





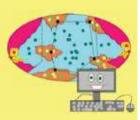


ASSISTIVE INFORMATION TECHNOLOGY FOR IMPROVED INCLUSIVENESS OF THE EDUCATION:

POLICY POSITION PAPER































ASSISTIVE INFORMATION TECHNOLOGY FOR IMPROVED INCLUSIVENESS OF THE EDUCATION:

POLICY POSITION PAPER

PROJECT FOR E-ACCESSIBLE EDUCATION "Open the Windows" is a civic organization dedicated to providing and facilitating the access to information technology for persons with disabilities.

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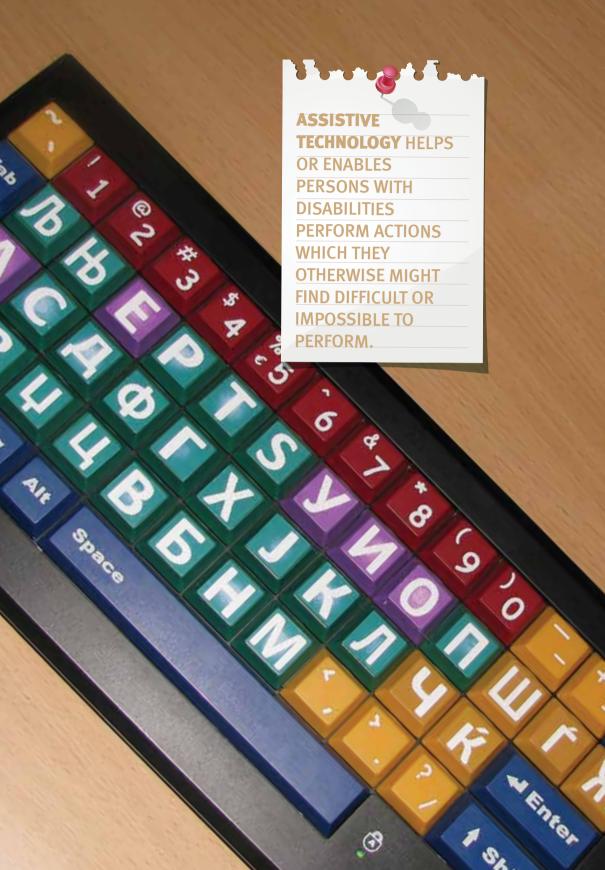
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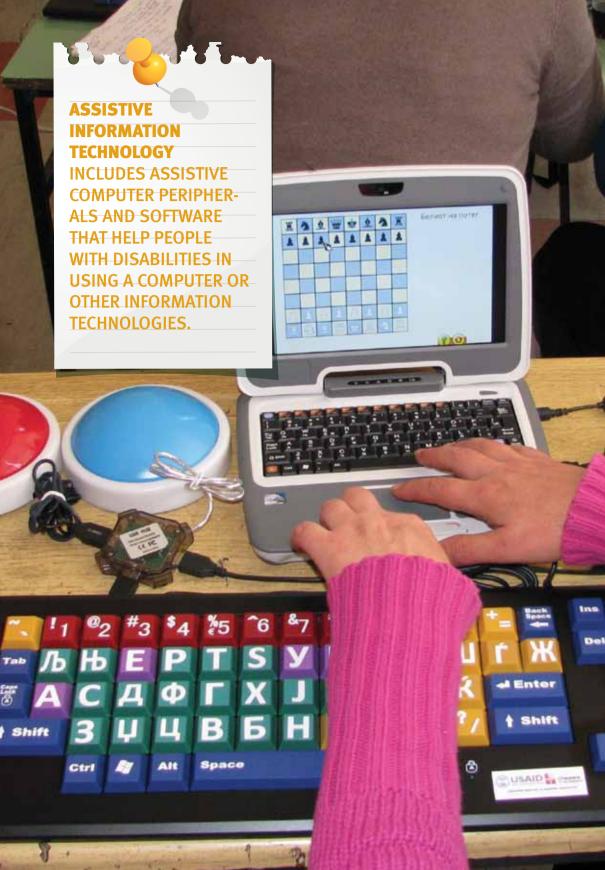
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CONCLUSIONS AND RECOMMENDATIONS FOR SYSTEMATIC INTRODUC-TION OF ASSISTIVE INFORMATION TECHNOLOGY IN THE EDUCATION





NSECON SOT EVIEUJONI CNR NOITROUEDRN NI RINOCEDRN NI Modern technologies are rapidly and irreversibly changing our world.

This often used phrase contains a strong nostalgic sentiment for the good old times when we were not as much alienated from each other, when we would return from holidays before our postcards reached our closest friends...

This publication, however, shows some of the positive changes and potential opportunities that this new digital age is offering.

Modern technologies can be used to foster the inclusion of persons with disabilities in all aspects of the social life, and the education is no exception.

The analysis "Assistive information technology for improved inclusiveness of the education" offers experiences and examples which demonstrate how technology contributes to the realization of the right to education of students with special educational needs. These positive stories are from our backyard, not from Utopia or some fairy-tale land.

USAID's Project for e-Accessible Education "Equal Access for Equal Opportunities", implemented by the organization "Open the Windows", made the pioneering steps in the country in introducing assistive information technology in mainstream primary education. For the first time, 21 primary schools from all over Macedonia were provided with equipment, software and training, enabling them to use computers as tools for improvement of the educational opportunities for students with special educational needs.

The dedication of and sincere cooperation between various stakeholders: primary schools, national and local educational institutions and in particular the Ministry of Education and Science, the Bureau for Development of the Education and the Ministry of Information Society and Administration, many students with special educational needs and their parents, USAID Macedonia Mission, "Open the Windows" and other civic organizations, turned these first joint steps into a success story.

In the same spirit of cooperation, lessons were learnt and recommendations were formulated that pave the way for systematic introduction of assistive information technology in the educational system in Macedonia, presented in the last chapter of this analysis.

A modern educational system produces competitive workforce capable of facing the 21st century challenges.

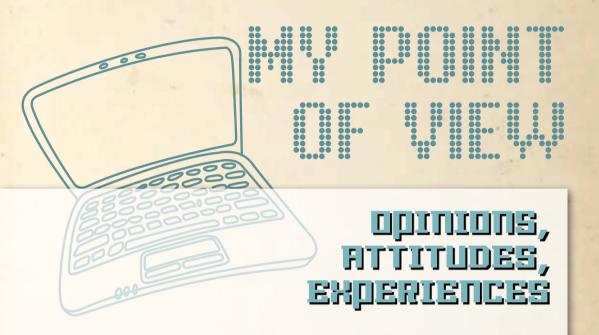
A modern and inclusive educational system enables persons with disabilities become active citizens contributing to the overall progress and wellbeing of the society.

