

Original Research Article

The application of technology in the process of learning by students with special needs

Comment [Dc1]: I suggest title: (suggestion: Benefit of Incorporating Technology in Special Education) based on the findings the author has.

Abstract

The object of this study is the application of technology in the process of learning by students with special needs. We argued that information technology and various technological devices can be useful in achieving learning outcomes and objectives, achieving the most efficient integration of students with disabilities, whether in the educational process or in socialization. The research methods used are of the combined type: quantitative and qualitative. Quantitative methods are part of the empirical research that involves parents, support teachers, school management, and representatives of associations of persons with disabilities. On the other hand, the qualitative method was available in the focus group with 6 participants, with disabilities and a support teacher, where the discussion was assisted by the support teacher.

Comment [Dc2]: suggest : Objective

Comment [Dc3]: Replace "we" by The author as academic writing....

Comment [Dc4]: The sentence needs to be re structure. suggestion

The author argued that the integration of information technology and various technological device help in enhancing learning outcome and social skills of students with disabilities.

Comment [Dc5]: employed to the focus group..

Comment [Dc6]: abstract must contain objective, research methods, research design, data collection strategies used, sample size and outcome in brief. Please add a brief summary of findings to the end of the abstract.

Keywords: technology; students; devices; teachers, computers

Comment [Dc7]: it is direct copy and paste from the methodology. you can make it read better by summarizing and paraphrasing

Introduction

Our research on the application of technology in the process of learning or learning by students with special needs, necessarily requires research and familiarity with the latest modern and technological equipment, which can be used in the school environment and wherever the process of learning in students with disabilities takes place. To research the degree of knowledge of technology for students with special needs, the degree of use and the possibility of possessing technology, in the research process several parties should be involved: the management of special schools and those with students with disabilities involved in the process of regular teaching with other students (inclusive schools), support teachers for children with special needs, parents, technology experts and representatives of various associations of the deaf, blind and others with these difficulties.

Comment [Dc8]: latest or modren choose one

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The change of modern life comes precisely thanks to the development of information technology and science. No school today can be imagined without the supply of technology that facilitates the learning process, concretization, illustrations with practical and visual examples, and facilitating students in terms of understanding, analysis, comparison, synthesis, abstraction, and generalization as thinking operations, for the issues being taught.

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Special and regular schools, thanks to the development of technology for people with disabilities, can facilitate the lives of children with these difficulties, their easier integration into society, more efficient learning, saving time for learning, increasing independence, and control over their lives and less dependence on family, school and society at large.

Comment [Dc11]: whole paragraph needs to be relooked into

Mobile phone is already part of every person, especially in Kosovo, the degree of coverage of rural and urban terrain with the internet is at the maximum level. Most families have internet in their homes. After the war in Kosovo, many new schools were built by the Government of Kosovo, international donors, and in recent years, it has been invested in equipping schools with information technology, but not to the required degree, especially the presence and type of technology adequate is still lacking in special schools and regular schools, for the children of students with disabilities.

The development of globalization, technology and the opening of Kosovar society to educational practices in different countries, has helped Kosovo to be included in the contemporary dynamics of education and the inclusion of technology in the educational process, especially among students with disabilities. But schools are changing more slowly compared to such a rapid change of technology, and there is often a need to update the old technology and schools to be equipped with the most advanced technology, especially for people with hearing, vision, physical mobility, etc.

The purpose of applying the scientific methodology in this research will be to collect data, how much they know, how much they use and how much they are trained in technology, people who have problems with hearing, sight, walking or hand movements, in general students with disabilities. In Chart 1, some examples of support technology concepts for different fields are presented, depending on the type of sensory impairment for people with disabilities.

	<i>Low- to Mid-tech</i>	<i>Mid- to High-tech</i>	<i>Apps for Mobile Devices</i>
<i>Receptive</i>	<i>Notepad – Notepads are an excellent way to record information. Students with learning disabilities (LDs) may appreciate having the information color-coded based on the purpose,</i>	<i>Audio recorders – Audio recorders that store hundreds of hours of audio can be purchased as cheaply as \$30-\$40. Talking dictionary – Students with LDs</i>	<i>Audiobooks – Provides a simple way to listen to many of the best classic books and modern titles .</i>

