UNIVERZITET U KRAGUJEVCU
FAKULTET TEHNIČKIH NAUKA U ČAČKU

INFORMACIONE TEHNOLOGIJE, OBRAZOVANJE I PREDUZETNIŠTVO

ZBORNIK RADOVA

ITOP17

Druga nacionalna konferencija sa međunarodnim učešćem

Čačak, 08. i 09. april 2017.

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Druga nacionalna Konferencija sa međunarodnim učešćem pod nazivom „Informacione tehnologije, obrazovanje i preduzetništvo 2017 – ITOP17“ treba da omogući **povezivanje informacionih tehnologija i preduzetništva obrazovanjem preduzetnika.**

Na Fakultetu tehničkih nauka u Čačku u okviru studijskog programa Preduzetnički menadžent, na osnovnim i budućim master studijama, informacione tehnologije vezane za elektronsko poslovanje, internet marketing, mobilno poslovanje i internet inteligentnim uredjajima su direktno uključeni, kao istoimeni predmeti, u obrazovanje preduzetnika.

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- Potrebe za inoviranjem studija IT u Srbiji: obezbeđenje kvaliteta kurikuluma, resursa, kompetencija
- Preduzetničko obrazovanje uokvireno profesionalnim razvojem nastavnika,
- Dualno obrazovanje – dobit na duge staze,
- Dualno (kooperativno) obrazovanje u Srbiji.

Posebna vrednost skupa su i dve sekcije pod nazivom Informacione tehnologije i preduzetništvo i Obrazovanje i preduzetništvo, gde nastavnici, profesori i stručnjaci iz navedenih oblasti izlažu svoja iskustva iz prakse.

Zaključci konferencije treba da se definišu u okviru okruglog stola na temu Informacione tehnologije za preduzetništvo u obrazovanju.

U realizaciji Nacionalne konferencije sa međunarodnim učešćem „Informacione tehnologije, obrazovanje i preduzetništvo – ITOP16“, pomogli su Ministarstvo prosvete, nauke i tehnološkog razvoja Republike Srbije, Fakultet tehničkih nauka u Čačku, Zavod za unapređivanje obrazovanja i vaspitanja, Zavod za vrednovanje kvaliteta obrazovanja i vaspitanja i Regionalni centar za stručno usavršavanje zaposlenih u obrazovanju u Čačku, na čemu im u ime Organizacionog odbora najlepše zahvaljujem.

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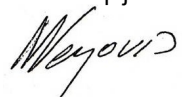

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OBRAZOVANJE I PREDUZETNIŠTVO

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MUTACIJA HOMO SAPIENS-a U HOMO ZAPIENS-a – NOVI KREATORI NOVIH ŠKOLA

MUTATION OF HOMO SAPIENS INTO HOMO ZAPIENS - NEW CREATORS OF NEW SCHOOLS

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Rezime: *Digitalna tehnologija je danas postala deo obrazovanja i utiče na potrebe današnjih studenata, nastavnih planova i programa, kao i na ukupnu organizacionu strukturu obrazovnih institucija. Ono šta je potrebno ovim novim „tipovima" učenika je fleksibilniji obrazovni sistem. Proces učenja pripada njima i oni postaju klijenti koje treba uslužiti. Stoga fleksibilnost mora da se ogleda u ciljevima učenja i zadacima, sadržajima, strategijama, metodama i oblicima rada, proveri znanja, tehnologiji i medijima, kao i u vremenu i sredini u kojoj se uči.*
U radu se razmatraju novi „tipovi" studenata koji studiraju na način sasvim drugačiji od prethodnih generacija. Zbog brzog razvoja tehnologije stvoreni su novi tipovi učenika koji uče na potpuno drugačiji način. Oni su u stanju da obavljaju više zadataka istovremeno. Zato škole moraju da se prilagode diskontinuitetu modernog doba koji tradicionalno orijentisan obrazovni koncept čini prilično nestabilnim..
Ključne reči: *reforme, studenti, novi „tipovi“ studenata, tehnologija, škole.*

