) and Aumentati.net,and a selection of sounds downloaded from the portal of the Ministry of Education of the Government of Spain. This library can be updated and personalised, using the images, pictograms or sound files (MP3, WAV) needed by the user (https://www.guiadisc.com/proyecto-in-tic-para-personas-con-discapacidad.html).

c) «Amovil»

Amóvil is the result of a project promoted by Fundación ONCE (Spanish National Organization for Blind People) entitled «Experimental study for the identification and comparison of accessible and easy-to-use mobile Internet technologies» (project co-financed by Plan Avanza). Their website is http://www.amovil.es/

The specific objectives of the experimental study proposed by ONCE Foundation are:

1. Develop a methodology that enables a comparative analysis of the different technologies integrated in mobile devices (operating systems, hardware components, communications software, user interfaces) from the point of view of its accessibility and ease of use, as well as the support products and main services for access to the information society provided through them.
2. Analyze the accessibility and ease of use of large volumes of mobile devices marketed in Spain, as well as the main support products and Internet services available for them.
3. Design an expert system for the search, selection and configuration of mobile devices, compatible support products and information society access services offered by operators that takes into account the needs of each user, both those arising from their functional diversity and their preferences for use.
4. Generate knowledge and awareness of accessibility to mobile communications through the development of a participative Internet site (Web 2.0).

5. Opening a channel for the collaboration of accessibility experts who constantly update the characteristics of the set of mobile phones being marketed in Spain at all times to ensure the sustainability of the project.

6. Make telephone manufacturers, operators and distributors aware of the need for access to society information for users with functional diversity, involving them in this project.

One of Amóvil's main objectives is to create a network of cooperators which helps to keep its knowledge base updated and thus be able to provide updated and truthful information on mobile devices and accessible applications. Therefore, it invites manufacturers, service providers, operators, experts in accessible technology, users and the general public to collaborate with the portal using the following ways:

— Loan of mobile devices for evaluation;

— Technical articles on mobile technology development, user experience studies, usability, etc., to be published on the portal's blog;

— Improvement and updating of the accessibility analysis methodology;

— Information on innovation in mobile technology;

— News about accessible mobile technology to be published in the News section;

— Translation of articles into one of the official languages of Spain or Europe, mainly English, French, Italian, Portuguese or German;

— Participation in Amóvil's awareness-raising and training initiatives (workshops, conferences, etc.);

— Opinions or testimonies on the use of devices or applications

3.2. Technological resources used in Spain

Although there are many technological products related to the training and rehabilitation of people with cognitive diversity, we will focus on applications or apps for mobile devices (phones and tablets) as it is a technological medium with a significant penetration in the population, whether children, teenagers or seniors.

Depending on the type of terminal we have, we will distinguish between apps for iOS operating systems, for specific mobile phones and Apple brand tablets; and for Android, specific for almost the rest of mobile phones of

brands such as Samsung, LG, etc.. In addition to specifying the operating system, we can also differentiate whether they are apps related to numerical calculation, specific games, entertainment, music, etc.

In order to be able to scan the QR codes both with the mobile phone and with the tablet, you can download the i-nigma application (free). For iOS devices (Apple) open any browser on your terminal and type the following internet address: http://bitly.com/i-nigma-ios. The address will direct you to the AppStore page to download the program. After opening, assign program access privileges to the device camera and capture the QR code with the terminal, press Go Online to go to the iTunes page to download the app whose code you have scanned.

For Android devices (Samsung, LG, etc.), open your internet browser and type the following internet address: http://bit.ly/i-nigma-android. The process of installing the program to scan QR codes is very similar to that of downloading and installing the apps to work on cognitive functional diversity as well. As for other devices, you must give privileges to the program to access your camera and photographs.

a) Mefacilyta

It's an application of the Vodafone Foundation. This application supports people with intellectual disabilities. Mefacilyta's support makes it easier to understand the activities you have to do each day.

This application is used by two types of people: people with comprehension difficulties and people with support.

People with comprehension difficulties can:

— Consult support through QR codes.
— Consult supports for their daily activities in a calendar.
— Consult your favorite supports.
— Complete task lists.
— Use games.
— Send video, audio or photos of the activities they do.
— Consult the time.
— Call their support staff.
— Download some support to consult when you do not have internet.

Support people, from a web environment, can:

— Create support for any daily activity with texts, photos, videos or sounds.

— Link some supports with others.

— Assign them to one or more people on the dates and times you choose.

— Create groups of people and assign support.

— Create alerts that notify people of a time they choose.

— Create task lists.

— Create games.

— Receive images, videos or sounds sent by people with comprehension difficulties.

— Share the supports they choose with the rest of the community.

Free download:

https://play.google.com/store/apps/details?id=en.fundacionvodafone.elabor.controlador&hl=en

b) LazarilloApp GPS Accessible

Lazarillo is a GPS application that seeks to provide autonomy to visually impaired people, through voice messages that provide information about the path on which they travel, facilitating their mobility through the city. The application provides greater independence and guidance to the user in its link with the environment, being able to go to the place you want independently, being notified of institutions, shops, public transport stops and services that are around.

The application provides people who are blind or have low vision with better accessibility to everything the city has to offer, completely free of charge. Lazarillo works in all the cities of the world, it is available in English, Spanish and Indonesian, while working on the translation to the rest of the languages.

Main characteristics of Lazarillo:

Exploration mode: announces where the user is and what is around him, such as bus stops, ATMs, shops, among others. It also informs about places close to its position and the intersection of streets where it travels, improving mobility. Searches by categories: locates nearby sites through categories such as banks, health, food, transportation, among others, ensuring better accessibility to what is in the environment. Specific searches: allows you to enter

addresses in the «search» button and find any place you need. Save Favorites: saves places to be available without Internet connection and associated with the user's account. It can be made with the address or through GPS locators. Routing or guiding from one point to another: it allows the user to choose a place and planning a route to get there. There are several travel options to ensure mobility in the city: walking, car, public transport or Uber.

Tracking: activates the tracking of a place to receive alerts as the user approaches it.

Free download: https://play.google.com/store/apps/details?id=com.lazarillo

c) Accessible Heritage Cities

The APP «Accessible Heritage Cities», an accessible and free application developed by «Javacoya Media» (project of ASPAYM Castilla y León) for the Group of World Heritage Cities of Spain with the collaboration of the State Representative Platform of People with Physical Disabilities, PREDIF has been the winner in the category of «Best solution for mobile devices» of the E-Volution Awards 2016 organized by the North of Castilla.

The purpose of this application is to offer disabled visitors and other needs, as well as information on the accessibility conditions of the tourist offer of Heritage Cities. Its contents facilitate the planning of visits and their own experience in the city, because they allow users to select the tourist resources of their interest and the establishments whose accessibility characteristics are best suited to their particular needs.

The application collects the routes of tourist interest of each city best prepared to be travelled by People with Reduced Mobility and tourist establishments of different types: monuments, museums, tourist offices, accommodation, restaurants, others.

All this information has been verified in situ by PREDIF technicians in accordance with a specific accessibility verification protocol for tourist establishments. The information on Úbeda and Baeza has been collected in 2015 and that of the other cities updated in 2014.

The App is available for iOS and Android devices, although it also has an online version at www.ciudadespatrimonioaccesibles.org. This website has an adaptive design (responsive) to be viewed from mobile devices, but it is

recommended to make use of mobile applications to access information from a mobile device because, being native applications, access to information is much faster and you can also access the information of the application without having access to the Internet (except the functionality of «Agenda» and «The nearest»).

This App is based on the same database as TUR4all, an inclusive tourism application developed by PREDIF and the Vodafone Spain Foundation.

Free Download:

https://play.google.com/store/apps/details?id=com.javacoya.cipat

d) Farm Animals: Learn and Paint

According to their creators, both parents and children will enjoy together knowing the sounds of the farm animals. The youngest will discover that just by touching the screen they will be able to hear the cow mooing, the sheep bulleting, the horse neighing...

The application also gives the youngest members of the household the opportunity to finger paint their favourite animals and share them with the rest of the family and friends. Once painted, it can be saved in the memory of the device and sent by email, WhatsApp, save in the cloud, and so on.

This app is for Apple branded terminals only and can be installed on both iPhone phones and iPad tablets.

In addition, aware of the convenience of introducing English from an early age, the application enables users to hear in Spanish and English the names of the animals with native voices in both languages, those of Spanish are voices of children and those of English are adults.

In total, ten different languages reside in the application created to help parents stimulate the sensory and cognitive development of their children. The animal illustrations included enrich the attractiveness of an app that dazzles with its aesthetics. The animals represented in this application are: cow, sheep, horse, pig, chicken, duck, dog, cat, donkey and hen.

Website:

https://itunes.apple.com/es/app/animales-granja-aprende-y/id504810539

e) Animal puzzles for children

(http://bit.ly/puzzles-animales-para-niños-android)

Puzzle 4 Kids is a playful educational game for young children. This game will help children develop association, tactile and fine motor skills. Users will learn the names of many farm animals, wild animals, insects, and other animals through fun and play.

It is a very stimulating app where applause and congratulations will always encourage and reward the child, motivating them to continue improving their vocabulary, memory, association and cognitive skills while playing. The game has animations, sounds and interactivity to repeat the game and learn.

It uses a simple, intuitive and child-friendly interface, it is in 30 different languages and pronunciations: English, African, Arabic, Bengali, Chinese, Danish, Dutch, Filipino, Finnish, French, German, Greek, Hindi, Indonesian, Italian, Japanese, Korean, Macedonian, Malay, Norwegian, Polish, Portuguese, Russian, Serbian, Spanish, Swedish, Thai, Turkish, Ukrainian and Vietnamese.

It has hundreds of puzzle pieces in 100 different puzzles, easy navigation between puzzles, high quality color graphics, soft background melodies, balloon animation and congratulations after the correct resolution of each puzzle, and best of all: all puzzles are free.

The creators of this app take children's privacy seriously, so it includes no links to social networks, no shopping applications, and no personal information is collected. Although it does include advertising, it has been carefully placed so that the child is unlikely to click on it while playing.

Website:

https://play.google.com/store/apps/details?id=com.iabuzz.puzzle4kidsAnimals&hl=en

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3.

ZUYD UNIVERSITY OF APPLIED SCIENCES, HEERLEN, THE NETHERLANDS (REPRESENTING PARTNER UCLL - BELGIUM)

OPTIMIZING THE DELIVERY, USE AND EVALUATION OF ASSISTIVE TECHNOLOGY (AT) FOR DYSLEXIA

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1. INTRODUCTION / BACKGROUND

People with dyslexia face major challenges in their school and work career due to limitations in written language. Therefore, they often opt for a lower level of education than is appropriate for their level of competence (NRD, 2013; SDN, 2016). Evidence shows that Assistive Technology (AT) can be very effective in preventing, diminishing, or solving those restrictions if properly selected and used (Van der Weerden, 2008; Henneman et al., 2013).

Implementation of AT for dyslexia is not going well according to a poll of the ministry of education, culture & welfare (Dijksma, 2009). A desk research and an invitational conference with Dutch stakeholders of these devices (suppliers, professionals, users and their social environment), showed that even when the selection of a device is carefully done, they are not used optimally in everyday life and high numbers of non-use have been ascertained. The stakeholders who should offer guidance and support often do not have enough time and/or material at their disposal, do not have the expertise to make optimal use of all the possibilities of AT and have no clear picture of how to stimulate and facilitate the use of AT. They strive for a more effective and efficient service delivery.

An added value of compensating AT for dyslexia is intrinsically tied to the environment in which they are used (Smeets & Kleijnen, 2008; Nijakowska, 2010; Pino & Mortari, 2014). This essential and optimized provision and use in daily life of these devices will only be achieved if the social environment is involved in taking an active role in accepting, facilitating and stimulating its use.

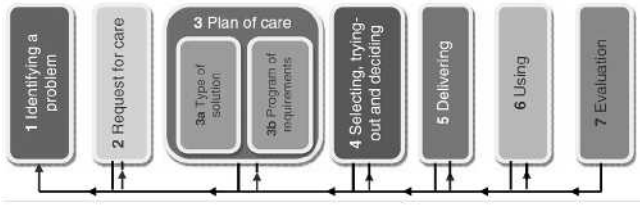

Figure 1. The steps taken in the provision of assistive products (Heerkens, Y., Bougie, T., & Claus, E. (2011). The use of the ICF in the process of supplying assistive products: discussion paper based on the experience using a general Dutch prescription guideline. *Prosthetics and Orthotics International*, 35(3), 310-317

Derived from a general Dutch guideline for the provision of AT devices (Heerkens et al., 2010; Heerkens et al., 2011) the three last steps comprise delivery and instruction, training and use, and maintenance and evaluation. Therefore, the aim of the COM project was to optimize those last three steps in the provision process of Augmentative and Alternative Communication AT devices and compensating AT devices for dyslexia. Both groups of users experience similar problems with the use of AT. However, they do not identify themselves as one group. It was therefore opted to elaborate the methodology separately for both groups The focus of this paper is on persons with dyslexia.

2. COM PROJECT

A Participatory Action Research was conducted in partnership with all stakeholders in four phases with a total duration of two years (2015-2017).

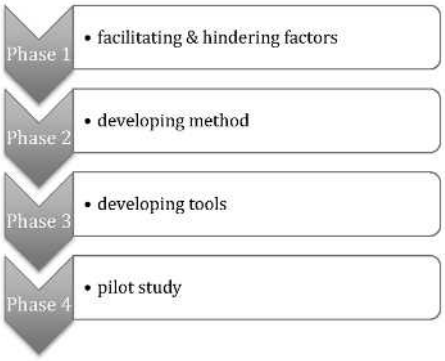

Figure 2. Four phases of the COM project

The Medical Ethical Committee Zuyderland, Heerlen, the Netherlands approved the study. Participants were recruited via the Dutch and Flemish suppliers of compensating AT for dyslexia, as well as via professional networks connected to Zuyd University of Applied Sciences. Those volunteers received a comprehensive information letter that detailed the study's purpose and procedure, the possibility to ask questions or to provide additional information and finally giving their informed consent to participate in the study.

2.1. Phase 1 — facilitating and hindering factors

2.1.1. Objective

The objective of the first phase was two-fold:

1) to gain insight into the current facilitating and hindering factors of all stakeholders

2) to define requirements for a set of tools to implement a new method that supports optimization of the last three steps of the provision process.

2.1.2. Method

Identification of facilitating and hindering factors in the use of AT took place through

1) out of the box meetings with end users, their family and social environment

2) focus group interviews with professionals (speech and language therapists, teachers) and suppliers

3) direct member check

Table 1. Participants «Out-of-the-box» meetings, and (focus group) interviews

Participants	Number
Adults	4
Children and youths	12
Professionals	6
Suppliers	4
Total	26

In total, 26 persons participated in the «Out-of-the-box» meetings, and focus group interviews, as detailed in table 1.

In order to gain insight into end users' experiences with the phases of delivery and instruction, training and use, and maintenance and evaluation, two so-called «Out-of-the- box meetings» were organized at different settings. The first meeting for end-users aged between 10 and 17 years took place at a Dutch amusement park during the autumn holidays, October 2015. Parents and one other communication partner (e.g. a friend or a classmate) accompanied the children and youths. Prior to the «Out-of-the-box» meeting, end-users were asked to fill in a digital version of the D-QUEST (Wessels & de Witte, 2003) to assess their satisfaction with the AT devices they used. The meeting with adult end-users took place in Heerlen.

Afterwards, focus groups were held at a meeting facility in Eindhoven, organized in two groups, consisting of respectively suppliers and professionals working with clients, also involved with the provision.

In each «Out-of-the-box» and focus group meeting participants were divided into small sub-groups and were asked to recall their experiences concerning the last three steps of the service delivery process using the Rich Picture Method (Monk & Howard, 1998). For each step, they discussed the

aspects that went well and should be maintained, what they perceived as negative and should be changed, and finally they deliberated about the ideal situation. They noted down statements and ideas on sticky notes. Meetings were concluded with a plenary discussion of the findings.

Written data from the sticky notes were clustered and summarized; group discussions and interviews were digitally recorded and transcribed. All data was analyzed inductively by using qualitative content analysis (Boeije, 2014).

Data from the various stakeholders was organized in a table to depict similarities and differences. The findings were complemented with those resulting from a scoping literature review, which is described with more detail in 2.2.

The findings from the out of the box meetings were presented to the participants during a member check. After confirmation, the findings were translated into a list of requirements for the intended new method. Every participant scored the list of requirements, using the MoSCoW method. Only the Must-haves and Should-haves were included in the list of requirements.

2.1.3. Results

From the comprehensive qualitative data collection the following topics emerged, which represent each of the last three steps of the service delivery process.

Delivery and instruction

Need for tailored, phased and repeated instruction: When funding devices, there is more attention needed for external preconditions that are vital for successful use. In many cases, tailored, phased and repeated instruction split over several shorter appointments would be more effective, and would help to prevent information overload. Instead of lengthy manuals, users benefit from practical, vivid instruction. Materials need to be adapted to individual users' level of knowledge and capacity, as well as to those of their immediate social environment. A mix of videos, pictures, quick reference guides, face-to-face instruction and schemes for adapted instruction by developmental phase would be supportive. Delivery and instruction require careful preparation and all stakeholders should be involved.

Need for a website to exchange information and experience: Participants advocate a forum to exchange information and experiences and a website

with FAQ. It is important for users that suppliers are accessible and that they quickly respond to their questions. Currently, it frequently takes too much time, the availability of suppliers' helpdesks is limited and staff with a more technical background often lacks communication skills.

Need for qualified professionals: It is essential for professionals working with end-users of AT for dyslexia to have knowledge on software devices, functions and functionalities. They need to support the construction of the relation between user and immediate social environment and have to encourage it. Professionals and suppliers have to use a common language. Professionals have to be involved with the entire provision process, focusing on the implementation of AT into the daily life of their users and their social environment.

Use

Need for collaboration and common language: Besides good and efficient collaboration and a common language, it is crucial that implicit knowledge of all stakeholders becomes explicit. Currently, the service delivery and collaboration depends too much on specific, individual persons.

School plays a very important role for proper use of compensating AT for dyslexia in support of children and youths. Attending professionals also act as a mediator during this phase: between teachers and end users' social environment, but also between the supplier and end users' social environment. They should coach pupils, parents and teachers in stimulating AT's use at home and at school. Furthermore, they have an important task in empowering end users' social networks. However, depending on the setting professionals have various amounts of time and resources available for users and their AT devices, which is perceived as a huge problem. Teachers and classmates have prejudices against students with dyslexia using their computer in classroom.

End users have to experience benefits by using AT in everyday life, with a focus on independence and productivity (e.g. education, work). Use should be possible under all circumstances and should not be frustrating (e.g. by problems with rebooting, or functioning). Ideally, the device should become a part of the person.

The social environment plays a crucial role in AT's use. People should act as a role model and encourage the use of it. Professionals have to empower them throughout the entire process.

Need for shared responsibility: A clear school policy and programs are essential to stimulate AT's use for children. Frequently, teachers do not feel responsible but rather threatened and thus should be better involved in the implementation process. They should take an active role in making educational content accessible with compensating AT for dyslexia and ensure active use, but need more knowledge and training to be able to do so. They should engage more in active collaboration. Use of the device has to be implemented in daily activities at school.

Need for awareness: Besides involvement of the immediate environment, there is a need for more attention and awareness on the importance of being able to read and write in the society as well as for a different attitude. Written communication determines quality of life and the sense of self-esteem, which is sometimes neglected by others. The relevance of using AT is still too often minimized.

Maintenance and evaluation

Need for a client-centered evaluation: When funding AT devices for dyslexia, evaluation should be obliged. Suppliers mentioned that they could learn from a thorough evaluation allowing them to re-design their services in a client-centered way. However, mainly technical aspects rather than adequate use are actually considered.

Need for repeated evaluation: Participants desire a decent evaluation procedure, open to end users' needs, with periodical updates and use of a validated measurement instrument. Administering a short evaluation form is not sufficient. Gaining insight into end users, practical use, perceived problems with, functionality and benefits of the devices also demands a tailored evaluation (e.g. by structured observation). Moreover, parents' capacity should be taken into account. Transitions could form a good cause for evaluation.

Need for open evaluation: Suppliers and professionals have an important role in the evaluation, maintenance and support, their accessibility and availability should be assured and improved. High-quality service provided by user-friendly personnel is required. Criticism may not influence further service delivery.

Repair and replacement of devices should proceed safely and smoothly; the impact on users should be kept to a minimum.

Again, collaboration between all stakeholders is essential. Problems should be signaled timely and all persons involved have to be aware of their tasks and responsibilities.

2.2. Phase 2 — developing method COM

2.2.1. Objective

In this phase the aim was to develop a method to promote optimal use of AT devices for dyslexia.

2.2.2. Method

We used a mixed method design in which

1) best practices with regard to the use of AT devices for dyslexia described in the international scientific literature were collected,
2) 5 Mini-cases were conducted,
3) an integral method was developed,
4) a Community of practice (COP) was built and
5) a Member check performed.

1) In a desk-research we explored the international literature using Pubmed, Cinahl, Google scholar, Cochrane, Science Direct to detect the best practices and approached experts to gain other relevant information.

2) 5 mini-cases were conducted through conversations with professionals, clients and their environment, patient records and participatory semi-structured observations. In total 5 participatory observations are conducted in different contexts (school, work, home, leisure) to get insight into a day in the life of a AT device user for dyslexia. Data was analysed using a content analysis.

3) Based upon the outcomes of phase 1, the desk-research and mini-cases, the integral method was developed. The steps taken in the provision of assistive products (Heerkens, Y., Bougie, T., & Claus, E., 2011) was used as a basis for the development of the integral method. In several meetings with the project group a standard for delivery and instruction, for use and evaluation was developed.

4) The COP was built based upon the strategy: Inquire, Design, Prototype, Launch, Grow and Sustain (Cambridge et al., 2005). In phase 2 only the steps Inquire and Design were conducted. In the step Inquire the needs of the stakeholders (teachers, users, professionals, deliverers) with

regard to the community were collected in a day session. In this session the aims, the outcomes, the themes were discussed in subgroups. All participants were encouraged to participate actively. At the end of the sessions the outcomes of each subgroup were discussed. Based upon the outcomes a common vision and mission was formulated. In the design session the facilities, finance and organizational structure of the digital Community of Practice was discussed.

5) Member check: The developed integral method and the design of the Community of Practice were presented and discussed with a delegation of the stakeholders.

2.2.3. Results

The literature review complements the facilitating and hampering factors from phase 1 with good practices and suggestions.

Instead of best practices, the mini-cases merely revealed points to improve like making sure that the content was available in time, improving the number of activities at school where AT are allowed and the appointment of a supporting buddy in the classroom when the pupil encounters a problem using AT.

