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STUDENTS WITH DISABILITIES IN E-ENVIRONMENT: PSYCHOLOGICAL VIEW

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Abstract: *Inclusive education and inclusion of students with disabilities in educational system are European policy. In this paper categorisation of students with disabilities is presented as first step to developing e-environment for them. The most important components of e-environment for students with disabilities are assistive technology and e-learning/e-teaching procedures. E-learning is the psychological process supported by the e-technology. Than, psychological aspects, some principles of development of e-courses for students with disabilities, and benefits of e-environment are reviewed.*

Keywords: *Students with disabilities, Inclusive education, E-Learning, E-teaching, Psychological conditions.*

1. INTRODUCTION

Inclusive education policy considers different subgroups with special educational needs. However, some subgroups of SEN students don't receive enough attention. One of the most vulnerable subgroup is students with disabilities whose educational needs are often being neglected.

The increased use of information and communication technologies in everyday life and development of adaptive hardware and software have allowed individuals with disabilities to do things that were difficult or impossible for them to do in the past [1].

Although the technical support is expanded, integration of them with learning procedures and adaptation to educational needs of students with disabilities are not directed to all subgroups. One of the reasons is lack of the teamwork in creating e-learning technology-supported processes and teaching for students with disabilities. Simplification of psychological knowledge on characteristics of students with learning disabilities, and lack of valid and methodologically competent research on psychological effects of e-learning procedures adapted to students with disabilities are also common problems.

However, e-learning technology can promote the inclusion of students with various disabilities [1].

2. STUDENTS WITH DISABILITIES

The European disability policy is expressed in the Madrid Declaration written by the European Disability Forum for the European Year of People with Disabilities. It is focused on disability as a human rights issue. People with disabilities are entitled to the same human rights as all other European citizens. The enlargement process affects millions of citizens with disabilities in the accession countries. In some of them an established dialogue with the public authorities concerning disability affairs exists already. Nevertheless, the situation of people with disabilities is still very precarious in certain parts of Central and Eastern Europe, and there is a real need to work for the improvement of their living conditions [2]. An enlarged Europe must guarantee people with and without disability freedom of movement, and freedom of association, the right to access appropriate education, employment, goods, services and social protection and to make free choices.

In all European countries, people with special educational needs (SEN) are divided into categories. Defining the categories of special educational needs is not universal in European countries [3], [4]. Some countries define only 1 or 2 categories (eg. Denmark). Other countries provide more than 10 categories (eg. Poland). Most countries defined 6-10 categories of special educational needs. In some countries (eg. Liechtenstein), there are no different categories of special educational needs, but there are different forms of support. These differences in definitions are influenced by the differences in legislation and sources of financing of the educational system, rather than looking at a variety of special needs.

In general, in most European countries, people with special educational needs usually include following subgroups: (1) people with specific learning disabilities, (2) persons with visual impairments, (3) persons with hearing impairments, (4) people with slower cognitive functioning, (5) autistic people, (6) people with neurological and other diseases, (7) people with complex cognitive, emotional and social difficulties, (8) people

with multiple difficulties, and (9) people with speech and language disorders.

Classifications of students/people with disabilities
Some countries, organizations and projects develop different classification of students with disabilities.
The classification of students with disabilities in the USA differentiates the following categories [5]: specific learning disabilities (5.0% in the USA population at the age from 3 to 21 at the 2009), speech or language impairments (2.9%), intellectual disability (1.0%), emotional disturbance (0,9%), hearing impairments (0.2%), orthopedic impairments (0,1%), other health impairments (1.3%), visual impairments (0.1%), multiple disabilities (0.3%), deaf-blindness, autism (0,7%), traumatic brain injury (0.1%), developmental delay (0.7%), preschool disabled. At the age from 3 to 21 in the USA there are 13.2% students with disabilities (all categories).
ETTAD project ([6] Enable Teachers and Trainers to improve the accessibility of Adult Education for people with disabilities – LLL project) differentiated the following subgroups of students with disabilities: students with physical disabilities, students who are blind of partially sighted, students who are deaf or hard of hearing, students with specific learning difficulties (SpLD) including dyslexia, students with language or speech difficulties, students with medical conditions, students with hidden disabilities or psychiatric disabilities, students who have mental health difficulties.
SINC@HE project (Support and Inclusion of students with disabilities at Higher Education Institutions in Montenegro - TEMPUS project), according to IDEA, use the following classification of students with disabilities [7]: visual impairment/ disability, including blindness; emotional disturbance or psychological and psychiatric disorders; physical disability or/ and orthopedic impairment; long-term health condition or/ and other health impairment (e.g. cancer, asthma, HIV/AIDS, epilepsy, chronic fatigue syndrome, diabetes); hearing impairment/ disability, including deafness; specific learning difficulties or specific learning disabilities.
According to national reports, there are approximately 5% students with disabilities in the student population in the both of compared countries - Greece and Serbia.

