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## **ICTs IN INCLUSIVE EDUCATION: INTERNATIONAL EXPERIENCE**

Inclusive education – ensuring equal access to education for all learners, taking into account the diversity of special educational needs and individual opportunities. People with disabilities need to acquire the fundamental knowledge that enables survival in society under the specific demands caused by functional limitations that hinder participation in ordinary education systems. ICTs are powerful supporting tool in inclusive education. Nowadays ICT has become an important element of the learning and teaching process. A lot of ICT tools are used in inclusive education. It is necessary comparing and analyzing international practice of using ICT in inclusive education to create educational program with ICT tools for all children. Authors showed to what extent ICT in inclusive education can be used effectively and in innovative ways in relation to four thematic areas that emerge from a consideration of the key messages within the UN Convention. In total, about ten countries and their positive experience were reviewed.

**Key words:** inclusive education, information and communication technologies, training pedagogies, international experience.

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### **Инклюзивті білім беруде АКТ-і: халықаралық тәжірибе**

Инклюзивті білім беру, білім – адамның негізгі құқығы және ол әділетті қоғамның негізі болып табылады деген сенімнен туындайды. Инклюзивті білім беру – тұлғаның арнайы білім беру қажеттіліктері, жеке мүмкіндіктері мен қаблеттерін ескере отырып, барлық студенттердің білім алуына тең дәрежеде бірдей қол жеткізуін қамтамасыз ету. Мүмкіндігі шектеулі адамдарға арнайы білім беру жүйесіне қатысуға кедергі келтіретін функционалды шектеулерден туындаған ерекше талаптарға сәйкес қоғамда өмір сүруге мүмкіндік беретін негізгі фундаментальды білімге ие болуы керек. АКТ – инклюзивті білім берудің мықты қосымша құралы. Бүгінгі таңда АКТ оқу мен тәрбие процесінің маңызды элементіне айналды. Барлық балаларға бірдей тең АКТ құралдарымен білім беру бағдарламасын құру қажет. Бұл мақалада инклюзивті білім беруде АКТ-ны әртүрлі қолдану мүмкіндіктерін зерттеу мақсатында инклюзивті білім беру жүйесінде мүмкіндігі шектеулі жандар үшін білім беруде АКТ-ны қолдану қарастырылады. Мақалада инклюзивті білім беруде, БҰҰ Конвенциясының аясында қабылданған кілттік идеяға негізделі отырып туындаған негізгі төрт тақырыптық салада АКТ-ның тиімді қолданылатыны көрсетілді. Оңға жуық мемлекеттің озық тәжірибелері қарастырылды.

**Түйін сөздер:** инклюзивті білім беру, ақпараттық-коммуникациялық технологиялар, педагогтарды даярлау, халықаралық тәжірибе.

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### **ИКТ в инклюзивном образовании: международный опыт**

Инклюзивное образование выросло из веры в то, что образование является одним из основных прав человека и что оно обеспечивает основу для более справедливого общества. Инклюзивное образование – обеспечение равного доступа к образованию для всех учащихся с учетом разнообразия особых образовательных потребностей и индивидуальных возможностей. Людям с ограниченными возможностями необходимо приобрести фундаментальные знания, которые позволяют выживать в обществе в соответствии с особыми требованиями, вызванными

функциональными ограничениями, препятствующими участию в обычных системах образования. ИКТ – мощный вспомогательный инструмент инклюзивного образования. Сейчас, ИКТ стали важным элементом процесса обучения и преподавания. В инклюзивном образовании используется множество инструментов ИКТ. Необходимо сопоставить и проанализировать международную практику использования ИКТ в инклюзивном образовании для создания образовательной программы для всех детей с инструментами ИКТ. Авторы показали, как ИКТ в инклюзивном образовании могут быть использованы эффективно в четырех тематических областях, которые вытекают из рассмотрения ключевых идей в рамках Конвенции ООН. Всего рассмотрено около десяти стран и их положительный опыт.

**Ключевые слова:** инклюзивное образование, информационно-коммуникационная технология, подготовка педагогов, международный опыт.