The assistive information technology connects in the best possible manner the continuous long-term efforts of the authorities to modernize our education and improve its inclusiveness. Its adequate use can show the noble side of this modern time, its heart and soul that we all seem to be longing for.

Let's make the best use of the opportunities ahead of us!

Vladimir Lazovski Executive Director "Open the Windows"







Assistive information technology is the point of connection of the two strategic priorities of the Ministry of Education and Science: on one hand, for modernization of the education and, on the other, for improving its inclusiveness.

Assistive technology facilitates learning, develops abilities of students with special educational needs and enables them to gain knowledge and skills necessary in the modern society. In fact,

the use of such technology serves to foster equal participation of students with special educational needs not only in the system of education, but in the whole digital society as well.

Introducing assistive information technology in primary schools in Macedonia will contribute to providing equal educational opportunities for all students, which is our obligation and priority.

MBA Panche Kralev, Minister of Education and Science



One of the priorities of the Government is the modernization of the educational process by widening the use of information and communication technologies. This approach proved to be a significant factor in improving and updating curricula in the educational system of the Republic of Macedonia.

Considering our aim to build an inclusive society, in which the benefits of information and communication technologies will be

available to all, the use of assistive information technology in the education is definitely of utmost importance. Assistive technologies will help students with special educational to obtain the knowledge foreseen with the school curricula, as well as to develop a variety of skills that will make their life easier in the future.

Ivo Ivanovski, Minister of Information Society and Administration



Assistive technology enables and facilitates computer use by students with special educational needs. It is an additional tool for teachers to bring curricula closer to the students with special educational needs in a clear and understandable manner. This technology enables teachers to individualize their approach and prepare and implement individual educational plans for their students with disabilities.

The Bureau for Development of the Education, in cooperation with USAID, translated and adapted the educational suite GCompris intended for children aged between two and ten years in Macedonian and Albanian language and produced a manual for teachers. In addition to curricula referencing for GCompris use in grades one to five, the manual also contains directions and guidelines for teachers concerning their work with students with special educational needs.

Vesna Horvatovikj, Director of the Bureau for Development of the Education

Supporting Macedonia's efforts to develop a modern and inclusive educational system is one of USAID's priorities. Experiences from numerous countries show that assistive information technology greatly contributes to this goal.

USAID is proud to have supported Macedonia's pioneering steps to introduce assistive information technology in selected primary

schools, hand-in-hand with the national educational institutions, schools, teachers, parents, and our implementing partner, Open the Windows. I sincerely hope that, together, we will ensure continued use of technology in the best possible interest for students with disabilities

Robert Wuertz, USAID Macedonia Mission Director

By using assistive information technology, my daughter obtained literacy skills and gained a lot of knowledge; by using Internet she was able to learn a foreign language.

But the most important benefit is that she gained self-confidence: at the school she became equal with her classmates who began to see her with different eyes; they began to recognize her as equal to them.



Nagjenka Tutorov Apostolovska, mother of Vera

Information and communication technologies would not find its adequate place in the educational system without adequate consideration of the potential of assistive information technology. Many children with disabilities can be successful in the regular educational system by using assistive information technology.



Computers, which are to be found in almost all schools nowadays, and assistive computer peripherals significantly facilitate the life of many children with disabilities. The opportunities to communicate in different ways, access to information, developing their creative abilities and productivity have all become available to them.

Prof. PhD Natasha Cicevska Jovanova, Institute of Special Education and Rehabilitation

When using assistive information technology, the computer becomes an open window for the students with special educational needs. It enables them to travel around the world that they daily dream about.

The access to this technology and adequate adaptions of the school curriculum will give them a real belief in the new age, an age which will allow every child to equally participate in all aspect of the social life.



MEd Peco Rojkovski, pedagogue at the "Slavko Lumbarkovski" primary school, village of Novaci





NATIONWIDE
RESEARCH
TO RESESS
THE NEEDS
FOR RESISTIVE
INFORMATION
TECHNOLOGY
IN PRIMARY
EDUCATION

FACTS AND FIGURES

In the 2009/2010 school year:

- more than 80% of the schools have at least one student with special educational needs;
- less than 20% of the schools have an accessible entrance ramp;
- more than 40% of students with special educational needs have difficulties or cannot use the standard school computers;
- in 2% of the schools, students with special educational needs use assistive computer peripherals or accessibility software options when using a computer.

In the period 2006-2010, the use computers and Internet in primary and secondary education rapidly increased. All schools received computers for each student and the teachers acquired the necessary knowledge and skills through trainings.

However, the potential of assistive information technology as a tool for fostering inclusion in the education was overlooked and remained largely underused. The Governmental project with a very inclusive title "Computer for Every Child" did not take in consideration the needs of students with special educational needs.

ABOUT THE RESEARCH

At the end of the 2009/2010 school year, the association "Open the Windows" conducted a nationwide research to assess the needs for assistive technology in mainstream primary schools. This was the first step in the implementation of the project for e-accessible schools "Equal Access for Equal Opportunities", funded by USAID.

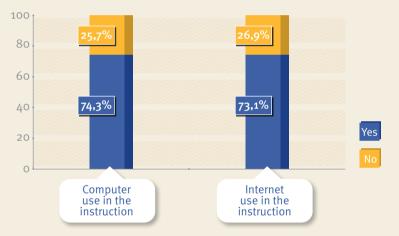
The research provided data from 71.3% of all mainstream primary schools in the country, which were all asked to take part in the survey. The sample was representative in terms of regional and representation of schools from rural and urban areas, as well as in terms of languages of instruction.

The report of the research was published in Macedonian and English and is available on the "Open the Windows" website.

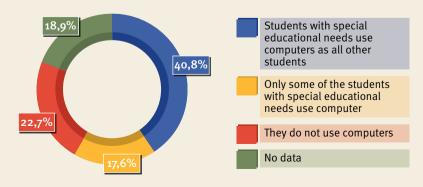


COMPUTER USE IN THE INSTRUCTION

At the end of 2009/2010 school year, three of four schools in the country used computers and Internet.



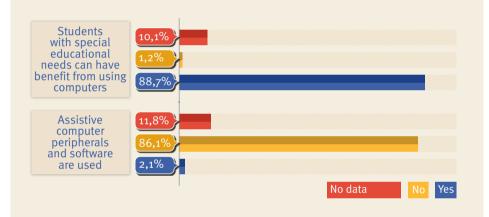
However, a significant part of the students with special educational needs did not have the opportunity to benefit from the wide use of computers. Namely, over 40% of these students could not or had difficulty using the standard school computer equipment.



At the same, schools almost unanimously answered that using a computer can positively affect the personal development of students with special educational needs.