	topic, or function of the information.	<p>can use talking dictionaries to verify definitions and spelling.</p> <p>Talking dictionaries are small enough to be carried in a pencil case and are not as expensive as computers or tablets.</p> <p>Visuwords – This free online dictionary allows students to look up words to find their meanings and associations with other words and concepts.</p>	
Speaking	Cue cards – Cue cards provide helpful hints for the oral presentation of information, and the process of composing cue cards can help organize the information beforehand.	<p>Prezi – A free 3D graphic organizer which can be used to create presentations.</p> <p>Prezis can be collaborative as students can comment and build upon other Prezis.</p>	<p>ShowMe Interactive Whiteboard –In order to reduce anxiety, students may opt to record presentations on their iPad beforehand. Video recordings can be uploaded on YouTube or a more private domain.</p>
Reading	<p>Highlighter strips – Translucent rectangles of color can help eliminate extra visual clutter by blocking out the rest of the text.</p> <p>Sticky notes – Students with LDs may find it useful to summarize the main ideas of the text with sticky notes which can be stuck directly on the page.</p>	<p>Kurzweil 3000 – Text-to-speech software, such as Kurzweil 3000, can read aloud digital or printed text.</p> <p>Storyline Online – A free online streaming video program featuring books read aloud.</p> <p>Each book includes accompanying activities and lesson ideas.</p> <p>Project</p>	<p>Speak Selection –Located in the accessibility features of Apple devices, Speak Selection can be used to read aloud electronic text.</p> <p>Free Books – This app contains more than 23,000 free booksNotes, highlight options, bookmark, and dictionary tools are provided.</p> <p>GoodReader – This PDF reader allows you to add sticky notes, highlight and take notes.</p>

		<p><i>Gutenberg – Over 45,000 free e-books.</i></p> <p><i>Wikipedia – The Simple English function on Wikipedia allows content to be “translated” into plain English which is easier to read.</i></p>	
Writing	<p><i>Pencil grips – For students who struggle with handwriting, pencil grips can provide a surface that is easier to manipulate.</i></p> <p><i>Computerized pens – These pens can automatically transmit handwriting into digital text. Some computerized pens have audio-recording functions that allow the writer to listen to specific sections of the audio file by tapping on the written notes.</i></p>	<p><i>Word processing – functions such as spell prediction, synonym support, and word-prediction features are helpful for students with learning disabilities.</i></p>	<p><i>Pages – The Pages app allows you to compose, edit work, and share. It also includes word prediction, speech-to-text, and spell check functions.</i></p> <p><i>iWordQ – iWordQ provides reading assistance, word choice and proofreading functions.</i></p> <p><i>Dragon Dictation – This easy-to-use voice recognition application allows you to speak and instantly see your text or e-mail messages. You must be connected to the Internet for this application to work.</i></p>
Reasoning	<p><i>Graphic organizers – Organizing ideas visually allows students with LDs to see the connections between ideas.</i></p> <p><i>Audio recorders – Many students with LD experience difficulty translating oral language into written text. Recording ideas early in the thinking process can provide</i></p>	<p><i>Inspiration – This software helps students organize ideas visually without the challenge of handwriting or spelling requirements. The content can be instantly translated into outlines for essays or compositions.</i></p> <p><i>Spark-Space – This software</i></p>	<p><i>SimpleMind+ – This app allows you to brainstorm and organize your ideas. Completed concept maps can be automatically converted to an outline.</i></p>

	<p>a record for later recall and clarification.</p>	<p>supports the writing of students who are visual learners through the use of functions such as the idea mapping essay writer tool.</p> <p>Audacity – Audacity is a free software program that allows you to record and edit sounds.</p>	
Math	<p>4-function calculator – Depending on the type of work being done, a 4-function calculator can be a great help without providing a disproportionate advantage to students with LDs.</p>	<p>Graphing calculator - Graphing computers can solve complex equations, and the dynamic display screen allows the student to verify the results before solving on paper.</p> <p>Math Dictionary for Kids – An animated, interactive online math dictionary that explains over 600 common mathematical terms in simple language.</p> <p>Braiiing Camp – Animated lessons and interactive activities to assess student understanding.</p> <p>IXL Math - IXL's math practice skills are aligned with pre-K through Grade 8 provincial curricula, and student's</p>	<p>ShowMe and ScreenChomp – These apps provide an interactive whiteboard interface to solve problems. The actions on the screen and audio can be recorded and shared as a video file.</p>

		<i>performance is assessed on each objective. Sumdog – Sumdog's learning engine adapts its math questions to each student's ability. Covering number operations through to simple algebra, it is designed for students aged 6 to 14.</i>	
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Chart 1: Examples of support technology depending on the domain. Source: (Young & MacCormack, n.d.)