## Introduction

Nowadays Inclusive education is only education that give the possibility to all people to be part of the training and educational process. Despite of the physical, intellectual, social, emotional, linguistic and other differences of people, they can be involved into development and socialization process. It admits to the growing child become an equal member of society, decrease the risks of their discrimination and insulation. The ideology of inclusive education is to eliminate any ways of discrimination for children and provide equal approach to everyone, however develops specific environment for children with SEN.

Today all countries in the world integrated an inclusive education to their educational system, making it reality. Notwithstanding the fact that inclusive education enters to practice swiftly, the educational system should solve a numerous amount of difficult problems and new challenges.

It is important to create the adoptable educational system that internalizes the needs of different children, also the system tries to conform these needs, ensuring that all stakeholders in the system are convenient with variety and view it as a important challenge rather than a hard issue. The system of education should fit the child.

Despite the fact that all countries are creating all conditions for the inclusion of children with disabilities actively, they are found to be frequently trapped in a vicious cycle of exclusion from education, society and mainstream development programmes due to lack of necessary support and the means for equal participation.

ICTs have a big opportunity to assist lifelong learning for all categories of learners. It includes students who have special educational needs (SEN). The using of ICTs must promote independence, inclusion, and equality for people with SEN. So, it will contribute integration of people with SEN as important, valuable, honored, and benefiting members of society.

**The aim of this article** is consideration of the using of ICTs in an inclusive education setting for people with SEN. We purposed to disclose and describe the various possibilities and opportunities of ICT application in inclusive education with people with SEN in abroad.

## Conceptual framework

In present educational situations where children use computers, the computer is used to put pupils through their rates, to provide exercises of a relevant level of difficulty, to submit feedback, also to share information (Seymour Papert, 2017).

Today, we use the term “ICT” (an information and communication technology) in stead of “computers”. Information and communication technologies (ICTs) can complement, improve and transform education for the better. The United Nations report states that the Internet service, information and telecommunication, production equipment and deliveries, technology tools, libraries, networked information services are all included in ICT (Syed Noor-Ul-Amin, 2013).

The information and communication technologies (ICTs) may be considered as the conjunction of “Informatics technology” with other close technologies, particularly with communication technologies (UNESCO, 2002).

In time of educational expansion the improving of education quality and training is a critical question..

ICTs are the most imperious instrument for expansion formal and non-formal potentials of education, to anticipatorily underserved constituencies straggling and rural populations, groups traditionally expelled from education caused cultural and social reasons, for instance ethnic minorities, persons with various kinds of disability, the elderly, also all others who because of time or cost constraints can not study.

ICTs are widely implemented in schools and can solve many educational problems. Its merits was

proved by a lot of studies. For instance, in 2013 the European Commission's survey demonstrated that the availability of ICTs at home and school was ideal for influencing educational performance of learners positively. Furthermore it was also found that more training was necessary for the appropriate and optimum use of ICTs in education. Also Zinnbauer's study showed that ICTs through their networking could improve the school capital and thus impact on collaboration among those involved in the teaching and learning enterprise which is fundamental for cooperative achievement of the goals of educative teaching and learning (Zinnbauer, 2007).

The quality of education can be improved by ICTs in several ways:

- it increases learners motivation and involvement;
- it facilitates the mastering of basic skills;
- it enhances teacher training.

If ICTs (videos, television and multimedia computer software) combining text, sound, and colourful moving images allowed stimulating and authentic content it will engage learners into the learning process, making it much more effective than the classroom with monotonous monologue. It was found that students were feeling more motivated after lessons where teachers used ICTs than the 45 minutes lecture.

Internationally, the Institute established in 1997 by UNESCO on Information Technologies in Education, is involved in the implementation of ICT at all levels of education and in its various sectors. After, all countries started use ICT in education and develop various ways to create it accessibility for all.

The International Telecommunication Union (ITU, the United Nations specialized agency in the field of information and communication technologies) reported that a ranking was compiled in 2017 to assess the country's position in the use of ICTs in education. Iceland, South Korea, Switzerland, Denmark, Great Britain, Hong Kong, the Netherlands, Norway, Luxembourg, and Japan are among the top ten countries on the ICTs using in educational system. Kazakhstan took 52nd place (ITU, 2017).

The history of integration ICTs in inclusive education related with the projects on creation helping educational tools.