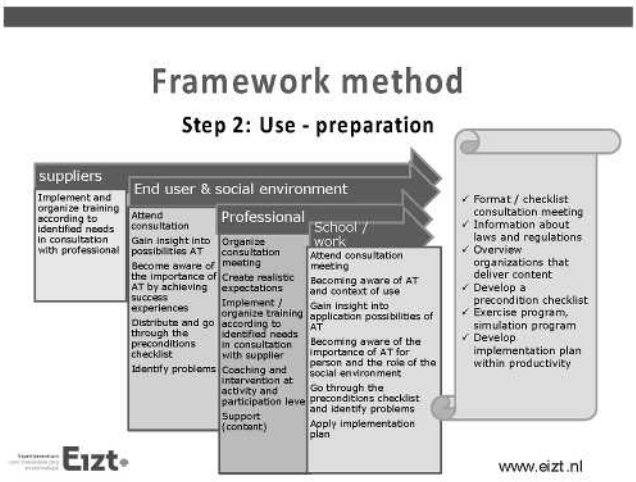

Figure 3. Example framework integral method — step 2 use (preparation)

Based upon the identified necessary actions (see example figure 3), stakeholders developed a method to optimize the delivery, use and evaluation of compensating devices for dyslexia. This method

1) outlines every partial step that has to be taken in each of the 3 steps in time;

2) details tasks and responsibilities of all persons involved;

3) supports multi-disciplinary collaboration by providing a common language and framework and support client-centered, context- and evidence based practice.

The Community of Practice needs to serve all stakeholders: professionals, users, parents, deliverers (figure 3).

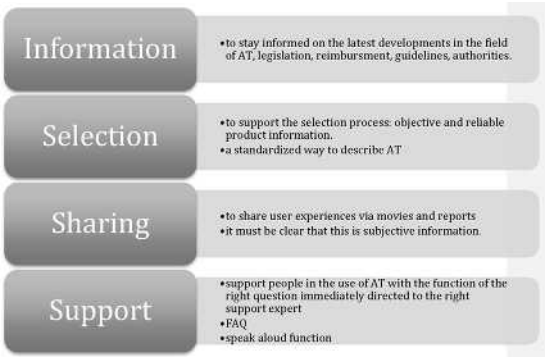

Figure 4. Content needs COP

2.3. Phase 3 — materials and tools development

2.3.1. Objective

This phase consisted of 5 steps:

1) adapting the developed method, based on a member check,

2) developing tools to apply the developed method,

3) making an inventory of measurement instruments to be able to conduct the pilot and to measure the effects,

4) building and testing an online Community of Practice,

5) providing instruction for applying the products for the implementation of the COM method as well as an integral implementation method

2.3.2. Method

1. *Adapting the developed method, based on a member check*: in an iterative process the integral implementation method has been refined, based

on the feedback obtained by all stakeholders, using group discussion with the participants involved (persons with dyslexia and their parents / carers, suppliers, professionals, care organisations, schools, and advisory board) and the research team. Participants were asked to provide feedback on the developed method and stimulated to indicate necessary changes from their perspective. These suggestions were incorporated in a new version of the method, which was presented again, until consensus was reached.

2 *Developing tools to apply the developed method*: Based on the results of phase 1 and 2 as detailed in the previous paragraphs, products were developed to facilitate the implementation of compensating AT for dyslexia for all steps of the integral implementation method. The developed products comprised: materials to create awareness for the importance of compensating AT for dyslexia, videos in which the different phases (delivery and instruction, training and use, maintenance and evaluation of AT devices for dyslexia) were explained, a clear description of tasks and responsibilities of all stakeholders involved in accessible format, checklists to prepare each phase, vivid user-guides, and an easy to use, accessible measurement instrument for evaluation. All products were developed in close collaboration between members of the project group, AT users, and students of different educational programmes from Zuyd University of Applied Sciences. All tools can be downloaded from the aforementioned website.

3 *Inventory of measurement instruments to be able to conduct the pilot and to measure the effects of the AT provision*: Based on the project members' expertise regarding measurement instruments (e.g. database: measuring in care), suitable instruments were selected to measure effectiveness and use of as well as satisfaction with AT, further focused on compensating AT for dyslexia. Together with the participating suppliers and professionals the most suitable instruments were selected and discussed with AT users, concerning face validity and feasibility. To limit time and effort as much as possible, the evaluation starts with a quick scan to identify those aspects which need more in-depth measurement. Taking into account recent trends in evaluating the effects of AT service provision from the perspective of the user, several generic as well as (compensating AT for) dyslexia specific measurement instruments were selected and reviewed by the members of the project group concerning validity, usability, and reliability. This selection of measurement instruments was presented to and discussed with the participating AT suppliers and professionals.

4. *Building and testing an online Community of Practice*: In this phase an online Community of Practice was built, tested and implemented according to the method: Inquire, Design, Prototype, Launch, Grow and Sustain (Cambridge et al., 2005). In collaboration with students from the educational programme communication and multimedia design and a professional design bureau a first version of the website was realised, based on a detailed list of requirements as ascertained in the preceding phases. A small group representing all stakeholders (2 suppliers, 1 professional, 2 clients and meaningful others, 2 members of the advisory board, and 3 teachers) was invited to test the online COP. The group described above tested the online COP in «lab settings» as well as in real world settings with several clients. They evaluated aspects like technical stability / reliability, lay-out and usability. Their findings were reported to the design bureau and the site was adapted accordingly. Furthermore, the website was filled with relevant content.

5. *Providing instruction for applying the products for the implementation of the COM method as well as an integral implementation method*

All participating suppliers and professionals received one day instruction and training on using the COM method. This training day was held in Den Bosch. In the morning the integral implementation method was explained in detail and afterwards, the participants were asked to use the developed tools in an interactive workgroup session. All products for each phase of the implementation method were explained and applied. At the end of the day the participants provided their feedback on the developed tools and rising questions were discussed and answered.

2.3.3. Results

As a result the integral implementation method was published via the website www.dyslexiehulpmiddelen.com. The developed products comprised: materials to create awareness for the importance of compensating AT for dyslexia, videos in which the different phases (delivery and instruction, training and use, maintenance and evaluation of AT devices for dyslexia) were explained, a clear description of tasks and responsibilities of all stakeholders involved in accessible format, checklists to prepare each phase, vivid user-guides, and an easy to use, accessible measurement instrument for evaluation. All products were developed in close collaboration between members of the project group, AT users, and students of different educational programmes from Zuyd University of Applied Sciences. All tools can be downloaded from the aforementioned website.

The measurement instrument starts with a quick scan on users' satisfaction with the process of AT provision, the AT and the perceived added value of the AT. When indicated, these aspects could be evaluated in more depth by using the D-Quest (Wessels & de Witte, 2003) and the IPPA (Wessels et al., 2003). This instrument for evaluation can be found in two different versions, one for children and youth and one for adults, on the aforementioned website. The result of phase 2.3.4 was a working first version of the online Community of Practice (the website www.dyslexiehulpmiddelen.com). The last phase resulted in x professionals working with persons with dyslexia who are able to use the COM method.

2.4. Phase 4 — The pilot study

2.4.1. Objective

In the last phase

1) the method was implemented by means of a pilot study,
2) the digital COP was used
3) a product and process evaluation took place, and
4) after adjustment, the method was launched.

These subprojects reinforce each other.

2.4.2. Method

Pilot Study Six children with dyslexia participated in the pilot study. These participants were followed for approximately 3 months through the steps of delivery and instruction, the use and evaluation, and maintenance. We applied the newly developed method. We also used the developed measurement instrument for evaluation to ascertain differences between the pre- and posttest. This measurement instrument contains

1) First impression of satisfaction: on the basis of colored buttons (red, yellow, green) the student indicated to what extent he was satisfied with the device, the provision and the benefits of the use;
2) Influence of the environment was evaluated with the question «Can you use your AT in all situations of daily life in which you would like to?»;
3) The D-QUEST (Wessels & de Witte, 2003) to assess the satisfaction with the AT devices they used;

4) The D-QUEST (Wessels & de Witte, 2003) to assess the satisfaction of the provision of the AT;

5) The Individually Prioritized Problem Assessment (IPPA, Wessels et al., 2002) to assess the effectiveness of the AT provision.

The evaluation took place during a conversation with child, parent(s) and a language and speech pathologist.

Use of digital COP All participants in the project are invited to make use of the COP themselves and to invite their network to participate in the COP.

Product and process evaluation The COM method and digital COP are evaluated on several aspects by suppliers of AT for dyslexia, practitioners, teachers, persons diagnosed with dyslexia and their social environment.

During the product evaluation following questions were asked: «Is the method user-friendly? Realistic? Does it meet the set objectives?». Questions during the process evaluation include: «Can you achieve the objectives by the chosen organizational structure and the procedures? To what extent was the support offered encouraging and / or obstructing?». The evaluation took place on the basis of interviews and a focus interview per group.

Adjustment and launch Based upon the inventoried problems in the process and product evaluation, the last adjustments were made. A training day was organized for all stakeholders involved. During that day participants were trained in using the COM method throughout all three steps. Participants learned to use the developed tools.

2.4.3. Results

Pilot study All participants reported a reduction in perceived problems due to the use of the AT.

Table 2. Results of IPPA-start and IPPA-follow-up for case S

IPPA	**Start** **10/6/2017**		**Follow-up** **13/10/2017**
Challenging activities of daily living which are expected or hoped to decrease by the use of your compensating AT for dyslexia	**Importance of this activity**	**Difficulty of the activity**	**Difficulty of the activity**
	1 = Not important at all 2 = Not so important 3 = Somewhat important 4 = Quite important 5 = Most	1 = No difficulty at all 2 = Little difficulty 3 = Quite some difficulty 4 = A lot of difficulty 5 = Too much difficulty to perform the activity at all	
1 I want to decrease my writing mistakes	5	5	3
2 I want to decrease my angry level because other children are better in writing than me	5	5	1
3 I want to improve and facilitate my learning speed for tests	4	4	1
4 I want to be more independent in executing my homework and studying	3	3	4
Total score IPPA-interview (total perceived problems)	[(5x5) + (5x5)+(4x5)+(3x4)]:4= 82:4 = 20,5		[(5x3) + (5x1)+(4x1)+(3x4)]: 4= 36:4 = 9

In table 2 the results of the IPPA-start and IPPA-follow-up are resumed for S., an 11-year old boy with dyslexia who was in the 5th grade of primary-school. After 4 months of use of the AT and guidance with the developed COM method, he and his parents experienced less problems (IPPA-score 9) than before using this method (IPPA-score 20,5). During the IPPA-interview at the start, child and mother report high difficulties with the activities. When asked for the difficulty he experienced with «I want to decrease my writing mistakes», he answered «10» while the maximum score is 5. When asked for the difficulty at «I want to decrease my angry level because other children are better in writing than me», he mentioned «15» and his mother even «100». The child reports more difficulties on the item «independency in executing homework and studying» after the intervention because he still needs help with the foreign language French. Reading and writing tasks in Dutch, his mother tongue, he can now perform without his parents' help.

Materials and tools developed within the COM project were used during the intervention. The professional (in this case a language and speech pathologist) focused in the step of *delivery and instruction* on creating awareness among parents, teachers and school environment and on functional instruction of the AT. The developed awareness posters were used to emphasize the benefits of the AT for this pupil at school. By going through the prezi «Milestones and transition moments in learning» together, the parents gained insight into the learning problems of their child and the advantages that the AT could generate. The checklist with the preconditions for the use of AT facilitated a successful start. In the step of *training and use* the intervention consisted of coaching which focused on the activities identified in the IPPA-interview. By making concrete agreements on and expanding the use of AT in various tasks and contexts, participation was stimulated. The timeline with detailed tasks and responsibilities provided guidance to all persons involved.

The professional also coordinated and facilitated the consultation moments with the school, parents and child to make adjustments where and when necessary. For example by questioning the influence of the environment, it became clear that S. was not allowed to use his AT during all activities at school. Solutions were then sought together.

Launch A training day was held in November '17 for education and healthcare professionals who would like to use this developed methodology. The attendance was high and the audience received the developed methodology very enthusiastically. Educational and healthcare professionals benefit from the new insights. They can play a crucial role in guiding persons with

AT by using this method. By acquiring knowledge about how the optimal use of AT can be achieved, more learning goals can be achieved and people with dyslexia function more independently and contribute more to society, possibly saving costs later in life. People with dyslexia can follow education that suits their intellectual abilities and interests. This increases their chance of work and their functioning in their job.

3. DISCUSSION / CONCLUSION

Within the COM project, a method for successfully implementing AT to compensate for dyslexia was developed. In all phases the cooperation between suppliers, professionals in care and education, users and their social environment was stimulated as much as possible. Materials, tools and the website www.dyslexiehulpmiddelen.com were developed to optimize the use of AT to compensate for dyslexia.

Professionals from the work field embraced the developed method and the results of the pilot study were positive. Collaboration and awareness are crucial to enable the use of AT for people with dyslexia.

The results of the project were presented at different national and international congresses. In addition, the results were also presented during multiple training days and workshops of professional associations, where the research community and field workers were represented. Since 2018 the ministry of Education of Flanders in Belgium, provides free reading software for students with a limitation in written communication. The COM method was received very enthusiastically in Belgium and was used as a starting point for their publications and tools (De Craemer et al., 2018). A roadshow took place to inform schools about reading software. During these roadshows, we presented our developed method in all major cities of Flanders in Belgium.

At this moment the accessibility of the website is further increased in a Raak Top Up-project. In the future, the COM method will be further implemented in the Netherlands. The focus will be on

1) Creating awareness amongst teachers;
2) Training of professionals (teachers, therapists);
3) Making information on the digital platform more accessible;
4) Extending and maintaining a database of tools.

The method will be integrated into the platform of the project «Stimuleringsprogramma Preventieve en Integrale Aanpak Dyslexie en Hulpmiddelen Onderwijs» (Kleijnen & Krikhaar, 2018).

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The authors would like to thank the UCLL for the opportunity to present this project in the Erasmus+ project Teleseict Teaching and Learning in Special Education with Information Communication Technologies. UCLL hosts eight research centres: Art of Teaching, Education & Development, Health Innovation, Inclusive Society, Resilient People, Smart Organisations, Digital Solutions, & Sustainable Resources. In this project Inclusive Society will be involved. The Inclusive Society expertise centre is a practice-based knowledge and training centre that builds up practical (scientific) expertise on inclusion, participation and diversity. They do this by bringing together expanding expertise and collaboration with other partners. The assignments of the expertise centre Inclusive Society relate among other things to the art of living together. Here the focus is on the role and contribution of professionals and volunteers in supporting and strengthening citizenship practices. The broadening of global citizenship is also a line of expertise within this. In addition to these contributions to a democratic society, this centre of expertise also aims at the further deepening and development of an inclusive society with a specific focus on inclusive education, non-violent resistance methods in the classroom, non-native languages, economic deprivation and behavioural problems. Furthermore, they also focus on questions about the place of the internet in care and welfare, specifically on the themes: media education, online help, addiction and gaming. The various substantive topics in this centre of expertise move on a continuum of special target groups to the universal design «for all» with always special attention to exclusion mechanisms. Characteristic of the expertise centre is the further development of participative and empowering research methodology. For maximum cross-fertilization between the centre and the relevant sectors, the expertise centre provides support in the form of vision development, research, material development, coaching and consultancy.

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4.

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ICT AS GOOD PRACTICES FOR STUDENTS WITH INTELLECTUAL DISABILITIES AT GREEK PUBLIC SCHOOLS

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1. INTRODUCTION

Over the last decades the tremendous development of ICTs are changing the world and the way education is conducted. Currently ICT is being used in classrooms. It has been implemented and many schools now have at least some access to ICT within the classroom. The use of ICTs affects every aspect of our daily life and ICT is considered a mean to bridge the gap between different groups of people such as the group of people with special educational needs. Recently, there have been a growing number of researches that supports the fact that, ICTs and assistive technologies enable people with special educational needs to lead more fulfilled lives (Stevens, 2004, Williams, Jamali & Nicholas, 2006).

Information and communication technologies (ICTs) have brought profound changes to our environment and in the ways we relate to each other. Television, cell phones and Internet use have opened up new prospects for communication, leisure activity and education in our increasingly globalized world. These new technologies have greatly facilitated the exchange of information among individuals and thereby contributed to the eradication of distance and physical barriers (Gutiérrez & Martorell, 2011).

2. DEFINING THE TERMS

The term «special educational needs» covers a range of problems which can cause difficulties in learning. Even though there have been many defini-

tions over the years, comparative studies show that the term «special educational needs» can mean different things to different countries. «The areas of needs» as defined in the 2001 SEN Code of Practice are: Communication and Interaction, Sensory and/or Physical, Cognition and Learning, Behaviour, Emotional and Social Development. Defining the area of «Special Needs» has been a widely discussed issue. Titles as Learning Disabilities or Learning Disorders are also used to describe a group of the population that have problems in their school performance and maybe later in their lifetimes (DfES, 2001).

Specifically, as some authors, like Salvador-Carulla & Berteli (2008), indicate that intellectual disability (ID) is a meta-syndrome characterized by significant limitations in intellectual functioning and learning. On the one hand, Schalock, Borthwick-Duffy & al. (2010) consider intellectual disability as a dysfunction in practical, social and conceptual skills. The concept of ID is complex, involving various biological, psychological and social factors. In the past, expressions such as «mental retardation» and «mental deficiency» were used in reporting on this phenomenon. Currently, however, there is a broad consensus for using the term «intellectual disability» as it does not have such a pejorative connotation. Traditionally, the intelligence quotient (IQ) is the main tool for quantifying the degree of ID. The International Classification of Diseases (ICD-10) published by the World Health Organization establishes four levels of ID in terms of its severity: mild (IQ from 50 to 69), moderate (IQ from 35 to 49), severe (IQ from 20 to 34), and profound ID (IQ less than 20) (Gutiérrez & Martorell, 2011).

Many intellectually disabled students have limited to non verbal or written communication skills, so assistive technology is vital to their involvement in the world around them (Parette, Stoner, and Watts, 2009). Students feel as though they are ostracized from their classmates and that they are seen as different. On the one hand, the solution could be the combining mainstream use of technologies to incorporate programs of assistive technology for those students that need it, and on the other hand we can create an environment where everyone can freely participate in their own ways.

Along the same lines and by these terms, we have to state that ICT could facilitate the life of learners — students with special educational needs and the people around them as teachers, educators parents etc. ICT could and must increasingly seen as a tool in terms of creating independent learning environments, ensuring access to the curriculum and enhancing the social inclusion of all individuals.Society as a whole is responsible for eradicating

the discrimination that may arise from this stigma effect and for ensuring that people with ID are able to benefit fully from all the advantages afforded by the new information and communication technologies.

3. SCHOOLS FOR ALL

Inclusive education is a fundamental part of European and international educational systems. Many declarations and UN policies (UNESCO) promote inclusive education (UNESCO, 2007). In the context of inclusive education all students are accepted to attend their neighbourhood schools and supported to learn, contribute and participate in all aspects of school life. Inclusive education mentions at the developing and designing our schools, classrooms, programs and activities, maximizing opportunities, instruments, resources and technologies so that all students learn and participate together (UNESCO, 2009).

In this context we realize the real and great necessity of creating schools for all. The Education for All (EFA) initiative from the United Nations is an essential element of the Millennium Development Goals, in part because education is seen as being crucial to human development, and also because so many children do not have access to education UNESCO (2005). Therefore, the development of successful inclusive schools, «schools for all» in which the learning and participation of all children is valued, is an essential task for all countries. Community awareness and service about people with educational needs must start in the school. Creating a positive learning culture involves developing a sense of responsibility and engagement in these communities. People need to be able to relate to actions, to understand its immediate impact in relation to their own and the school's values.

This report is looking at the ways it can be used successfully and effectively, with a particular focus on students with additional learning needs and disabilities. Looking at the researches it is clear that the effective use of ICT programs and assistive technology will have a positive effect on the education of students with disabilities.

The European Agency on the Development of Special Needs Education (2006) reports that dealing with differences and diversity continues to be one of the biggest problems faced by schools across Europe. It is suggested that difficulties in creating schools for all are often associated with low expectations and aspirations, intergenerational poverty and underachievement, and a belief by some that education is a privilege and not a right that should be

available to all. Specifically, Rouse (2008) mention that barriers to participation arise from inflexible or irrelevant curricula, didactic teaching methods, inappropriate systems of assessment and examinations, and inadequate preparation of and support for teachers. Also, it is noticeable that in some countries schools are operating in a hostile policy environment that results in insufficient «capacity» because of restrictive school structures, a competitive ethos, negative cultures and a lack of human and material resources. In turn these views lead to negative attitudes about learners who struggle, low expectations and a belief that some children are «worthy» of help but others are «unworthy» because their difficulties are their own (or their parents') fault (Rouse, 2008).

Therefore, although inclusion is seen as important in most countries, experience tells us that it is difficult to achieve for children with additional support needs for a number of reasons including:

— Uncertainty about professional roles and the status of teachers especially those who have responsibilities for additional support needs

— A lack of agreement about the nature and usefulness of specialist knowledge

— Territorial disputes between professionals associated with certain «special» practices

— Inadequate preparation of teachers and a lack of on-going professional development opportunities (Rouse, 2008).

Consequently, students with a wide variety of disabilities are now, more than ever, being put into main stream classrooms; as teachers we have a responsibility to work in inclusive ways.

4. TEACHERS' ROLES AND IDENTITIES — ICT IN INCLUSIVE CLASSROOMS

For these combined programs, we refer to earlier chapter, and for an environment where everyone can freely participate in their own ways, arise some questions about the roles, responsibilities and identities of teachers.

— Are teachers well prepared and supported to accept the responsibility for creating these schools?

— How do teachers use ICT and assistive technologies so that students can learn at the best of their ability but also without making them feel different or incapable?

Although there is widespread support for inclusion at a philosophical level, there are some concerns that the policy of inclusion is difficult to implement because teachers are not sufficiently well prepared and supported to work in inclusive ways. Inclusion requires teachers to accept the responsibility for creating schools in which all children can learn and feel they belong. In this task, teachers are crucial because of the central role they play in promoting participation and reducing underachievement, particularly with children who might be perceived as having difficulties in learning.

Recent research indicates that although teachers in schools show great interest and motivation to learn about the potential of ICT, in practice, use of ICT is relatively low and it is focused on a narrow range of applications, with word processing being the predominant use, and video/network conferencing, emailing and the Internet being rarely used. Many teachers recognize a range of benefits for pupils and themselves in using ICT, but more often than not fail to integrate it in their teaching, continuing to «*teach ICT rather than teach with ICT*» (Waite, 2004).

In primary schools, teachers tend to use ICT to support classroom practice, while secondary school teachers use it more for professional development and personal use rather than for teaching. The same study showed that teachers who use a computer at home tend to use it more in classrooms and that differences exist between subject areas in the practice and attitudes towards ICT, with teachers of business management using it more and Mathematics and science teachers using it the least. Many reasons have been suggested for the failure of ICT to embed more completely in schools. Some authors, like Pelgrum (2001), Williams et al. (1998), Mooij and Smeets (2001), Dawes (2001) reports that obstacles of using ICT are three major factors: lack of resources, lack of knowledge and skills and pedagogical difficulties to integrate technology in instruction. Zhao and Cziko (2001) identify three conditions that must be fulfilled for teachers to be motivated and use ICT in their practice:

1. Teachers must believe that by using technology they are more likely to achieve a higher-level goal than through other means used («effectiveness»)
2. They must believe that if used, technology will not disturb the other highlevel goals that they want to achieve («disturbances»)
3. Finally, teacher must believe that they are in control, having the ability and resources to use ICT effectively («control»).