Abstract: *Digital technology has become a part of education and it influences the needs of today's students, curricula, and the overall organizational structure of educational institutions. What these new "types" of students need is a more flexible educational system. The process of learning belongs to them and they become clients to be served. Therefore, flexibility must be reflected in the learning objectives and tasks, content, strategies, methods and forms of work, verification of knowledge, technology and media, and time and study environment.*
This paper discusses the new "types" of students who study in a manner quite different from previous generations. Due to the rapid development of technology new types of students who learn a completely different way have been created. They are able to perform multiple tasks simultaneously. Thus, schools must adapt to the discontinuity of the modern era which makes traditionally oriented educational concept rather unstable.
Key words: *reforms, students, new “types of students“, technology, schools.*

1. INTRODUCTION

All educational reforms so far have been related to external changes including reforms of curricula, change in the length of schooling, changes in the organization of schools, changes in educational goals and tasks, etc. The requirements set by the strategies for reforming the teaching process, the forms and methods as well as the position of pupils/students in the Republic Macedonia, are joined in the proposals for modernizing teaching, of which the most frequent are the following: application of active forms and methods of work, placing students in situations in which they observe, analyze, arrange, synthesize, conclude, generalize, investigate, and use various sources of knowledge, problem solving, etc. Since the very beginning of school it was and has remained the subject of many studies and it seems that the fundamental issue in these studies has been how to organize the school. The search for the answer to the question how to best organize schools necessarily includes the search for the answer to the question: What is a human being? A human being (student) is a complex being, not only a being of culture (homo culturalis), (homo faber) a being who creates, a being who thinks (homo sapiens), a being who teaches/learns (educator - educans), but all of them together with a potential for something more. By reducing the human being to one or more than one dimensions, education is expected to create a usable product. Most schools typically see a student as a homo sapiens and their "thinkingness" is measured by the amount of stored or reproduced information. In accordance with that understanding, the efficiency of a school is measured by the "cognitive achievement" on tests. For this reason, school reforms often move from one extreme to another (from "reform makeup that means 'more of the same', to "psycho-social issues") while constantly losing sight of a complete human being.

However, at the end of the last and the beginning of the new millennium, changes in technology created the effect of concentric circles on the water surface, thereby changing the fundamental and long ingrained attitudes. Some areas are highly susceptible to change, while others are more conservative. In no other area is this more visible than in the process of education and learning. In real life in today's schools the technological revolution has changed the student under the influence of the dynamic environment and he/she has been transformed into a "new type of student." Besides creating new environments and challenges, technology affects our brain and even modifies it. Reviewing the basic understanding of neurology [11], points out that "plasticity refers to the brain's ability to change." Our brains are constantly changing, developing, and they need to respond to transformations in our environment and the tools we use. Not only do these new tools require adaptation on the part of the user, but they are also changing the way of his/her thinking. The students of today are radically changed. They did not only change their clothes and style compared to previous ones, but they think and process information in a way completely different from previous generations. Current students have experiences that are very different from previous ones. Different kinds of experiences lead to changes in brain structures and it is very likely that the brains of students physiologically changed and are different from those of previous generations, and all this is due to the manner and conditions in which they grew up [4]. Whether this is literally the case or not, we are convinced that the way they process information has radically changed [3]. Believes that "new" students appear in the educational system who have formed under the influence of new developments in the world of new technologies.

These students are not passive consumers of educational resources of knowledge. At the end of the 80s of the last century children were born, grew up and developed in an advanced technological environment.

Today's students, from kindergarten to university, are the first generation that has grown up with digital technology, a computer mouse in hand, TV remote control, mobile phone, iPod and other electronic devices for communication and entertainment. This same generation is the expected result of the inclusion of digital technologies in everyday life, where all the technological advantages are regularly used for easier communication, learning or playing. Many tools of the digital age, such as computer games, the Internet, e-mail, instant messenger, wikis and blogs are an integral part of their lives [8]. The usage of the mass media is declining while online communication with peers, searching for information and entertainment on the Internet, are becoming increasingly popular among young generations [7]. New tools - new schools, new ICT tools are changing the way people, including our students, communicate with the world. The challenges of the new millennium require that students be more adaptable and analytical, and possess skills for recognizing which are the best tools in the environment that is rapidly changing. Have schools changed? Some have, but some are still adjusting. In order to be new, a school must create new ways of teaching and learning, and introduce the use of new methods in the teaching process. We should find a way to successfully help students in the 21st century – both in work and in play, and in all other aspects of life in a world that promises nothing else but change.