There are three main functions of ICTs in inclusive education:

- Compensation – technical assistance to facilitate traditional educational activities: reading and writing;
- didactic – it is the process of using ICT in common and modification the methods of training by this ratio. There are a lot of opportunities and

ways of using ICTs as a didactic tool to create a suitable learning environment;;

- communication – for communication technologies – often referring to the use of supportive alternative communication systems.

There are several types of ICTs that used in IE:

- standard technologies includes the computers with settings where every functions built into them. It makes special for persons with disabilities;
- alternative formats: aviable HTML, talking books that work with the DAISY system (Digital Accessibility Information System); also it includes "low-tech" ones like Braille;
- assistive technology (AT). There are a lot of types of assistive technologies, majority of them are known by everyone. For instance hearing aids, screen readers, assistive keyboards and etc. AT is tools, products, means, software and services. They created to accomplish, bearing, or increase the possibilities and functions of people with SEN".

Also, individual aids like mobility aids (wheel-chairs), communication supporting systems, technological programmes that make easy a computer access for people belongs to AT. Other high-tech ATs have used about twenty years and it has changed everything, making the education available.

So, every ICT tool that is used in education has learning software and Virtual Learning Environments. All students can use these ICTs.

Today, a lot of various of ICTs are used in education.

The information technologies are used for training and educating persons with disabilities. Technologies are defined by a especially strong system of sanitarian-hygienic and psychological and physiological equipments. However, not all types ICT tools acceptable for people now, only several of them are used in educational process for correction and development aims and need specific equipments. For that reason, the creation of IE infrastructure needs choosing didactical technologies and means carefully, analyzing all cognitive, psychological, pedagogical and physiological possibilities and needs of learners.

Consequently, it is important to be sure that all using software and hardware tools in inclusive educational system are satisfied categories below: – usability; -approachability; – flexibility; – affordability; – cost-effectiveness.

## Methods

Now in pedagogical science in the process of research of education systems and the processes happening in them, the system of approach is used. This

methodology of the pedagogical analysis is lawful also at research of foreign education systems.

System approach to an assessment of foreign pedagogical experience assumes consideration both the separate invariant and integrative parts of educational process, so as well as complete coverage of education systems of various countries or regions in their unity and internal communications. The system analysis allows to reveal tendencies and contradictions of a development of education, factors of influence and impact on this development, to select the most successful experience, to make it's development and transformation in practice. At the same time it is important not just to record positive sides of experience, and to reveal contents and tendencies of didactic searches but to comprehend basic provisions of creation of educational process which is developed in the world theory and practice of education.

There are three functions of comparative pedagogy: descriptive, explanatory and predictive. The predictive function of comparative pedagogy is manifested in the identification of trends in the development of education, the development of specific methods of its organization, justifying themselves in practice.

Modern foreign pedagogy, based on the general principles of integration and in inclusive education, formed on the basis of almost half a century of experience, today has a very specific scale of indicators recognized by countries with a developed integration system, with which it is possible to compare and assess the presence and level of development of integration processes in different countries. Let's name just a few of these indicators, the most significant from our point of view:

- availability and implementation in the country of the relevant legislation;
- the provision of the economic basis of these legislative acts;
- willingness and positive attitude towards the use of ICT in IE of specialists;
- ensuring accessibility to the use of ICT in inclusive education;
- delivery of the necessary pedagogical resources to the child in need of them, and not backward, when the child is delivered to the available resources;
- adherence to the principle of voluntariness: all participants in the integration process and inclusive learning interact and cooperate with each other voluntarily;

Also, in many studies authors use the framework proposed in the report ICTs in Education for PWD

by EADSNE and UNESCO IITE. ICTs used in IE were divided into four possible areas of application (UNESCO, 2013):

(i) Supporting personal access to information and knowledge: ICT as a tool to improve a learner's access to information and knowledge in formal and non-formal learning situations.

(ii) Supporting learning and teaching situations: ICT for pedagogical, didactic uses, assisting in personal, learning development and shaping new skills; ICT as a tool for teachers to support learning.

(iii) Supporting personal communication and interaction: ICT as a tool for alternative/augmentative communication to replace or supplement personal communication barriers; ICT as a tool to overcome social and/or geographical isolation.

