

# PROCEEDINGS

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of the Union of Scientists - Ruse

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Book 5

## Mathematics, Informatics and Physics

Volume 13, 2016



RUSE

# **PROCEEDINGS**

## **OF THE UNION OF SCIENTISTS - RUSE**

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# **PROCEEDINGS**

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**The Ruse Branch of the Union of Scientists in Bulgaria**

was founded in 1956. Its first Chairman was Prof. Stoyan Petrov. He was followed by Prof. Trifon Georgiev, Prof. Kolyo Vasilev, Prof. Georgi Popov, Prof. Mityo Kanev, Assoc. Prof. Boris Borisov, Prof. Emil Marinov, Prof. Hristo Beloev. The individual members number nearly 300 recognized scientists from Ruse, organized in 13 scientific sections. There are several collective members too – organizations and companies from Ruse, known for their success in the field of science and higher education, or their applied research activities. The activities of the Union of Scientists – Ruse are numerous: scientific, educational and other humanitarian events directly related to hot issues in the development of Ruse region, including its infrastructure, environment, history and future development; commitment to the development of the scientific organizations in Ruse, the professional development and growth of the scientists and the protection of their individual rights.

The Union of Scientists – Ruse (US – Ruse) organizes publishing of scientific and popular informative literature, and since 1998 – the "Proceedings of the Union of Scientists- Ruse".

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**"MATHEMATICS, INFORMATICS AND PHYSICS"**

**VOLUME 13**

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## GOOD PRACTICES IN THE LEARNING PROCESS OF "DIGITAL" GENERATION IN BULGARIA

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**Abstract:** *The development and widespread deployment of information and communication technologies (ICT) has a strong impact on all areas of modern life, including ways of perception in the learning process.*

*As a result of this ubiquitous digital environment and the continuous interaction with it, students have different ability of thinking, learning and information perception.*

*It is not a secret anymore that the traditional education is not able to meet students' needs and expectations.*

*As a matter of fact the education system has serious problems in teaching the digital students.*

*There are some e-learning practices in Bulgaria adapted, but do not meet the learning needs of the digital generation. This paper presents ways of adapting traditional education to the learning needs of the new "digital" generation with new ICT.*

**Keywords:** *ICT, digital generation, e-learning, learning style, good practice.*

### INTRODUCTION

The advent of ICT, including mobile technologies such as laptops, tablets and smartphones change the way of perception in the learning process. Depending on their age, students prefer to use and easier to perceive various information sources. It's no secret that the education system adapts slower and more difficult able to meet their needs and expectations and meet serious problems in their learning

In the world wide, the level of computerization and advent of ICTs runs at different speeds depending on the economic development of the particular country. In developed countries this process is at a more advanced stage, while countries with less developed economy behind. According to the Annual Growth Survey 2016<sup>1</sup> of the European Union "Intelligent investment in Europe's human capital and result-oriented reforms of education and training are part of the effort to restore jobs and sustainable growth. Although the EU is a major manufacturer of skills and knowledge, its systems of education and learning do not achieve sufficient results internationally."

According to a survey of students from the digital generation<sup>2</sup>, 97% of them own a computer, 94% - own mobile phone or iPhone, 99% use the web for research or make a homework<sup>3</sup>. Survey Results of InsightExpress<sup>4</sup> at the students and young professionals from 14 countries, indicate that the mobile device (laptop, smartphone, tablet) became "the most important technology in their live" them, as smartphones are poised to replace

<sup>1</sup> Annual Growth Survey 2016. European Commission./ Europa 2020. [http://ec.europa.eu/europe2020/making-it-happen/annual-growth-surveys/index\\_bg.htm](http://ec.europa.eu/europe2020/making-it-happen/annual-growth-surveys/index_bg.htm)

<sup>2</sup> Junco, R., Mastrodicasa, J. Connecting to the Net.Generation: What Higher Education Professionals Need to Know About Today's Students, NASPA, 2007

<sup>3</sup> Berk R. How Do You Leverage the Latest Technologies, including Web 2.0 Tools, in Your Classroom?, International Journal of Technology in Teaching and Learning, 6(1), 2010.

<sup>4</sup> InsightExpress' Mobile Consumer August 26, 2011

[https://www.insightexpress.com/pdfs/InsightExpress\\_Mobile%20Consumer%20Research\\_September2011.pdf](https://www.insightexpress.com/pdfs/InsightExpress_Mobile%20Consumer%20Research_September2011.pdf)

desktops. Those born between 1994- 2004 years (Generation Z) already live in information technology

According to a survey by the National Statistical Institute (NSI) Bulgaria conducted on 11.12.2015 year, held on persons between 16 and 74 years, the computers based used for file operations - 43.9 % and transferred from PC to another device - 42%. Only 9% of consumers make a change or check the configuration parameters of software applications and 17.2% for software installation<sup>5</sup>.