Consequently, we could mention that the real obstacle in achieving all these is the fact that many teachers lack confidence with ICT and often refuse to utilise it, or use it in a way which adds little to their students' engagement and education. This is why teacher professional development in computer technology has become a major priority for most schools, but still needs to be improved (Phelps, Graham, and Kerr, 2004). For students with severe intellectual disabilities ICT can make a huge difference at school and in their home lives, allowing them to be active participants. Students with mild intellectual disabilities can also be assisted greatly by ICT programs; however, there can be a barrier of the student refusing extra help (Soderstrom & Ytterhus, 2010). These are valid problems that should not be ignored. While there are many constraints on the successful implementation of these programs, they can be overcome if attention is focused on this area of education.

Similarly, teachers in special and local authority support services are more likely to have a clear professional identity as «support teachers». Teachers are crucial in determining what happens in classrooms and there are those who would argue that the development of more inclusive classrooms requires teachers to cater for different student learning needs through the modification or differentiation of the curriculum (Forlin, 2001).

5. BARRIERS IN GREECE

But, as we already said, there are still problems that need to be addressed so that ICT can become part of everyday teaching. It is clear that there is a big gap between what teachers know as a result of being on a training course and what they do in their classrooms.

Especially, for Greece, we could refer those barriers:

— ICT infrastructure within the school
— The cost
— Savings in time and labour
— The greater precision in the use of assistive technology
— The lack of professional development that occurs within the school on ICT implementation
— Teacher's training and reliability of ICT
— Teachers lack of confidence with ICT
— Teachers refuse to utilize it

Although all these barriers, we could be optimistic about the use and the effects of the ICT within the classrooms. Understanding the rights and needs of every child and providing a good quality of teaching, assessment and intervention via ICTs are the most important factors to provide access to technology for every learner. We need to focus on finding ways to make sure these programs are being implemented correctly and frequently. Teachers, all teachers and not just special education teachers, have responsibilities in making participation, inclusion and acceptance possible for students with disabilities.

If responsibilities are to be shared and teachers are to take on new roles, then there have to be changes to the way inclusion is conceptualized and a realization that it can only be achieved if all teachers are supported in the development of all aspects of this process; knowing, doing and believing.

6. ICTS GOOD PRACTICES IN GREECE

Some authors and declarations, like Istenic Starcic & Bagon (2014), Drigas & Ioannidou (2013), UNESCO (2011) demonstrated a significant contribution of ICT use in the classroom as a learning tool, especially in the education of disabled students as it helps to ensure accessibility and active participation for all students. It is clear that currently ICT is being used in classrooms. It has been implemented and many schools now have at least some access to ICT within the classroom. The effective use of ICT programs and assistive technology will have a positive effect on the education of students with disabilities. Many intellectually disabled students have limited to no verbal or written communication skills, so assistive technology is vital to their involvement in the world around them (Parette, Stoner, and Watts, 2009). As Radabaugh (1988), mention «*for most people technology makes things easier, for persons with disabilities, technology makes things possible*» (in Ribeiro & Moreira, 2010).

An obstacle in achieving this, as we already refer to earlier chapters, is the fact that many teachers lack confidence with ICT and often refuse to utilize it, or use it in a way which adds little to their students' engagement and education.

In this report we have already focused to the barriers for the development of successful inclusive schools in Greece that need to be addressed so that ICT can become part of everyday teaching. These are valid problems that should not be ignored. But for students with intellectual disabilities, we have

to refer to the programs which have been developed and are constantly being developed to allow them greater participation within the classroom. Dominant issues in the ICT literature report the benefits of alternative communication, assistive or enabling technology, internet applications, virtual environments, teacher education and technology integration.

6.1. The benefits of ICTs development for Students with Disabilities in Greece

For the past decade there has been conducted great progress in the design and the development of ICT software programs to provide students with special educational needs equal access to education. As Drigas and Ioannidou (2013) state Information and Communication Technologies (ICTs) is a general term which refers to all kinds of technologies that enable users to access and manipulate. Especially, in Greece, the last decade, there have been some popular applications that are used for assessment and intervention purposes of specific difficulties. They provide school staff, specialists and parents with the possibility to employ different ICT strategies which might lead to an easier understanding of children's learning differences. Moreover, several benefits are limited cost, greater precision and savings in time and labor (Singleton, 2004).

Drigas and Ioannidou (2013) mention to ICT's contribution to acquiring skills such as reading, writing and visual-motor coordination and define them as technological tools and resources that are used to communicate, create, organize, disseminate, store, retrieve and manage information and learning. ICT support personal access to information and knowledge, learning and teaching situation, personal communication and interaction, and access to educational administrative procedures (UNESCO, 2011). The new concepts of literacies (multiliteracies) demand that ICT, by supporting teaching and expanding assessment methods, provides alternative means of delivering literate practices. In additional, Drigas and Ioannidou (2013) describes ICTs as multimodal tools also expand the transmission of information in multiple ways, not only through enhancing language development, knowledge and thinking, but also by allowing the acquisition of other multifaceted cognitive skills. In addition, with appropriate use, they encourage dialogue and argumentation, the opportunity to formulate a variety of questions and the development of social networking and collaboration. ICT practices contribute to better comprehension, assimilation and consolidation of school subjects such as mathematics, science, languages etc.

In the case of students with special educational needs and intellectual disabilidies the utilization of ICT in a variety of cases is the best way to access knowledge, information, the curriculum and learning in general. The use of appropriate (ICT) digital applications play also an important role in the education of students who have intellectual disabilities, attention and concentration problems as they allow students to focus more and engage themselves creatively (Solomonidou, Garagouni-Areou & Zafiropoulou, 2004). Some authors, like Lidström & Hemmingsson (2014) refer that e-books and digital educational applications and programmes can really support the teaching and education of disabled students as they show more interest, attention, concentration and enthusiasm.

6.2. ICTs applications for students with disabilities in Grrece

The last decade in Greece some educational materials for students with intellectual disabilities are designed to meet the needs of these students. Programs such as boardmaker, PowerPoint, Google Maps, Movie Maker, GCompris, Clicker5 are some of the practices used as educational applications and softwares for students with disabilities in Greece. In various ways these programs allow students to learn basic movement and mouse buttons, create folders and subfolders, learn the basic functions of the right click, such as opening, copying, moving, pasting, renaming, deleting, but also encourage children to create written commands, requests and expression.

For example, in Greece, some authors like Gelastopoulou, M. & Kourbetis, V. (2017) [in the context of the project: «Design and Development of Accessible Educational & Instructional Material for Students with Disabilities» that co-financed by the European Union and Greek national funds through the Operational Program «Education and Lifelong Learning» of the National Strategic Reference Framework (NSRF)] presented designed and developed some accessible educational materials and software for students with disabilities utilizing ICT. The material developed is fully accessible to students with: intellectual disability, deafness, blindness, autism, attention deficit hyperactivity disorder (ADHD) and motor disabilities. The content is accessible through the use of alternative communication systems (pictograms, drawings, pictures) and easy to read texts. Access is ensured through the incorporation of the Greek Sign Language and Braille via multimedia resources.

The implementation of this project resulted, as authors mentioned (Gelastopoulou & Kourbetis, 2017), in the following questions and concerns:

1. What kind of training materials could be developed to address and benefit the largest possible number of students?

2. What are the most appropriate technologies to be utilized?

3. What adjustments need to be made in order to establish the appropriate principles, characteristics and procedures that govern the accessible educational materials so as to ensure the maximum participation of students with disabilities in the educational process?

4. How to maximize the design of the learning environment in order to achieve the best use of the educational material, so that all students benefit?

For this project differentiating textbooks include the adaptation of the text in an «easy to read» format, educational content simplified with a focus on presenting concepts using images and providing the text in print and digital format. These simplified versions contribute equal content to the education of students with intellectual disabilities and other special educational needs, but also combats functional illiteracy in non-disabled students.

The last years there are many efforts from organizations, ministry of education and some other institutions in this way. Drigas and Ioannidou (2013) mention that regardless of the valuable contribution of ICT to promote inclusive learning, if not used appropriately and is not accessible to all students the risk of widening social inequalities is evident.

7. CONCLUSIONS

The rapid development of technology and its increasing utilization in schools is undeniable. ICT is increasingly seen as a tool in terms of creating independent learning environments, ensuring access to the curriculum and enhancing the social inclusion of all individuals. ICT could facilitate the life of learners — students with special educational needs and the people around them as teachers, educators, parents, etc. In this context special conditions must be created to enable every student to have equal access to technological innovations. Computer-based assessment appears to help teachers, the professionals involved as well as parents to understand deeper and to point the needs of every child. In addition, computerized intervention tools could be of great benefit since they can be used in school and home settings in a way that they promote the quality of offered education as well as self-advocacy. Adaptations have to be made in relation to equity, ethnicity, culture and language for an effective delivery of technology services. Understanding the

rights and needs of every child and providing a good quality of teaching, assessment and intervention via ICTs, are the most important factors to help individuals ensure access to appropriate learning and life skills programs. In conclusion, the needs of all students are met by creating equal opportunities for learning, classroom participation and equal access to the curriculum.

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5.

UNIVERSITY OF SZEGED, HUNGARY

INTEGRATION AND ICT TOOLS IN THE EDUCATION OF SEN STUDENTS IN HUNGARY

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1. SPECIAL EDUCATIONAL NEEDS AND INTELLECTUAL DISABILITY IN HUNGARY

According to the current regulations, the definition of special educational needs (SEN) includes «children/students requiring special treatment who, based on the expert opinion of a committee of experts, are physically disabled or have a perceptual, intellectual disability or speech disorder or have multiple disabilities in the case of the simultaneous occurrence of several deficiencies or have autism spectrum disorder or any other psychological disorder (a serious disorder related to learning or the control of attention or behaviour)» (NPE, 2. 4. §25).

The number of SEN children is increasing year by year in Hungary. In primary and lower secondary schools, the proportion of SEN children is 8 per cent; and in upper secondary school, the figure is 5 per cent (KSH, 2017/2018). However, students with SEN seem to be overrepresented in Hungarian schools because of the lack of uniform SEN diagnostics (Csépe, 2009).

According to Csépe (2009), we can distinguish various SEN groups. Children in Group 1 have no special educational needs. Their number is smaller

than supposed on a theoretical basis. Group 2a comprises children who indicate problems in performance. Group 2b includes children who are low performers and whose school achievement is significantly below average. These types of SEN children are usually diagnosable in the first years of primary school or in kindergarten. According to current statistics, the number of children in these SEN categories is higher than supposed on a theoretical basis; these categories are thus overrepresented in Hungary (Csépe, 2009).

The task of diagnostics and education of Group 2a falls to the teachers, but Group 2b students already need special diagnosis and special SEN teachers for their development. Group 2b symptoms must be diagnosed by a specialist or a group of specialists. These children must be educated in complementary instruction, where the educational service is partly integrated into mainstream schools and classes. Unfortunately, it is generally assumed that remedial instruction requires no special knowledge or equipment, such as ICT-based instruction (Csépe, 2009).

Children in Group 3 show serious problems in school achievement. This type of SEN can usually be recognized shortly after birth. It requires intensive intervention and rehabilitative instruction, which is only offered in special schools or special classes (Csépe, 2009).

Csépe (2009) emphasizes that since there is no uniform diagnostics, it would be necessary to develop a comprehensive and detailed assessment diagnostics system for each SEN category. In addition, a detailed protocol would be necessary to diagnose all SEN types. These protocols should be used uniformly in all institutions that test and diagnose students. Over the last ten years, several teams have been working on protocols for the diagnostics of different SEN types (e.g. Csákvári & Mészáros, 2012).

The use of the term «intellectual disability» and its interpretation are not uniform in Hungary. They may also depend on an expert's particular profession (doctor, psychologist or special education teacher). Although the term «intellectual disability» is commonly used in the international literature, the conventional deficit-oriented approach and a term equivalent to «mental retardation» in English are still present in Hungarian professional communication (Csákvári & Mészáros, 2012). Intelligence measurement plays a decisive role in determining the degree of disability, leading to four different degrees (mild, moderate, severe and profound intellectual disability). In the vocabulary of special education teachers, the terms «learning disability» and «intellectual disability» are used for mild and moderate degrees. In these

cases, the child will be categorized as «educable», while in the case of severe and profound disability, the category will be «trainable».

Children with a moderate, severe or profound intellectual disability are usually in SEN Group 2b or 3. As noted above, their diagnosis can usually be made shortly after birth, but a mild intellectual disability is often only diagnosed after they enter primary school (Csákvári & Mészáros, 2012). The task of diagnosing intellectual disability falls to expert committees, which are also responsible for identifying autism spectrum disorder, behavioural problems and hyperactivity, as well as learning difficulties in school, such as dyslexia and dyscalculia. Expert committees also propose the appropriate form of education for the child.

2. SEN STUDENTS IN THE EDUCATION SYSTEM

There are two types of educational obligation for students with intellectual disabilities. The «obligation to educate» applies to cases with a mild or moderate degree of mental disability and the «obligation to train» to cases with severe or profound disability (Tóth, 2015).

According to current regulations, children with an intellectual disability can enter three types of educational environments: mainstream schools, special schools and special training institutions (or home training as an alternative). In practice, «educable» children with mild or moderate disabilities can be placed in mainstream institutions, but they typically attend special schools. If they successfully complete their studies, they can receive a valid certificate. In the case of «trainable» children with a severe or profound intellectual disability, development takes place in small groups, in special training institutions or in a home environment (Tóth, 2015).

The possibilities of integration are limited by the current regulations. Although they have the opportunity to integrate children with a mild intellectual disability, mainstream schools can only do so if the intention to integrate children with an intellectual disability is included in the school's deed of foundation and if the conditions for special education can be provided in the school (Tóth, 2015). Schools integrating SEN students usually receive less professional and financial support than necessary.

After completing primary school, about 40 per cent of disabled students do not continue their studies at secondary level. In the case of a mild or moderate intellectual disability, it is possible for the students to take part in secondary vocational training. However, in practice, the majority of students

with a mild intellectual disability in secondary education attend special institutions. In the case of students with a moderate intellectual disability, a large majority of them attend special institutions (European Agency, 2019).

3. ICT IN THE EDUCATION OF SEN STUDENTS

The use of ICT in schools in Hungary was initially limited by the fact that schools had little means to purchase ICT tools. More notable developments started in the 2000s with local initiatives (smartboards, educational software etc.). EU developments have been important steps, with special attention paid to SEN students using ICT tools. Recently, there have been a large number of projects funded by the EU to buy new ICT tools.

Teachers using ICT tools are of the opinion that these tools can also provide effective support in the education of SEN students (Kovács, 2015). The use of computers creates a new pedagogical environment that is particularly motivating and helps to reduce anxiety among SEN students. ICT cannot replace traditional development methods, but it can effectively help and complement their therapeutic effects. The use of software requires concentration, and it increases attention and independence. For students with learning difficulties, the computer can create a barrier-free environment that helps them keep up with others. The aim is to facilitate the integration of disabled students and to reduce the disadvantages caused by their emotional, social and/or intellectual limitations.

Schools can obtain ICT tools through special grants, and, potentially, as donations from companies. In most cases, these tools include digital boards, tablets, smartphones and (rarely) other tools (such as a 3D printer). Most of the software used in schools consists of freely downloadable applications (Kovács, 2015). The students' tasks on these tools are prepared by the teachers themselves according to students' special educational needs. Therefore, websites that offer information on opportunities for grants, downloadable applications and best practices are of great importance to teachers.

Beyond acquiring ICT tools, there are other tasks involved in training student teachers and practising teachers. In the training of special education teachers, students are provided detailed information on and training in the field of special needs, but there are only a few courses on ICT. In practice, special education teachers are usually familiar with and can use some ICT applications for children with hearing or visual impairment, and also for those

with autism spectrum disorder. Nevertheless, there are only a few ICT tools for the education of children with an intellectual disability (Virányi, 2014).

In mainstream teacher training, there are very few courses on special needs, and only a few courses on ICT. Mainstream teachers and teacher trainees know much less about these areas than special education teachers and students who attend SEN courses for a number of years. This lack of comprehensive knowledge may be the reason that mainstream student teachers and even experienced teachers confuse SEN categories, for example, learning difficulty, learning disorder, learning disability and mild mental disability.

The solution would be pre — and in— service training programmes for both teacher trainees and teachers; moreover, teachers would need to be provided practice in ICT use by specialists in assistive technologies (Kovács, 2015). There are useful and successful initiatives, such as projects funded by the government, for example, digital theme weeks for schools. Problems associated with teaching SEN students can be discussed at teacher trainings and teachers' conferences. For teachers who are interested in the issues of SEN, there are some best practices forums to obtain information and share experience. Most of them are initiatives taken by individuals or communities of special education teachers. Social media, special interest groups, blogs and video channels on this topic are also very popular. For example, a thematic forum on a widely known and used website has been created for teachers, and it has already grown to about 12,000 members.

Identifying and changing attitudes among student teachers could be a step in a process resulting in improved outcomes for all children with disabilities. Teachers' attitudes towards SEN and inclusion are influenced by a number of factors, such as teachers' knowledge, teaching experience and past experience working with SEN students and the availability of support services (Virányi, 2014).

4. ICT-BASED ASSESSMENT AND DEVELOPMENT OF STUDENTS' SKILLS AND ABILITIES

4.1. The 'Development of Diagnostic Assessments' project

Recent years have seen an emerging issue of integration and inclusion of students with special educational needs in Hungarian schools, with a great deal of attention drawn to the development of a diagnostic assessment system

that makes it possible to discover similarities and differences in basic skill development between children with and without SEN. In response to this, a significant developmental project was launched about ten years ago in the Center for Research on Learning and Instruction at the University of Szeged, focusing on the testing of children in Years 1-6. In the first years, the eDia online platform was created for mainstream children, but in the course of the project, tasks were also continuously designed which are suitable for the assessment of SEN children as well (eDia, 2012). The age groups involved in the studies were expanded. At present, not only children in Years 1-6 can be involved in assessments, but also kindergarten school children, and even lower and upper secondary school students.

As a greater emphasis has recently been placed on SEN students worldwide, there have already been some diagnostic tools and tests that could help to diagnose student development both in mainstream and special education. Some of these tests have been adapted to the system. Additionally special items have been developed to assess special educational needs (eDia, 2012). A set of developmental programmes are being developed for use in the classroom environment for personalized online learning.

Thus, children's results can be assessed and compared using the same set of criteria. Children who have encountered technical barriers and have been unable to use ICT tools because of their physical status can receive further technical assistance (eDia, 2012). For instance, children with physical barriers can use special tools, such as a special keyboard or head mouse.

4.2. The eDia system: online assessment of children's skills

The eDia online assessment system (http://edia.hu) is a web-based, learning-centred system which replaces and expands the possibilities of paper-based assessment. It can be divided into two domains: (1) the eDia platform, which has been developed for low-stakes assessments, and (2) the item bank (Molnár & Csapó, 2019b). The assessment system consists of a large number of items, which have been used for both large-scale and pilot assessments. The item bank includes more than 20,000 tasks in reading, mathematics and science, foreign language, music, visual abilities, reasoning and problem solving, with a list still expanding. The items are multimedia-based and supplemented with images, sounds, animations, videos and simulations. In addition to the literacy-based test items, the item bank contains questionnaires to analyse learning components (Molnár & Csapó, 2019a). Over 1000 schools use the eDia in Hungary to assess primary and lower secondary school stu-

dents with and without SEN (Habók & Magyar, 2018; Habók & Magyar, 2019; Molnár & Csapó, 2019b).

The hardware infrastructure for the system is operated by the server farm at the University of Szeged. As the system is web-based, it is possible to use it in any country in the world. Originally, the eDia system was designed in Hungarian, but recent years have seen a need to use the system in a number of other languages, including English, Arabic, Chinese and Russian. The system allows for more than 60,000 students to be tested simultaneously (Molnár & Csapó, 2019b). The delivery module of the software makes it possible to use it on various devices, including desktop computers, tablets and mobile phones if they are provided with internet browsers. The trial version of the system was launched in 2014; since then, a database has been developed with results from more than 70,000 students (Molnár & Csapó, 2019b).

The eDia online system comprises every step of the measurement process, including item design, the piloting phase, the large-scale testing process and evaluation of students. Molnár and Csapó (2019a) summarized the main objectives of the system: eDia allows creation, testing and proofreading of tasks, construction of tests, online delivery of tests to schools, automatic corrections of tasks, creation of basic statistical analysis, and generation of feedback for children, teachers and school management (Molnár & Csapó, 2019a). A test editing module forms an integral part of the system and can be used in two ways. Tests can be prepared in the traditional form as fixed, complete tests. Adaptive testing can also be applied with differentiated tasks. Children thus gain access to the next step based on the difficulty of each module. Low performers and students with intellectual disabilities can easily experience a sense of achievement through personalized tasks (Molnár & Csapó, 2019b).

A great advantage of the system is that not only human feedback can be built into the system, but also automated scoring feedback on children's results. The automatic scoring system is used for diagnostic assessments, informing children of their own results immediately after testing. They are provided simple, easy-to-understand feedback, while teachers receive complex feedback on children's results at the item level. Not only the scores, but also other details of the assessment process, such as testing time and the number of trials, are listed for teachers in a table (Csapó, Ainley, Bennett, Latour, & Law, 2012; Molnár & Csapó, 2019b).

Based on the measurement results of all participants in the same survey and in the same grade, an evaluation figure shows the actual results of an individual child and a short text interprets the results, the text being assigned to the evaluation figure in each case. Thus, teachers can easily see and interpret deviations from the average. The system aids in ascertaining the children's current level of ability and showing the direction of any necessary intervention (Molnár & Csapó, 2019c).

The eDia online system is also suitable for children with special educational needs. SEN children can do the same tasks as children without SEN. As for the item bank, it contains a large number of items and tasks, and different levels of tasks can be found for children with intellectual disabilities as well. Task assignment is the teachers' responsibility; teachers can set up tests according to the skills of the individual child. Each teacher can thus create tests for children according to the child's needs. The following tests compiled by the eDia team have already been tested to assess children with intellectual disabilities: Computer Mouse and Tablet Usage, Reading Preparation, Counting Skills, Inductive Reasoning (see an example of an item in Figure 1) and Visual Memory.