(iv) Supporting access to educational administrative procedures: ICT as a tool to access administrative procedures in organizations; ICT as a tool to administer and improve services for learners with disabilities.

Based on the above criteria, we will give only a brief description of the practice in an inclusive education setting in Asia and Europe. We took 3 main countries from: CIS countries (Belarus), Europe (Belgium) and Asia (Japan). Also, we added 8 examples from countries such as England, Australia, France, Turkey, Taiwan, Singapore, Bangladesh, Indonesia.

### ICTs in inclusive education

Every ICT tools should follow the "Accessibility" (Benigno, V., Bocconi, S. & Ott, M. 2007). For each product, the accessibility evaluation process is achieved considering two different but complementary aspects:

- a) its compliance along the requirements of the law in force;
- b) its actual usability by students with disabilities; and they should be available in the price.

ICT application in inclusive education should be based on supportive policies and strategic goals of the state. Every training program should follow Salamanca Declaration; Convention on the Rights of the Child; Convention on the Rights of Persons with Disabilities; Declaration of Principles and Plan of Action of the World Summit on the Information Society; Laws about Education; State Compulsory Educational Standards (SCES); also Recommendations for Inclusive Education: Access to Education for All; Policy Guiding Principles for Inclusive Education.

The International human rights laws and regulations frame consists responsibility, rights and

goals of the condition of available ICTs. Notwithstanding, there are not any recommendations and guidelines on designing and integration ICT application policies.

The Convention of the United Nations on the rights of persons with disabilities still occurs on a global level, and States parties to the Convention (including the Republic of Kazakhstan) continue to make efforts to accomplish the aim of inclusive education and establish that learners with disabilities had full access to a free and full education.

In accordance with this international document, attention to disability people arises from the fact that in society there are certain barriers that are not by reason of the presence of health defects. In the UN Convention of “On the rights of persons with disabilities” (2006) 24<sup>th</sup> article reports guidance on inclusive education. In particular, they belong to the adaptation of children with disabilities to educational process and training them in the use of ICT. Article 4 of the Convention States that all ICT is advisable to create all-purpose design, and wishes of persons with disabilities should be considering at the design stage and production of technical means to eliminate the risk of upgrading facilities in the future. St. 9 of the Convention on the rights of persons with disabilities stipulates that the state should create favorable conditions for access of persons with disabilities to information resources and to encourage the use of modern ICT to close the digital divide.

The UNESCO Information for All Programme (IFAP) (2009) was recognized to: contribute a basis for international cooperation and partnerships in creating an Information society for all. IFAP has designed a model on National Information Society policy aimed on persons who make programmes.

The World Summit on the Information Society (WSIS) has as well as determined a Declaration of Principles for Building the Information Society in 2003 year. This declaration has been noticed in several regional and world summits on information society. The Tokyo Declaration; Accra Commitment; The San Salvador Commitment also reviewed this declaration.

Kazakhstan created the , ICT development program in RK for 2010-2014, “Digital Kazakhstan” program. In 2017, “Informational Kazakhstan – 2020” State program, where the purpose was to develop information literacy community.

Five key directions has been elaborated by the program “Digital Kazakhstan”.

#### 1. Digitization of economic branches

Digital economy is the utility of the on-line possibilities and innovative digital technologies both for

the large enterprises and for small and medium businesses.

#### 2. Transition to the digital state

Digital state means open, transparent and convenient opportunities for citizens and business, accessible online and all time.

#### 3. Realization of the Digital Silk Way

The Digital Silk Way provides speed and secure access to the Internet, like high quality of the mobile communication coverage on the country’s territory

#### 4. Evolution of the human capital assets

Evolution of the new competence and digital literacy of the population will become possible due to the innovations in education

#### 5. Innovative ecosystem formation

This ecosystem develops technology entrepreneurship and innovations with the genuine links among business, academic domain and state (Zhexembekova V. 2018).

In 2006-2008 years a home access program has been developed in the United Kingdom of Great Britain. It is a nationwide initiative that aims to provide homeschooling access for all students and people with disabilities through a computer connected to the Internet. In addition, assistive technology and specialized software are used to support learning for all, including tailored special technologies for students with special needs. This program is very effective in the innovative use of ICT, with financial support. But there were also disadvantages of such a program. Providing appropriate ICT equipment for a large number of students in a limited period of time was very problematic.