<b>Persons who regularly use the Internet (every day or at least once a week) 11.12.2015</b>	
<b>By Finished education</b>	
Primary education or lower	24,7
High school	53.9
University education	86.3
<b>By age</b>	
16-24 years old	84.1
25-34 years old	82.0
35-44 years old	69.2
45-54 years old	52.8
55-64 years old	31.4
65-74 years old	10,5
<b>By Economic activity</b>	
workers	71.8
unemployed	37.4
learners	94.9
others	18,6

**Table 1. Persons who regularly use the Internet [http://www.nsi.bg/]**

This paper make a brief analysis of the characteristics of the last few generations (X, Y, Z and  $\alpha$ ) and consider various learning practice in Bulgaria, adapted to the characteristics of the digital generation and as a result, leading to positive results in learning.

Internationally as well as in Bulgaria, education can be both traditional education offered by schools and universities and postgraduate qualification in the form of courses.

Learning organizations (schools, universities and postgraduate) seek to respond to various means to attract students. Table 2 describes the characteristics of the last few generations that have influence on what technical means would be nice to build the learning.

<sup>5</sup> E-skills of persons. NSI. Statistical data.. information society // <http://www.nsi.bg/>

	Accepting information	Advantages	Disadvantages
Born 1961-1981 (generation X)	Independent, consistent better concentration	Independent, consistent better concentration	Make more efforts in learning and working with new ICT
Born 1981-1994 (generation Y)	Learn better with images; Continuous contact with computer games; expectation for high reward	visual-of viewers learning style, redistribution of the material structure of semantically related, small learning objects requiring less time for review and adoption	difficult to deal with e-courses containing large volumes of text materials and / or arranged sequentially in endless for them lists
Born 1994 - 2010 (generation Z)	don't think on technologies language, think on relationships language; multitasking; nonlinear visual thinking and agility	Visual perception of information, multichannel, communicates by deploying different channels	scan information, but do not remember and more able to systematize the fact that the information is "at hand" demotivate children to accumulate knowledge. lack of concentration, jumping from resource to resource.
Born 2010-..... (generation $\alpha$ )	pending	more materialistically and technologically oriented	pending

**Table 2. The characteristics of the X, Y, Z and  $\alpha$  generations**

Cohabitation of several generations have grown up away or right depending on the technology poses a serious challenge to learning institutions. They are required to go beyond the traditional model of learning and adapting it to a new and more flexible one. Flexibility is a valuable quality in education, just as in other areas of life. Learning (and teaching) is not different. The students often ask interesting questions or wise teacher makes comments during a previously planned lessons. It is these variations arising from unexpected question asked may be the most interesting, most fun and valuable part of the lesson.

Skillfully combining traditional learning with electronic and digital sources, the use of modern ICT, virtual classrooms, interactive blackboards, is a way to challenge and engage the attention of the young digital generation. As saying Eugenia Kovatcheva in his work

“Horizons eLearning”: “Internet enters more and more in training and changing the style of relationships between learners and learners how to collaborators and joint research and development of education are the basis of modern training. The change in pedagogical approach is essential for all participants in the learning process, and it is a requirement of the society of knowledge, with the support of ICT.<sup>6</sup>”

The use of web-based resources in the learning process is a positive practice that can compensate for the disadvantages of traditional methods of teaching and learning. In the learning process a long time ago not rely on passive teaching methods and apply methods such student-centered learning, learning by doing and others. The work by the web-based resources complements the range of methods used for learning and increases its effectiveness in the following areas:

1. Raising the student' interest.
2. Increased motivation for learning through direct involvement in the learning process - learning by doing.
3. Forming a so-called. transferable skills - for analysis and synthesis of information, teamwork, presentation skills and more.

Some strategies that could ensure successful adaptation of training to the new digital generation are conducting interactive classroom exercises, doing individual and group projects using the concepts of eLearning from second generation (e-learning 2.0), using web 2.0 in all its forms to conduct information between students and teachers, as well as access to virtual labs for simulations for measurements and design.

Use of an interactive version of textbooks and supporting materials or developing a digital version of the educational content in the form of CD-ROM or DVD-ROM, or materials on a cloud. Special software can be used as a projector and a computer or interactive whiteboard and enables to display materials from the textbook interesting way students; to run audio and video recordings of the material from the textbook; easy orientation and navigation; quickly find the necessary materials through search bar.