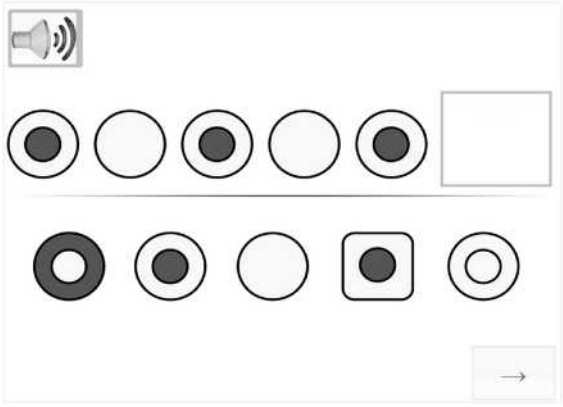

Figure 1. An item from the Inductive Reasoning test (http://edia.hu/ikmprojekt/)

Development on the paper-based DIFER (Diagnostic System for Assessing Development) to assess school readiness was started in the 1970s by József Nagy and his research team. In the last ten years, the online version of DIFER has been established and is now suitable for online testing of 4-8-year-old children's school readiness in the areas of speech sound discrimination, writing motor coordination, counting skills (see an example of an item in Figure

2), experiential reasoning and comprehension of relations. The eDia online system is also appropriate to diagnose SEN children's school readiness and ascertain possible learning difficulties which can hinder the development of reading and writing skills (Csapó, Molnár, & Nagy, 2014).

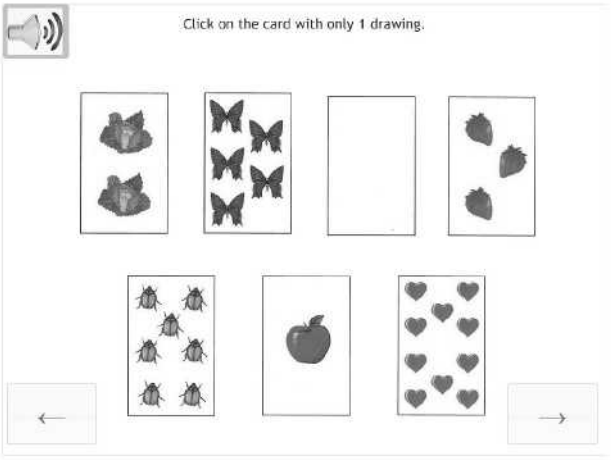

Figure 2. An item from the DIFER Counting Skills test (Csapó, Molnár, & Nagy, 2014)

The online diagnostic assessments also involve children with multiple disabilities, who cannot be integrated into mainstream education and require a special environment and instruments for testing. Researchers have elaborated a «pre-test bar» to create an environment in which children with multiple disabilities can practise and be tested. This environment attempts to establish a child-focused motivating platform using new tools such as the MouSense program, which replaces the traditional mouse and touchpad. WebCam and WiiMote can also be connected to the ICT tools to aid in the administering of both tests and questionnaires. Children with disabilities can be supported with headbands.

In addition to reading, counting, reasoning and learning skills, students' motivation and attitude towards learning can also be assessed. In recent years, a number of developmental programmes have been developed especially for elementary and lower secondary school children. These programmes are based on the eDia team's research results and experience and aim to develop thinking and reasoning skills among young students. The impact of the programmes was investigated via experimental and control groups (Molnár & Csapó, 2019c).

5. USING ELEA IN THE DEVELOPMENT OF SEN CHILDREN

The eLea online platform (http://edia.hu/elea/) is built on the eDia online system. The eLea platform presents developmental programmes and methodological aids that can make the learning process more motivating and personalized. These programmes can also be used for children with or without SEN. The programmes facilitate the development of basic skills, such as vocabulary, reading comprehension, basic mathematics and reasoning. The target groups for the eLea online platform are primary and lower secondary school children (Molnár & Csapó, 2019c). For example, the reading comprehension programme is made up of series of developmental modules. The modules contain tasks of varying difficulty, so the tasks can be adapted to students with differing abilities (see an example of an item in Figure 3).

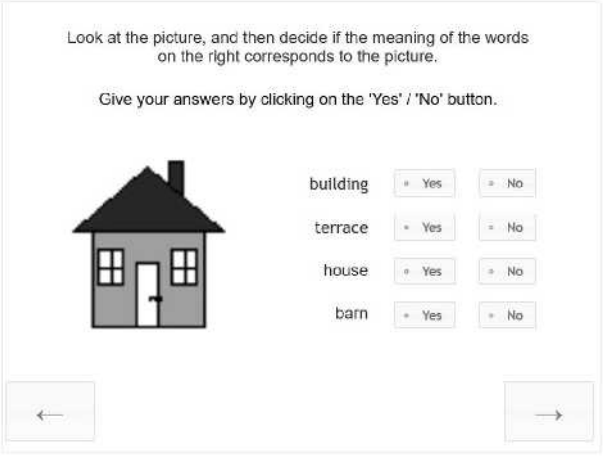

Figure 3. An item from the Develop your Vocabulary! Reading Comprehension Programme for Years 3-6 (http://edia.hu/elea/)

The programmes can be implemented individually or facilitated by a teacher. One programme lasts for 6 to 10 weeks. Feedback is built into the system. Students thus receive immediate feedback on their own results after each task. If a solution is incorrect, students can return to it and attempt to complete the task again. If they cannot solve the problem, they can ask for help from the teacher. The advantage of the programmes is that students can complete the tasks at their own pace. The environment is brightly coloured, thus arousing students' attention and motivating them. The screen can be magnified, thereby allowing students to see the tasks well. The construction

of the tests and questionnaires has only been designed for use with a mouse or touchpad and not with a keyboard, thus not requiring writing (Molnár & Csapó, 2019a).

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6.

PALACKÝ UNIVERSITY OLOMOUC, CZECH REPUBLIC

MODERN TECHNOLOGIES AS A MEANS OF SELF-RELIANCE AND AUTONOMY IN PERSONS WITH SEVERE VISUAL IMPAIRMENT

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1. INTRODUCTION

Severe visual impairment is the cause of the loss or significant limitation of visual information receiving. Visual information — according to available research — is the source of 70-85 % of information from our surroundings. Due to this, it is evident that the diagnosis of severe visual impairment brings consequences to most areas of a person's life. We can see the consequences not only in the common areas of self-reliance, reception of information, and communication, but also in areas of everyday life such as independent orientation, self-reliance, spatial orientation and activities connected with it such as walking to school or to work, shopping, leisure time activities and so on.

1.1. Person with severe visual impairment

As a person with severe visual impairment we can globally consider those persons whose visual perception has been affected on a scale from one third of norm to the loss of light perception. This statement can be proved especially by medical definitions. The most widespread of them is specified by the World

Health Organization (WHO). Dotřelová (in Kraus, 1997, p. 317) works with the given definition and thus she creates the definition which is adjusted to the needs of the Czech medical environment which is the field from which special pedagogues[1] adopt it. Low vision is the «irreversible decrease of visual acuity of a better eye below 6/18 to 3/60 inclusive. From the practical point of view we divide low vision into mild low vision — to 6/60 inclusive and severe low vision — below 6/60 to 3/60 inclusive. Blindness is an irreversible decrease of central visual acuity 3/60 — light perception.

Practical blindness is: a) decrease of central visual acuity 3/60 to 1/60 inclusive, b) binocular visual field smaller than 10 grades but bigger than 5 grades around the central visual acuity.

Real blindness is:

a) decrease of central visual acuity below 1/60 — light perception
b) binocular visual field 5 grades and less, also without damage to central fixation. Full blindness: light perception with a defective projection up to the loss of light perception (amaurosis)».

From the above-mentioned classification we can clearly see that persons with a visual impairment create a varied group regarding the loss of visual acuity or a visual field, however, later in this text we will see that not only these two criteria influence a person´s abilities to receive information visually. The quality of processing of the information source depends also on other criteria — on the age of a person, on the time when the visual impairment arose or on the duration of the visual impairment. To the above-mentioned issue we have to add that when assessing the visual impairment and visual disability it is always the better eye which is being assessed. The structure is specific also in another aspect — we also define functional disorders in it — which means persons with a disorder of binocular vision. These cases are mostly curable.

Each of the groups of persons with visual impairment has to cope with the consequences resulting from their visual impairment in their personal, educational and work lives. Some of the consequences are specific to all groups of persons with visual impairment (problems with spatial orientation and mobility, the need to use compensatory means and aids, limitations when

(1) In the Czech Republic, a special pedagogue (special education teacher) is an expert not only on education but also other aspects connected with care and support of persons with special needs.

choosing occupation); other consequences are specific only to some of the groups (the need to use a bigger script, the use of optical aids, the need to undergo an orthoptic-pleoptic therapy etc.).

Because of the narrow focus of this chapter we will mention only some consequences and possibilities for their alleviation or even elimination.

1.2. The most frequent consequences of the loss or limitation of visual perception

Above in the text we have mentioned that there are consequences of the loss or limitations of visual perception that are common to all groups of persons with visual impairment, such as:

— problems with spatial orientation or mobility,
— problems with self-reliance,
— problems with finding a job,
— the need to use compensatory means and aids.

Specific only for some groups of persons with visual impairment are for instance:

— following the principles of visual hygiene,
— the use of optical aids.

1.2.1. Spatial orientation and mobility of persons with severe visual impairment

Spatial orientation — which means the ability of individuals to orient themselves in micro space and also in macro space — in persons with severe visual impairment is disrupted according to the grade and especially according to the type of visual impairment. In the Czech Republic the methodology of practice of spatial orientation and mobility has been in existence since the 1970s. This methodology has also been embodied in the curriculum of primary schools. Spatial orientation is afterwards practised and trained in subsequent blocks.

— Elements of spatial orientation and mobility (further only SOM)

○ Managing of basic techniques of walking without a white cane (Trailing — finger sliding technique, Safety holding — upper, lower and combined, Walking with a seeing guide).

○ Development of the natural orientation skills of a person with a visual impairment. and eliminating negative consequences of a visual impairment in the area of SOM (decreasing of divergences from a straight direction, estimation of distances, estimation of angles, training in the perception of a track´s slant, training in the perception of a track´s curvature, development of auditory orientation, development of a «sense» of obstacles, climbing stairs, training of stability). (Wiener, 1986; Růžičková & Kroupová, 2017)

— Walking with a white cane

○ When practising walking with a white cane the procedure is the same both in children and in adults; however, in adults it takes less time. In the Czech Republic children are instructed to start using a white cane in the second or the third year of primary school. The training procedure starts on a basic level including managing a basic stance, a basic holding as well as various techniques of walking with a long cane. Subsequently we continue with walking on different terrains, in various surroundings until the point when a person is able to seek targets on both short and long tracks with obstacles as well as without them.

— Analytic-synthetic activity

○ Using all kinds of information when applying basic techniques of movement in the process of spatial orientation and mobility. (Wiener, 1986)

Persons with visual impairment learn spatial orientation and mobility from instructors of spatial orientation both in the area of social care and in schooling. The task of these instructors is to teach individuals to move independently, to be self-reliant but they are also instructed that when planning tracks, it is always important to take into consideration the singularity of each individual, their needs and also their particular requirements. During spatial orientation and mobility, we use both architectural adjustments and special aids — either classic ones or modern ones which are meant to facilitate walking and an spatial orientation.

1.2.2. Possibilities of compensation for the loss of visual perception

Compensation for a visual impairment means an effort to find the largest possible extent of replacement for the loss of visual perception by means of other sources — either lower compensatory tools, higher compensatory tools

or compensatory aids. Lower compensatory tools are our remaining senses, particularly hearing, which is, like sight, a long-distance receptor and by using it we can gain a large amount of information in a relatively short time; however, we need someone to tell us the information. With the exception of echolocation, persons with visual impairment cannot gain the information themselves. Touch, on the other hand, is another compensatory tool which is sufficient for gaining information «oneself»; however, in contrast to sight, touch is a synthetic sense which requires physical contact. Therefore we need more time to gain information this way. Smell and taste, our other two senses, play a complementary role when gaining information. They inform us about possible danger but also about pleasant things. (Růžičková, 2017).

Higher compensatory tools represent a person´s skills and characteristics. An individual can gradually improve them, but on the other hand if they neglect them, they stop functioning. We name only the most important representatives of these tools, which are memory, imagination, speech, fantasy and concentration.

When using both higher and lower compensatory tools, compensatory aids are also required. We can divide compensatory aids using a large number of criteria — into optical and non-optical ones, into mechanical and electronic ones, into classical and modern ones, by the place and the means of application etc.

Later in this part of the chapter we will analyze topics such as aids and building adjustments which can help persons with a severe visual impairment to partly or completely compensate for the loss of visual perception.

Technical aids for persons with a severe visual impairment can be divided by more criteria which we mentioned above in the text. Here we will mention only those aids and tools that are currently used most frequently.

According to Moravcová (2004) the most frequently used tools are — as she calls them — non-optical aids, which means the adaptations in physical environment. In special pedagogical and ophthalmological literature this is called visual hygiene.

1.2.3. Visual hygiene

Visual hygiene is a set of basic habits and procedures which should be followed by a person with a severe visual impairment in order not to worsen

visual abilities and functions. (Růžičková, Kroupová & Vondráková, 2018) These are:

— The proper correction of an impairment which means correcting the impairment as much as possible by optical or surgical means and also by using medications.

— Keeping the set time for working to the proximity ordered by an ophthalmologist. This work should be replaced by the work to the distance so that a visual analyser can «rest» adequately.

— The lighting of a room should be adjusted to the individual needs of a person — persons with photophobia need to shade their workplace or to use filter glasses; on the other hand persons with hemeralopia individually need to increase the amount of light rays either by sitting at a window or having a lamp or a lightbox on a table.

— Colour contrast in a room either on walls or on furniture together with the contrast of presented materials is another means of increasing the comfort when working in micro space as well as in macro space.

— Adjustment of script and texts which include not only enlargement but also sufficient line spacing, distances between letters or changed paper size.

— As mentioned previously, furniture in a room should contrast with the floor, walls and also to a text which is placed on it. Desks should have a hinged board which allows the text to be brought closer without the need to lean when reading or doing art activities and it should be also equipped with enough storage space inside.

— There are also other principles of visual hygiene such as painting of a room, work with a blackboard or total time set for a whole lesson.

Visual hygiene is one of the means which helps individuals in the educational process with relatively little effort but on the other hand brings good results. However, when we speak about the educational process, we also have to take into consideration the adaptation of work environments or the adaptation of the educational environment for persons with a central disorder that arose at an older age due to various etiologies.

1.2.4. Aids and the means of compensation for persons with a severe visual impairment

Besides the above-mentioned non-optical aids there are also optical, mechanical and electronic means and aids. If we wanted to describe them in

detail or to name them all, we would have to write a special book. Therefore we will focus only on those which relate to this chapter.

Optical aids:

Since the invention of eyeglass lenses, optical aids have been — besides the adaptations in physical environment — the first aids by which the loss of sight was compensated. Kopáč (2012, retrieved from: https://pan-optika.cz/historie-bryli-a-brylovych-cocek-1006/) states that the first mentions of glasses — or more precisely — of magnifying glasses as we know them these days occurred in the 13th century. «The most important document proving this fact is the piece of work written by the Englishman Roger Bacon, "Opus Majus", from the year 1267. Here we learn that old people can see letters again large enough using glass ball-shaped segments. We can consider this piece of knowledge to be the first important step leading to the invention of glasses. However glass lenses were first put into frames later. As the first step they were put only into one frame and later into two frames (eyecup) that were connected by a bridge».

Among other widely used optical corrective aids these days we can rank contact lenses, which are put directly on a cornea. Similarly to glasses they help to correct refractional impairments. It is well known that the first soft contact lenses were originally invented in the 1950s in Czechoslovakia in a team led by Prof. Wichterle.

These two optical aids are commonly used these days. In persons with a severe visual impairment they are also bolstered by optical magnifying glasses, binocular systems or electronic magnifying glasses.

— Similar to glasses, optical magnifying glasses are actually massive and distinct magnifying glasses. The glasses of magnifying glasses can be placed both into a «handle» and into a stand or a holder. In this way the binocular magnifying systems Kepler or Galileo are produced. One of the versions which helps persons with hemeralopia to highlight a text is a magnifying glass with lighting.

— Electronic magnifying glasses are modern aids that work on the basis of a screen and a magnifying glass in the form of a small camera which can be moving or stationary. Electronic magnifying glasses work on the basis of enlargement of a scanned text/model and its processing (the possibility to change colour, or just a contrast or reversible projection of a text's colour depends on the quality of a magnifying glass and also

on the need of a user). Today there are magnifying glasses both with a relatively small five-inch screen and also those with 55-inch screens or even larger. It is also possible to connect a moving magnifying glass to a monitor or a television.

— If an individual wants to own not only an enlarging aid but also a multilateral aid, they can replace a digital electronic magnifying glass with special software installed on their desktop computer/laptop/mobile phone/tablet. Most smaller digital devices as well as most computers have a magnifying program; however, if someone needs a more sophisticated program with more functions, they can choose from some of the paid programs which can enlarge a part of a screen, adjust colours, filter out unwanted effects, underline a read text, invert colours, intensify contrasts etc.

For the persons who are blind there are screen readers as a substitution of electronic magnifying aids. Screen readers in fact read a screen and transform a text on a screen into a spoken or touchable form (in order to do this special hardware is required — the socalled Braille terminal).

Aids for the facilitation of orientation in the surroundings and mobility

Most people would say that the most common aid for persons with a severe visual impairment is a white cane. However, this commonly used aid is not the only one that helps persons with visual impairment with spatial orientation as well as with the facilitation of mobility.

A white cane is an aid which is not only traditional and well-known but also an aid which is — in connection with skills, knowledge, will and motivation of an individual — one of the most effective and the best solutions to moving in macro space. A white cane can be also complemented by other aids and adjustments of the surroundings:

— A guide dog

A guide dog is an aid that is awarded to person with several visual impairment with visual acuity below 0,05. Today there are three facilities in the Czech Republic (The Guide Dogs Training School in Praha — Jinonice, The Guide Dogs Training School in Brno and The Endowment Fund with its seat in Prague) that are the members of The International Guide Dog Federation. This membership guarantees the quality of a given dog (or it at least dramatically lowers the possible risk of a badly trained dog).

— Architectural adaptations in the physical environment

One of the most typical adaptation in the physical environment that is used by persons with visual impairment is the sound system installation of pedestrian crossings which has already become a common part of streets and roads. However, it is important to add that there are both pedestrian crossings with a fixed sound system installation and also those that need to be activated by pressing a button on a special remote control of acoustic mobility devices (VPN — in Czech).

— Other architectural adaptations of physical environment that help persons with a severe visual impairment are guiding strips, both those on pedestrian crossings and also those connecting two points of orientation on the way. Natural guidelines are the walls of buildings, the edges of paving, kerbs, areas between a lawn and a pavement and so on. In addition to natural guidelines there is an increasing number of artificial guidelines, both those in the form of milled grooves into the pavement (a negative relief) and also those in the form of a positive relief — relief pavement in asphalt or tiles, transverse lines across a pedestrian crossing etc.

— Warning strips, which means a relief change of paving, are visible especially in a place where a pavement passes into a road (this border is prescriptively defined by the width of 40 centimetres) and there are both signal strips and guiding strips leading to it.

— Remote control of acoustic mobility devices (VPN)

On the website of the company APEX (http://www.apex-jesenice.cz/tyfloset9.php?lang=cz) it is possible to find specification of the aid. According to it the remote control of acoustic mobility devices VPN 02 is a part of a system *TYFLOSET*® and it is designed as an aid for individuals with severe visual impairment and blindness. This aid in the form of a plastic box with six buttons can transmit commands and communicate with acoustic orientational and informational devices. By means of acoustic beacons it helps a persons with severe visual impairment with their spatial orientation while using intelligent stops, EZOP panels (for more information see below), crossroads with traffic lights, public transport with sound and voice signals and so on.

— Ultrasound and other obstacle detectors

Ultrasound obstacle detectors (e.g. Tyflosonar, Ray etc.) are not commonly used; however, they exist and help some persons with severe visual

impairment to overcome the fear of injuries and also to navigate them at place which would be otherwise too difficult for them to walk on without assistance. These aids work on the basis of reflecting ultrasound waves and their receipt into the same appliance — after the assessment of the return speed and a set mode it gives a sound signal that informs persons with visual impairment how far an obstacle is from them or if the space around them is empty. Ultrasound obstacle detectors can be either hand-held, neck hanging or in the form of glasses. The aids work with that part of a body which is not protected by a white cane — which means the part from the waist up.

— GPS modules and modern canes

Global Positioning System (GPS) modules have been used by individuals with visual impairment for more than ten years — since the time when GPS signal was permitted to be used for commercial use. They are still being tested and refined. Today both exterior and interior guidance systems are in use.

— Digital voice and acoustic beacons

Most important buildings in big cities these days are commonly equipped with beacons for the blind. The acoustic ones give information using sound signals going a particular direction, on the other hand the orientational voice beacons help the blind with a direction and they also inform about the name of a building and — in the next phase — also of everything what is situated in the building they are in. The beacons are — similarly to pedestrian crossings without a permanent sound system installation or EZOP panels mentioned below — activated by means of a signal from VPN.

— EZOP panels

EZOP (Electronic display panel) provides information about train arrivals and departures, about their delays, it describes a local vestibule and ways to platforms. It also gives information about monuments located in a town. EZOP is designed not only for the sighted who need only the change of contrast or enlargement (the sighted can enlarge displayed information) but also for individuals who are blind because EZOP is equipped with a voice output. If button number 5 is pressed on a remote control (VPN), it activates a signal by which the user can fix the position of a panel more easily. Below each EZOP display there are four buttons

for better and easier operation: up arrow, down arrow, enter and on the left a button — magnifying glass, all of them of course with relief on the top.

— Intelligent stops

Intelligent stops are electronic panels installed at public transport stops; their displays show topical information about lines. The voice output is activated by button number 1, which announces the name of a stop where a person is standing, and button 2 activates a voice phrase giving more information about lines (the panel chronologically announces numbers and directions of lines by departure times and that includes also information about possible delays of a given line, if it is a low-floored line etc).

— Maps and plans

In order to get a grasp of a route and its integration into a space, location, differentiation, points of orientation etc., persons who are blind as well as those with intact sight can use maps and plans. A typical representant of this category are maps created by shaping plastic; however, modern times bring the possibilities of a quick formation of a plan or a map using a reprint (a model downloaded from the internet, a model created manually/by copying an old model etc.) onto paper which is thermally activated. (Vondráková & Růžičková, 2018; Vondráková, Růžičková & Barvíř, 2018) By means of thermal printers (P.I.A.F., Zy — Fuser) we get a relief form. Another possibility can be so-called touch maps created by means of still more and more commonly used 3D printers.

Earlier in the text we have — in short and only for purposes of this publication — specified who a person with a severe visual impairment is, the consequences of a visual impairment and also the methods and aids that ease the mentioned consequences. We hope it is evident that within the constraints we had for this chapter, it is not possible to work on this topic more elaborately. Our insight was influenced by a part which follows this theoretical introduction to the matters. In this part we will introduce ways of diagnosing persons with a severe visual impairment on a special pedagogical (not medical) basis and we will also show how our methods, means and aids can help these individuals or support them in their progress and development.

2. GOOD PRACTICE EXAMPLES

The diversity among the group of persons with severe visual impairment means that we need to offer to them a broad range of aids and procedures that will support all of them in achieving given goals or targets. This is reflected not only in the need to think always of the specific individual when planning goals, recommending specific aid, planning the work with this aid, but also in the need to know the correct diagnosis and exact «request» of person with severe visual impairment or his/her family who came to us — experts.

A vision therapist is, not only within the Czech Republic, one of the experts who can both diagnose visual impairment using functional assessment and also work with persons with visual impairment.