On the other hand, only 2.1% of all schools reported that their students with special educational needs used assistive computer peripherals or accessibility software options as tools that facilitate their access to the school computers.

"The computer helps students with special educational needs to improve their fine motor skills, as well as their abilities to focus and concentrate. The educational games enable improvement of their logical thinking skills and acquiring knowledge through fun and play." (quote from the questionnaires)



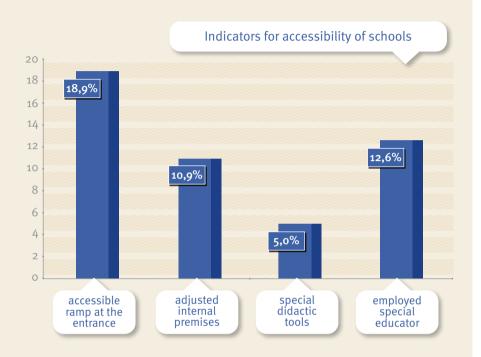
"One child uses a hearing device; another uses stilts." (quote from the questionnaires)

This answer of one of the schools to the question whether any of their students with disabilities uses an assistive computer peripheral and/or accessibility options shows that schools were not familiar with assistive information technology. It is obvious that neither the hearing device, nor the stilts are assistive computer peripherals; yet, the school positively answered this survey question and is among the 2.1% schools in the country that reported using assistive information technology in the instruction.

Although aware that computers can bring benefit to *all* students, schools lacked both information on assistive information technology and skills to adapt technology to their students with special educational needs.

ACCESSIBILITY OF PRIMARY SCHOOLS

In general, most of the primary schools are not sufficiently accessible for students with special educational needs in terms of premises and available resources:

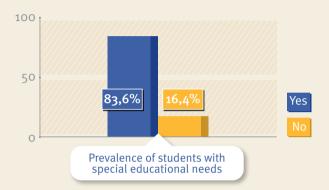


One third of the schools (33.2%) participated in initiatives or projects to enhance the involvement of students with special educational needs in the last three years prior to the survey. Most frequent examples included participation in workshops, trainings and other forms of capacity strengthening of teachers and professional teams working with students with special educational needs.

"In our school, we promote inclusive education and develop awareness that the school is a place for all children, that everyone has their strengths and weaknesses ..." (quote from the questionnaires)

PREVALENCE OF STUDENTS WITH SPECIAL EDUCATIONAL NEEDS

The research has shown that 83.6% of all mainstream primary schools in the country had at least one student with special educational needs among its students in the 2009/2010 school year.



Between 10 and 11 students with special educational needs followed the instruction in each school, which is about 1.7% of the total number of students.

It should be noted however that, according to obtained answers, schools seemed not to have a standard procedure for identifying and monitoring of students with special educational needs: Apparently, schools use different sources of information or rely on their own (provisional) assessment when reporting on the prevalence of students with special educational needs.

The research also came to the conclusion that the majority of schools needed additional professional assistance from other institutions and professionals (special educators) for identification of students with special educational needs and, in particular, for adjusting their approach towards them.

"We need a special educator who will be in our school all the time." (quote from the questionnaires)

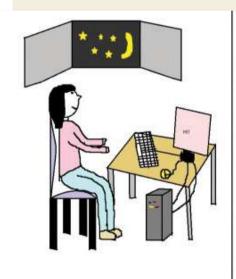
KEY TERMS

"Mainstream primary school" – all public primary schools in the country, excluding special primary and music schools.

"Students with special educational needs" – students who experience some form of disability and encounter difficulties in following the instruction and acquiring knowledge and skills in a standard manner:

- intellectual disability
- physical disability,
- speech and hearing impairments,
- combined disabilities,
- learning difficulties: dyslexia, dysgraphia, dyscalculia, hyperactivity,
- autism,
- other, not mentioned types of disability.

The definitions of these terms were shared with the schools during the research for terminological precision and compatibility.















INTRODUCING RSSISTIVE TECHNOLOGY IN 21 PRIMARY SCHOOLS IN MACEDONIA

FACTS AND FIGURES

In the 2011/2012 school year:

- the educational suite (software) GCompris, with more than 100 activities (games), localized in Macedonian and Albanian language;
- 21 primary schools equipped with assistive computer peripherals;
- more than 400 relevant individuals trained in using assistive information technology in the work with students with special educational needs.

The research of the needs of mainstream primary schools regarding assistive information technology, presented in the previous chapter, indicated which schools could benefit the most from its introduction in the instruction.

Schools' needs of assistive information technology, were assessed on the basis of the following criteria:

- prevalence of students with special educational needs;
- accessibility of the school;
- use of computers in the instruction.

Forty schools across the country were shortlisted.

"Open the Windows" visited all forty schools and conducted interviews with their representatives, in order to obtain detailed information on the situation and needs of their students with special educational needs.

All data gathered through the survey and the field visits and interviews were analyzed, resulting in the selection of 21 schools that were offered to join in on the pioneering trip towards introducing assistive information technology in the education in Macedonia. All schools gladly accepted the challenge.

LIST OF SCHOOLS WHICH INTRODUCED ASSISTIVE TECHNOLOGY IN THE INSTRUCTION

"Ian Amos Komenski," Skopie

"Kuzman Josifovski Pitu," Skopje

"Gjorjija Pulevski," Skopje

"Dimo Hadzi Dimov," Skopje

"Johan Hajnrih Pestaloci," Skopje

"Dituria," Saraj, Skopje

"Sv. Kiril i Metodij," Veles

"Vasil Glavinov." Veles

"Toli Zordumis," Kumanovo

"Magdalena Anteva," v. of Karpos,

Kumanovo

"Dr. Vlado Polezinoski," Kicevo

"Slavko Lumbarkovski," village of Novaci

"Kiril i Metodij," Sveti Nikole

"Josip Broz Tito," Valandovo

"Goce Delcev," Prilep

"Ilinden," Kriva Palanka

"Bratstvo-edinstvo." Ohrid

"Dituria," Lipkovo

"Slavco Stojmenski," Vinica

"Simce Nastevski," village of Vratnica

"Kiril i Metodij," village of Bucin

Support from the MoES

In March 2010, the Ministry of Education and Science (MoES) issued their consent for the implementation of the "Equal Access for Equal Opportunities" project for introduction of assistive information technology in the mainstream schools.

Another display of MoES support was the presence of the then Minister of Education and Science at the project launching





and Science at the project launching event, together with the USAID Macedonia Mission Director of and spouse of the U.S. Ambassador in the country.

The process of introducing assistive information technology in the instruction was carried out in three steps:

- localization of educational software;
- equipping schools with assistive computer peripherals;
- training of teachers and other school representatives.

