Design and Development of Accessible Educational and Teaching Aids for Students with Disability

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INTRODUCTION

The rapid increase of students with different and diverse educational needs in mainstream schooling is a reality with multiple costs requiring new educational practices. Universal Design for Learning ("Universal Design" or "Design for All") foregrounds educational practices by creating diverse educational environments, tools, educational materials and support services. The "Universal Design in education" can be regarded as an extension of the Universal Design in architecture, as expressed by Ron Mace, where the structures are the result of ideas, design and construction serving the maximum number of users, including disabled people, without any modifications or specialised design (Mace, Hardie & Place 1996, Erlandson 2008).

The basic prerequisite of the "Universal Design in education" is to identify and eliminate barriers in class (both general and special class), as well as in the curriculum, the teaching materials and methods and the educational software. Universal Design involves presenting information in multiple forms, using alternative pathways and means towards acquisition of knowledge and

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participation, but also changing goals and objectives, individualised teaching and measurable effectiveness. It is important products and services to be designed for potential and necessary adaptations, when required, in order to meet the individual user needs (Abascal & Civit 2001, Emiliani 2001).

Inequalities in education for students with disability are widespread throughout the whole education system in Greece. However, ensuring equal opportunities and encouraging equal access to knowledge for all students is considered the basic and non-negotiable principle in any democratic society, in order for the education system to play a significant role in mitigating social inequalities. Given the rapid development of technology and its increasing exploitation for individual or professional use, school education must create the conditions which will enable each and every student to comprehend the role of ICT, to use and exploit, as well as to constantly improve his/her ability to have access ICT efficiently.

The growing amount of knowledge and information, despite its provided opportunities and the progress that undoubtedly represents, involves the risk of widening social inequalities and creating a diversity gap. Therefore, ensuring access for all to information and knowledge requires the need for providing equal opportunities in learning and assessment. Furthermore, the constant discoveries and innovations in various fields of science and technology lead to constant revision of knowledge thus press both individuals and communities to adopt lifelong learning practices.

THE PROJECT

The project's aim is to present the methodology and the standards for adapting textbooks of all curricular subjects concerning the first two grades of primary school level, so that to be fully accessible by students with different types of disability (in terms of the Action, "Design and Development of Accessible Educational and Instructional Materials for Students with Disabilities - Horizontal Action" under the Operational Program "EDUCATION AND LIFELONG LEARNING 2007-2013").

First, we describe the need to develop educational material both in printed and digital form - depending on the type of disability and the special educational

need - the use of suitable digital technology which will make it fully accessible, as well as the requirements for the special software provision (platform/platforms) to be used for adaptation and integration of the educational content in digital environments accessible to students with specific disabilities.

In addition, we present the development of special educational material designed to properly prepare students with disabilities for school enrolling.

The special learning needs covered through the development of the specific educational material are those of students with:

- Visual Impairment
- Hearing Impairment
- Physical (motor) disability
- Mild mental disability
- Autism
- Attention deficit disorder (ADD)

We present arguments for the need to inform educational staff, teachers and general stakeholders (parents, students, etc.) on the feasibility and benefits of developing such educational material, in order to raise awareness and urge them to engage in implementation mechanisms and exploitation procedures, as well as to participate in the forthcoming teacher training.

Finally, we discuss the need to ensure the project sustainability and to effectively disseminate the experience gained; we also describe the training model the School Counselors and Headmasters of special education, as well as the special education professionals. The evaluation concerns qualitative and quantitative assessment of results so that the gained expertise and experience to be exploited for future textbooks' adaptation concerning additional school level grades.

ACCESSIBLE EDUCATIONAL MATERIAL

The current National Curriculum has defined the requirements for the creation of the necessary supportive teaching material, which has to ensure the access of students with disabilities and special educational needs. The educational material produced within the Project is noted for its accessibility, so that to be suitable for

students with special educational needs (Kourbetis 2006, Watts-Taffe & Gwinn 2007).

Students with visual impairment need textbooks in Braille code, recorded material, enlarged material or relief, three-dimensional material etc. The development of material for students with visual impairment requires computers with specialised software, as well as development processes for the conversion, structure and testing of the material. Note that, in the process of proper interface between people with visual impairment and the educational material, the two-fold communication "text-to-speech/speech-to-text" (T2S/S2T) will be included.

Teaching material will also be provided to blind or visually impaired students (such as relief pictures for the subject of "environmental studies", maps, figures, watches, flashlights, etc.). We will develop special educational material for the teaching of Greek in Braille and the Nemeth Code, as well as for the improvement and strengthening motor and orientation skills (development of readiness activities, pre-reading tasks, the Braille teaching method and the method of Orientation and Mobility skills for the Blind and the partially–sighted students with gradual vision loss).

We will also search and buy specific software (platform / platforms) that allows students with visual impairment, and students with hearing and physical disability to have access to adapted digital content. Furthermore, digital teaching materials, selected by the Special Education Department of the Pedagogical Institute, will be adapted and integrated.

Similarly, students with hearing impairment need suitable material using Greek Sign Language, material for bilingual education as well as interpretation services (Lane, Hoffmeister & Behan 1996). The development of material for the deaf requires computers with video recording, specialised software as well as development processes for the conversion into Greek Sign Language, sign interpretation, structure and testing of the material (Barman & Stockton 2002, Easterbrooks and Stephenson 2006).

For the deaf and hard of hearing students, we will develop accessible digital learning material for the curricular subjects of the first two grades of primary school level, namely Maths, Language, Social Studies and the Literature.

Also, we plan to develop specific educational material for Greek Sign Language learning (A' and B' grade) as well as teaching material for language readiness.

Students with mild mental disability need textbooks transcribed with the Method "Easy-to-Read" (Arvidsson 1998, Tronbacke 1996) and read aloud by a native speaker (Baker & Anderson 2005).

Students with physical (motor) disability need textbooks accessible through "one movement" which will be achieved by simple text scanning and touch-screen reader. Therefore, the existing educational material for both A' and B' grades will become accessible by students with physical (motor) disability, as such, without any modifications.

Students with autism, apart from the general and adapted accessible material, need alternative educational material and adapted visual textbooks' layout which do not include much information on each page, having clear visual instructions. The alternative communicative ways contribute to the development of language skills for children and adults with communication disorders. Also, they are used as introduction to the learning process of reading and writing and for the communicative process in general. Note that, in the process of appropriate software development for students in the autism spectrum, expanded technical and educational approaches will also be taken into account, such as the Makaton, the Applied Behavior Analysis etc, which will be adapted to the autism spectrum. The adaptability of the educational material to the characteristics of the autistic child is a prerequisite in any kind of implementation. For students with autism, selected texts of the Literature textbook for grades A' and B' will be adapted.

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