The interactive blackboard (IB) is one of most suitable means for providing interactivity in the classroom, which not only can arouse the interest of students, but also increases the attractiveness, visibility and information value of the material introduced adding dynamics in teaching, but also allowing the student to actively participate in lesson. IBs are an effective tool for creating video training materials used and preferred by self-training students of the digital generation. Interactive blackboard allows for flexible redirection of lesson "on the fly", such as to check a Web site or digital resources to find needed information or data to access relevant video or photographic images, then smoothly back to the planned lesson. This can do wonders to satisfy the curiosity of students. Innovative teachers work hard to build a learning environment in which students are the focus of learning, where curiosity is more valuable than content, where learning is not just memorizing what the teacher tells students, but rather interact with ideas so as to build a personal sense of them. This constructivist approach is at the heart of learning in the 21st century.

The virtual classroom is an interactive tool which enables direct, synchronous link between teachers and students. This online learning environment can be web based or it can be reached through additional software and may require removal of autorun file. Virtual classroom not only enables collaboration and communication but also allows students to arrange their study commitments. This functionality is especially useful for people who have difficulties in organizing your time. The virtual classroom is used by many

<sup>6</sup> Kovatcheva, E. eLearning horizons. Sofia, Demetra, 2013, 199 p.



schools, various educational institutions and businesses. Discovered the advantages of this type of applications they successfully conducted the required distance learning (online training), raising the skills of its students. The capabilities of the virtual classroom offering share different types of files: audio, video, PDF or Microsoft Office. For presentations are available options for use of the pointer, zoom in and painting. There are two types of chat - public and private, sharing feature on desktop and integrated VoIP. Provides opportunity to perform two roles - a viewer or a moderator. These roles, logically, have different powers. Positive aspects of the virtual classroom are detected by the parents - through her they teach you to see if and how quality is education their children receive.

Smart classroom is another innovative solution that provoked the interest of the digital generation. It aims to provide students a fully digital and interactive learning environment. Smart classroom is a technology enhanced learning space with built-in opportunities for teaching and learning through the integration of ICT, such as computers, specialized software, assistive listening devices, networking, and audio / visual capabilities. Smart Classroom integrates a projector and projection screen, connecting cables for laptop, DVD, sound system, touch screen for controlling system phone. Some classrooms are equipped with additional resources such as computers with operating systems like Windows, and Mac, microphone, stereo speakers, wireless pointer or mouse, USB extension cable device.

## CONCLUSION

Overall, Bulgaria observed a stronger enters of ICT in postgraduate courses. Organizations that offer similar courses use multiple variations of the latest ICT with the aim of attracting more students. The way the organization of the course is also flexible and adapted to the working client.

The advent of new ICT in traditional education – schools and universities be implemented according to the legal framework of the country and strategies for effective implementation of ICT in Education and Science of the Republic of Bulgaria; (2014-2020); Development of vocational education and learning (2014-2020) and to promote and improve literacy skills (2014 - 2020 AD). The granting and use of web-based resources in the learning process, increasing the interest and motivation for learning of students through direct involvement in the learning process - learning by doing and formation of transferable skills such as analysis and synthesis of information, teamwork, presentation skills, etc. like as full commitment and motivation in personal virtual space, including social networking, social media, shared resources, shared links, IM (Instant Messaging) communication., combined with a skilled teacher would give a good result and would increase the effectiveness of learning. In this way the improving the quality of formal education will increase the quality of graduates specialists<sup>7</sup>.

To be able to actively involved in the process of creating new knowledge, learners should have appropriate expertise "overcome" structural barriers - inclusion in existing networks of students or building new networks and using them actively in order to obtain new knowledge; skills for effective communication - sharing knowledge, generate new ideas for the needs of other members of the network; problem solving – skills to recognize,

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<sup>7</sup> Ivanova,A., G.Ivanova, A. Smikarov. The new generation of students and the future of e-learning in high schools – eLearning 2.0 and personal learning environment. Proceedings of the Third National Conference with international participation on e-learning in higher education, Svishtov, Academic publisher of SA “D.Tzenov”, 2009, Bulgaria, p. 27-36, ISBN 978-954-23-0

classify and evaluate a problem in its context and the correct way to solve it; Leadership – managing and coordinating the work of network members.

These competences are among the integrative skills and use of ICT as part of life skills and prepare for career involved in the governing documents of the EU and the program "Partnership for development of skills for the 21st century: Partnership for 21st Century Skills)<sup>8</sup>.