3. GOALS AND OUTCOMES OF EDUCATION OF STUDENTS WITH DISABILITIES

Historically, many of the outcomes expected of human service programs for people with disabilities were primarily oriented to protection and care [8]. With the civil rights movement of the past two decades, one aspect of which focused on educating students with disabilities in public schools, traditional outcomes were reconceptualised to encompass [8]: (a) employment, useful work, and activity valued by the community; (b) access to further education when desired and appropriate; (c) personal autonomy, independence, and adult status; (d) social interaction, community participation, leisure, and recreation; and (e) participation in the life of the family. The most important goal is preparation of people with disabilities to become productive and independent adults.

European countries tend to reject the medical model and move to the educational system. This system must be able to provide support services, counselling and treatment to all persons with special educational needs, within the same educational system, not within the health institutions (with their support, when necessary). Therefore, training of teachers involves the acquisition of general or specific knowledge of all these categories. Teachers must be properly informed about the special educational needs, various difficulties that may arise in the work, and strategies for appropriate and effective work with this population in public schools.

The first decade of twenty first century is the period of the expansion of inclusive education. Inclusive education is an influential movement and a developed system of activities that provides equality of opportunities. Goals of inclusive education are educational goals; educational goals is wider concept than academically oriented goals. Concept of inclusive education and a successful schooling experience should to provide the student with the tools and skills necessary to make the transition effectively to the next stage of life.

Inclusive education [6]: takes a coherent approach which is anticipatory and proactive; has a strategy for delivering equal opportunities and diversity policies; involves the whole institution; matches provision to student needs; incorporates regular reflection, review and refinement of strategies and methods that actively involve students with disabilities.

Inclusive teaching/instruction is the central part of inclusive education. Inclusive teaching means recognizing of learning needs of all students, and also acknowledging of individual differences among students with disabilities. Inclusive teaching avoids pigeonholing students into specific groups with predictable and fixed approaches to learning.

Reasons of inclusive teaching importance [6]: (a) Inclusive teaching is more likely to be good teaching. (b) Education should reflect, promote and facilitate living in a diverse society. (c) More and more students with disabilities are entering higher education. (d) Educational institutions provide equality of opportunity for students with disabilities. (e) Students with disabilities are increasingly aware of their rightsand less prepared to accept inadequate provision. (f) Although provision for students with disabilities has dramatically improved in recent years, it is still patchy, under-resourced and inconsistent.

Realization of goals of students with disabilities education is based on the differentiation and individualization of teaching. Differentiation of teaching and learning is the process of adaptation of teaching to the cognitive and socio-emotional characteristics of some students' groups with the same or similar characteristics.

Individualization of teaching and learning is the process of individual cognitive and socio-emotional differences of each person separately. In traditional class-subject teaching, valid differentiation is the precondition for enough level of individualization. Differentiation and individualization of learning and teaching is mutually conditioned and realized into 3 modalities [9]: (a) internal differentiation and internal individualization, (b) flexible individualization and differentiation:

(c) external differentiation. Diversity of educational technology facilitates differentiation and individualization of instructional process and development of the individualized educational program and some forms of educational personalization [10].

According to the NRC report [8], instruction for students with severe disabilities has evolved into an ecological approach, meaning that the student's learning needs and functioning level are considered in conjunction with the demands of the environment; skills are never taught in isolation from actual performance demands. For elementary-school-age students, curricular priorities most often involve communication, socialization, self-help, motor skills, and functional academics. For secondary-school-age students, curricular priorities include employment preparation and placement, personal management, and leisure. For students with mild disabilities, a combination of academic, vocational, and functional outcomes is often selected with the specific mix of components dependent on individual student goals and needs.