Applying Technology In Special Education: Breaking The Barriers

There are many ways of how technology can help students with special needs. For example, some kinds of disabilities don't allow students to use handwritten text that is an integral part of "traditional" education. Using technical tools intended for **human speech recognition and synthesizing**, you can avoid the necessity to use paper and pen during the lessons. Such technology would be also helpful for students with disorders that don't allow to process visual information correctly.

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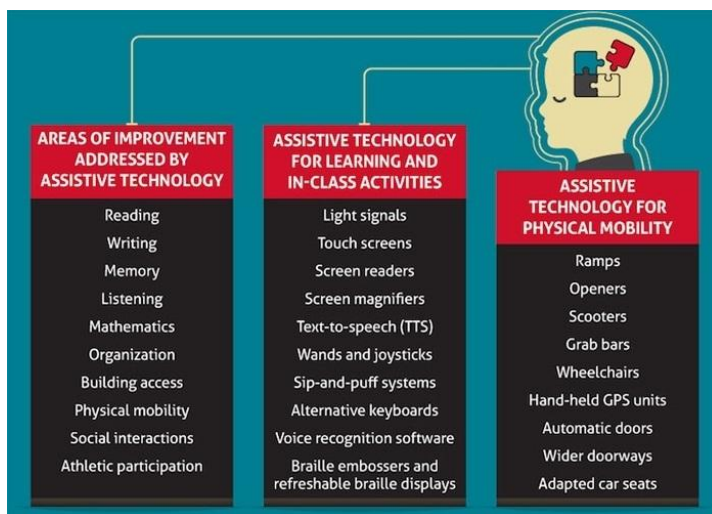
The **adaptive computing** technology allows using digital devices to bypass challenging tasks. Screen reader applications such as JAWS along with specially designed Braille keyboards allow visually challenged students to use the computer.

Augmentative communication systems help students with speech problems to overcome the communication barrier. Such systems use picture charts, books, and specialized computers providing functions of word-prediction for more effective communication.(Dikusar,2018)

Before applying for services of a company that develops technologies for special education, consider the following advice:

- Pay attention to the cost of a given solution and its potential effect on the learning process.

- Prefer a technology that is not difficult to master.
- Make sure that the application you're going to choose is reliable and will naturally integrate into the educational process.
- Focus on user-friendly and intuitive solutions.
- Possibility to implement custom functionality that meets your requirements or customize the existing solution.



Source: University of Cincinnati

Fig 1. Applying Technology In Special Education

Research methods

The research methods that will be included in the research, are of the combined type: quantitative and qualitative. Quantitative methods will be part of the empirical research, involving parents, support teachers, school management, and representatives of associations of persons with disabilities. While the qualitative method will be available in the focus group with 6 participants, with disabilities and a support teacher, where the discussion will be assisted by the support teacher.

Samples and research techniques

Comment [Dc13]: this work or this paper

The research sample will consist of 100 respondents: students, support teachers, parents, representatives of associations of persons with disabilities, and school management. Questionnaires in quantitative methodology and focus groups from qualitative methodology will be the techniques that will be applied in this research. Several types of questionnaires will be applied, depending on the type of disability: the questionnaire for people with hearing impairments, visual impairments, intellectual disabilities, physical disabilities, learning difficulties such as dyslexia (disability for reading), Down Syndrome, and autism.

Comment [Dc14]: delete as paper has to be in the past tense.

Each questionnaire will have 12 closed and open type questions, divided into four sections:

- 1) the section on technology availability for people with disabilities;
- 2) the section on the degree of knowledge of technology;
- 3) the section on the degree of application of technology of learning;
- 4) the section to present the challenges of technology application by people with special needs.

The questionnaires will be implemented with support teachers and teachers of people with disabilities, with the management of special and regular schools, with parents and representatives of associations of the deaf and blind in the Municipality of Gjilan.

Focus groups

Comment [Dc16]: write in past tense

The focus group will consist of people with disabilities and their support teachers, assisting in the joint discussion with the researcher, in the four municipalities of Kosovo: the Municipality of Prizren, the Municipality of Peja, the Municipality of Prishtina, and the Municipality of Gjilan.

There will be 4 focus groups of 6 participants in 4 municipalities of Kosovo. Out of 6 participants in the focus groups, in each focus group will be 4 persons with disabilities and 1 support teacher and 1 representative of the school management, or with the possibility of including 1 representative from the associations that protect the interests of persons' limited abilities.