As seen from the above, the formation of a new culture of learning and teaching is not an easy task as the needs of the digital generation requires a change in traditional approaches involving an mostly passive role of learners.

Using the opportunities of modern ICT in the learning process itself could not completely solve the problems criticized today education both in Bulgaria and in the world, but it certainly can help innovative and relevant to the style of learning digital student teaching methods and evaluation. This will lead to increased efficiency and effectiveness of training both in universities and in various institutions offering training. The role of the computer in the world of paper and digital generation still has a great importance. In a world of globalization and the need for learning and perfection, the level of ICT knowledge, the way their perception affects proportionately to their effort in the learning process and ex post implementation

Naturally, the question arises how will study born after 2010, the so-called next-generation, that soon after birth by imitation perform actions with prascheto on "tuch screen" -a any device?

## REFERENCES

- [1] Annual Growth Survey 2016. European Commission./ Europa 2020. [http://ec.europa.eu/europe2020/making-it-happen/annual-growth-surveys/index\\_bg.htm](http://ec.europa.eu/europe2020/making-it-happen/annual-growth-surveys/index_bg.htm).
- [2] Berk R. Net Generation Profile Scale: This Is Only A Test Scale!, Transformative Dialogues: Teaching & Learning Journal, Vol.3, March 2010.
- [3] Basic principles for working with interactive whiteboard. New Educational Technologies at the University of Veliko Tarnovo "St. st. Cyril and Methodius"./ [http://www.cet-vtu.com/site/bul/et2\\_9.html](http://www.cet-vtu.com/site/bul/et2_9.html).
- [4] Classroomsmart. /<http://classroomsmart.net/>.
- [5] Digital generation and the challenges to the education system./ Anelia Ivanova/ Eighth National Seminar on e-learning Sofia, Bulgaria, 27.11.2009.
- [6] Ivanova, A., G. Ivanova, A. Smikarov. The new generation of students and the future of e-learning in high schools - eLearning 2.0 and personal learning environment. Proceedings of the Third National Conference with international participation on e-learning in higher education, Svishtov, Academic publisher of SA "D. Tzenov", 2009, Bulgaria, p. 27-36, ISBN 978-954-23-0.
- [7] Frank N. Magid Associates. "The First Generation of the Twenty First Century."April 30, 2012.
- [8] Junco, R., Mastrodicasa, J. Connecting to the Net.Generation: What Higher Education Professionals Need to Know About Today's Students, NASPA, 2007.
- [9] Generation X,Y I Z./ Foundation "digital kids"/ <http://digitalkidz.eu/about-us/pokolenia-x-y-z> - 15.03.2016.
- [10] Konstantinova, Milena, From 2D to 3D education. Innovative methods and practices in the use of ICT in the learning process, april 2015, p.24.
- [11] Kovatcheva, E. eLearning horizons. Sofia, Demetra, 2013, 199 c.

<sup>8</sup> Partnership for 21<sup>st</sup> Century learning <http://www.p21.org/our-work/resources/for-educators#SkillsMaps>

[12] National statistical institute of Republica Bulgaria// <http://www.nsi.bg/>.

[13] Stoikova, V., Anelia Ivanova, A. Smikarov Good practices in e-learning students of the digital generation. Scientific papers of University of Rousse, Bulgaria - 2012, volume 51, series 3.2.

[14] Virtual Classroom Advanced solutions for distance learning LMS.//<http://www.online-learning.bg/virtualna-klasna-staq.html>.

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## ДОБРИ ПРАКТИКИ В ПРОЦЕСА НА ОБУЧЕНИЕ НА "ДИГИТАЛНОТО" ПОКОЛЕНИЕ В БЪЛГАРИЯ

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**Резюме:** *Развитието и широкото внедряване на информационни и комуникационни технологии (ИКТ) оказва силно въздействие върху всички области на съвременния живот, в това число и начина на възприемане в процеса на обучение. В резултат на пълното цифрово обкръжение и на непрекъснатото взаимодействие с него, настоящите и още повече – бъдещите студенти възприемат и обработват информацията по твърде различен начин, имат различен начин на мислене и стил на учене от предшествениците си. Не е тайна, че образователната ни система трудно успява да отговори на техните потребности и очаквания и среща сериозни проблеми при обучението им.*

*Разглеждани са някои практики в електронното обучение в България, адаптирани към особеностите на дигиталното поколение и в резултат на това довели до положителни резултати при обучение. Тази статия представя способи за адаптиране на традиционното обучение към нуждите за обучение на новото поколение с помощта на новите ИКТ*

**Ключови думи:** *ИКТ, дигитално поколение, е-обучение, стилове на обучение, добри практики.*

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