Learning may occur in a variety of physical locations and the types of learning activity in different learning environments are often characteristic.

4. INSTRUCTIONAL E-ENVIRONMENT FOR STUDENTS WITH DISABILITIES

What is the framework of e-environment for students with disabilities? We make differences between assistive technology and e-learning/e-teaching for students with disabilities in the concept of e-environment for them.

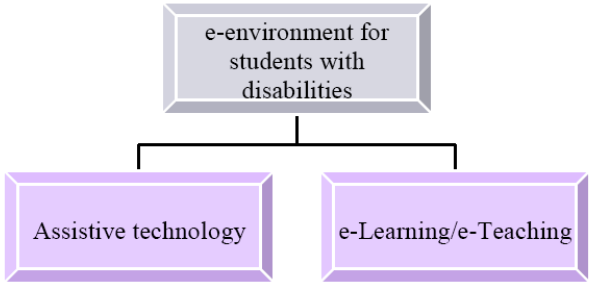

Fig. 1. Component of e-environment for SwD

Assistive technology is any mean [11]: hardware or software, used to increase, improve or maintain capabilities of persons with disabilities. Assistive technology enables people with disabilities to execute tasks that are sometimes difficult or impossible to do without technical aid, and helps them to achieve their scholar, professional and social inclusion. Computer is only one component of assistive technology for students with disabilities.

Today, e-learning is a system of procedures, processes and instructional materials which ensure the diversity and efficiency of learning as well as individual activities (and psychological process), and important social activities in the school system. The concept of constructivism and socio-constructivism is the basic frame of different types of inclusive teaching. Simultaneously, these concepts are the base of current e-learning technologies. Therefore, integration of e-learning/e-teaching as supported technologies in teaching students with disabilities is usefulness. Since learning is a social activity and understanding is socially constructed, e-learning should be designed to promote participation, allowing all students to take part in all subjects and activities, enhancing cooperative learning, offering powerful opportunities [12].

Today, e-education (e-learning/e-teaching is the central part of e-education) of students with disabilities is already widespread [13]. According some authors, the most creative e-learning solutions, content and processes are in this field.

E-learning and e-teaching

Conceptual frameworks for e-learning and e-teaching are different. E-learning is focused on the learner and learning process. The term "teaching" is used in two ways: teaching as the teacher activities and teaching as the instructional activities. Then, there are two meanings of the concept "e-teaching". According to Nakajima, e-teaching is "the system designed to improve teachers' performance, and their self-regulation and motivation. It's service designs are aimed at supporting teachers to teach effectively in an e-learning environment" [14]. The architecture of e-learning is centred on learner. The architecture of e-teaching "needs to be centred on teachers" [14]. E-teaching is not just prerequisite to e-learning, but it can be a great innovation in education.

However, in this paper the term e-teaching is used in a broader sense. E-teaching is the instruction system of processes and activities designed according to the ICT development, characteristics, and models of e-learning, principles of formal communication, principles of e-education, principles of competence-based education system etc. [15]. Precise meaning of the term electronic teaching includes the system of learner activities and teacher activities in the instruction supported and shaped by the information-communication technology and electronic engineering solutions.

A wide range of Web 2.0 tools are used to support inclusion [6] – some relatively "low tech" technical solutions (based primary on discussion platforms), and new sophisticated technical platforms (immersive technologies and games in combinations with tools like podcasts, blogs and social networking). Current Web 2.0 technology (and the other advanced technologies) provides e-learning based on interactivity and higher cognitive processes activation. E-learning is viewed as a system of activities that reinforces students' cognitive domain. The planning of learning activities and the development of scenarios (not design of learning materials) are emphasized, especially in the field of education of students with disabilities.

5. PSYCHOLOGICAL FUNDAMENTS OF DESING E-COURSES FOR STUDENTS WITH DISABILITIES

Guglielman [12] emphasised necessity of interdisciplinary approach to developing e-learning environment for SwD (educational technology, learning theories, e/learning models and approaches, e-inclusion, universal design,

participatory design). In this paper we derive some aspects of course design framework in special context – important principles from psychological framework.

E-teachers and developers of e-courses can organize e-learning by integrating different media opportunities and involving different perceptual processes. It is very important to provide multimedia support and activate different perceptual channels for information reception in e-students learning. Organising of learning materials for e-readers with disabilities (must respect demands of the reading process.