The vision therapist focuses on promoting development and rehabilitation of vision and can also apply modern diagnostic methods using standardized tests. He/she also applies the methods of behavioural diagnostics as he/she observes behaviour connected to a visual stimulus.

«A vision therapy is a set of methods for the diagnosis of visual functions and visual skills and related special methods for the development of visual functions and skills, with the aim of maximizing the use of vision with the support of rehabilitation and compensation aids and special procedures and techniques. Vision therapy enables and facilitates long-term (a lifelong) process of developing and maintaining visual abilities for gathering information from the surroundings, for communication, for education, for taking care of oneself, for spatial orientation and mobility, and for managing daily activities». (IAZT, Retrieved from ww.iazt.cz)

Vision therapy is an interdisciplinary discipline due to the strict requirements for specific education of vision therapists (Růžičková, Kroupová, and Vondráková, 2018). In the Czech health care system, the vision therapist is classified as non-medical personnel in the health sector as he/she is obliged to have, apart from post-graduate medical education, a Master's degree in the special education of persons with visual impairment. The work of this specialist consists of diagnostics, therapy, rehabilitation, preventive and dispensary care within the vision therapy. He/she can work independently or in cooperation with a medical doctor. The vision therapist is a professional who fulfils the tasks of both the special education teacher of persons with visual impairment and the diagnostician in health care sector at the same time. He/she focuses primarily on diagnostics, functional vision assessment, educa-

tional counselling and training in the use of aids, and moreover on psychological support of the person with visual impairment.

The following section will concentrate on examples of a vision therapist's work including the functional vision assessment, the selection of a specific intervention strategy or appropriate aids, and training how to use them.

2.1. A 2-year-old boy with bilateral congenital cataract

Personal and family history

Diagnosis — bilateral congenital cataract

The boy was born at the beginning of February 2017 to parents without visual impairment. His parents live together with one set of grandparents, who help them to care for the boy. The delivery was at term, by caesarean section. The mother noticed a different colour of the retina in one eye already while she was at the maternity hospital. Her suspicion was confirmed by medical staff. The boy underwent cataract surgery on his right eye at the age of 2 months and 2.5 months later, on his left eye too.

The services of the Early Intervention Centre have been provided to the family; the experts concentrated on visual stimulation. Since November 2017, the boy has also been in care of a vision therapist in Olomouc. He visits the therapist on a relatively regular basis so based on that we can present the development of his vision over more than a year and a half.

Current state of vision correction/ of compensatory aids and modern techniques used

The dioptric loss of vision acuity caused by surgery was compensated by soft contact lenses; their dioptric value has been lowered gradually. Since January 2019, the ophthalmologist has corrected the loss of accommodation abilities caused by the surgery with dioptric glasses.

It can be stated that at present the visual acuity is corrected as shown below:

— OD contact lenses of dioptric value +23DP + correction with glasses -3DP.
— OS contact lenses of dioptric value +27DP + correction with glasses -3DP.

Apart from the aforementioned optical correction, the environment has been adapted in terms of visual stimulation and currently also visual hygiene.

Functional Vision Assessment

Functional vision assessment has been performed 6 times thus far. We have used several different functional vision tests:

— To assess visual acuity we used the Lea Gratings Test and the Cardiff Test.
— To assess contrast sensitivity we used Hiding Heidi Test.
— To assess colour perception we used a test of matching colours as directed.

The outcomes of intervention performed for a year and half:

— The visual acuity in both eyes has changed from significantly under-average (compared to peers) to the lower average of children of the same age due to vision training and well-selected vision correction.
— The space perception — from significant nystagmus, non-simultaneous eye movements and significant strabismus alternans to a state when eyes work well together, they can move in all vision directions and especially the degree of nystagmus was lowered.
— The colour perception is within the norm. He recognises and matches basic colours and can even name some of them.
— The contrast sensitivity at short distances is within the norm too.

The development of the boy

Repeated functional assessment has proven that due to modern diagnostics and adequate vision correction the visual perception of both eyes has developed gradually but separately. This could be partially caused by the fact that surgeries took place at different times, which is highly non-standard. The boy has used not only contact lenses since one year of age and later on also glasses but according to the results of functional tests, he has also used an eye patch for the stronger eye for 4 hours per day. After the last functional assessment the vision therapist together with ophthalmologist recommended the use of eye patch for both eyes alternately in the mornings as the results proved that boy's visual acuity is thanks to the adequate stimulation and pleoptic exercises done at home with his mother currently at the same level as of his peers. The further vision therapy will aim at training of eye conver-

gence, especially correct combining of the image from each eye and stereoscopic depth perception that the boy currently lacks.

The importance of modern procedures and techniques is confirmed by the fact that due to the modern compensatory aids (in this case special contact lenses with high optic value and high permeability), modern instrumentation, screening of visual impairment, and surgeries suitable for small children, the boy's development (concerning mobility, mental abilities, vision functions and visuomotor coordination) is at the same level as his peers'.

In this case, modern procedures and instruments were used while diagnosing visual impairment, during surgeries, and during vision correction because intraocular lenses cannot be implanted in a child with cataracts and they were as well used during the functional vision assessment and further vision corrections.

2.2. A 12-year-old boy with Stargardt Disease

Personal and Family History

The boy was born in June 2007 as the first of two children. His mother has the same condition — Stargardt Disease. His younger sister was diagnosed with congenital glaucoma in one eye. His father does not have any visual impairment. The family lives together in a bigger city. The mother cares for the children most of the time. She projects her visual impairment onto her son and tries to help him as much as she can.

The boy is a client of a non-governmental non-profit organisation for persons with visual impairment that provides social services according to Law no. 108/206, about social services (referred as NGO later on). This organisation supports his out-of-school activities. The School Counselling Centre (SPC — Speciálně pedagogické centrum) supports the boy together with family and the above-mentioned NGO while at school.

He currently attends the 6th grade of a regular primary school.

Current state of vision correction/ of compensatory aids and modern techniques used

The boy currently uses glasses for vision correction but their effect on visual acuity is limited due to the fact that his impairment is not correctable with glasses. The visual impairment is corrected by adaptations in the phys-

ical environment, the use of a monocular and a portable electronic magnifier (about the training of their use see more at the end of this section).

Functional Vision Assessment

Vision therapy is provided once a year at the request of the above-mentioned NGO and the family. The NGO follows the recommendations of the vision therapist while working with the boy.

The boy is lively, relatively active in areas of his interests. He would like to participate in group sports but his visual impairment is a barrier to the sports he is interested in.

The therapist used standardised tests for adults with visual impairment as the age and intelligence of the boy enabled it.

The first examination took place in the boy's home, the second one at the above-mentioned NGO.

The results of functional vision assessment revealed:

— Visual acuity when looking at a distant target is 8 % of the norm binocularly and when using the right eye, 6 % of the norm when using left eye — this means severe vision impairment even with refractive correction.

— Visual acuity when looking at a close target is a quarter of the norm — thanks to the fact that the boy taught himself (without the support of specialists) to use natural correction due eccentric fixation.

— Spatial perception when looking at one object either close or distant is significantly affected by eccentric fixation as well as by the compensatory position of his head.

— Depth perception is affected severely — the boy does not perceive depth at all — he cannot state which object is in front, which object is closer and which farther. The boy follows both close and distant objects and phenomena with his right eye. Depth perception was not preserved due to impaired stereopsis.

— Colour perception was assessed with a test for children (Isihara Test for Children) and for adults (Isihara Test for Adults and Hue Test). It revealed that colour perception is severely affected across the whole colour spectrum.

— The vision impairment affected the contrast sensitivity as well as all above-mentioned vision functions. The Low Contrast Flipchart Test

showed that he preserved 10 % of the contrast scale but only when tested at the distance of 1 meter.

Development of the boy by the means of modern procedures and aids

The boy is communicative. He is aware of his impairment — his awareness can be partially based on the example of his mother and her support. He is able to inform people around him when he needs to change or adapt something in his physical environment. He follows the recommendations given by specialists. He does not obey his mother's advice much. He rather finds his own path and makes his own mistakes. The first thing he learned without the support of any specialist was eccentric fixation when looking at close objects, which he supports by tilting the position of his head.

The first support he demanded was the adaptation of his physical environment — magnifying texts and the use of natural and artificial light at his working place (e.g. he suggested switching desks with his sister). A specific area he needs to work on is the loss of colour perception (it was surprising for his mother as she perceives colours much better than her son). These adaptations helped him to increase his concentration and improve the focus of eccentric fixation. The time he can work with close objects without resting has lengthened — it is about 10 minutes now.

Other adaptations that are acceptable for him are the use of a monocular and a portable electronic magnifier that he chose himself. He uses them at school and also during activities in his free time. The boy uses the monocular during wanders, hiking and when looking at the blackboard at school. The electronic magnifier is used when working with texts at school, less when at home.

The boy and his mother have accepted the offer of the NGO and so the boy has started to train working independently in surrounding space using the elements of spatial orientation and mobility training. He is probably not going to use the white cane as his peripheral vision is relatively good. His spatial orientation training in unknown environments aims at the use of seeing guide and safety positions at the moment. The following elements of spatial orientation and mobility training are also trained: stability, walking straight and the use of maps and plans. Work with plans and maps has already been introduced to boy at school, but the NGO uses maps and plans printed by Zy-fuser more practically.

All above mentioned procedures, aids and means have enabled the boy to be independent while moving and when attending school.

2.3. A 9-year-old girl with microphthalmos

Personal and Family History

Diagnosis: microphthalmos

The girl lives with both parents and her older brother in a small city. The visual impairment in other members of family has already been tested for but not proved yet. The girl is a client of the same non-governmental non-profit organisation as the previous boy. The NGO supports her during her out-of-school activities. The School Counselling Centre (SPC — Speciálně pedagogické centrum) supports her together with her family and the above-mentioned NGO while at school. At present, she attends the 3rd grade of regular primary school. There is a teacher's assistant in her classroom.

Current state of vision correction/ of compensatory aids and modern techniques used

The girl currently uses following compensatory procedures — principles of visual hygiene and also spatial orientation and mobility.

Functional Vision Assessment

The results of functional vision assessment revealed:

— Visual acuity of the better eye without any vision correction when looking at distant target is 6 % of the norm.

— Visual acuity of the better eye when looking at a close target is approximately 20 % of the norm.

— Spatial perception is influenced by the leading left eye that has better visual acuity at distance as well as at near.

— Depth perception has not developed at all.

— Colour perception was assessed with the Hue Test. It proved that colour perception is preserved for the whole spectrum including various shades of all colours.

— The vision impairment — microphthalmos — affected the contrast sensitivity as well as all above mentioned vision functions. It was assessed with the Hiding Heidi test which showed a preservation of 25 % of con-

trast scale when measured from the distance of 1 meter in the right eye and 5% in the left eye from the distance of 2.5 metres.

Development of the girl by the means of modern procedures and aids

The girl's «request» was twofold — first, it was the development of spatial orientation at places close to her home and at school and the second was enhancement of the quality of the work in micro space and when working with text.

Her spatial orientation and mobility is supported by her whole family. She likes to perform her abilities, she attends a ballet course, she has her own place there and is fairly familiar with the environment there, and therefore spatial orientation is not a problem at that location.

Further goals when concerning spatial orientation and mobility are — further development of specific elements of spatial orientation and mobility, walking with a seeing guide, trailing, and moreover estimating different distances, following a sound source, straight walking. In the future, she will be training in the use of a white cane to support her independent mobility. She has already been introduced to the white cane, she uses it in unknown environments to alert those in her surroundings about her condition.

Concerning the principles of visual hygiene — the girl uses magnified texts and high contrast of the text as well as of images and their background. Her orientation in the text on the page is much better when the paper is landscape orientated and the text equipped with tactile lines. Also very helpful is the use of coloured text and transparent foils that can «deepen» the text. The girl uses a portable electronic telescope to magnify images and texts, currently only at home.

The girl's independence has grown since the elements of spatial orientation and mobility have been introduced and recognised in maths classes and her ballet course — the girl does not feel embarrassed, she likes to demonstrate her abilities and tries to be as independent as her brother.

3. CONCLUSION

Persons with visual impairment need to learn how to use compensatory means and aids and specific procedures due to the fact that their visual perception that is otherwise responsible for acquiring about 80 % of information from their surroundings is limited or completely lost. In the text above we

described basic possibilities of compensation or those which apply to presented examples.

We introduced not only the traditional classification of persons with visual impairment but also the consequences caused by it and possible ways to mitigate or eliminate these consequences by means of modern and traditional procedures, or modern and traditional aids.

Our theoretical assumptions were accompanied by practical examples from the work of a vision therapist. These illustrate who a vision therapist is and how the correct diagnosis and adequate guidance can support a person with visual impairment in everyday life.

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7.

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ASPECTS REGARDING THE USE OF ICT IN THE INCLUSIVE EDUCATION OF VISUALLY IMPAIRED STUDENTS. CASE STUDY FROM ROMANIA

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1. INTRODUCTION

Integration of students with SEN into mainstream schools is a challenge for any country of the world, regardless of how much is invested in this process. This fact gives the school institution the role of fundamental component of the social system, capable to give concrete answers to the current imperatives set by the evolution of the contemporary society and to resolve a series of problems related to the need for social acceptance / valorisation of each individual and to their capacity to integrated into a continuously changing society. In order to fulfil these expectations, the effective teacher should also be concerned with the progress of their students, maximising the time when students are engaged in their tasks and the school learning time. Several of a teacher's personality traits leave their marks on the school achievement, therefore they should be constantly concerned with their own professional trening (Blândul & Bradea, 2017).

In recent years, and ICT, in particular, has become more and more important, being present in almost all aspects of our modern society. On the other hand, from the perspective of inclusion, school is the space where each student should have equal educational opportunities. The evolution of new technologies has generated changes at all levels of society and has had a deep

influence on the activities implemented in schools, including those which concern the education and inclusion of people with disabilities. The use of information and communication technologies in education has led to significant changes in didactic principles, as well as teaching and learning strategies. In recent years, a particular attention has been given to the development of adaptations designed for users with special needs, and these adaptations are known as *access technologies*.

School should focus primarily on students acquiring the knowledge of how to learn the strategies needed to solve problems in everyday life. This process should take place in a cooperative and solidary way, with the teaching and learning processes happening concurrently, with each child «learning how to learn», one from the other, without competition and arbitrary hierarchies, in a spirit of respect and tolerance towards others. All children have the right to take part in all activities included in the curriculum of mainstream schools. During school hours, teachers and experts should get directly involved in supporting by all manner of means the maximal integration of students with special educational needs. Thus, by a series of measures, school should make efforts to meet students' all educational needs, without injuring their dignity and personality. In this respect, ICT, in conjunction with access technologies, becomes an indispensable tool for any field, and this fact has enabled, and will continue to enable, the access of all people with disabilities to education, information and vocational trening (Blândul & Bradea, 2016). In order to achieve that, a new approach is required and/or adjustment to a new style of thinking and of behaviour, which will allow society to deal with changes.

2. ASPECTS OF SPECIAL EDUCATION IN ROMANIA

In Romania, there are not yet inclusive schools in the true meaning of the word. The educational policy of the Ministry of Education includes the modernization and reconfiguration of the special education system with a view to reaching the fundamental aim of the educational, professional and social integration of children with special needs so that they adjust to community life. In order to reach this aim, two main directions have been set for the future: children should be enrolled from the very beginning in a mainstream school close to their house and benefit of diversified and quality support services.

Recent changes focus on creating support services for children in difficulty. The expectations in respect of increasing the quality of education for

these children include training mainstream education teachers in the field of education for children with SEN and in that of inclusive education, psycho-pedagogical and specialist educational support services, home schooling, part-time education and specialist speech therapy and psycho-pedagogical counseling services. The Ministry of Education, the school inspectorates and schools in partnerships have also developed many programs and projects in this respect. Despite all that, educational support services are ineffective and not very developed, and the mentality of the community has not changed significantly concerning the inclusion of all children in any school (Vrăsmaș, 2011, Horga, Apostu & Balica, 2015). In Romania, integration still prevails over inclusion.

In the Romanian education system, there are more forms for the integration of children with SEN in mainstream schools: compact classes, groups of 3-4 children with SEN integrated into mainstream schools and individual integration in regular classes, in mainstream schools. We speak, in fact, more of a physical integration than of a real one. Support services are insufficient and ineffective both for children with SEN and their families, and the teachers, the other children and their families from mainstream schools. These services should still be developed, albeit important steps have been taken in the direction of creating support services for children with various disabilities. In Romania, there are still well-organized special schools, with well-trained teachers for special education who are dedicated to their work. Statistics, however, show that in recent years the number of children enrolled in special education has decreased, while the number of children integrated into mainstream schools has increased (Horga, Apostu & Balica, 2015).

The legislation in force provides for a support / itinerant didactic framework for 15 children in primary education and one for 20 children in gymnasium education. Under the new regulations, a support/ itinerant teacher is standardized to 8-10 children with mild and moderate deficiencies and to 6-8 children with severe or associated deficiencies. The itinerant / support teaching staff is a trained person in the field of special education and, together with the educator/ the school teacher of mass education, forms a team responsible for the process of learning students with SEN (Pop, 2016). The teacher combines the role of consultant teacher and tutor for students with SEN included in integration programs. Such a teacher works in one or more schools in a well-defined community/area and provides the necessary counselling for mass school teachers, curricular assessment, and direct participation in the instructional and educational process of children with SEN. How-

ever, the status of the support / itinerant didactic framework is unclear, it involves too many tasks, some of which can be achieved by various other specialists in the education system (speech therapist, school counsellor, school psychologist), there are no facilities in the transport of the itinerant to the school where the child with SEN is integrated etc. The results of the support / itinerant teaching staff activity are rather modest at the level of child development, but much more evident in the mentality of the integrative school and the parents of the children in these schools. Until now, only a limited number of mass schools have become integrative schools and integrated children with SEN.

Support services still need further development, although important steps have been taken to create support services for children with different disabilities. In Romania, they still operate in parallel and special schools, well organized, with well-trained teachers, trained for special education and dedicated to their work. But statistical data show that in recent years the number of children entering special education has decreased, while the number of children integrated into mass schools has increased.

3. THE SITUATION OF VISUALLY IMPAIRED CHILDREN IN ROMANIA

In Romania, there are 3,200 children and 106,588 adults with visual disabilities, according to the latest statistics published by the General Directorate for the Protection of Persons with Handicap within the Ministry of Labor, Family, Social Protection and the Elderly. Out of these, 1,116 children and 54,559 adults are classified as 'severe' with disabilities.

Unlike other students with SEN, those with visual impairments are very poorly supported in mass education because of the lack of school facilities. Only 0.5% of mass-reading units have the necessary equipment and software to provide an educational environment tailored for children with special educational needs, especially visually impaired students.

That is why most of them choose special schools where they can benefit from specific facilities and teachers trained in this sense. In Romania, there are 7 special schools for visually impaired students (distributed throughout the country), financed by the state, where students receive free education. They work on several stages of schooling (preschool, primary, gymnasium, high school and post-secondary), trying to integrate young people with visual impairments into the labour market. However, framing visually impaired children in special schools limits the possibilities of socializing and collabo-

rating with other people, except their colleagues, their family members, or those who are in the same condition. After graduation, the possibilities for continuing studies are extremely low or nonexistent, while the presence in the workplace is achievable for less than 1%.

The distinction between «integrated education» and «inclusive education» is still insufficiently clarified despite the fact that the literature has given generous space to this subject. For example, I. Chelemen (2011) accredits the idea that integrated education would mainly target those situations in which the student with disabilities tries to adapt the particularities of the educational environment, using all internal and external resources to meet the academic requirements and social aspects of the school. On the contrary, inclusive education refers to situations in which the school meets the needs of its pupils (whether or not they have different types of disabilities), by designing a differentiated / adapted curriculum, providing resources for accessing different didactic contents, implementing various forms of curricular and extracurricular activities, facilitating the physical mobility of people inside or outside school, and so on. It can be appreciated that an inclusive school is a school of diversity, in which each student has a well-defined status and role, respectively, to be valued at his / her right capacity.

However, as I have already said, there are few educational units that can be considered true 'educational inclusion centres'. Among the reasons for this standard can be mentioned the high costs involved in educational action, despite the fact that compulsory education in Romania is free of charge; the difficulties that some schools have in ensuring the movement of students with physical disabilities in school space or in facilitating access to printed courses for those with sensory problems; the insufficiency of qualified and non-teaching staff qualified in the field of special education, the existence of inadequate or insufficient material and financial resources; difficulties in co-operation between school and some families of disabled students, sometimes inappropriate involvement of local and central public authorities in school life etc. All these elements create a state of uncertainty and dissatisfaction at the level of special/special inclusive education, with direct effects on the chances of success of the process of integration/inclusion of people with disabilities in the communities in which they live. There is a need for a significant transformation of the social and educational paradigm following which the special/special education system operates, including by changing the attitudes of individuals and the culture of organizations, so that people in difficulty are accepted and supported to live as normal as possible within society.

4. ACCESS TECHNOLOGIES USED IN SCHOOLS IN ROMANIA

The constant development of new technologies provides useful resources for visually impaired children in order to discover, develop and encourage their potential in areas of social life.

The term **access technologies (AT)** refers to hardware and software applications by means of which people with visual disabilities can use information technology, namely the computer, with everything related to it, including the Internet and related communication services.

Any equipment in the electronic field may be included in the AT category if it meets several conditions:

— facilitates independent access to information for the visually impaired person;
— allows the development of new skills to facilitate social and professional integration;
— provides support in educational activities and social interactions;

New access technologies allow a visually impaired person to perform a task (for example, at home: electronic mail, Internet search, school reading: books and lectures, writing materials etc.) at a time and at a level quite similar to a valid person.

In the field of special psycho-pedagogy, access technologies have allowed a new orientation and approach to the issue of people with disabilities, both in terms of corrective-compensatory intervention and the development of their new abilities (Bradea & Blândul, 2017).

Access technologies are classified into hardware access technologies and software access technologies.

Thus, the main hardware access technologies used in Romanian schools for working with students with visual impairments are:

— **The Braille display**, it is one of the most representative computer peripherals designed for the blind. The purpose of the Braille display is to give Braille characters descriptive and textual information that the user needs to interact with applications.
— **The electronic office magnifier**, it is an electronic device designed for people with low vision (amblyopia) to enlarge and read written docu-

ments. This unit contains a display (LCD screen) and a camcorder. The camera takes the image of a document (book) and displays it on the screen at the desired size. The device allows you to display either in natural colours or in fake colours. They help increase contrast, especially for reading.

— **The voice interpreter**, it is an independent device that is dedicated to scanning, recognition (OCR), and speech interpretation of the text. This device incorporates several technologies, namely: a Pentium processor, scanning and text recognition software, text reader software, and synthetic voice software.

— **Device for making tactile diagrams** — it performs tactile images or diagrams. It works with a special paper that has in its structure microcapsules with alcohol, which expands by heating. Taking the tactile image begins by drawing the desired contour on paper with a special pencil or ink that must contain fine carbon particles because the selective heat of the paper is made by thermal infrared radiation.