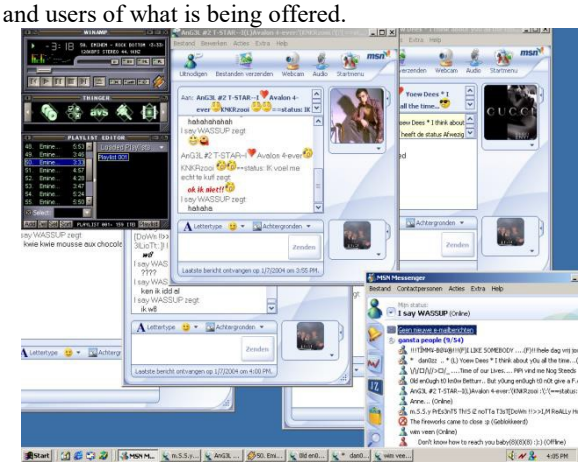
Young people today grow up with technology, they use it every day and do not know a world without it. Most of our students know how to use ICT tools for their purposes. Schools must help them to use these tools for learning as much as to satisfy their curiosity. Therefore, we are beginning to see the development of another category of tools - web-based educational applications. However, technology alone cannot solve every problem in education. Some issues are unsolvable, but the application of technology can sometimes sufficiently help. It sounds rather frankly, does it not? Technology has dramatically changed the way today's generation of children (students) live. We are speaking about the generation of new "types" of students for whom personal computers, the Internet, MP3s, mobile phones, iPods, and all the "old" media, are the natural environment in which they grew up. New "types" of students represent a generation born with a computer mouse in hand and a computer screen as a window to the world [5]. They are also known as Homo Zappiens. The term Homo Zappiens was created and publicly presented for the first time at a conference in Oslo in 2000, by the Dutch university professor Wim Veen, who had been dealing for years with the impact of ICT on education and pedagogy. The name Homo Zappiens is derived from the Latin word "homo" (man) and the onomatopoeia of brandishing laser weapons "zap-zap-zap", or of changing TV channels with the remote control. Homo Zappiens plays computer games, communicates 24/7 with the help of various tools and software, creates virtual friendships with fb friends, preferring the Internet and mobile phones to the printed media [7]. Homo Zappiens likes to play computer games in which there are no winners and losers, which are without a beginning or end, and where it is possible to continuously change the rules of the game [8]. Games require proactive players who solve problems and provide an environment in which children experiment, taking different roles. These games encourage research approach to learning since children very often begin to play even if they do not know what the ultimate goal of the game is [2]. They define their

goals and appropriate strategies to achieve those goals. The games that do not have a limited number of participants are very popular on the network, so anyone interested can join the game and thus, through the game, a person/participant is able to communicate with people from different age groups and with different views on life. All participants in the game try to solve a variety of strategic issues through continuous interaction with each other.

Picture 1. New “types” of students

By communicating with a variety of digital tools, students can take different identities thus experimenting with social roles [6]. To facilitate and speed up communication new "types" of students have even developed a new form of communication, so that their messages consist of a number of abbreviations they understand. In order to get information about something that interests them, new "types" of students first search the internet by entering keywords in a search engine (e.g. Google) or by calling their friends. Various activities are offered through wikis and blogs (video blog, photo blog, drawing, audio) so they can see each other, create, share, and comment. Easy operation with digital recordings, an abundance of simple software and free space in cyber-space have enabled the young generation to create their own custom made media world. Homo Zappiens have learned to get by in the world of information and successfully deal with information overload [8]. They are aware that there is a tremendous amount of knowledge which, with the help of technology, is quickly and easily accessible, and they build their knowledge at the time they want to know something or when it is necessary for employment, hobby or something else. Because of this line of reasoning, the way of understanding the processes of education, the place, time and manner in which they are carried out are constantly changing, and hence the concepts and ideas of “just-in-time learning”, “learning-on-demand”, “just enough learning”, and “just for you learning” are becoming more and more current. Attitudes that see knowledge as a whole consisting of "knowing what" (explicitly) and "knowing how" (implicitly) are replaced with "knowing where". For this new "types" of students it is very important to know where to find specific information, the way in which any information will be critically processed and placed in a wider social context and the manner in which to communicate with others in the easiest, fastest and most effective way. Through this experience the children (students) develop research approach to learning and they construct and give meaning to

the information. With the help of the research approach to learning a number of meta-cognitive skills that are very important in the learning process are being developed [7]. Merging of individual media characteristics or mixing of text, audio and video elements and the interactive approach to these elements makes these new "types" of student's active creators and users of what is being offered.