LOCALIZATION OF EDUCATIONAL SOFTWARE

Despite the visible progress in the computerization of education in recent years, schools still have a rather limited choice when it comes to educational software in mother tongues applicable in the instruction.

Previously localized educational applications that works under the Ubuntu Linux operating system installed on school computers were mainly intended for students from upper classes and secondary school students. For elementary school students, there was no other localized software except for the ToolKID educational package.

This limits the possibilities to use computers in schools' daily work with students with special educational needs.

Therefore, "Open the Windows" initiated the localization of the GCompris educational suite in Macedonian and Albanian. This initiative was endorsed by USAID Macedonia through its Primary Education Project (PEP) and the Bureau for Development of Education (BDE).

Using the experiences of the localization of ToolKID, the educational software GCompris was localized and made available to schools in August 2011, just before the start of the school year. BDE advisors prepared a manual for teachers on the application of GCompris in the instruction, which included recommendations on the use of the educational software in the work with students with special educational needs

These recommendations were based on "Open the Windows" experience in using assistive information technology with children with special educational needs. In fact, some of them had the opportunity to test the games, which was their contribution to the localization of GCompris and the preparation of the manual for teachers.

The educational suite GCompris in Macedonian and Albanian language that works under the Ubuntu Linux operating system can be downloaded from: www.thinktogether.mk.

About GCompris

GComprise is an educational suite consisted of numerous educational activities for children aged between two and ten. These activities help younger children to learn numbers and letters, adopt skills for using mouse and keyboard, as well as perform basic mathematical operations.

This educational package enables learning through play. Its educational role is even greater taking into consideration that GCompris is a powerful tool that can be customized to the individual needs of each child, while educational activities easily fit into the objectives of the curriculum.

GCompris is free open source software that is constantly being developed and upgraded. It is translated into more than 60 languages.



Certificate of Appreciation from the U.S. Embassy

In November 2011, the U.S. Embassy in Macedonia presented the collaborators from "Open the Windows" and the USAID Primary Education Project with Certificate of Appreciation for the "exemplary cooperation and full commitment that resulted in improved educational opportunities for students with special educational needs and for students from first to fifth grade."

EQUIPPING SCHOOLS

In the period from August to December 2011, each of the mentioned 21 primary schools was equipped with 7-12 sets of the following assistive computer peripherals: big-button keyboard, trackball, joystick and switches (pair). Schools also received USB hubs which allow simultaneous use of multiple assistive peripherals on one computer.

These computer peripherals meet the needs of most students with special educational needs who cannot use the standard computer equipment.

The number of distributed sets per school was mainly determined on the basis of the assessment of potential users among students, made in cooperation with schools' professional teams. A total of 200 sets of the mentioned computer peripherals were distributed.



Big-button keyboard can be used by children with motor difficulties or vision impairments. It is also helpful for students with learning disabilities who avoid standard keyboards because

of the large number of buttons. The device offers greater accuracy, speed, and clarity.

Big-button keyboards with Cyrillic (Macedonian) letters are not available on the market. To overcome this situation, "Open the Windows" produced stickers with the Cyrillic letters for each key on the keyboard, in order to facilitate the use of this peripheral by students with special educational needs.



The adapted joystick replaces the computer mouse and is intended for students who have motor difficulties. If properly positioned, apart from the hands, the joystick can be used with the chin, elbow or foot.

The use of this peripheral requires special software (JoyMouse) which allows speed and acceleration adjustment of the movement and reduction of the impact of tremor (shake) for children with motor difficulties.



The trackball is a computer peripheral that replaces the computer mouse. It is used by students who have well-developed fine motor skills (i.e. motoric skills of the fingers), but have difficulties in performing movements with the larger muscles.

The trackball can easily be handled with the fingers or chin.



The switch is a peripheral that is used as a replacement for the left and right click of a standard computer mouse. It is useful for students who have difficulties in the development of the fine motor skills and are not able to accurately use the mouse

buttons. The switches can be placed in different positions in relation to the body and can be used by hand, chin or elbow.

This peripheral is commonly used in combination with the joystick.

Most assistive computer peripherals are not available on the Macedonian market.

The procurement of the assistive computer peripherals for the 21 primary schools once again confirmed this fact: All companies that initially expressed interest in participating in the open tender required additional explanations on the type and



specifications of the requested peripherals, commenting that those are not among the products they regularly offer on the market.

It is interesting to note however, that the selected supplier produced the switches locally, at a significantly lower price than what is usually found for similar peripherals abroad.

TRAINING FOR TEACHERS

More than 400 teachers and other representatives of the supported schools have gained knowledge and skills on the use of assistive information technology in the work with students with special educational needs.

"Open the Windows" delivered training for teachers, professional team representatives and parents of students with special educational needs in each of the 21 supported schools, immediately after the delivery of the equipment. The aim was to introduce teachers and other participants to assistive information technology and the possibilities for its use in the instruction.

The trainings were based on the adult learning principles and had strong practical and participatory features. The practical part made use of the school computer equipment.

A total of 403 participants completed the trainings and received certificates for participation. Their structure is as follows:



- ▶ 313 teachers,
- ▶ 36 representatives of professionals school teams (mainly pedagogues and psychologists),
- ▶ 21 parents of students with special educational needs,
- ▶ 11 principals,
- 9 representatives of local governments,
- ▶ 13 participants from other relevant professions.

High grades from the participants

Upon completion, participants highly assessed their satisfaction with the training through anonymous questionnaires. By using a scale from 1 (the lowest) to 4 (the highest grade), the key aspects of the training were rated excellently:

- quality of lectures: 3.96;
- ▶ training relevance to school needs: 3.85;
- comprehensibility and clarity: 3.95.

Trainings in the media

The first training at the "Jan Amos Komenski" primary school in Skopje was launched by: the Minister of Information Society and Administration Ivanovski, the USAID Macedonia Mission Director Wuertz, the Mayor of the Municipality of Karposh Jakimovski and the Deputy Director of the Bureau for Development of Education Selmani. The event received extensive media coverage.

Trainings at several other schools were also covered by local media: The primary schools "Slavco Stojmenski" in Vinica, "Bratstvo-edinstvo" in Ohrid and "Slavko Lumbarkovski" in the village of Novaci organized public training launching event, with the Mayor attended the opening at the last school.



Topics

The training covered seven related topics that enabled participants to improve their understanding of the concept of inclusion as a basis for assistive information technology use:

- 1. Disability
- 2. Inclusion and e-Inclusion
- **3.** Accessibility
- **4.** Assistive information technology
- 5. Accessibility options in Edubuntu Linux
- **6.** Use of educational software packages: GCompris and ToolKID
- **7.** Computer use at school and students with special educational needs



"I like the fact that the entire content and all information can be implemented in the instruction in the lower classes." (quote from the training evaluation questionnaire)



"The training provided us with knowledge which we can apply in the future ..."