*ICT as a tool to improve a learner’s access to information and knowledge*

Japan launched its Knowledge Construction with Technology led by the Consortium for Renovating Education of the Future (CoREF) project in 2010 with the primary aim of transforming traditional didactic teaching styles to more collaborative and knowledge constructive approaches. The targeted learning outcomes for primary and secondary school students include promoting collaborative problem solving skills through the Knowledge Constructive Jigsaw pedagogy (Miyake 2013).

In Japan, researchers found solutions of accessible education of children with SEN. The creation of easy-to-use tools for children with disability is difficult. One of solution is a web-based learning that allows students to take courses at home. For instance, “Devengo” is an integrated cloud-based service, where user can book and pay online. Users can order one of the available educational courses online by staying home, using this software. It is possible

to hire someone with professional background and someone who has the necessary skills for teaching learners with a specific form of disability.

In Belgium, ICT has used by government since 2008 year. It is using at mainstream and special primary and secondary education after raising awareness of the potential possibilities of using ICT with learners with SEN.

The special goals were:

- Knowledge improving regarding the using ICTs in training and educating students with disabilities and problems with education;
- Information condition and confortation of information about ICT application in educational process with pupils, especially ones who has disabilities and learning problems;
- Support and help of educational institutions with the creation of a apparition and a policy on ICTs application for pupils with SEN at school;
- Developing e-learning products and ICT tools to use it in learning proces of pupils with SEN.

Two means were created: a printed publication and CD. The first one consists of a recommendation and advice of ICT using; learning opportunities of ICT (apps and software); special education materials; instruments for teacher, special topics about using tools of e-learning, distance learning, e-portfolio, Internet in the work with learners with SEN; negotiability and accessibility issues; health and e-safety questions. Second one is CD. The CD has learning materials and extra information. There were special developed educational materials, for instance, a digital movie for persons with hearing problems based on maths learning approach, pictograms set concerning special education settings and a manual on using digital whiteboards in SEN-contexts.

In 2010 students developed special projects on supporting learners with autism. The project called "Leren en werken met autisme" that means learning and working with Autism. They designed a DVD where providing manuals purposed to support and help such kind of people in their conversion and adaptation from school to workplace. Also it can be applied on workplace training settings. Assistive manuals and materials were developed to help them. For instance, the wai-pass – [www.wai-pass.be](http://www.wai-pass.be) service. It is a specific e-portfolio software. As well as there were Toolkits for learning and training on workplace, videos with roadmaps, recommendations and advices about training and preparing students for regular working.

In England from 2006 to 2008 the Home Access Programme was designed and became national after two years. It purposes to afford full ac-

cess to learning at home for all persons through a computer with Internet connection. Moreover, supporting technologies and special software to helping learning, involving specific adaptive technologies for learners with SEN. The project had some problems with time. It was hard to deliver in a short time period the ICT tools that can be enough for everyone.

*ICTs to learning and teaching situations*

In 2018 two professors of one of Japan universities, Satoshi Sakai and Eiichi Miyazaki created 3-D printer. This printer allows educators to develop tools that can be used to help support learners with physical disabilities. Also, it is possible to create educational materials for the classroom by themselves. Sakai provided cameras that could take 360-degree photos and microphones, helping teachers who can not join lectures given by experts. He gave advice and commented teachers on how to increase communication with the students after watching videos and online face-to-face meetings with teachers (Keiko Yamaguchi, 2018).

There are a lot of ICT tools that can be used in work with children with SEN: NOVA Chat, DynaVox xPress, Maestro, Read 180, MangoMon, Photo Vocabulary, Wayland, N.Y., New Castle, Del., Kansas City, Mo. and etc.

In Belgium scientists developed system purposed to children who have chronic illness. The system is known as Bednet. Learners who were at home or in hospital could take part in lessons and other school activities by using ths system. The Bednet system needs a computer, particulary selected peripherals, accessible Internet connection and a devoted interface. The system helped learners not to miss class and be a part of educational environment online. In 2007–2008 years a pilot project was used by only 39 students, after a years in the numbers of participants doubled, then in 2009–2010 year about 160 pupils used this system. Moreover, this system used not only by students, teachers, parents and families were users of it also.