— **The readers or Daisy players,** are devices that allow listening to books created in the Daisy standard. They are similar to an MP3 / CD player. However, unlike the latter, they are the only ones that allow selective listening to the information created in the Daisy format. They are designed specifically for visually impaired people. To be read, Daisy cards or other types of text or audio files must be uploaded via a computer to the internal memory of the device, or copied with a CD.

The most used access technologies for individual computer work are software access technologies.

The main software technologies used in Romanian schools are:

— **The screen reader** — is a software application that converts text from screen to voice. The program is able to read all the text displayed on the screen, including menus, dialog boxes, controls, and buttons that can be controlled with the keyboard. The screen reader is a tool for blind people to use the Internet (e-mail, web browsing), work with text processing applications, and perform other tasks using the computer. For Microsoft Windows based environments, the most popular screen readers are JAWS and Window-Eyes.

— **Text conversion programs in audio files (Text-to-Speech)** are software applications that allow the conversion of text files into audio files. The difference between such an application and a screen reader appli-

cation is that text-to-speech interpretation is saved in an audio file that can be read at any time with any device where music can be listened.

— **Electronic magnifying glass (screen magnifier)** for the computer screen is an application designed for visually impaired people (amblyopic), which allows an increased viewing of the computer screen. One of the most popular electronic magnifying glass applications is ZoomText, and it is capable of increasing the screen up to 36 times, also allowing you to choose which part of the screen to enlarge.

— **RoboBraille** is an e-mail and web-based service capable of automatically converting documents into a variety of alternative formats for people with visual impairments and reading difficulties. RoboBraille is available 24/7 as a self-service solution, is free for all users, for all registered or unregistered users who do not use this service for commercial purposes. The objective is to support and promote the independence of people with special needs during the educational system and labor market. As an added benefit, RoboBraille ensures the privacy of those who need materials in alternative formats.

5. ONLINE PLATFORMS

Accessing general online information allows people with disabilities to overcome any physical barriers regarding communication and transportation from accessing other sources of information. ICT accessibility is therefore necessary for people to participate fully in society. Many efforts have been undertaken by the Romanian Ministry of Education, with the significant support of NGOs, in order to ensure an educational environment that ensures equal opportunities for children with visual deficiencies. Several sites have been created that can be used both at school and at home.

a) One of these is **School for All**, a site that aims to create a learning environment accessible to all students, regardless of the presence of a visual disability. The site provides accessible material that any student can read on the computer. The information on this site is complementary to what is learned in the classroom, giving students the support in daily training. Through this site, blind learners have access to accessible, free content, in line with school curriculum, and can read them with a screen reader (for pre-school children — riddles; for primary education — fables, math collections; for gymnasium education — poems, legends, mathematical collections, math memorization, fun mathematics, elements of algebra theory, plane geometry, geometry in space, for high school edu-

cation — mathematical collections, solved baccalaureate variants) (http://www.scoalapentrutoti.ro/index.php?option=com_content&view=article&id=59&Itemid=61).

b) Pontes Library. It is an online collection of electronic books by volunteers of the Pontes Association from Cluj-Napoca. On this site you can find thousands of titles in electronic format (over 20,000), which can only be accessed by people with visual impairments. If they request, they receive an account where they can log in and then be able to borrow what they want. Books are sorted into different categories of content and according to the accuracy of the scanned text. The library can be accessed via both an online portal and an Android application programmed by a member of IT Pontes (http://www.pontes.ro/ro/carti/index.php). The library is secured in such a way that it can be tracked if a user has compromised the login data, and consequently the necessary steps will be taken and sometimes is forbidden for a user to enter and borrow books.

c) Sound Archive Pontes. Sound archive Pontes was created for those who want to spend their time in a pleasant way, listening to theater plays, biographies / memoirs, verses in special performances, happy moments, etc. The database of this sound archive has a few thousand files with an average length of 60 minutes. For access to this sound archive, just like in the library, a few conditions have to be taken into consideration: the user has to have visual impairments, has to send a copy of the identity card and of the certificate to the association`s secretariat and then has to ask for a request of a user and a password to the same email address. Those who already have an account at the Pontes Library can authenticate themselves with the same data in the library. Both services are available to any visually impaired user in Romania or abroad who can prove it. Along with these materials that are used both at school and at home, the site also includes accessible audio games for people with visual impairments in order to enjoy their free time. Adventure games — Pontes Escape, table games — Pontes Backgammon, Pontes Duel shooter, and many more. Some of the audio games allow communication between remote players, often from different countries, through existing chat systems (even with an included translator to facilitate communication between different language speakers). It can be said that these games can also function as a social model. For the Android operating system, a casino game package with various card games was created, from Poker to Blackjack.

d) IDAE — Accessible education for blind or visually impaired people. IDAE —**Integration and Development through Alternative Education** is an educational platform made by the Tandem Association, acces-

sible to visually impaired people, which aims to bring educational materials covering a wide range of subjects and school materials under the same click. All materials within the platform are accessible (audible and visual) to meet the needs of blind or partially visually impaired people. *HST* sau ***History through Sound and Touch***is the first chapter of the IDAE platform and invites us to throw an eye (or lean an ear) on the history of the Romanians. HTA includes materials related to Romanian history, texts accompanied by hearing aids, described photos, maps and 3D maps. The platform became available in mid-2018, and the materials available are useful in following the school curriculum and help the students with the baccalaureate exam. HTA is more than an online platform. History through sound and touch counts so far workshops with history teachers, summer school with pupils, creative and educational workshops for typical and blind people alike. In addition, there is a lot of work on launching a multi-sensory history book that features history beyond text, in words and 3D maps. HTA can be found on Facebook and on Instagram: http://www.asociatiatandem.ro/educatie-accesibila-nevazatori/

6. THE PARENTS' REASPONSABILITY IN INCLSIVE EDUCATION OF PUPILS WITH VISUAL IMPAIRMENTS

Along with school, parents play a particularly important role in the school and social inclusion of children with different disabilities. Among the most important attributions in this case can be mentioned: providing the material and financial support necessary for the child's physical and mental development, investing in formal and non-formal education of the child, achieving the primary socialization of the child with the other members of the family, in the school and social environment of which it is part, the provision of emotional support to overcome all obstacles encountered throughout life, etc. When the child experiences a particular disability, parental responsibility increases significantly because, in addition to all the other tasks listed, they will need to ensure that their son / daughter receives the best specialist care and benefits from adequate recovery and education. To fulfill these responsibilities, parents also need counseling and support from specialist psychopedagogics specialists to learn how to relate appropriately to their child, and how to work with competent institutions in the field. But perhaps the most important thing would be to recognize and accept that they have a problem they can not manage for themselves and for which they need specialized help.

But not only typical individuals or organizations have to change their approach to disabled people so we can talk about successful integration. It is equally important that people with special needs to have a positive attitude that allows them to effectively manage the crisis situations they are crossing. Undoubtedly, it becomes the duty of society to try to resolve, as far as possible, the problems faced by their fellow peoples in difficulty (in order not to turn a disability into a handicap), but equally true is that the persons concerned have, in turn, the duty to be actively and responsibly involved in managing the problems that concern them most effectively. Unfortunately, this is not always the case, and some people with disabilities seem to leave too much responsibility to others for their own destiny.

In the following, we propose to look at the case of a visually impaired student who attended a roundtable organized by the Association for Education and Training *TopFormalis* in Oradea, Romania in July 2018 on topics related to the importance of assistive technology in the recovery and integration of people with disabilities. We will understand from the presentation of the case that, although external support is essential for the success of inclusion, the decisive role in this process lies with the person concerned, the first and most interested in bringing a life as close as possible to the community standards. Also, in the second case study, we will insist on a workshop proposed by the same non-governmental organization in March 2019, on which issues were discussed on the relationship between teachers and parents in the context of children's disability. We will try to capture in this case the emotions an adult can experience when he discovers that his son has a certain physical or mental deficiency.

7. CASE STUDY 1. A TEANAGER WITH VISUAL IMPAIRMENT

Miss A.A., a 20-year-old female, was diagnosed with retinal detachment in both eyes, which led to the complete loss of visual capacity as early as 14 years. At the time of installing total blindness, the adolescent was a 8th grade student at a home school in the town, but the accident that caused the diagnosis forced her to suspend her formal education for 4 years and then continue her studies at a high school intended exclusively for visually impaired people from the North-West part of Romania. After complete loss of vision, A.A. has encountered numerous problems of adaptation to new living and study conditions, especially in terms of spatial orientation, acquiring new information, and socializing with people in the environment. In general, spatial issues related to difficulties in moving (especially in an unknown outside

environment), in identifying and recognizing new objects, in determining the exact position of her own person, and various objects in relation to her. Issues related to the acquisition of new information — whether it is teaching content or other information from other sources — are caused in particular by the limitation of access to such sources, as most messages are transmitted through the visual channel. Finally, problems of interpersonal communication are often caused by the atypical attitudes of the healthy individuals towards the disabled. Thus, they are reproached by typical individuals that «they do not know how to deal with people with disabilities», either being too indifferent or too overprotective.

In order to overcome these obstacles, the student A.A. called on the support of assistive technology, as well as the development of aggressive non-assertive personal behavior. Firstly, new information technologies can help visually impaired people to lead or move relative safely in the environment. For example, the student A.A. mentions a navigation application that can be used on the mobile phone to help the visually impaired move on a predetermined route validated by a valid person (*Be My Eyes*). Also, there are some text-to-speech applications that enable people with visual impairments to have access to lecture texts through a voice synthesizer. In certain situations, however, A.A. had to use the Braille language when the information received could not be presented otherwise. As for the interpersonal relationship, the non-assertive behavior of some healthy individuals determined A.A. to use the same modalities of communication, which, repeatedly, could lead in time to limiting the possibilities of social integration.

On the other hand, the continuation of high school studies by A.A. is one of the most important elements that can help in her personal and professional development. The relevance of formal education is given, first of all, by the fact that a person with disabilities can obtain a recognized qualification through a diploma which will later give him the chance to continue his education at a higher level of schooling or to integrate into the labor market,in a better-positioned job. But the most important thing is that higher education, assistive technologies, learning pro-social behaviors, etc. may increase the chances of the person with a disability to better integrate into the community and provide better access to its living standards.

8. CASE STUDY 2. WORKSHOP «SOME AASPECTS REGARDING RELATIONSHIP TEACHERS-PARENTS IN THE CONTEXT OF PUPILS' VISUAL IMPAIRMENTS»

Under aegis of the «TopFormalis Friends Club», in March this year, the whorkshop «Aspects about the relationship of teacher-parent in the context of child disability» took place at the «Gheorghe Şincai» County Library in Oradea, a very delicate subject for both teachers, as well as for parents. A special place in this workshop was dedicated to the analysis of the psycho-pedagogical characteristics of pupils with visual impairments.

After a brief presentation of the visual analyzer physiology anatomy and physiology, insisting on the main visual indexes (visual acuity, visual field, light sensitivity, contrast or chromaticity, etc.), the main defects of vision (myopia, hypermetropia, astigmatism, glaucoma, etc.) and the most important ways of medical and psycho-pedagogical intervention available to both specialists and parents less familiarized with the rigors of the field.

Also discussed were the disorders that may arise in intellectual development and which give a variety of intellectual disabilities, such as difficulties in adapting to the school environment, communication disorders, behavior, relationship and learning.

After classifying these disorders, some useful tips have been given when there is a child with visual disability in the classroom. We have highlighted the most important aspects that we must take into account in order to teacher-parent relationship work as good as possible: knowledge, attitudes and skills.

As a practical activity, those present had to detach from a passage received on a note, the emotions, feelings, states that parents live in confronting their child's disability, and then presented them with theories of adaptation to disability (denial, negotiation, anger, depression and acceptance) and the effects of disabilities on different family members.

As a conclusion of the effect of adaptation to disability, it has been highlighted as an important variable — the training level of the parents and the type of disability that a child has, which is not necessarily an obstacle to a positive perspective on the child.

Recommended habits were: skills to listen, to communicate, to be assertive, to work in groups, and as a practical activity an assertiveness test was carried out: the tiger, the owl and the turtle.

The workshop aimed at and made collaboration between specialists, teachers and parents, all united by the same desire: overcoming the difficulties in the education of children with disabilities. Because the winners are mainly the children, but also the family, the school and then the society as a whole.

9. SUGGESTIONS FOR PEOPLES WITH DISABILITIES TO AN EFFECTIVE INTEGRATION

As mentioned in the previous paragraphs, the success of social inclusion / inclusion of people with disabilities depends, to a considerable extent, on the way in which the actions of different social actors —family, school, membership group, governmental and non— governmental organizations responsible for the support and therapy of these people, local public authorities involved in the development of social and educational policies in the field, and so on.However, people with disabilities may play the most important role in their own social inclusion, as the way they relate to their deficiency or the other actors on the social scene may depend on their response and, finally, the degree of success of of the whole process. In most cases, the benefit of people with disabilities is minimized, their status being limited to the «object» or «passive beneficiary» of the integrationist action.These are just a few reasons why we suggest that in the following paragraphs to offer some suggestions (generally valid principles) addressed to people with disabilities to raise awareness of their resources and to support them in and to use them as efficiently as possible for personal benefit.

a) *Proactive approach to life situations* — refers to transforming the visually impaired person from an «object» subjected to genetic, psychological and social determinism into an «agent» of his own change, endowed with the resources and tools needed to consciously involve himself in situations can control them, or accept them confidently those they can not control;

b) *Designing each activity from the perspective of the final result* — addresses the recommendation for visually impaired people to prioritize engagement in an activity to determine exactly the target they are proposing, the «mission» they have to accomplish, and in office to select their work strategies, action plan, and evaluate their results;

c) *Establishing priorities* — depending on their importance and urgency, it is preferable that any person with disabilities insist on impor-

tant but not urgent things, which can give him stability and confidence in the work he has done;

d) *The I win-You win approach* — involves the existence of a mutual collaboration between the visually impaired and the normal development based on cooperation, trust and mutual respect so that everyone can finally win;

e) *Empathetic communication* — is the highest form of interpersonal communication, where the most important requirement for partners is to first try to understand the interlocutor and only then to ask to be understood.In the relationship between a person with a disability and a typical one, this form of communication refers to the fact that it is important for everyone to focus first and foremost on the needs of the other and then on his needs;

f) *Promoting creative cooperation* — refers to the fact that a whole represents more than the sum of the component parts, and a visually impaired person needs to be approached in its entirety, at a psychological, pedagogical, social, medical, etc. level;

g) *Ensuring a permanent* «*personal renewal*» — refers to the fact that, in order to be effective, a person with disabilities needs to constantly be concerned about his comfort and the assurance of a physical, mental, spiritual, socio-cultural well-being.

It is important to note that all these seven sets of suggestions must be seen in a close interdependence, respecting each of them by attracting benefits at all other levels. This is all the more relevant since, according to the most recent statistical data, about 20% of the world's population has different forms of deficiencies and the number of these people is steadily increasing both in percentage and absolute value (Ginsburg, Rapp, 2017).That is why we consider it extremely useful for members of the contemporary community to be prepared to accept disability as a normal form of the diversity of life on the globe and to support the inclusion of peers with such different issues as equal partners in society. Thus, the premises of an inclusive society open to all its members will be created, in which all people, although different, will have equal chances to be both personally and socio-professionally successful.

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8.

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SPECIAL NEEDS EDUCATION IN ALBANIA AND SOME BEST PRACTICES OF ICT-BASED SOLUTIONS

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1. INTRODUCTION

Persons with disabilities are a significant population group in Albania. The last Census (2011) shows that 6.2% of Albanians above the 15 years age live with at least one type of disability and most of them have no proper education. In the Albanian system, disabled people enjoys all human rights, (education, employment, health, etc.) and fundamental freedoms (opinion, expression, etc.) as foreseen in the Albanian constitution and in the relevant international compulsory instruments. The constitution (article 59/f) stipulates that the state and the government must act in favor of disabled persons in fields of health rehabilitation, the special education, the social integration and living conditions improvement. According to these constitutional foresights a certain number of laws and decrees have been putted in place, especially regarding the legal statutes of various groups of disabled persons and on social and health care, such as the Law No. 93/2014 «On the people with disabilities», the National Strategy on People with Disabilities in Albania, and the DCM No.248, date 30.04.2014 «On employment promotion program for persons with disabilities». All these documents pays a particular attention to the education of those persons, establishing both public policies with this regard and promoting specific projects focused in the special needs education. Regardless these initiatives, several issues need to be addressed in the next future. I.e. the number of children with disabilities attending pre-school and pre-

university education is very low compared to the total percentage; barriers, or hesitation, on the part of parents to enroll their children in kindergartens and general schools; stigmatizing attitudes towards children with disabilities' fear related to their vulnerability; or prejudice that children with disabilities cannot benefit from the general school program; sometimes teachers disapprove having a child with disabilities in their class due to the greater amount of work that this process requires, complaints from other parents, lack of knowledge and capabilities to better address the educational needs of children with disabilities, lack of teaching assistants, etc. An important support in fostering the special needs education in Albania stems from some projects specifically focused both in ICT solutions for teaching and learning process and updating the classic teaching methods. Therefore, in this chapter we will initially present the Albanian framework on the special needs education and the public policies with this regard, and after we will analyze three specific projects dealing with special needs education, which had a particular focus on the tools and methods, offered by the current information and communication technology: Schools as Community Centers; I-Learn; and School Me.

2. OVERVIEW OF THE ALBANIAN EDUCATIONAL SYSTEM

After the fall of the totalitarian regimes, many eastern European countries were involved in educational reforms in order to rebuild and recompose the educational systems in line with global developments in education (Gjokutaj, 2013). In this context, Albania also undertook different policies in order to modernize curricula, enhance system capacities, guarantee fully access to compulsory education, and align the education system with the international frameworks, particularly with the European standards (UNESCO, 2017), considering the integration process in the European Union began shortly after the fall of the communist regime. In about 30 years the educational system in Albania has undergone several changes, changes that contributed to the actual shape of the system. Nowadays, in Albania the education system is divided in preschool education; basic education; secondary education; and higher education. Preschool education includes kinder-gardens and preparatory classes, and is intended for children aged 3-6, however this level is not compulsory. Children above the age of 6 until 16 are enrolled in the mandatory basic education, with a 5+4 format: 5 years in the primary level and 4 years in the lower secondary level. After the basic education students can continue their upper secondary studies in two main directions, such as academically oriented gymnasiums or vocational education and training programmes. The higher education system is aligned with the principles of Bolo-

gna, and foresees three-year bachelor degree programmes followed by one or two years of master's degree studies. The highest education level is represented by the three years of doctoral studies.

According to the actual legislation, at the central level the education system in the Republic of Albania is under the jurisdiction of the Parliament, with its Committee of Education and Culture, Council of Ministers, and Ministry of Education and Sport and has its affiliate institutions (UNESCO, 2017). The central level governance is supported at regional level by the districts and municipalities, including administrative bodies, i.e the Regional Education Directorates, Municipalities, District Councils and their Departments of Education and Health (ibid.). The overall aim of these institutions is to guarantee the right to education which is based on constitutional provisions, in specific the article 57 (Republic of Albania, 1998 and following amendments). According to the Constitution of the Republic of Albania, citizens enjoy equal rights to be educated at all levels regardless of their social status, nationality, language, gender, race, political convictions, health and economic level. Moreover, in compliance with the Constitution, national minorities have the possibility to learn in their own language, and to learn about their history and culture (article 20).

Beyond the constitutional provisions, the legislative framework on the education system in Albania is completed by several laws and other legal acts (Vadahi and Bilali, 2015) which are directly or indirectly related to the education system (UNESCO, 2017), the most important of which are the law 69/2012 on «Pre-University Education System in the Republic of Albania» and its amendments and law 80/2015 on «Higher Education and Scientific Research in the higher education institution in Albania» and its amendments. According to these provisions, the general objectives and principles of the Albanian education system include (but are not limited to) the equal right to education for all citizens; the creation the conditions for complete personal development and offering appropriate educational opportunities; revision and modernization of the content of education in accordance with contemporary social requirements; adapting vocational education and trainings to the guidelines of social development and the changes in work and production; providing conditions for lifelong education; increasing the quality and the efficiency of education (IBE, 2007).

Regarding the number of students enrolled in the education system, the recent data shows that in the academic year 2017/2018, 650,153 Albanians

were enrolled in the official education system, with an enrolment rate of 82.8%.

	Pre-university education	% of the total	Higher education	% of the total	Total	% of pupils/ students in school age
Pupils	520,759	80.1 %	129,394	19.9 %	650,153	82.8%

Source: INSTAT (2018), Statistics on the registration in the academic year 2017/2018.

It is very important to note that there is a constant decline of students enrolled in the pre-university level: i.e. in 2007 the student body was nearly 700,000 students, but in 2014, Albania education system, overall, served 585,945 students in the pre-university education, and in 2014 the number decreased again in 520,759 (UNESCO, 2017).

3. INCLUSIVE AND SPECIAL NEEDS EDUCATION IN ALBANIA

Special needs education in Albania has its own historical development[(1)]. It has been firstly institutionalized in 1963 with the opening of the Institute of pupils with visual and hearing disability and other networks of institutions mainly providing medical care rather than education. After the 1970s, the first special schools of pupils with mild mental disabilities where open in different cities of Albania having developed specific curricula. It was only after the 1990s that the process of integration of pupils with disabilities into ordinary schools will start to be considered, first with only some normative provisions, some piloting projects and in 2002 for the first time the legal framework on the right of disabled children had clearly stated inclusive education as indispensable and the right of disabled children to be educated in mainstream schools rather than segregate in special institutions. In 2012, Albania ratified the United Nations Convention on the Rights of People with Disabilities (Law no. 108/2012, date 15.11.2012, article 24 on Education) and the new Law on Pre-University Education (Law nr.69/2012 Chapter XI on Education of Disabled Children) where inclusive education is to be provided within the general system of education.

(1) For a detailed historical development of special need education in Albania see WorldVizion, 2012.

Yet, despite the efforts for the development of inclusive education of children with disabilities and special needs into mainstream education, a significant number of children are still being educated in special schools or rather not being registered at all. There is dispute on the accuracy of the data, yet the estimates are an evaluation of the seriousness of the problem. Some 35 percent of persons with disabilities within the age cohort 6-15 years old and about 60 percent of those aged 15-18 years old have never registered or attended school (Voko, 2014). And these data varies significantly also according to the type of disability the person faces as well as according to the geographical area. For example, only half of children with hearing or mobility difficulties aged 6 to 14 years old attend school and more than two-thirds of children with visual impairment, communication, memory and self-care are enrolled in the school (Ferré, *et. al*. 2015); whereas in rural areas the access to inclusive education is virtually non-existent. Moreover, of those attending school only less than two-thirds of people with disabilities finish secondary school and only 3% attending university.

The initial teacher education programs do not sufficiently prepare student teachers in topics regarding special needs education, few topics (4 to 5) on special needs education are included to pre-school and primary education curricula and no training for the secondary and upper-secondary education (Vula et al., 2012).