(quote from the training evaluation questionnaire)





EFFECTS
OF THE
INTRODUCTION
OF ASSISTIVE
INFORMATION
TECHNOLOGY
IN 21 PRIMARY
SCHOOLS

FACTS AND FIGURES

- more than 200 students with special educational needs use one or more assistive computer peripherals or accessibility software options;
- the big-button keyboard is the most commonly used peripheral;
- almost 50% of the teachers use new methods in the work with students with special educational needs following the introduction of assistive information technology;
- more than 90% of the parents of students with special education needs consider that the use of assistive information technology enhances the educational opportunities for their children.

Assistive information technology improves the quality of education of students with special educational needs in mainstream schools. The initial experiences in Macedonia confirm this fact, which is not surprising given the positive experiences worldwide.

The assessment of the effects of the introduction of assistive information technology in 21 primary schools was made at three levels:

- through survey;
- by documenting and analyzing the positive examples and practices at the schools;
- through personal stories of students with special educational needs.

ASSISTIVE INFORMATION TECHNOLOGY IN ACTION

Several months after the introduction of assistive information technology, "Open the Windows" conducted a survey to assess the initial effects. In February 2012, the survey covered four categories of respondents:

- primary schools;
- teachers:
- students with special educational needs;
- parents of students with special educational needs.

The findings confirm that the introduction of assistive information technology in the instruction **improves the inclusiveness** of the educational process and **increases the opportunities for active involvement** of students with special educational needs.

This text gives an overview of some of the most significant findings of the survey; the full report, in Macedonian and English, is available on the "Open the Windows" website.

"Assistive information technology significantly supports the inclusion of children with special needs in the educational process, especially of children with combined disabilities and those with concentration and attention deficit disorder. The assistive technology helps the children retain their attention and makes it easier for the teacher to realize the curriculum." (quote from the survey questionnaire)

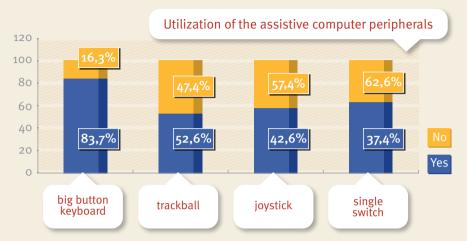
In the 20 schools that responded the questionnaire, a total of 214 students with special educational need use one or more assistive computer peripherals or accessibility software options. On average, between 10 and 11 students per school directly benefit from assistive information technology.



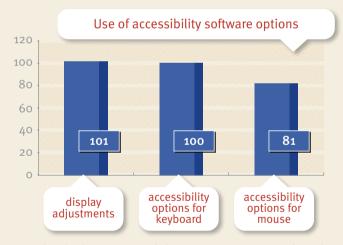
Students who use assistive information technology are children facing different types of disabilities. According to the schools, the most prevalent are students with learning disabilities, intellectual disabilities and students with combined difficulties.

However, the schools do not have accurate records because of the absence of a systematic approach to the identification, registration and progress monitoring of students with special needs involved in the mainstream educational system in our country.

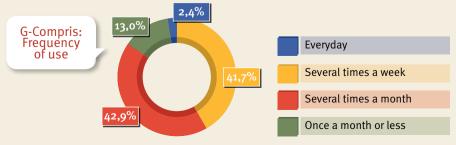
The big-button keyboard is the most commonly used peripheral; switches are used the least. The utilization degree for each type of assistive computer peripheral, calculated as the ratio between the peripherals in use and the total number of donated peripherals, is as follows:



The following are the three most commonly used accessibility software options (presented per the total number of students using a particular option):



19 of the 20 schools that answered the questionnaire use the educational suite GCompris in the instruction. Frequency of use, according to teachers, is as follows:

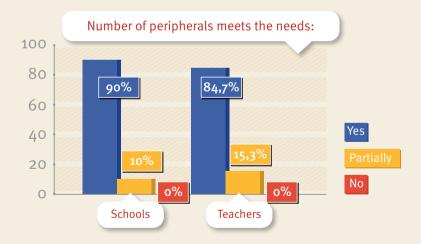


In the work with students with special educational needs, the GCompris is used for achieving a wide range of goals related to the curriculum, but also to encourage their personal development. Most commonly reported goals include:

- obtaining literacy skills;
- gaining basic mathematical skills;
- vocabulary upgrading and expression improvement;
- development and improvement of manual fine motor skills;
- development of cognitive skills (thinking, memory, attention;
- stimulating creativity; and
- relaxation and entertainment.

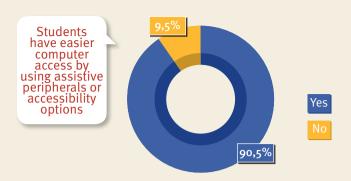
This suggests that the teachers gained good knowledge concerning the possibilities and the manner of use of the educational software in the instruction.

Schools and teachers consider that the number of donated peripherals meets the needs of students with special educational needs:



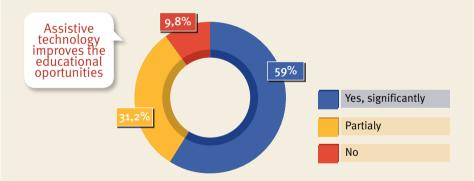
This information is important for planning future similar interventions in the field of education, particularly when it comes to estimating the necessary funds.

Students with special educational needs, as direct users of assistive information technology, have confirmed that the use of assistive computer peripherals or accessibility software options makes the computer use easier for them:

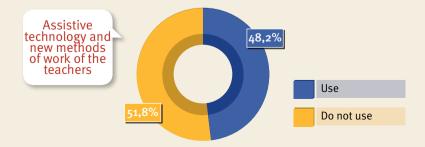


"I prefer writing on a computer than in a notebook, but at school I only use computer when I work with the special educator."
(a student in the survey questionnaire)

Their parents are also satisfied with the introduction of assistive information technology and positively evaluated its impact on the educational opportunities of their children:



The introduction of assistive information technology allows almost half of the teachers to use new methods in the work with students with special educational needs:



Finally, the vast majority of schools and teachers believe that assistive information technology brings many important positive changes for students with special educational needs:

ODSEDVED CHANCES.	SCHOOLS		TEACHERS	
OBSERVED CHANGES:		%	No	%
Improves the involvement of students with disabilities in the instruction and school activities	19	95%	61	71,8%
Fosters a sense of equality and strengthens their self-confidence	18	90%	74	87,1%
Increases the interest of students with disabilities for the instruction, their curiosity and desire to acquire new knowledge	17	85%	64	75,3%
Enables them easier preparation of their homework and mastering of curriculum	17	85%	43	50,6%
Generally, no changes were observed among students with disabilities as a result of the use of assistive technology in the instruction	1	5%	2	2,4%
Other	0	0%	3	3,5%
TOTAL SCHOOLS:	20	1	85	1

NOTE: Schools and teachers were able to choose more than one option

The computer – my window to the world

The competition "The computer - my window to the world" was yet another confirmation of successful use of assistive information technology in the schools:

More than 500 students, with and without special educational needs from the supported



21 schools, submitted arts and literary works produced on a computer. Part of the students made their creations by using assistive computer peripherals or accessibility software options.