In Belarus, the National Institute of Education and the Research and Production Private Enterprise INFOTRIUMF conducted study on the creation software and methodological support for students with hard speech problems. They studied 1 and 5 grades students math learning, difficulties in education and hearing impairments.

Computer technologies are used as a instrument of educational activities. This approach increase the cognitive activities of children, motivates and supports them in an individual education, also it formation self-control and self-esteem of pupils.

Teachers started use technologies in many countries. For instance, one of them “Barnsborough”, that training literacy. This virtual environment had the interactive character, audio and visual opportunities, the newest and live temper of the products.

Furthermore, “digital storytelling” able to be an effective tools of teaching literacy to primary school students. As a construction tool, digital storytelling is loaded with a variety of multimedia such as images, audio, and video. This application can be used for teaching hard hearing children.

*Also, we added the practice of other countries.*

*Australian educators* Chandler, O’Brien & Unsworth reported how they consumed 3D digital cinema software in working with students. They used it to give opportunity for students to tell their stories. Students share about things or people that helped to improve their literacy and thinking, management and planning by using 3D digital cinema (Chandler, O’Brien & Unsworth, 2010).

*In Turkey*, WebQuest was created for elementary school students to learning math by Halat and Pecker. Webquest is a ICT tool where pupils can work with data found on the Internet platform. Halat and Pecker did experiment in Webquest and found that learners more interesting with math and investigation in a game or in a story problem than memorizing math rules. The advantages of this software is an improvement spatial transformations and spatial thinking of students; it increases students communication and their critical thinking, self-confidence and motivation to learn.

*In Taiwan*, Wei, Hung, Li and Chen demonstrated a project called Joyful Classroom Learning System (JCLS). The system consists of a robot learning assistant, touch input device, mobile computing device, mobile display device, wireless LAN and operating software. The children’s response showed that most of the students agreed that they were more interested in learning with the RLC Robot than in a traditional classroom; some students commented that the opportunity to make several attempts in search of the correct answer was very valuable for them and helped them to independently find out the reasons for their mistakes (Wei, Hung, Li and Chen, 2011).

*In Singapore*, Exploratory CT Learning Games Provide Stimulation Of Children’s Abstract Thinking. Lim, Nonis and Hedberg investigated the use of a 3D multiplayer virtual environment known as Quest Atlantis (QA) in classrooms at a Singapore elementary school. The introduction of QA into the curriculum affected the development of students’ speech, computer skills, the rhythm of learning and

found support from the school and parents (Lim, C.P., Nonis, D., & Hedberg, J. 2006).

*ICT to personal communication and interaction*

*In Japan*, Fujitsu developed a system that consists of four software called ‘Fujitsu Education Solution K-12 SNE Kids Touch’ to provide a better learning environment for children with SENs. These four software programs: “Let’s draw lines!”, “Let’s write hiragana!”, “Let’s write katakana!” and “Let’s do jigsaw puzzles!”. This system is built on a touch-based surface, designed to develop the fundamental skills of children with SENs. Children with SEN such as intellectually handicapped children, physically disabled children, and developmentally disabled children (Ito, Nozawa, Miyairi, & Takashi, 2015). This program has been piloted from October 2012 to February 2014 and shows exceptional strengths such as great accessibility, ability to import and export educational materials and record learning history and the easy user interface helps students quickly adapt to the system. Results also show that children are motivated to practice with the software, while teachers can monitor and keep track of the progress through the learning history. This model is now under modification according to feedback and suggestion during the pilot phase, promise to be a great supporting tool for education of children with SENs (Ito et al., 2015).

*In Belgium*, “Modem” communication and computer centre was developed, its mission is to offer independent advice and assistance to those in need of alternative/augmentative communication and/or computer adaptations. Modem conducts various projects in Belgium. One of them aimed to lower the threshold in using ICT when developing communication aids in special education. The basic help was necessary in developing communicational aides was recognised. Modem taught and showed how to start and gave how-to instructions to teachers and parents. However, it was not answered the basic questions like “how can i start?”, people needed an easily accessible, transparent and clear way of supporting. They created screencasts, step-by-step instructional videos that help the teacher or caregiver. These videos presented in a website-format on a DVD that consists of about 100 hyperlinks, background information on software, pictograms and photography. This information helps the teachers in the practical development of the communication aide of their choice.