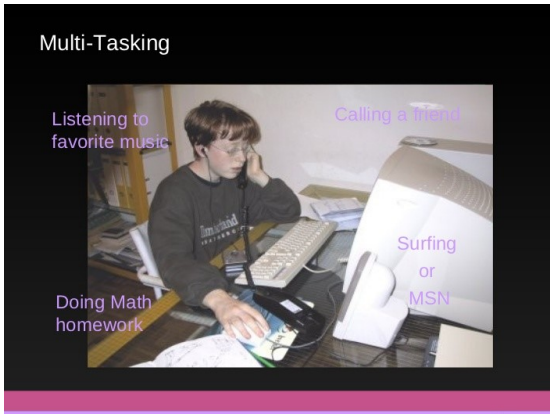


Picture 2. New "types" of students – active creators

NEW "TYPES" OF STUDENTS – NEW SCHOOL

These new "types" of students represent a generation for whom learning is a game. For them, school is a place for socializing with friends, rather than a place for learning [8]. This generation of children (students) has grown up with technology and learns from computer screens, icons, sounds, pictures and games, exploring and questioning. The expected consequence is the emergence of new ways of reasoning, nonlinear approach to learning, faster adoption of information, multi-tasking, etc. Given the above, we can say that the new "types" of students are characterized by 4 skills [7].

1. Iconic skills
2. Multi-tasking
3. Concurrent processing of different types of information
4. Nonlinear approach to learning.



Picture 3: Homo Zappiens working

Today's students learn intuitively and find their way much better when surrounded by icons (Windows and the Internet). Finding their way on pages full of icons, colors, images, Flash and Java applications and sound effects is not a problem for them. Multi-tasking is a skill typical of the new "types" of students. The new "types" of students are accustomed to receiving and processing information very quickly and they perform several tasks simultaneously. They also prefer a nonlinear approach to learning and do not cope well when the contents are organized in a linear way, and today's schools are mostly analog and linear [8].

Linear learning causes stress and lack of motivation in the new "types" of students. They learn in such a way that they themselves rearrange content so that it suits them at a particular moment, which is very different from the approach in which the teachers or the textbook always transmit the content in the same manner and order. The new "types" of students are accustomed to the hypertext which provides them with such features, as opposed to plain text.

All this is contrary to the approaches of previous generations. Previously the children learnt in a rational way, and reading was the basis of their learning. Data is soaked up one by one and worked exclusively one thing at a certain time, or developed ability to mono-requirements. They learned to work alone, laying competitive and different learning game. The data were absorbed one by one and they did exclusively one thing at one time, i.e. they developed the ability to cope with mono-requirements. They learned to work alone, have a competitive attitude and to distinguish play form learning. The way the new "types" of students access information and communicate, as already mentioned, developed completely different generic skills in children, different abilities and, consequently, new abilities for learning. The following table shows a comparison of the characteristics of Homo Sapiens and Homo Zappiens in the learning process.

Table 1. Characteristics of the new "types" of students - Homo Zappiens and Homo Sapiens (according to Prensky)

Homo Zappiens	Homo Sapiens
Great speed	Conventional speed
Wide attention span	Long attention span
Multitasking	Monotasking
Holistic approach to learning	Analytical approach to learning
Nonlinear approach to learning	Linear approach to learning
Iconic skills	Reading skills
Networking, Individuality, Cooperation, Competition, Activity (creation of knowledge)	Passivity (listening and reproduction)
Learning with searching for information	Learning through memorizing information
Learning through play	Learning is different from play
Learning through externalization	Learning through internalization
Using fantasy	Orientation to reality