Students with special educational needs were among the authors of the awarded and the selected works published in a brochure available on the "Open the Windows" website.

POSITIVE EXPERIENCES OF SCHOOLS

There is no one-size-fits-all model for the use of assistive information technology that guarantees positive results: each student and each school are different and individual.

But the experiences of the schools point out to several important elements that effectively turn assistive information technology into an inclusive tool supporting the education of students with special educational needs:

- Adaptation to the individual needs and abilities of each student with special educational needs is crucial: technology should be adjusted to serve the user, not the other way around.
- ▶ Cooperation with parents and different local structures (such as municipalities, other schools, civic organizations, etc.) allows maximum use of the available resources. It also contributes to disseminating information on the potential of the assistive information technology within the local educational community, but also to the general public.
- Innovation, dedication and proactivity of both students and teachers enable the use of new teaching and learning methods more effective and more inspiring for all involved than the standard ones.

COOPERATION AND SHARING

Several schools allow their students with special educational needs to use the assistive computer peripherals at home. It is a confirmation of the good cooperation and mutual trust between the school and parents.



The "Goce Delcev" school from Prilep shares some of the peripherals, which are not used at that moment, available to other schools in the town. Also, the special educator (engaged in several municipal schools) provides information and advice to students from other schools. As a result, the parents of two students with special educational needs purchased big-

button keyboards. "Open the Windows" provided stickers with Cyrillic letters for them to make it easier for the students to use them in their homes.

The "Kiril i Metodij" school from Sveti Nikole has a similar practice: some of the peripherals are used in the daycare center for people with disabilities. One of the teachers regularly communicates with the employees at the daycare center and shares information, knowledge and



skills on the use of assistive information technology.

Several municipalities supported the initiatives of the schools or parents as a direct result of the introduction of assistive technologies in the instruction:

- Municipality of Novaci took the obligation to procure computers for six students with special educational needs who did not have a computer at home.
- Municipality of Karpos provided a laptop and a big-button keyboard for a first-grade student with Down syndrome facing difficulties with obtaining literacy skills.
- ▶ The initiative of the Parents Council of the "Josip Broz Tito" school was accepted by the Municipality of Valandovo and the company "Dojran Stil", which procured a customized electric wheelchair for a student with physical disability.

Private initiatives

Following the training on assistive information technology use, three parents bought big-button keyboards for their children.

One teacher procured joystick and switches for a close family member.

These and more similar examples are additional confirmation for the need of assistive information technology.

NEW METHODS

A student from the "Bratstvo-edinstvo" school from Ohrid prepared a magazine-like work on natural phenomena, which was an easy and funny manner for him of acquiring new knowledge in the field of natural sciences. The teacher was inspired by the proposed methods of work during the training on assistive information technology use in the instruction.

At the "Dimo Hadzi Dimov" school from Skopje, a student with special educational needs prepares computer presentations and magazine-like works in order to

Magazine-like work of Suel Xhelili, primary

Magazine-like work of Suel Xhelili, primary school "Bratstvoedinstvo," Ohrid

acquire new knowledge or repeat the material in several subjects: math, art, geography, etc. The student demonstrates his presentations and works to his classmates.

A school teacher from the "Kiril i Metodij" school in the village of Buchin used the big-button keyboard to help an Albanian student with special educational needs to master reading and writing in Macedonian language.

ADAPTATION AND INNOVATION

The "Goce Delcev" primary school from Prilep made a series of adjustments to meet the needs of their students with special educational needs:

- A student with visual impairment from the lower classes uses a big screen connected to the small Classmate laptop.
- Another student from the upper classes uses the Classmate laptop (normally used in the lower classes), which he can also use at home.
- ▶ The school shaped and glued silicone letters on the big-button keyboard to ensure that their student with vision impairment can use the key-board by touching and recognizing the buttons.



Also, the school identified their needs for additional equipment, such as touch screens, which they intend to purchase by organizing humanitarian fundraising events.

Professional development

Introducing assistive technology in the instruction is a new challenge for the professional development of teachers and school professional teams.

For illustration, the training in the "Dituria" primary school, Saraj, was voluntarily visited by the psychologist from the "Vera Ciriviri Trena" primary school from Skopje.

Also, an unemployed graduated special educator attended one of the trainings in Veles.





PERSONAL STORIES

I LOVE THE SCHOOL AND MANCHESTER UNITED

Only thirteen years old, **VIKTORIJA PENOVA** is a true fighter. Despite her physical disability, she is a tempered girl eager to experience the world.



Viktorija lives in the village of Balinci and has attended the local satellite school "Dame Gruev" in the village of Brajkovci for the first four grades. Her mother Mirjana remembers: "When the time came for her enrollment at school, we had some doubts, but we received an invitation and went to talk to the local school." Teacher Stanka Petruseva was mainly to be "blamed" for Viktorija's enrollment and acceptance at the school. Another school staff, janitor Katerina Andonova dedicatedly took care of the little girl's stay at school.

"I love the school and have many friends there who

support me. My favorite subjects are art, English and computer science", says Viktorija.

She had difficulties using the standard computer prior getting acquainted to assistive information technology. "Since October last year, I use the computer with a trackball and a virtuall key-board. At first I tried the joystick, but some movements were difficult for me", she explains her experience with assistive information technology.

At home, Viktorija uses a small laptop, which the school made available for her. "We are very satisfied with all the efforts of the school. Since they allowed her to use the laptop at home, Viktorija prepares her homework a lot easier. She has never gone to school without her homework", her mother Mirjana says.

The girl's classmates proudly say their class is special and consider Viktorija as one of the equals. "She was motivated by the 'Survivor' reality show and proposed that we elect the class president on weekly basis. We did that for a few weeks and it was great fun", her friend Tamara Naumova recalls with a big smile on her face.

When she finishes her school assignments, Viktorija uses the computer to play games, surf the internet and follow the latest sports results together with her father Blaze. "I'm a passionate fan of Manchester United", proudly says Viktorija. Her mother adds that she is particularly emotional and stressed when things do not look well for her favorite team.