Comment [Dc17]: were

The structured questions, which will be part of the focus groups, will be about the degree of knowledge, use, and availability of: computers in the learning process, sign language translation, assistive devices of any kind for people with disabilities hearing aids, devices that

translate speech into text, devices that enable and facilitate physical movements, devices that facilitate walking and orientation for blind people, etc.

Importance of research

The importance of this topic is very high, as there is a lack of research in this field in Kosovo and the importance of the recommendations that can emerge from this research, for educational institutions, NGOs and government institutions to change policies in accessing people limited abilities, in the most modern technologies for learning. The findings of this research are expected to contribute to the improvement of the way of teaching by supportive teachers in school settings where there are students with disabilities. Considering the application of appropriate methods and strategies in relation to students with special needs and experimenting with different ways of presenting information can facilitate the teaching and learning process, both for teachers working with these students and also for these students themselves. As a result, the application of technological equipment is expected to help increase the motivation, communication, engagement and self-confidence of students with disabilities.

Comment [Dc18]: It was necessary to conduct this study owing to the lack of research in this field in Kosovo the result of which would be useful in providing valuable recommendations to benefit educational institutions, NGOs

The computer is considered as an auxiliary device, with the help of which the teacher transmits information, which has a specific educational purpose. There are so many applications, platforms, opportunities, to make learning easier for students with disabilities. In the research, we will argue that information technology and various technological devices can be useful in achieving learning outcomes and objectives, achieving the most efficient integration of students with disabilities, whether in the educational process or in socialization. and in increasing their independence from others.

The purpose of the research

The purpose of this research is to discover and identify technological needs for students with special needs in primary schools and to test (show) how assistive technologies are able to help these students to be equal to other students and without many challenges, to be able to attend the lesson.

This paper focuses on the following areas:

- The level of technology being used by students with special needs;

- The degree of mastery and efficiency in their use by students with disabilities and by the teachers themselves and the support teacher;
- The need for new training inefficient use;
- Challenges of students 'and teachers' use of technology.

This research is based on the role where **informatics** technology can be promoted in the education of children with special needs within the classroom. Some more detailed options to follow, describing how computer applications, will enable students with special needs to access regular instruction like their peers.

Another purpose of this study is to research contemporary methods for students with disabilities, using computers and other technological and modern equipment, and to argue that if new modern methods are applied, measurable progress will be made in achieving school outcomes, compared to the use of traditional teaching and learning methods.

The object of research

The **object** of this study is the application of technology in the process of learning or learning by students with special needs. The main idea of the paper is to identify the challenges of using modern technology by students with special needs in primary school, the degree of technological application in teaching by teachers for students with special needs and the opportunities offered by pre-university institutions in Kosovo for these special social categories in the use of technology for pedagogical and didactic purposes. The application of technology in overcoming barriers in learning, reading, memorization, and writing process, is of great importance, but this increases the need to update knowledge of the latest technological innovations to use them.

Results and discussion

Kosovo, which emerged from the last war in 1999, faced poor school and technological infrastructure, investing significantly, especially in the last two decades, in the construction of physical facilities, the supply of school inventory, but it is still far from supplying with the appropriate technological equipment, although some progress has been made in this area, with the opening of laboratories and computer cabinets, as well as teachers themselves equipped with basic technical equipment, projectors, etc., which favors a growing environment of use of technology also for learning of students with special needs. Also,

Kosovo with a demographic majority of young people under 25, has extensive use of technology, Internet access, social media, and so on. According to the Kosovo Agency of Statistics, the use of the Internet in Kosovo by age groups, in the period 2018-2020, has been dominated by those 35-44 years old. In Chart 2, data on internet use are presented by the age groups 16-24 years old, 25-34 years old, 45-54 years old, 55-64 years old and over 65 years old. The Internet is mostly used by the 35-44 age group (in 2018, 20.6; in 2019, 20.5; in 2020, 19.5), then as equals are followed by the 25-34 age group (in 2018, 16.5; in 2019, 17.4; in 2020, 16.1) with those 16-24 years old (17.0 in 2018, 14.5 in 2019 and 17.4 in 2020), and most at least, older and older age groups, over 55 years old.

Internet use by age groups for three years			
	2018	2019	2020
16-24	17,0	14,5	17,4
25-34	16,5	17,4	16,1
35-44	20,6	20,5	19,5
45-54	19,3	19,5	18,9
55-64	12,7	13,5	15,5
65+	8,4	9,2	10,1

Chart 2. Use of the Internet by age groups in 2018, 2019 and 2020. Source: Kosovo Agency of Statistics

Users according to gender, who have had internet access at home or apartment by gender and year			
	2018	2019	2020
Male	59,2	55,8	57,4
Female	35,4	38,7	40,2

Chart 3. Internet access from home to Kosovar families. Source: Kosovo Agency of Statistics

Even in the use of Internet devices, during the last three months, such as mobile phones, laptops, tablets, other mobile devices, Kosovar society owns the equipment in most parts of the country. As seen in Chart 4, the use of mobile phones dominates, in 2018, 84.9, while in 2019 it decreases slightly, 78.9.