Second of them is of the pictograms project. Teachers are using more specific free symbols for children with special needs in their work. The aims of the pictograms project were drawing more than

1,000 new or renewed symbols for use in a school setting and to develop new teaching materials using these symbols.

These symbols purposed to support the education of both learners using assistive or augmentative communication and learners with poor or no reading skills. They are also intended to maximise visual support of the verbal communication/information for every learner with special needs. More than 1,300 new or renewed pictograms for education, divided into six themes were created. These pictograms were placed on a CD that has been included in a new book 'ICT zonder beperkingen' (ICT without limits). Its peculiarity of new pictograms – it includes a modern theme of global citizenship: the problem of waste (sorting waste, preventing waste).

*In Belarus*, researchers created computer programs that focused on social development and competences for students with learning disabilities. The first computer-based programme was developed to be used as a diagnostic tool of social competence, adapted for senior aged students with learning disabilities. The programme consists of the following methods as a diagnostic questionnaire of social development; a questionnaire exploring student motivation; a survey of values orientation; an index of social development and a socio-metric scale and test.

The second one was developed to promote playing in typical social situations that might not normally be accessible for students with learning disabilities either living in boarding schools, or those having limited physical movement possibilities. It composed of two programmes like "Eat Properly" and "Give Assistance", which aimed to help learners to acquire additional social knowledge about social norms and rules. The students learn to take on social roles, understand and follow social rules by solving social situations, simulating role-play.

In 2008-2010 years *In France* students created Handicarte map that helps 'moving' on campus. It is software that calculates the best itinerary from one spot to the other on campus by choosing the easiest, most accessible route. The application can be downloaded from a web site. Using a global positioning system, it creates a digital interactive map, which indicates the actual campus routes. The application aims at improving the autonomy of people with disabilities by providing them with the best way to go from one place to another, keeping in mind their personal situation.

Other examples of ICTs supporting communication and interaction is the Eye-Based Pointing Device (Eye B-Pod) developed by students of the Bina

Nusantara University *in Indonesia*, allows users to operate the computer by using their eyes. The other program, called Linux IGOS Voice Command is an application in the Indonesian language Bahasa, allows users to operate their computers using voice commands with an application developed for the Linux platform (UNESCO, 2013).

The PTMagicKeyboard is a multiple function application. It can be used as a fully configurable virtual keyboard, with a predictive text system that increases up to 5 times the writing speed. As a simple example it is possible to produce a keyboard with only 8 very large buttons, or have more than 100 buttons. It incorporates a voice recognition system that allows control over the computer by using only voice commands. It also has the ability to convert text into voice for any application.

*ICT to educational administrative procedures*

*In Japan*, scientists created a special software. It helps students with disabilities to show their potentials and abilities. Teachers should use Individualized Education Program (IEP) Software and Response (RI) to Intervention software when they will work with CWDD. IEP software prunes down the work with CWDD that have problems in learning. RI software providing necessary means to evaluate the students' knowledge, monitoring their learning progress. It allows to make easy the reporting.

Staff Performance Management System that works online allows monitoring a students educational plan, changing it if needed and helping learners to achieve their goals.

*In Belarus* uses the scientific project of students. It called "Development of Automated Integrated System (AIS) of Distant Learning, Socio-psychological Rehabilitation and Employment of Disabled in Belarus". The goal of this project was to create a database of information about people with disability. It keeps information about everyone with disabilities who wants to do professional re-qualification or think about having professional knowledge. Also there were informations about actual vacancies in the employment market. The final aim of the project was helping and supporting people's social rehabilitation. It was achieved through the pruning employment procedures with an automated system for accessing information and e-learning opportunities.