The eighth-grader travels to the central primary school in Valandovo every day. She is an excellent student and has a great desire to continue her education. "I will personally engage to enable Viktorija to continue her education. Secondary

education is compulsory. The gymnasium in the town will need small adaptations to provide all necessary conditions for her. I will share our experience with them", says the school principal Mladen Kostadinov.

As a little girl, Viktorija wanted to become a doctor. Now she wants to have a job that has a lot to do with the computer, but cannot decide yet whether she wants to become a programmer or a designer.

Continuing her education will be the first step towards fulfilling her dream.



Greek wheelchair for a Macedonian girl

Although accepted by the community, Viktorija and her family daily face the challenge of the lack of physical accessibility of her living environment and the school.

In the last year, her class follows instruction in one classroom on the ground floor abandoning the previous practice to change cabinets for each school subject. "Her mother used to take her in her hands from one classroom to the other", principal Kostadinov remembers.

Motivated by her progress following the introduction of assistive information technology, the psychologist Anita Kitanovic and the school's Council of Parents led by Makedonka Uzunova, launched an initiative to provide an electric wheelchair for Viktorija. The Greek company "Dojran Steal", where Viktorija's father works, and the Municipality of Valandovo joined assets and procured the wheelchair, tailor-made for Viktorija in Thessaloniki.

"Now I can walk with my friends on my own, my parents need not be with me all the time anymore", wickedly says the young girl and easily maneuvers her way through the classroom.

TRIP AROUND THE WORLD

DAVOR GJORGJIEVSKI from the village of Mozdivnjak, Kriva Palanka, attends the satellite school "Ilinden".



The fifth-grader is impatient to join his classmates after the start of the new school year for him was delayed due to a foot surgery. "I really like it at school and I like using the computer the most."

Since November 2011, after his school introduced assistive information technology, he uses assistive peripherals when working on the computer: The trackball and

the switches overcome the paresis of his right hand and ease his access to the machine enabling him to independently perform all functions.

"He handles the assistive peripherals very well, increased the speed of working

and achieves equal results as all other students. In the next period, we shall try using the joystick as I believe he might use it even better than the trackball", says his teacher Natasa Mladenovska.

Due to the delayed start of this school year for him, the school allowed Davor to use the peripherals at home. Using the computer, he easily follows the lessons he does not attend in an attempt to be ready to catch up his friends at school once his foot recovers.

His father Draganco worked hard with Davor from his youngest age ensuring that his son could enroll at school at the adequate age. "I used games and farming tools helping Davor exercise his hands and legs ever since he was a very young boy", his father recalled.

Apparently peaceful and rather shy, Davor is a hardworking and

The power of determination

Prior enrolling to primary school, Davor had some speech impairment and had to regularly attend a speech therapist.

A minor technical problem was that there was no such service in his region. The closest speech therapist was some 100 kilometers away in Skopje!

Davor and his parents spent a year traveling to the capital once or twice a week. Not even financial difficulties diminished their determination: the family sold their car to be able to complete the therapy.

Their willpower resulted in Davor overcoming his speech impairment just in time to start his primary education.

"There should be various social services supporting families of persons with disabilities in every town", his father Draganco concludes. determined student. From the very beginning, he and his family enjoyed the support of the school and the teachers. Now he can independently follow the instruction. "I am very pleased that everybody at the school tries hard to help him, especially his teacher", father Draganco says.

"Davor is equal to all other students. He takes part in all activities, does all the exercises even during the gym classes. I help him whenever there is a more difficult exercise — it is like a therapy for him" says his teacher with a smile. "He fights for good grades. At school, he helps younger children around the computers."



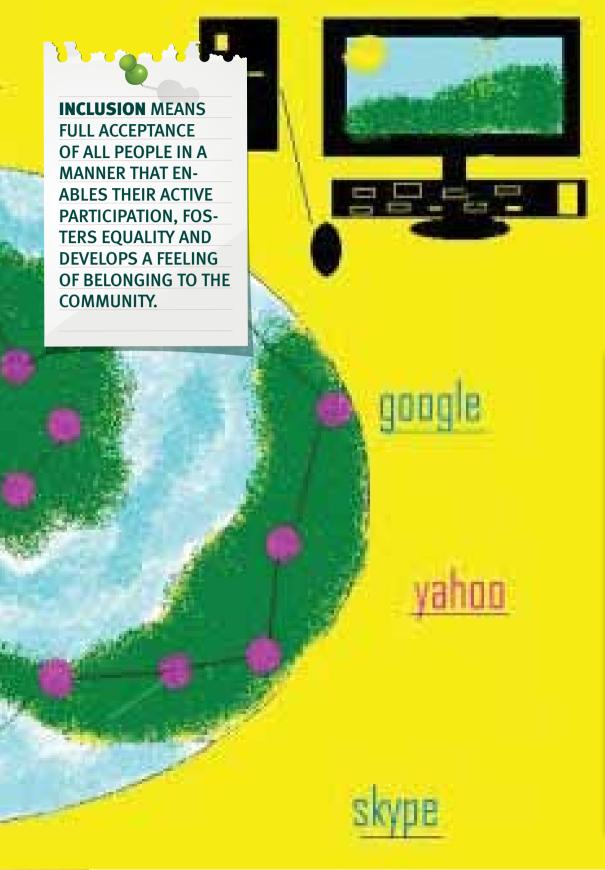
As almost all his peers, Davor has a Facebook profile and loves playing Farm and Counter Strike. He adores making origamifigures, a technique he mastered during the technical education classes.

Davor also enjoys children's games with his best friends Andrej and Stefan, with whom he shares the passion for football.

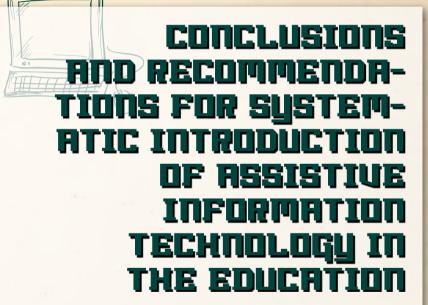
And one day, when he grows up, he wants to be a truck driver. By then, Davor travels all around the world through his computer.

Hiding brings most damage to the children

Davor's father Draganco believes that the state should register all persons with disabilities in the country, which would be a step forwards towards a systematic improvement of their situation. He is aware that parents of children with disabilities "must speak out and stop hiding their children at home. In fact, the practice of hiding from the community brings most damage to the children themselves."







The conclusions and recommendations for systematic introduction of assistive information technology in education, mainly in primary education, were determined in a participatory process involving numerous relevant education stakeholders.

During February and March 2012, "Open the Windows" conducted three regional round tables attended by representatives from the following institutions:

- Primary schools where assistive technology was introduced,
- National educational institutions: Ministry of Education and Science and Bureau for Development of Education,
- ▶ Local educational institutions, including the branches of the Bureau for Development of Education and relevant municipal educational advisers,
- ▶ Parents of students with special needs,
- Civic associations working in the field of disability, etc.