Considering the above table, it is important to note that new "types" of students - Homo Zappiens, unlike Homo Sapiens who are fully analogous, are fully digital (multitasking), and that the learning process has evolved from individual activities of internalization of knowledge to social externalization of knowledge. Although many theories of learning emphasized the importance of social activities in the learning process long before technology started to dominate students' lives, it is with the help of technology that people (students) become the nodes of technical and social networks. Social networks on the Internet we be described as a meeting place for communication and creation of knowledge, and social networking, which is facilitated by a variety of social software, is the main activity in the construction of knowledge. The new "types" of students are self-guiding students 'nano' students, digital thinkers, experienced communicators and creative problem-solvers, and they have developed new values as opposed to the values of the previous generation, preparing themselves for a creative and chaotic society. They want to cooperate and work in a group, they are active and easily learn through play. The new "types" of students feel they have the right to define their own interests. For them everything is available and they want to do only what interests them at a particular moment. To highlight the difference between the new generation of students and previous generations, Prensky (2001) uses the term digital natives and digital immigrants. Students today are called digital natives because they are speakers of the digital language of computers, software and the Internet. We, who were not born into the digital world, but at some point in life have found ourselves surrounded by new technology, are called digital immigrants. A digital immigrant is socialized differently and will always remain with one foot in the past. The difference between the digital native and the digital immigrant is evident in some everyday things, for example, a digital native will not print his/her e-mail messages and will read and edit documents directly on the computer. A big problem in education is that teachers (digital immigrants) speak the language of the pre-digital age and teach a generation that does not understand that language, i.e. Homo Zappiens who speak an entirely different language. [1] gives a list of factors that shape the mindset of the information age, and it includes: the Internet is better than TV, the

practice is more important than theory, performing multiple tasks at the same time is a way of life, and learning looks more like a Nintendo than like logic. [1] concludes that "we have to think in a way that it is necessary to transform the educational experience so that it becomes important for students of the Information Age." Many studies often point to the fact that children learn much more with the help of computer games and online communication. Despite this, many educational institutions, teachers and parents complain of today's generations and many of them believe that all these technological devices and software are a waste of time, that they have an adverse effect on children's health and lead to social isolation. Educational systems underestimate new generations and treat them as a disruption, preventing their development. Those new "types" of students are often referred to as children with attention disorder and their overload with the network is emphasized. Schools, teachers and parents complain that children today have a short range of attention (i.e. they are not able to listen to us for five minutes when we are telling them something), that they are hyperactive (e.g. they are unable to concentrate on one task or some work), they are undisciplined (i.e. they forget their textbooks and school supplies, they forget to pass on a message from teachers to their parents), and they have no respect for older people (they think the teachers and they are equals). Teachers today do not value the new qualities of the new "types" of students. Their skills are completely unfamiliar to teachers. Very often we hear teachers saying "I just cannot work with them. They are impossible in class". Teachers continuously assume that the methods, forms of work and activities available and efficient when they were students, will act as such for their present students. The new "types" of students do not pay attention to what teachers teach in comparison to all the other things that they perceive. Teachers and parents often wonder how their children can study, listen to music and watch TV at the same time. Digital immigrants are unable to do this, because they did not exercise it during their development. Some of the critics of education, in particular of the curricula, teaching methods and the traditional approach to teaching, learning and education in general, said: "Many of our schools are good schools. The design and organization of today's schools are rooted in Taylorism. The organizational structure is based on hierarchy, mass production, standardization, planning and control. Although the industrial era is past, today's schools still exist although they were designed 150 years ago. As such, schools were institutions appropriate for the industrial era, and today they should be seen as museums. We can say that that today's schools are ready-made schools dominated by teaching oriented towards the teacher. Classrooms are organized and equipped for frontal teaching in which students sit one behind the other, and teaching is organized by the teacher who is in front of them at his desk using the board or some modern teaching technology. What Homo Zappiens need is a more flexible educational system. The learning process belongs to them and they become customers to be served. Therefore, flexibility must be reflected in the goals and tasks of learning, contents, strategies, methods and forms of work, checking knowledge, in technology and media, time and learning environments.

CONCLUSION

The role of a teacher is no longer the role of a lecturer, but the role of a leader, collaborator, organizer, researcher. Teachers are mostly, not that it is their fault, trained to deliver facts, and then check whether they are adopted. Instead of just transmitting knowledge, teachers need to create new models that will stimulate learning and learning

new skills. The role of the student has also changed. The very idea that someone is a student creates passivity in advance. However, the new "types" of students have set goals and objectives for learning, they actively create knowledge from different sources of information, they collaborate and provide feedback to their peers, and they assist their teachers in adopting the new skills that students already have. It is important to note that the process of learning passes into their hands and they become responsible for their own learning.

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