In 2003, it was recognized as a countrywide automated system for supporting the e-learning and employment of people with disabilities. Then, the project was included in a State Programme 'Electronic Belarus' for 2003–2005. The AIS base of tutors data able to work with special groups of people with disabilities. This project included over 500 tu-



tors. They can work using e-learning toolkits, can teach various curriculum disciplines (economics, accounting, marketing, etc.) depending on the specific needs of the learners.

*In Belgium*, a Web 2.0 site for educators working with children or young adults with a disability was created, where teachers can share learning resources like worksheets, lesson plans, tests, websites, software, hardware solutions, interesting seminars, educational video, pictures, audio and etc. This [www.leerzogsite.be](http://www.leerzogsite.be) site is a project-site of [www.klascement.net](http://www.klascement.net), at first, it started as IC-Thehpt. It is completely free and supported by the Flemish Government. Most of the materials found on website are distributed with a Creative Commons license, also a special moderator reviews and evaluates every new addition and its relation to use with children with disabilities. All materials are selected from the large database of KlasCement.net and they are available to sort by type of disability, age and topic and etc. As we know, children with special needs require a very individualised approach and use very specific teaching materials. Teachers often can not find right materials, and this site gives the possibility to share and use the materials within their specific area of interest. The website combines the strengths of Web 2.0 with a high standard for quality. It provides the empty 'shell' that is filled by the users, but never without losing sight of quality and usability with children with disabilities (UNESCO, 2013).

*In Bangladesh* since 2005 improve the accessibility of reading materials by print-disabled persons and provide livelihoods for the visually impaired through employment. DAISY for all helps PWD reach for more knowledge, especially information about legal and their rights. However, it faces the challenges of the sustainable fund, mismatched user demands, and a lack of DTB contents. Recommendations include improving monitoring and tracking system to tracking project progress and identifying gaps for provision of meaningful access to information, matching users with appropriate technologies and relevant information, strengthen partnership with other organizations for contents and distribution of DTBs (YPSA, 2011).

## Conclusion

In the time of global information, ICT societies have enormous educational potential. The integration of ICT and its variety of types into the educational society and pedagogical activity developing and formulating a new educational system. In this

system where the student has independence and responsibility in learning.

The adoption and use of ICTs in inclusive education have a positive influence on teaching, learning and research. ICT can develop the communication skills of students, motivate them to learn and achieve higher results. Also it can be used as training programmes. These possibilities can affect on students accomplishment and achievement. ICT for personal communication and interaction IE is the system that try to show the belief that education is a basic human right and that it provides the foundation for a more just society. The ICT using practice in education proved that ICTS are the main tool to support education and inclusiveness of the people with disabilities.

The results show that the ICTs can help children learners to have better learning and communication experiences. Despite of ICTs have impacted on educational practice in inclusive education to day in quite small ways but that the impact will grow considerably in years to come and that ICT will become a strong agent for change among many educational practices.

Also, we should take into problems common to all countries, which were examined by us, include:

- o Widespread use of assistive technologies, inaccessibility of ICT.
- o AT does not cover the needs of all consumers, there is no technical support.
- o Negative attitude of teachers who do not see and underestimate the potential of using ICT by people with disabilities.
- o Insufficient support of teachers and students, which makes it impossible to consider ICT as a pedagogical tool, and not as an addition to traditional teaching methods.
- o Necessary of policy and economical support of using ICT in inclusive education

To create flexible, accessible ICT based IE system we should take into this barriers into.

Also, there are not the universal tool or program that can be used in all above-mentioned themes or one that can suit all costumers.

It is necessary to create a program that will be convenient and accessible for all users of children with disabilities and normal children. it is important to take into account age, psychological, pedagogical and physiological development, peculiarities of children's development, abilities and opportunities, it is important to take into account the influence and activities of the children of the program in the same way.

A teacher, as a person who carries responsibility and plays a main and important role in children's

life and has a great influence, must convey and teach the right use of programs.

For this it is important that the teacher and students are information literate.

It is not possible for the government alone to implement the use of ICTs in inclusive education. ICTs application should not be a top-down policy but rather be a bottom-up which the special education needs are first identified and then resolved with appropriate ICTs application. Therefore, it requires

efforts and resources from all stakeholders from the policymakers, private sectors, international organizations, school leaders, teachers, and especially people with disabilities themselves to make the best out of an ICTs-enabled inclusive education.

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