The digital literacy and use of ICT in education and in general and special needs education is one of the key priorities that is integral to the new Curriculum Framework in Albania, reflected in the 2014-2020 Pre-University Education Development Strategy and the Cross-cutting Strategy on «Digital Agenda of Albania» 2015-2012, aiming to increase the funding for enhancing and improving digitization of the learning process. Yet, the evaluations have shown that the current policy and institutional architecture concerning ICT in education is too fragmented to meet evolving national aspirations and global demands and with regard to its implementation the challenges rest on the lack of proper infrastructure related to school textbooks and teaching materials (UNESCO, 2017).

Still there has been some good practices possible through various non-governmental organizations which are creating and sustaining inclusive educational practice through development programmes/projects with a focus on ICT-based solutions.

4. SOME GOOD PRACTICES DEALING WITH SNE AND ICT

4.1. Schools as Community Centers — the Ecosystem of Education for Sustainable Development

The project Schools as Community Centers — the Ecosystem of Education for Sustainable Development (AIPA, 2017) was implemented by the Ministry of Education and Sports in partnership with the Albanian Institute of Public Affairs (AIPA), funded in the framework of the IADSA programme (2015-2017). The project aim was to create a model of Schools as Community Centers, through the implementation of its five main components, in five high schools in different regions of the country, that establish a set of partnerships between the school and other community and offer a range of resources, supports and opportunities to improve student learning by emphasizing real-world learning and by creating stronger families and healthier communities. The project is closely related to and directly supported the development of one of the current priorities of pre-university education such as the transformation of the school into a community center. The project was motivated by the official document «Standards for School as Community Center» Nr.1794 Prot, 03.12.2014, approved by the Ministry of Education and Sports, the new approved Curricula Framework, the policy document «Development Strategy 2014-2020 Pre-University Education» or by the activities related to the proliferation of philosophy inclusiveness in pre-university educational institutions, as well as by strengthening and developing of schools as community centers. Moreover, the project is in line with the following priorities: a) Improved governance, leadership and human resource management capacity; b) Learning quality and comprehensive; c) Ensuring quality of achievements and restructuring physical environments for learning. This project targets students, teachers, parents and communities in seven national high schools belonging to different regions of the country. The schools targeted in this project were: «Halim Xhelo» in Vlora, «Seit Najdani», in Dibër, «Raqi Qirinxhi» and «Themistokli Gërmenji», in Korça, «28 Nëntori» in Shkodra, «Andon Zako Çajupi» and «Ismail Qemali» in Tirana. These schools were chosen based on the main problems identified by MoES, consisting on: a) The low quality of the preparation of projects forthwith the emerging necessity to link infrastructural investments realized in education which are mainly focused on the construction and reconstruction of educational objects-new construction and rehabilitation with investments on didactic tools, ICT labs etc.; b) There is a need for enhancing opportunities, means and solutions for learning; Through the interventions made in this project was intended to cre-

ate a novelty in the role that schools should and can play to improve the quality not only in terms of teaching and learning but also in the community aspect in order that the school to be considered a friendly and open area with the suitable skills and competences to initiate and address initiatives to community for improving the quality of life of the entire community around the school.

Referring to the issues and priorities outlined in the Pre-University Education Development Strategy 2014-2020, as well as a preliminary analysis conducted in the various schools in the region was considered necessary to carry out a series of initiatives aimed at creating the right physical and social environment for the development of a school as a community center. During this analysis emerged different issues to be addressed, i.e. need for enriching knowledge base and didactical materials for pupils; lack of extracurricular texts on libraries; amortized technological equipment; lack of skills and competencies in developing innovative educational practices and pedagogical models (ICT projects, action and practical based learning etc.); lack ramps to ensure accessibility of students with physical disabilities (www.myschool.al).

Based on these evidences, the five main components of the project during these two years were: Inclusiveness and Governance; Active learning in the community; Recreation and Sports; Teaching and Active Pupils; ICT and Innovation. The fifth component, the most relevant regarding the object of this chapter, regarded the creation of the necessary skills, capacities and competencies for the use of information and communication technologies in teaching and learning process, by paying particular attention to the specific needs of each learner, including the learners with special educational needs (http://myschool.al/tik.html). The interventions envisaged for this component emphasized the creation of the necessary digital infrastructure in the school, the training of teachers and pupils regarding the realization and implementation of ICT curricula and projects related to their applications (http://myschool.al/resources/IT-ne-shkolle.pdf). Important part of this component was the realization of the ICT labs in each of the schools involved and the training of teachers to adapt the tools of the lab (pc, tablets, networks) according to the needs of the learners. Moreover, this component was closely related to the online platform (myschool.al) designed as an online resource center for pupils, teachers, parents, and community representatives. Another important element of the project, although not closely related to the objective of this work, was the adaption of the school with accessibility tools, i.e. ramps, for children with disabilities.

4.2. I-Learn

I-Learn was a project implemented by the Ministry of Innovation and Public Administration in partnership with the Faculty of Natural Sciences at the University of Tirana, the Institute for deaf students, and the Albanian National Association of the Deaf. The main objective of this project was to equip with tablets and provide a digital platform for deaf pupils, contributing directly to their inclusion into society. Supporting partner of this project was also the Ministry of Education and Sports, committed to support this project through the development of specific curricula for students with special educational needs. According to the former Minister of the MAS, «A specialized computer program will be developed to ensure communication through sign language, a program that will positively influence the avoidance of some difficulties such as the difficulty of explaining by teachers as well as the interactive communication between them and other students without hearing problems» (MAS, 2015). This project will integrate the multimedia typographic alphabet and sign language, supplemented by the relevant translation into the spoken language and through this innovative project and technology, the missing opportunities for children with hearing problems, learning and communicating between each other by guaranteeing the right to information for all. The platform also includes programs, language-use lessons, and special exercises for these students. In the framework of this project was created the windows application «Unë Mësoj», which can potentially be useful for children with deafness. According to Melo (2016), there are several advantages of this application: personalized teaching process; increasing interest in learning; support the teacher-student communication; and helps the communication parent-child. Mobile devices can provide very good opportunities to improve the learning process with children who do not listen. The mobile application «Une Mesoj» designed in support of the Institute for Deaf Students but also for the entire community of people with deafness has made a special contribution to providing an access to sign language, alphabet and skills, in providing a personalized tutoring, increasing interest through the use of tablets and interactive games by increasing the active participation of these children in learning process (Melo, 2016).

4.3. SchoolMe

SchoolMe is an e-platform that enable teachers to implement innovations in the learning process and to develop student's skills of learning. It develop the curricula for basic education of the Albanian and Kosovar schooling,

offering online resources in the learning process. For each lesson, there is a forum in which students and teachers ask questions, teachers can keep notes on line and plan their teaching, which can be used as e-portfolio. It also has a section for professional networking of teachers but this is still work in progress and has not been yet available. This online platform is a good example of the use of new technologies in teaching which accompanies classroom learning, courses of the 9th grade curricula, with videos and movies, specific maps and images, labs and documents, it has potentials to be adopted to the needs of students with special needs and have specific section. (2)

5. CONCLUSION

In most European countries the general trend is towards a gradual inclusion of students with special needs in mainstream schooling, Albania is following the same development. Yet the inclusive education, still requires to maintain some form of special provisions especially in countries that face difficulties to properly implement such strategy. ICT and assistive technology could be of benefit particularly to pupils of special needs education offering additional tools to integrate them in a mainstream class, more flexibility and differentiation in educational methodologies, simplify the education process and provide more opportunity for individual work. Yet, despite its facilitating role in creating opportunities for people with disabilities to exercise human rights, access to assistive technology is limited in many countries (Borg, *et. al.*, 2011).

Albania, although has made some efforts to integrate children with disabilities and special needs into mainstream education, it is still recommended that the country develop the curricula and digital competencies of teachers, the online platforms could be a good practices of sharing best practices. Moreover, to achieve good results in inclusive education and the use of ICT there is a need for the engagement of many stockholders, not only the governmental respective ministries and agencies, but also international organizations, civil society organizations, parents associations, and other partners in the field, which can share best practices.

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9.

SAKARYA UNIVERSITY, TURKEY

TECHNOLOGICAL MATERIALS USED IN EDUCATION OF THE INDIVIDUALS WITH AUTISM SPECTRUM DISORDERS IN TURKEY

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1. DEFINITION AND CHARACTERISTICS OF AUTISM SPECTRUM DISORDER

Autism Spectrum Disorder (ASD) has not only caused specific problems confined to individuals, but it has also become a social phenomenon that affects every part of society in every part of the world. ASD is described as a neuro-developmental disorder that encompassing impaired communication and social interaction, and repetitive stereotypic behavior and language (APA, 2013). Autism is also characterized by cognitive impairment as well as inabilities in communication and creative activities (Abidoğlu, Ertuğruloğlu & Büyükeğilmez, 2017). Although ASD has different characteristics in each child, children with ASD have problems in four main developmental areas: Communication, social interaction, repetitive behaviors and limited interests. In addition to these difficulties, resistance to changes in daily routines, limitations in chance learning by chance observation and imitation, and difficulties in sharing the game and making friends are the other characteristics of children with ASD.

Autism has no relationship with parental attitudes or the economic conditions of the family. ASD occurs in every racial and ethnic group, and across all socioeconomic levels. However, the incidence of autism is higher in boys than in girls. The analysis of Centers for Disease Control and Prevention estimates that 1 in 68 children has ASD (NIH, 2019). Children may develop normally until the second or even third year of life, but then start to withdraw and become indifferent to social interaction. Although it is not known what causes the autism spectrum disorder, there is evidence that it is genetically based. However, it is not yet known which genes are responsible for autism (TAF, 2018).

Symptoms of ASD may vary depending on the brain development. For this reason, it is expected to complete the age of 3 in general. Early diagnosis can allow the family to better prepare for the process and to establish a strategy. On the other hand, it is necessary not to worry the family during diagnosis process. Because, ASD symptoms can be seen during the development of a non-ASD child. For a reliable diagnosis of ASD, it is necessary for the child to be seen many times, periodically, in different environments and by multiple specialists. In order to make a valid and reliable clinical observation, it is necessary to ask the family in detail questions about the child. For example, «Checklist for Autism in Toddlers» (CHAT) is a widely used measure in

family interviews during the diagnostic process, and helps the clinician make a detailed interview. (Korkmaz, 2010).

There are many behavioral characteristics used to recognize people with autism, but usually no autism is present in all of these characteristics, and often they are not seen at the same time. Manifestations of ASD symptoms vary widely, leading to a clinical heterogeneity of ASD. For example, one child with ASD may have well-developed communication skills, no cognitive impairment, whereas another might intellectual disabilities and restricted motor movements (Roane, Fisher & Carr, 2016). In addition to its distinctly changing manifestations, there are also common aspects. In other words, children with ASD show some behavioral expressions and these behavioral expressions can be seen in everyday life of children. The absence of a meaningful eye contact is often the first symptom. They may be indifferent to individuals' feelings and human relations. They experience irrelevant worries and fears (Korkmaz, 2010). Additionally, the impairment include difficulties in expressing and interpreting nonverbal communication, so children with ASD have difficulties in initiating and maintaining relationships. Restricted and repetitive motor movements such as hand flapping may be seen in ASD (Roane et al., 2016).

2. DIFFICULTIES OF FAMILIES OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

Having a child with ASD affects the entire family functions negatively. Parents of children with ASD experience more stress and depression. There is a substantial number of research detailing the correlates of the chronic physical, emotional, social, and financial stressors that these families experience. Research found that parents of children (primarily mothers) with ASD experience higher levels of stress and lower levels of well-being than both the general population and parents of children with other developmental disabilities (Eisenhower, Baker & Blacher, 2005; Meadan, Halle & Ebata, 2010; Tehee, Honan & Hevey, 2009; Tint & Weiss, 2016). Besides bringing up a child with higher levels of challenging behaviour, low domestic support could increase the level of stress (Bromley, Hare, Davison & Emerson, 2004). Considering all of these, supporting the family and ensuring its emotional and physical health is a crucial aspect of overall management of ASD.

As ASD is an «incurable» neurodevelopmental disabilitity, chronic management is required. (Myers & Johnson, 2007). So, family is recognized as «sine qua non» of the effective treatment process of ASD. Parents' mental

health and stress levels must be explored by providing effective and relevant support (Tehee et al., 2009).

Children with ASD may have comorbid disorders including intellectual disability, depression, anxiety, attention deficit and hyperactivity disorder (ADHD), obsessive compulsive disorder, sleep disorders, bipolar disorder, or difficulties in sensory processing (Liu, Breslin & ElGarhy, 2015). The stress level of the family affects the severity of comorbid disorders. For example sleep disturbance correlate with family distress and may have significant effects on quality of life of children with ASD. This stress can also lead to depression, anger, anxiety, and marital dissatisfaction (Higgins, Bailey, & Pearce, 2005; Meadan et al., 2010). All of these characterizing features of ASD adversely affect the quality of life of the individuals with this disorder and their families. Within this context, variety of intervention methods and techniques, as well as the educational benefit to children with ASD, reduces the family's anxiety. In terms of intervention of ASD, using technological materials in educational process of individuals with ASD has great importance in terms of enhancing their quality of life and their parents (Yassıbaş & Çolak, 2019).

Autism has no definitive treatment and is a life-long disease. Early diagnosis and early initiation of appropriate training can greatly improve adaptation skills. No validated pharmacological treatments for the core symptoms of ASD are available. Besides, the fact that intervention models have different levels of impact on children with ASD reflects the complex nature of autism (Myers & Johnson, 2007). When families feel unsupported, dysfunctional coping behaviors can develop. Avoidance and subsequent social isolation are possible consequences that may lead to mental health problems (Johnson & Simpson, 2013; Phetrasuwan & Miles, 2009). In a study by Hastings and Johnson (2001), it was found that adaptive coping strategies, informal social support and beliefs about the effectiveness of intervention were associated with lower levels of stress, coping and support. In relation to the parental stress, there was a negative correlation between parental pessimism and being resistant to the moderating effect of family coping strategies (Tehee et al., 2009). Considering the effect of parental stress, the main goals of interventions are to enhance the child’s ultimate functional independence and quality of life by minimizing the core autism spectrum disorder features, facilitating development and learning, promoting socialization, and educating and supporting families to promote the coping skills, and alleviate family distress (Myers & Johnson, 2007).

In the education of individuals with ASD, there are 14 evidence-based interventions highlighted by the National Autism Center (NAC, 2015). These intervention models underlined by the NAC are: Behavioral Interventions, Cognitive Behavioral Intervention Package, Comprehensive Behavioral Treatment for Young Children, Language Training (Production), Modeling, Naturalistic Teaching Strategies, Parent Training Package, Peer Training Package, Pivotal Response Treatment, Activity Schedules, Scripting, Self-Management Strategies, Social Skills Package, Story-Based Interventions (Yassıbaş & Çolak, 2019). The technological materials contribute directly and indirectly to these intervention models and increase their power of influence.

3. TECHNOLOGICAL MATERIALS USED IN EDUCATION OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER IN TURKEY

In this section it is aimed to give information about the technological materials used in education of the individuals with Autism Spectrum Disorder in Turkey. When the materials used in the education of individuals with ASD are examined, the «Teaching with Cue» model will be introduced first. The cues are defined as written or spoken words, expressions and explanations to help children with autism connect and maintain other people (McClannahan and Krantz, 1999).

3.1. Voice Cues

Voice cues are recorded on magnetic cards and used in card readers called Language Master.

Children place cards in which the cues are pre-recorded in the space above the card reader. The card then automatically moves from right to left and the device reads the cue (Tohumotizmportali, t.y.).

Figure 1. Magnetic card reader and magnetic sound cards (Source: http://www.tohumotizmportali.org/icerik/etkilesim-ve-ozbakim-becerileri-kazandirmak/baskalariyla-iletisim-kurma-ve-sohbet-etme/replikli-ogretim-karsilikli-sohbet-etme)

3.2. Teaching Through Video Model

Video model learning is based on Bandura's (1969) social learning theory. This teaching model is stated as a method in which the intended behavior is recorded with a video recorder in order to increase the student's capacity to keep in mind, the ability to imitate and generalize this skill to different situations (Hitchcock, Dowrick and Prater, 2003). There are steps to be followed while teaching with video model. These steps are presented in Figure 2:

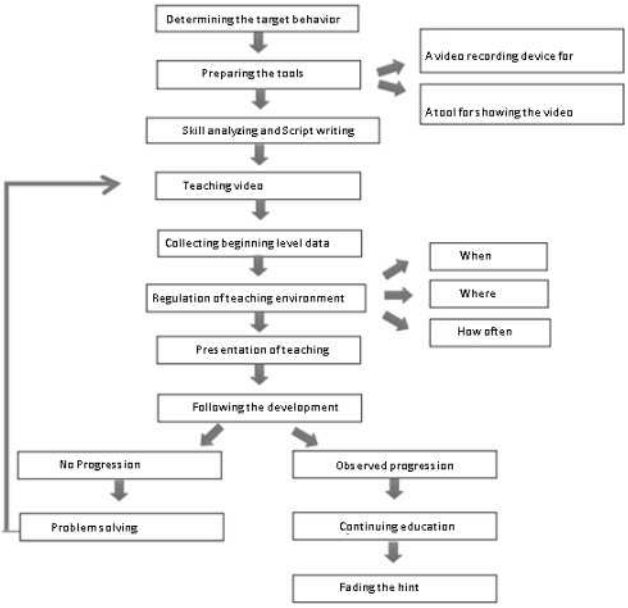

Figure 2. Steps followed in the teaching process with video model (Genç-Tosun & Kurt, 2014)

When the national field literature is examined, it is seen that there are some studies about video model teaching in the education of individuals with ASD. In the research conducted by Gülsöz and Çıkılı (2018), the effectiveness of video modeling technique in teaching cold drink preparation and presentation skills to students with high functional autism was examined and it was stated that the study was conducted with three students aged 10-11. As a result of the research, it is stated that video modeling technique is effective in teaching cold drink preparation and presentation skills to students with high functional autism and this effect is permanent after teaching. In another study (Yavuz and Şafak, 2017), it was seen that video modeling and the effectiveness and efficiency of video clues were compared in the teaching of sachet tea and crusty toast preparation behaviors of children with ASD. Three boys with ASD aged 16 and 17 participated in the study. While three subjects who participated in the study gained all target behaviors with video clues, two subjects gained target behaviors with video model teaching and one subject did not. It is stated that the persistence of acquired behaviors is maintained after the end of the research.

3.3. Speech Generating Devices

Speech-producing devices are increasingly used in communication intervention programs for individuals with ASD (van der Meer and Rispoli, 2010). New generation speech generation devices typically consist of a computer-based speech synthesis unit and a visual display. The visual display is usually configured with a series of icons (for example, colored line drawings) representing words or phrases. When you touch the icons, it produces the corresponding space.

For example, touching the icon of a ball can give the following expression: «I want to play with the ball». Speech generating devices are said to be used in situations where natural speech cannot develop, and when the person's speech is significantly limited and / or speech is largely incomprehensible (Schlosser, Sigafoos, & Koul, 2009; cited in Achmadi, Kagohara, van der Meer, O'Reilly, Lancioni, Sutherland, ... Sigafoos, 2012).

Figure 3. New generation speech generating device examples (Source: http://www.compusultsystems.com/assistivetechnology/our-at-products/mobile-solutions/proloquo2go ve http://www.assistiveware.com/media-resources)

Referring to the studies in Turkey regarding speech-generating devices, in the research conducted by Genç-Tosun (2016), which is applied to three subjects with autism aged 4-5 years, it was found that the devices producing touch screen speech and the teaching package prepared to teach the use of the device were effective in teaching multi-step demanding skills to individuals with autism.

3.4. Computer Supported Activity Schedules

Activity schedules are cited as a picture or phrase that allows children with autism to perform activities under the supervision of greatly reduced adults and points to a series of activities by a child (McClannahan and Krantz, 1999).

Figure 4. Example of activity schedules presented on computer (Dalgın, 2011)

When the work-related activity schedules used for ASD individuals in Turkey, it is observed that there is limited research on this subject. In one of these researches (Dalgın, 2011), it was seen that the teaching process presented with extended activity schedules with videos on the computer was effective in teaching the table-following skills of the subjects involved in the study, as well as three role play skills: tea time, hairdressing and train riding. In the study conducted by Çuhadar and Diken (2011) with three male subjects with autism between the ages of 4-6, it was concluded that teaching with activity schedules was effective in gaining the skills of participating in the program and activity skills. In another study (Ülke-Kürkçüoğlu, Bozkurt and Çuhadar, 2015), it was shown that the teaching process provided through computer-supported activity schedules was effective on acquiring, maintaining and generalizing the program and role playing skills of the children participating in the study.

3.5. Applications Developed by Tohum Autism Foundation

The focus on the education of individuals with ASD in the world has recently begun. Therefore, the methods and materials used in education and training are limited compared to the methods and materials used for individuals with other special education needs. On the other hand, in Turkey as well as in the world in the education of individuals with ASD is said to be more at the forefront of civil organizations. In Turkey, one of the organizations efforts for the training of individuals with ASD is Tohum Autism Foundation and its educational portal 'www.tohumotizmportali.org' is developed by the authors and academicians. In this portal, there are 5 sections and 20 modules for the characteristics of children with ASD, conducting early intervention with children at home, dealing with children's behavioral problems and preparing them for other stages of life. These modules consist of functional information, sample videos, photographs, various activities and test questions. The Foundation has some applications for children with autism. «My Tablet Com-

puter is Talking for Me» project conducted by Tohum Autism Foundation was prepared starting from the question of what might be the application that can be used in Turkeyand how technological developments are used in the education of individuals with autism. In the project the first Turkish iPad application for children with autism is developed. To increase the autistic children's education with the use of technology and through the purpose of inclusion of them in the educational system, it is conducted in collaboration with Tohum Autism Foundation of Special Education School, Eskişehir Anadolu University Disability Research Institute teachers / instructors and the graduate students.

3.5.1. «Tohum 1» Mobile Application

In the education of children with autism which is also the first in Turkey, the Turkish iPad application «Tohum 1» is available for free on the Apple Store on November 6, 2013.

«Tohum 1» application consists of four parts. The communication section, which is the first of these sections, includes 6 different categories such as food / drinks that the child may want at home, at school and in free time, activities he / she wants to do, and feelings he / she feels. For example, if the child wants to drink juice, he will touch the photo of the juice from the category of «beverages», and the tablet will sound «juice». The skill learning section consists of self-care, social skills, kitchen and home and communication. Skills are taught through video and picture narratives.

In the object name learning section, a total of 80 objects; categorized into 8 parts; like household goods, clothes, vehicles. The child can learn the most basic objects to learn by studying in this section. For example, in order to teach apples, the child is shown two or three different object pictures according to the difficulty level, and the question «Which one is apple?» is asked aloud and the child is expected to touch the image of the apple. Teaching can be done with or without clues. The activity schedule, which helps children with autism to carry out their daily activities on their own, constitutes the fourth and also the last section. The activity schedule includes activities such as going to the park, listening to music and playing games. This section also has a personalization feature, i.e. photos or images describing different activities can be added to the chart.