One of the possibilities of empowering memory is transformation of information into different representative. For example, if some information is given as the word(s), then it should be transformed into the image, or if the data is an image, then it should be transform into the word. It is one of the ways of strengthening the dual-channel memory. Students with disabilities, especially students with specific learning difficulties, learn better if the learning content are presented to them both verbally and graphically; then they can form a parallel mental models and engage multiple perceptual system reception. But, it is limited by the student's dominant cognitive style, and the type of content.

Some principles from psychology of perception, which are important to design educational material for some categories of students with disabilities, especially for students with learning difficulties, are important. Mayer [17] suggested the following gestalt psychological principles of stimuli organization in multimedial e-learning support: multimedia principle, spatial contiguity principle, temporal contiguity principle, coherence principle, modality principle, redundancy principle, individual differences principle.

Emphasised advantage of e-learning is reduction of the emotional stress and test anxiety: the students have enough time in asynchronous communication, they choose time of contact with e-teacher or e-classroom. At the other hand, one of the lack of e-learning is reduction of social interaction and emotional exchange. But, current e-technology overcome these barriers and, of course, don't reduce the importance of direct communication outside the electronic environment [18].

The development of IT support to the learning process and improvement of systems for e-learning are reducing effects of a frustration of direct instruction and classroom activities and avoiding some social conflicts.

However, new forms of student frustration in the process of e-learning are conditioned by a variety of activities. The availability of number of information is a major challenge: many members of the cyber generation react constant search for new content, fluctuation of attention, running to the offer.

When teachers recognize these behaviours at all generation connected to the information networks and computers, they should to guide development of students' selection strategies (so-called "stop strategy"). Teaching students with disabilities how to select information (a selection of information in learning situations is an indicator of the quality of learning) significantly contributes to the reduction of feelings of frustration in the network environment.

Klomp [19] makes review of the major benefits of developing e-learning courses for students with disabilities, positive effects of e-learning and education in e-environment on them and accessibility: peer support by using computer mediated communication tools; web-based education enables users – students with disabilities to be proactive and self-reliant, rather than reactive and dependent; flexibility in time and space afforded by distance education modalities can address the special educational needs of students, it allow students to progress at their own pace; multimodal communication, or wide range of e-learning communication tools allows presentation of information on the way adaptable to specific disability; individual student-teacher communications can take place efficient and easily, and more accessible; asynchronous communications is the benefit for students with disabilities etc. He derives barriers, too, but only few of them is psychological barriers: missing of guidance how to use e-learning content, failure to relate to the real world experience of the user, course developers don't know enough about learning disabilities, adaptation to the learning disabilities is not enough, teachers don't develop relevant e-teaching competencies etc.

E-learning can offer great opportunities to students with disabilities. But, more of teacher's didn't know how to implement ICT and e-learning technology in inclusive education. Teacher preparation for e-teaching students with disabilities is one of the most important part of developing e-learning environment for them. All over Europe, teachers and teachers who are teaching people with specific training needed, acquire knowledge in this field during undergraduate studies. The form of knowledge acquisition in different countries is different - even within the same country it may vary from faculty to faculty, the internal legal regulations [20].

Benefits of e-learning for specific groups of students with disabilities [6]:

- The added value for many students taking part in e-learning is the flexibility and control that they can have over their learning. If they are given choices and support, materials delivered in this way can be adapted to suit learning preferences (for example by reading text with synthesised computer voices, or changing background colours and fonts and using magnification).

- The ability to work at home in one's own time is also valuable to students with mobility and dexterity difficulties, who may have had adaptations made to their computer input and output systems.

- Software programs to aid accessibility include on-screen keyboards with switch access, predictive software programs, and voice or speech recognition systems with macros. Hardware devices include key guards to improve typing accuracy, single switches, track balls, and other specially designed items such as head or eye pointing systems.

- If typing quickly is difficult then asynchronous methods of communication may be preferred, such as e-mailing or posting to a discussion forum. It is important to encourage peer-to-peer collaboration and to maintain good contact with students to avoid feelings of isolation.

- Deaf students whose first language is BSL may have problems with the written English needed for e-mails and conference discussions, but that does not mean they should be curtailed, merely adapted using clear and concise language.