The findings from the survey on the effects of introducing assistive information technology and schools' practical experiences were used as bases for the discussions. The participation of various stakeholders enabled open

Mayor of Karpos Jakimovski addresses the first regional round table

discussions considering all aspects of the issue, which resulted in joint support for systematic introduction of assistive information technology in the education.

This analysis presents the conclusions and recommendations agreed upon by more than eighty participants in the conference "For E-Accessible Primary Schools: Assistive Technology in Primary Education in Macedonia", which completed the participatory process of consultations.

CONCLUSIONS

1. Initial experiences from the introduction of assistive information technology in the mainstream primary schools are positive.

It is a general consensus of all involved parties that the systematic introduction of assistive information technology in education contributes to the improvement of the:

- inclusiveness of the educational process;
- quality of the educational opportunities for students with special educational needs.
- Assistive information technology encourages teachers to apply new methods of work with students with special educational needs, based on individual educational plans.

Assistive information technology provides teachers with additional opportunities to demonstrate more creativity and innovativeness in their work. It is a tool that stimulates the individual approach towards students with special educational needs.

In order to use the assistive information technology to its full potential, there is a need for additional trainings and resource materials for teachers on:

- Development of individual educational plans including the use of assistive information technology for students with special educational needs:
- Assessment of the students with special educational needs who work according to individual educational plans.

3. There is no one-size-fits-all model for the use of assistive information technology.

Assistive information technology follows the principle that technology needs to be adjusted to the user, not vice versa.

Each individual student with special educational needs is in the center of every successful model of usage – his/her needs, capabilities and expectations. It is of crucial



importance to ensure the participation of the student and his/her parents in the needs assessment and the planning of the most suitable model of assistive information technology use, as well as in the accomplishments assessment (i.e. progress evaluation).

4. The degree of inclusiveness impacts the effects of assistive information technology use.

The effects of the usage largely depend on the conditions offered by schools for students with special educational needs. Primarily this refers to: physical accessibility, availability of adapted equipment, capacity and readiness of school professional teams and other personnel to work with the students with special needs.

Assistive information technology per se is not a magic formula for success; it is a significant segment of the overall inclusiveness of schools and the educational system in general.

5. Cooperation between schools, parents and other relevant stakeholders is one of the key factors for successful assistive information technology use.

Cooperation ensures that available resources, often scarce, are used to the maximum.

Experiences show that the effects of assistive information technology use are most positive in the cases of extensive cooperation between schools, parents and other relevant stakeholders such as the local authorities, civic and business sectors, etc. The proactive role of schools is crucial in initiating and fostering cooperation with other stakeholders.

6. There is a lack of procedures for identification, registration and progress monitoring of students with special educational needs in mainstream education.



The resulting lack of comprehensive and relevant data on the number and structure of students with special educational needs in the mainstream educational process hampers the efforts to determine systematic inclusive educational policies and to monitor the progress.

7. Inclusiveness of the overall educational system is a matter of a respect of the rights of persons with disabilities and a responsibility of the state deriving from the UN Convention on the Rights of Persons with Disabilities.

The ratification of the UN Convention on the Rights of Persons with Disabilities by the Macedonian Parliament in 2011, additionally stresses the need of adoption and implementation of inclusive educational policies. Part of the key questions in the Convention include: access of persons with disabilities to education, information and communication-areas in which assistive information technology might play a crucial role.

RECOMMENDATIONS

1. To adopt a long term strategy for the inclusion of students with special educational needs in the mainstream primary and secondary education.

The preparation of the strategy for inclusion should be participatory, with the involvement of all stakeholders and with multidisciplinary approach.

The strategy should adequately take into account the needs of students with special educational needs in the context of the current governmental efforts for modernization and computerization of the education. Participation of parents of students with special educational needs should be ensured in all stages of strategy development.

A special body should be established tasked to monitor the strategy

USAID Macedonia Mission Director
Wuertz at the opening
of the conference

implementation progress and consisting of representatives of all relevant stakeholders.

Also, the strategy should foresee a procedure for identification, registration and progress monitoring of students with special educational needs. This would create the basis for strategy implementation monitoring.

2. Assistive information technology should be introduced in the mainstream primary and secondary education, as well as in special primary and secondary schools.

Measures need to be enacted for introduction of assistive information technology in the mainstream compulsory education. That would also represent an accomplishment of a part of the requirements undertaken by



the government with the ratification of the UN Convention on the Rights of Persons with Disabilities.

On the other hand, access to computers and internet through assistive information technology needs to be ensured for students who attend special primary and secondary schools. This should be

in line with the efforts to modernize the curricula of special schools.

3. Promote the use of assistive information technology in higher educational institutions.

The state and the civic organizations should be the carriers of the efforts for promoting assistive information technology in two directions:

- ▶ Higher educational institutions should provide adequate support for students who need assistive information technology, especially in terms of e-accessibility of their electronic services and materials.
- Assistive information technology and relevant topics should become a part of regular curricula in relevant studies.
- 4. Produce manuals for assistive information technology use in the classroom with examples based on schools' practical experiences.

The manuals for different educational levels should present positive practices and guidelines for teachers on assistive information technology use in accordance with the curricula. In fact, they should be a tool for sharing ideas and information among practitioners.

These manuals will need to clearly convey the message that every successful model for assistive information technology use has to be based on the individual needs, capabilities and expectations of the students with special educational needs.

5. Textbooks and other educational materials need to be available in e-accessible electronic formats.

This is even more important in the field of primary and secondary education where the state chooses and provides the textbooks.

At the same time, such action would be a significant contribution towards the promotion of the concept of e-accessibility in general, which is in line with the National Strategy for e-Inclusion 2011-2014 of the Ministry for Information Society and Administration.

6. To strengthen the capacities of the schools for successful implementation of inclusive practices.

Special attention needs to be paid to further strengthening of the capacities of teachers and schools; professional teams through trainings and continuous professional development in the field of inclusive educational practices.

7. To strengthen the capacity of teachers for work with students with special educational needs, including assistive information technology use.

Assistive information technology use should be a part of the continuous professional development of teachers for inclusion of students with special educational needs in the instruction. Professional development should also include development and implementation of individual educational plans, as well as assessment of students who work according to individual educational plans.

8. Provide government program for subvention of procurement of computers and assistive peripherals for students with special educational needs.

Similar measure is already projected in the National Strategy for e-Inclusiveness 2011 – 2014 prepared by the Ministry for Information Society and Administration. Experiences from the former governmental program for subvention of procurement of computers in higher educational institutions have to be used in the planning and realization of this step.



Keynote speeches at the conference