3.5.2. Tohum 2 Mobile Application

The Tohum 2 mobile app aims to teach children with ASD a fun way to match object photos, recognize actions and distinguish body parts according to different levels of difficulty on iPad and Android devices.

In this application, the ability to match object photographs is a prerequisite for many skills such as mathematics, reading and writing, and tracking of activity tables with photographs. The ability to recognize actions is a prerequisite for skills that will help the child to listen, understand and perform various commands, to develop expressive language skills, and to make sense of what is happening around him. Recognizing the body parts of the child is an important skill both for the body to realize and learn the functions of the body organs, and to learn to express when there is a problem with these organs.

3.5.3. Concept Teaching Mobile Application

The Concept Teaching application aims to enable children with autism to learn the concepts they can use in communication, academic and daily life more effectively, easily and in a fun way with the help of technology. This application aims to teach preschool children a fun way to match, differentiate and categorize object photos.

The ability to match object photographs is a prerequisite for many skills such as associating similar stimuli in the child's environment, mathematics, reading-writing, photographic activity tracking, and receptive language. The ability to distinguish by showing object photos will help the child to understand language skills and what is going on around him, thus improving his learning skills. The ability to categorize, on the other hand, will help him/her to learn taxonomically higher concepts.

3.5.4. Listening Comprehension

Listening comprehension mobile application consists of two sections, first and second level, and each section has five categories. These categories are; «How-Why?», «Who?», «Where?», «What?», «What happened?». There are ten questions under each category. The most important feature of the application is the recording of user's performance. A graphical analysis option is provided to keep track of the child's / student's ability to understand listening through practice. In addition, the application offers the option to log in for multiple children.

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10.

POLYTECHNIC OF GUARDA, CI&DEI, PORTUGAL

EDUCATION FOR ALL, POLICIES IMPLEMENTED IN PORTUGAL TO ACHIEVE THIS GOAL

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1. INTRODUCTION

Talking about inclusive education nowadays is different from talking about a school that simply opens the doors to everyone. We think of a school that opens the doors and ensures that, on the start, everyone has achieved what they are entitled to: a humanist base profile, anchored in the development of values and skills that makes them fit active citizenship believing in freedom and well-being. A successful educational system has to ensure quality learning for all students, it is useless to have high-level curricular instruments if the learning process leaves out high percentages of students and does not provide the necessary support.

We know that everywhere the ICT is being used for totally different multipurpose, so, *it is necessary that education adapts to new environments by providing new tools and programs according to the needs for all of our students. ICT has an important role in achieving this goal* Tadeu & Brigas (2018). In Portugal, we still have considerable groups of students that are not completely supported in order to achieve success in schools, this happen due to several causes and all of them complex, requiring necessarily answers that are not simplistic and direct: the socioeconomic condition is the main exclu-

sion factor of the students; the learning disabilities associated with varying deficits have not made it easier for all pupils to grow together; the social-emotional gaps create barriers for a real learning; also certain social groups are at high risk of exclusion causing problems to acquire the needed success.

For some, these conditions are seen as fatalities over which there is no possible action to be done to turn the cycle, unfortunately, school is seen as something only for some. For many others, fortunately, school is not that, it is not a space dedicated to minority, but rather the place where everyone has the right to learn, through a curriculum that takes each student to the limit of their abilities to achieve personal realization.

2. INCLUSIVE EDUCATION — POLITICAL PRIORITIES

The strategies defined by the Portuguese entities establishes as *one of the priorities of the governmental action the supporting/pursuing on an inclusive school where each and every one of the students, regardless of their personal and social situation, find answers that enable them to acquire a level of education and training which will allow them to be fully socially integrated* (Decree-Law nº 54/2018).

This political primacy *realizes the right of each students to an inclusive education that responds to their potentialities, expectations and needs within the framework of a common and plural educational endeavour that provides everyone with the sense of participation and belonging in authentic conditions of equity, contributing thus, for the increased level of social cohesion* (Decree-Law nº 54/2018).

According to that the Decree-Law no. 54/2018 *establishes the principles and norms that guarantee inclusion, as a process that aims to respond to the diversity of the needs and potential of each and every one of the students through the increased participation in learning processes and in the life of the educational community* (Decree-Law nº 54/2018).

The objectives of the Decree-Law are (Decree-Law nº 54/2018):

a) *This decree-law establishes the principles and norms that guarantee inclusion, as a process that aims to respond to the diversity of the needs and potential of each and every one of the pupils, by increasing participation in the processes of learning and educational community life*

b) *This decree-law identifies the measures to support learning and inclusion, the specific curricular areas, as well as specific resources to be*

mobilized to meet the educational needs of each and every child and young person along the school path, in all different education and training offerings.

c) *This decree-law applies to school clusters and non-grouped schools, professional schools and establishments of pre-school education and basic and secondary education of private, cooperative and solidarity networks, hereinafter referred to as schools*

These procedures underline the necessity of each school to perceive the importance of the extra value of the variety of all its students, discovering new ways to act with that variance, changing the teaching processes inline to the distinct characteristics and conditions of each one of the students. In doing that they need to mobilize the tools at their disposal in order to everyone learn and participate in the school community.

This understanding indicates an approach that promote *the autonomy of schools and their professionals, namely through the reinforcement of the intervention of special education teachers, as an active part of the educational teams in the definition of strategies and in the monitoring of curricular diversification* (Decree-Law nº 54/2018). That enable the creation of educational environments in which:

— Students can provide or obtain appropriate support from peers and teachers if they need;

— The tasks to be proposed and the conditions for their realization are intentionally, productively and consequently managed;

— Each one contributes, as far as is possible, so that others can learn.

Even in cases where there are greater difficulties for students to participate in the curriculum, it will be up to each school to define the process in which it identifies the barriers to learning with the student are confronted, laying on the diversity of strategies to overcome them. To ensure that each student has access to the curriculum and the learning, taking each and every one to the limit of their potentialities.

The Decree-Law N. º 54/2018, reinforces also the right for each student to education, in line with their potentialities, expectations and needs, in a set of responses planned in the context of a communal and plural school development that ensures that everyone have a clear participation and the sense of truly belonging in the same conditions of equity.

The same Decree-Law defines the Guiding principles of inclusive education (Decree-Law nº 54/2018):

a) *Universal educability, the assumption that all children and pupils have the ability to learn and to develop in their education;*

b) *Equity, the guarantee that all children and pupils have access to the necessary support to realize their learning and development potential;*

c) *Inclusion, the right of all children and pupils to access and participate, fully and effectively, in the same educational contexts;*

d) *customization, the pupil-centred educational planning so that measures are decided on a case-by-case basis according to their needs, potential, interests and preferences, through a multilevel approach;*

e) *Flexibility, the flexible management of the curriculum, the school spaces and times, so that the educational activities in its methods, times and instruments can respond to the singularities of each student;*

f) *Self-determination, the respect for personal autonomy, taking into account not only the needs of the students but also their interests and preferences, and the expression of their cultural and linguistic identity, creating opportunities for the realization of their right to participate in decision-making*

g) *Parental involvement, the parents and guardians right to participation and information regarding all aspects of the educational process of their child;*

h) *Minimum interference, the technical and educational intervention shall be developed exclusively by entities and institutions whose action proves to be necessary to effectively promote the personal and educational development of children or pupils, respecting their private and family life*.

An inclusive education and school ensure the incorporation of variables such as ethics, concerning values and principles, aiming at combating discriminatory attitudes and the creation of a more just society; the implementation of educational policy measures that use a holistic approach to the entire education system and a coordinated action plan between the various actors for quality educational practices with respect for diversity, giving all students the opportunity to develop their maximum capacities.

The universal design for learning and the multilevel approach to curriculum access constitute the methodological options underlying this diploma. To this end, schools have their autonomy and flexibility in the mobilization

of resources and strategies that promote and ensure the full educational inclusion of each and every one of the students. If, on one hand, the systems of student categorization are abandoned, on the other, there is a focus on a continuum of actions, strategies and measures organized in three levels of intervention: universal; selective and additional.

3. INCLUSIVE EDUCATION APPROACH

When we talk in inclusive education we need to stress the role of the multidisciplinary team, they play a fundamental role in identifying the most appropriate support measures for each student, as well as in monitoring the effectiveness of their application. In this team, there are permanent members who have specific knowledge about the organization of the school, and other elements, including professionals that intervene with the student, emphasizing the participation of parents or responsible, whose involvement in everything that respects education of their children or learners is a right and a duty. The law it is especially based on the universal design for learning and the multilevel approach to curriculum access. This approach is supported by flexible curricular models, systematic monitoring and the checking of the effectiveness on the stability of the implemented interventions, the relationship between the triangle, teachers, parents, students has a significant responsibility on the choice of processes to support learning, organized at different steps of involvement, answering to the necessary responses for each individual student to obtain the base capabilities. Unlike the previous Decree-Law N. º 3/2008, this new legislation starts from the idea that it is necessary to classify in order to interfere in the field of action. It is required to ensure that the profile of students leaving compulsory education is reached by all, although using differentiated courses, which allow each one to advance in the curriculum looking forward to the educational success.

The present decree-law, therefore, establishes (Decree-Law nº 54/2018):

a) *Schools shall include in their guidance documents the lines of action for the creation of a school culture where everyone will find opportunities to learn and the conditions for the full realization of this right, responding to the needs of each pupil, valuing diversity and promoting equity and non-discrimination in accessing the curriculum and the progression in the educational system.*

b) *The lines of action for inclusion must link the entire school to a process of cultural, organizational and operational change based on a*

multi-tiered intervention model that recognizes and assumes the transformations in curriculum management, in educational practices and in its monitoring.

c) *The lines of action for inclusion shall integrate a continuum of universal, selective and additional measures that respond to the diversity of the needs of each and every pupil.4-Schools shall establish indicators to evaluate the effectiveness of the measures referred to in the preceding paragraph.*

4. SPECIFIC MEASURES

Measures to support learning and inclusion are prepared into three intermediating levels: the universal, the selective and the additional. They are been prepared actions of different stages according to the needs. The measures that will be implemented must be created upon the confirmation from monitoring and from the methodical evaluation of the efficacy according to the need of each student.

The recent Decree-Law n. º 54/2018 presents a set of measures to support learning and inclusion, which is important to check, namely:

1. *Universal Measures*

— *Pedagogical differentiation;*

— *Curricular accommodations;*

— *Curriculum enrichment;*

— *Promoting pro-social behaviour;*

— *The intervention with an academic or behavioural focus in small groups.*

2. *Selective Measures*

— *The differentiated curricular pathways;*

— *The non-significant curricular adaptations;*

— *Psych pedagogical support;*

— *The anticipation and reinforcement of learning;*

— *Tutorial support.*

3. *Additional Measures*

— *The frequency of the school year by subject;*

— *Significant curricular adaptations;*

— The individual transition plan;

— The development of structured teaching methodologies and strategies;

— The development of competencies of personal and social autonomy.

This present decree preserves the Adaptations to the Evaluation Process, which are materialized in:

— The diversification of information collection tools such as surveys, interviews, video or audio recordings;

— The statements in accessible formats, namely braille, tables and maps in relief, digital;

— The interpretation in Portuguese sign language;

— The use of support products;

— Extra time for evaluation test;

— The transcription of the answers;

— Reading statements;

— The use of a separate room;

— The pauses watched;

— The colour identification code in the statements.

In addition, are created multidisciplinary teams supporting inclusive education and learning support centres. It maintains the reference schools in the field of vision, for bilingual education, for early intervention in childhood, resource centres for inclusion, information and communication technology resources centres for special education. This decree had come into force at the beginning of the 2018-2019 school year, so it is very recent.

In order to further clarify the implementation of this decree, the Ministry of Education published a Support Handbook for Practice (Ministério da Educação, 2018) in order to explain the methodological options of this new decree-law, the applicability of the measure, the illustration of practical situations and the inclusion of documents for self-reflection and self-assessment of the school and the teacher, observation grids and examples of models/ forms to be used, figure 1.

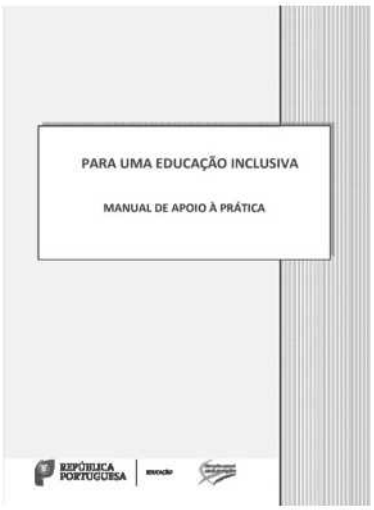

Figure 1. Support Handbook for Practice (Retrieve from https://www.dge.mec.pt/sites/default/files/EEspecial/manual_de_apoio_a_pratica.pdf at 01/02/2019)

5. SPECIFIC RESOURCES TO SUPPORT LEARNING AND INCLUSION

Schools should mobilize a specific set of resources to support learning and inclusion, including specific human resources (special education teachers; specialized technicians and operational assistants), organizational resources, multidisciplinary team to support inclusive education, Learning support centre, Reference schools in the field of vision, Reference schools for bilingual education, Reference schools for early childhood intervention, CRTIC, among others measures.

5.1. Learning support centre

This centre are a support organisation inside the school, which combine the human and material resources, the knowledge and expertise of the school.

The main objectives of the centre, in straight collaboration with other school structures and services, are (Decree-Law nº 54/2018):

— To support the inclusion of children and youth in the group/class and in the routines and activities of the school, namely through the diversification of access strategies to the school. curriculum;

— Promote and support access to training, higher education and integration into post-school life;

— Promote and support access to leisure, social participation and independent living.

— Promote the quality of student participation in the activities of the class to which they belong and in other learning contexts;

— Support the teachers of the group or class to which the students belong;

— Support the creation of learning resources and assessment tools for the various components of the curriculum;

— Develop interdisciplinary intervention methodologies that facilitate the processes of learning, autonomy and adaptation to the school context;

— Promote the creation of structured environments, rich in communication and interaction, learning providers;

— Support the organization of the transition process to post-school life.

5.2. Information and Communication Technology Resource Centres (CRTIC)

CRTIC are specialized centres services whose mission is to support schools in promoting the educational success of students whenever assistive technologies are needed, prescribing, advising, selecting and adapting them. The main purpose of the CRTIC is to assess the needs of students with Special Education Needs (SEN) on a permanent basis in relation to assistive technologies in their geographical area of coverage, figure 2.

Figure 2. CRTIC geographic location (Retrieve from https://www.dge.mec.pt/sites/default/files/mapa_pt_distribuicao_crtic.png on 05/02/2019)

Recognizing the importance of assistive technologies as a further pillar in the construction of an inclusive school and the need for timely intervention close to the reality of students, so a network of ICT resource centres was created in the schools. Within this centre, it is possible to work with students who use assistive technologies to reach their full potential by assessing barriers to access to the curriculum; prescription of assistive technologies more appropriate to learning and participation; the training of the students, professionals and families that interact with them; follow-up on the design of accessible materials and the implementation of equipment in the school; the sharing of up-to-date information within the peers and periodic review of the proposed solutions.

Any device or system that allows students to perform a school activity that they would not otherwise be able to allow full access to the curriculum and high levels of participation in the various learning contexts is considered a support product.

The CRTIC, as prescribing entities, have, among others, the following attributions:

— evaluation of students with SEN who need access to products/technologies to access the curriculum in order to guarantee the educational inclusion of these students;

— registration of the support products/technologies prescribed in the institutional platform;

— provision of information services;

— promotion of public sessions in the context of special educational needs and use of products/technologies of support, with the purpose of teaching, technical and vocational training, and training of teachers and the general educational community in the use of support products/technologies;

— creation of partnerships that can enrich the dynamics of the Resource Centre, through the local articulation with the Health and Social Security Services, Special Education Institutions, Municipalities, Institutions of Superior Education and organizations specializing in special educational needs in general;

— Awareness-raising of public enterprises and services for the admission of students to post-school transition programs.

The use of assistive technologies in a school context is a determining factor for inclusion and educational success, allowing to minimize or eliminate barriers regarding access to curriculum and participation in school life.

For many students, assistive technologies are essential for reading, writing, or communicating. Only through the use of specific tools, supported by appropriate pedagogical strategies, these students are able to get involved and participate in school every day and progress in their learning. Assistive technologies range from low technologies such as pencil thickeners or keyboard holders to high technologies such as computers or augmentative electronic communication devices. A support product will be appropriate for a particular user if it allows him to perform the tasks and activities required in his or her life contexts. In this perspective, the specialized evaluation for the purposes of selecting the preschool products to be prescribed to the students is carried out in a school context, focusing on the interaction between the student and the environment. Identifying the activities to be carried out, evaluating the student's abilities required by these activities and the contexts in which they will be carried out are fundamental aspects to consider.

5.3. Silent Partner in TELESEICT project — CRTIC-Guarda

Now we will describe more in detail the Centre of ICT Resources for Special Education Needs (SEN) of Guarda (CRTIC-Guarda). It has begun its activity in the academic year of 2007/2008 and is part of a national network of 25 centres, figure 2.

The creation of the national network of CRTIC is based on a policy of inclusion of students with SEN, of a permanent nature, in the schools of Regular Education. This legislation defines the Specialized Support in SEN, describing the educational measures to be applied, among which are part of the educational measure Support Technologies.

Each centre is made up of a team of teachers designated by the director of the School Group, where it is located, usually two special education teachers and a computer teacher.

The CRTIC of Guarda is based at the Secondary School Of Afonso De Albuquerque and has its own facilities, equipped with assistive technologies. The area of coverage of the CRTIC-Guarda extends to the surrounding counties of Almeida, Belmonte, Celorico da Beira, Figueira de Castelo Rodrigo, Fornos de Algodres, Guarda, Meda, Pinhel, Sabugal and Trancoso.

The main focus of the CRTIC-Guarda is to the evaluation of pupils with SEN for the purpose of adapting the technologies to support their specific needs and the information/training of teachers, professionals, operational assistants and families on the problems associated with different areas of disability or disability.

CRTIC have website, figure 3 (http://crticguarda.aeaag.pt/wp/), to publicize their services, activities and resources. A relevant role played by the CRTIC is to inform the educational community and, in particular, those most directly involved in supporting students with permanent SEN, on the technological and methodological solutions appropriate to each case. Public awareness and information sessions, in partnership with specialized entities, with the educational community (teachers, educational personnel, technical/therapeutic staff and families), have proved very important in order to provide more in-depth knowledge about the problems of these students and the solutions that can help them more effective inclusion.

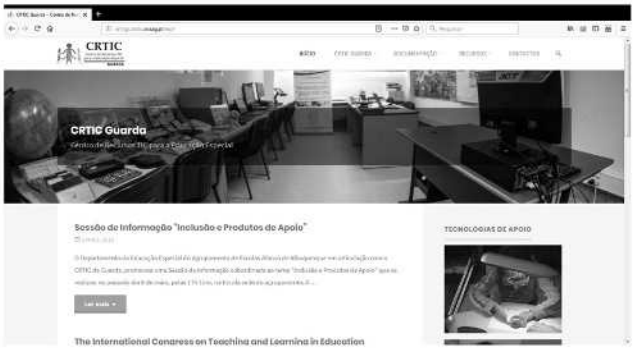

Figure 3. Website of CRTIC-Guarda (Retrieve from http:// crticguarda.aeaag.pt/wp/ on 05/02/2019)

Assistive technologies are facilitating devices designed to improve the functionality and reduce the student's incapacity, with the impact of allowing the performance of activities and participation in the domains of learning and professional and social life. The counselling, selection and adaptation of these devices imply the provision of specialized services. Support technologies funded by the school are limited to those that serve educational purposes.

Support products or technical aids have a broader scope, being 'any product, instrument, equipment or technical system used by disabled persons, specially produced or available which prevents, compensates, attenuates or neutralizes the functional or participation limitation' (DL 93/2009, April 16). These include many of the products recommended by doctors, such as prosthetics, crutches, walking sticks, wheelchairs, and many others, usually funded by the Ministries of Health and Solidarity, Employment and Social Security.

Since the supporting technologies are one of the educational measures contained in the legislation in force, the educational team that elaborates the Individual Educational Program of the student must consider whether the student can benefit from this particular measure and refer it to an evaluation by the CRTIC in its area. Also, the CRTIC website is used to share all software or assistive technologies for the activities.

5.4. Portuguese Accessibility Site

The Portuguese government has a website (www.acessibilidade.gov.pt) that ensures and provide the users the most important information. This website have resources that promote and allow to share the best practices and

guidelines regarding accessibility and usability, serving practitioners and students in the public and private sectors. Provides overviews of the user-centred design process. It also covers the related information and tools for making digital content more usable and useful.

The content inside the website is managed by the AMA, Portuguese National Agency for public modernization. This agency actively collaborates in the public and private sector interested to produce content and share industry trends and ideas on special education. Is possible to find resources, tutorials about the standards and support materials to help teacher and others to understand and develop content with accessibility and usability criteria.

Figure 4. Website of Portuguese Accessibility (Retrieve from www.acessibilidade.gov.pt on 08/02/2019)

6. CONCLUSION

The success of a effective educational system can be assessed by the way it ensures quality learning for all. Regardless of the quality and innovation of the curriculum instruments, they will not be successful if the learning process leaves out high percentages of students.

The concept of inclusive education that we defend differs a lot from the concept of a school that is limited to accepting all students, inclusive education is related to the need of creating spaces where learning is open to all, but that ensures, when leaving school, everyone has achieved what have right: a humanist-based profile, anchored in the development of values and skills that make them capable of exercising active citizenship in freedom and well-being.

Moving towards Inclusive Education implies redesigning the space of presentation and in particular the school in all its dimensions. In Portugal one of the major challenges is the reorganization of human and material resources, from an organization oriented towards individual support to support systems able to respond with quality to the needs of each of the students. The identification of barriers and the joint definition of pedagogical strategies and resources that support the learning and the interaction of students with needs.

The Portuguese society is dong the best efforts to provide the necessary inclusion for ALL, yet, in spite of excellent practices, and hard work of government, private associations, parents, schools, we are still far from a totally inclusion in society, and there are always drop backs in the progress achieved until the moment.

In this chapter we show some examples of that practices that have been designed and work in the field during the last years. The ICT have a tremendous influence in this effort, and we know that they help us to bring the best of everyone, does not matter the needs and demands, the ICT could give the possibility to ensure the right way for the steps to an education for all.

WE LEAVE NO ONE BEHIND!

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The world is changing and is moving very fast! The Information, Communication, Technology (ICT) tools are used everywhere, anytime in any field, going from Health, Economy, Engineering and of course Education. Our goal in this book is the Education of XXI century, and their need to be adapted to this new changes, by using in a proper way the tools that are at our disposal in the case of Special Education (SE), to meet the needs of all pupils. The book, *Guide of Good Practices,* highlights the importance of the balance between new technology and good pedagogy and is a part of the activities within the project *Teaching and Learning in Special Education with Information, Communication, Technology* (TELESEICT 2016-1-PT01-KA203-022950), a three-year ERASMUS + project in the framework of Key Action 2 (KA2). This publication has been produced by the partnership and is a collection of formal and informal practices carried out in each partner country, especially in the field of special education.

We include all… and leave no one behind!

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