- Access to e-learning, with the digitisation of texts, can be an important element of day-to-day study for visually impaired students, especially those who are dependent on screen reading software. Extra time may be required to learn to use the software. Poorly produced software can be effectively inaccessible to such students.

- When the location for online learning is in a general access area it is possible to inadvertently introduce physical barriers, not just technical ones. Simple solutions, such as raising the height of a computer table, can enable a person using a wheelchair to reach the keyboard. A supportive, height-adjustable chair allows a student with a back condition to sit more comfortably. Other equipment can make a great difference: easy-to-reach front loading printers, computers with raised buttons, or a casing that has the connections, controls and drive slots located at the front.

6. EXAMPLE AND RECOMMENDATIONS OF GOOD INCLUSIVE E-EDUCATION

Cullen et al. [16] recognized advantages of Web 2.0 technologies to support education of students with disabilities and developed Learning 2.0 tools. These tools: can be used to create learning environments which open up spaces to develop creativity and collaboration and which are appealing to learners who have problem in conventional learning/teaching environments; support inclusion through promoting empowerment, self-esteem and confidence-building; can expand learning horizons and engage learners in rich content environments; improve teacher-learner relationships by more collaborative role (for example, teachers become mentors or learning companions who facilitate independent learning and peer assessment, while learners take control of their learning processes).

Key mediating factors of realisation of successful learning and inclusion outcomes by using e-learning technologies (Learning 2.0) comprise [16]: existing levels of basic digital literacy; the cultural and social mix of participating learners; and the presence and quality of support available from other sources, for example, referent social groups (family, peers, classmates) and group interaction and social support.

Cullen et al. [16] emphasized that "although media-rich environments show positive learning gains for participants, and promote their active educational. Social and psychological re-engagement, low-tech environments show equally positive results. The key factors promoting positive learning outcomes appear to be how well the following fit together: the skills, needs and expectations of users, the technological and pedagogic choices made and the availability of effective support roles like mentors and learning companions".

ETTAD project is one of the long life projects of EU directed to the people with disabilities: Enable Teachers and Trainers to improve the accessibility of Adult Education for people with disabilities [6]. It has produced a web-based resource for teachers and trainers that identifies potential challenges that learners with might experience in engaging with their courses. ETAAD providers should place learners in the best possible learning environment for their needs, whatever those needs may be. Several strategies may be required to ensure that the specific needs of an individual are met. Providers should devise a comprehensive strategy to tackle every aspect of an individual learner's need – this may become complex and is a growing challenge for providers who have to cater to an increasingly diverse population of learners. Experience has demonstrated that adjustments made for students with disabilities can often benefit all students [6]. Apart from the physical location, the learning environment also encompasses teaching delivery and approaches to learning. Examine these from the perspective of learners with disabilities and consider how teacher can adapt own practice to facilitate the participation of these students and to ensure an appropriate and inclusive learning experience.

Some suggestions to teachers in e-learning/teaching environment from ETTAD: it is important to think about the skills a student requires to take part in the various learning environments. These may be visual, auditory or tactile skills. They may be related to language, perception, memory, concentration or other attributes that are easily taken for granted. A lack of or a difficulty with any of these skills or attributes may affect knowledge acquisition, construction and assimilation. This in turn will affect teachers' teaching delivery and strategies and how learning materials are used.

E-learning and virtual learning environments are increasingly used in higher education and it is important to consider how they impact on students with disabilities. Students may spend the majority of their time in private study and teacher should consider any constraints or barriers that may affect their learning in this environment and what he/she can do to assist.

7. CONCLUSION

Inclusive teaching means recognising, accommodating and meeting the learning needs of all students. It means acknowledging that students with disabilities have a range of individual learning needs and that they are members of diverse communities. Realization of goals of students with disabilities education is based on the differentiation and individualization of teaching. ICT is important supportive technology for education of students with disabilities. The framework of e-environment for students with disabilities includes assistive technology and e-learning/e-teaching for students with disabilities. Some of recognized effects of ICT support on education of students with disabilities are: multisensory channels are used; students' active role is emphasized; students self-construction of knowledge is developed; high level of individualization and personalization of teaching is possible; it makes links between school learning and students' everyday activities, teacher and e-teacher use new teaching elements (active facilitation, coordination, management, tutoring). E-learning technology can promote the inclusion of students with various disabilities.

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