Use of internet devices during the last 3 months and year

Mobile phones	
2018	84,9
2019	78,9
Laptop/Portativ Computer	
2018	22,5
2019	21,7
Desktop Computer	
2018	18,1
2019	11,8
Tablets	
2018	9,6
2019	11,9
Other mobile equipments	
2018	0,7
2019	2,7

Chart 4. Use of technological equipment in 2018 and 2019. Source: Kosovo Agency of Statistics

Coverage with information technology is on a large scale throughout the territory of Kosovo. This opens up optimistic prospects for the wider use of modern technology by all social categories, especially in teaching and learning at all levels of the education system, pre-university and university, for people with disabilities. In Chart 5, households in Kosovo, which have had internet access from home, in recent years, the absolute majority of households have had access.

Households in Kosovo that have had internet access from home and year		
Don't know	2017	0,4
	2018	0,2
	2019	0,8

	2020	0,2
No	2017	10,8
	2018	6,6
	2019	6,1
	2020	3,4
Yes	2017	88,8
	2018	93,2
	2019	93,2
	2020	96,4
Total	2017	100,0
	2018	100,0
	2019	100,0
	2020	

Chart 5. Internet access from home to Kosovar families. Source: Kosovo Agency of Statistics

Kosovo has laws, documents, and the constitution that protects the rights of people with special needs, and is committed to the application of all international conventions in the field of rights of children with special needs, which helps increase government investment, especially that of the Ministry of Education and Science in promoting the use of technology to facilitate learning by students with special needs. This context facilitates access to learning technology. An important role in this area has been given by some non-governmental organizations that deal specifically with the rights and freedoms of children with special needs, cooperating with schools in several projects for inclusive learning of students from this category. Therefore, in this aspect, in our study we will elaborate on the importance of NGOs, asking them about the attitudes for the challenges faced by students with special needs, to apply as much technology as possible in learning.

An important role in this aspect of our study treatment has the implementation of the Pre-University Education Curriculum, with European standards, which is approved by the Ministry of Education, Science, and Technology and monitored by education inspectors in all schools in Kosovo, although the number of pedagogical inspectors is quite small and needs their growth. In the continuation of the implementation of the pre-university curriculum, there is also the inclusion of people with special needs, the application of technology, etc. Therefore, in this paper will be treated the pre-university curricular aspects, which submit

requests to practice technology in teaching and learning, getting acquainted with the legal, curricular, normative, administrative instructions, and especially with the documents issued by the Ministry of Education, Science and Technology. The focus of our research will be the following issues: the degree of application of modern technology in learning to people with special needs; type of technology used, application challenges; measuring the knowledge of teachers themselves and school staff about technology as a learning tool for categories with special needs; measuring teachers' attitudes about this issue; finding the difficulties faced by both students, teachers, but also the school management for technological equipment; understanding how much the school attaches importance to teacher training in the use of technology in teaching and learning by people with special needs, etc.

Objectives

- Explaining the basic meanings of ICT systems for students with special needs;
- Evaluation of the learning process for students with special needs;
- Providing practical examples of certain use of ICT by students with special needs;
- Arguing that the use of technological equipment is useful for the learning process of students with special needs;
- Measure the degree of progress in mastering technology for learning;
- Identify the challenges of teachers working with these students on a daily basis and how they manage to manage these challenges.

Recommendations

Conclusion

The use of technology in special education helps break the barriers for people with disabilities and provide them with access to the most relevant educational programs. Properly designed software and hardware allow students with special needs to get modern education and achieve any required information online.

Technology helps provide students with individual learning events, enables reaching higher flexibility and differentiation in educational methodologies. With modern technology, teachers can adapt to the possibilities of a particular student with minimum effort and choose

Comment [Dc19]: objective is coming up for second time

Comment [Dc20]: The objective of study mentioned that the study will be important in providing recommendations based on findings. I suggest coming up with a few recommendations.

one of the dozens of available learning tactics designed to meet the needs of individual learners.

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Comment [Dc21]: References needs to be in alphabetical order if you are using APA 7. please follow APA 7 reference guide to correct some errors in citations.

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