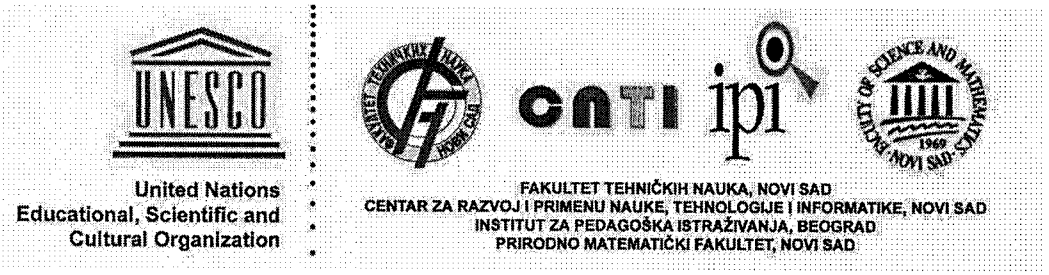

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INFORMATIKA
OBRAZOVANJE
ZA DRUŠTVO UČENJA I ZNANJA
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SADRŽAJ

ПРЕДГОВОР

Живимо у „веку знања“, „образованом друштву“, „друштву учења и знања“, „новој информационој цивилизацији“, „учећем друштву“, „аудиовизуелној електронској цивилизацији“, „умреженом друштву“, „дигиталној ренесанси“, са применом „интелигентних“ технологија образовања и „интелигентних“ средина за учење, мултимедијалних технологија, информационо-комуникационих технологија, нових ТВ и видео технологија, дигиталних технологија, технологија интерактивног учења, итд. У свим тим технолошким иновацијама морамо се снаћи тј. умети их користити, применити и даље усавршавати, што управо покушавамо одржавајући наш симпозијум већ скоро 10 година, покушавајући да иницирамо и подстакнемо наше педагошке раднике да нађу своје место у наведеним технологијама и да својим знањем олакшају улазак у **информатичко друштво** тј. **друштво знања и учења.**

Развој, стварање, ширење и коришћење **знања** представља централни проблем разматрања нашег симпозијума јер је знање препознато као објекат велике економске, политичке и културне вредности који потврђује квалификованост друштва које га ствара, има и користи.

Разматрајући проблеме знања и учења отварамо панораму будућности и сагледавамо шта нас чека, куда се образовни систем креће и чему стреми. На нашем Симпозијуму смо разматрали, анализирали и конципирали начине, облике и методе коришћења информација тј. стварања и примене знања које се већ сада неслућеном брзином у времену и простору, преноси и шири међу друштвима, културама и генерацијама.

Стварање **образовних друштава** тј. **друштава знања и учења** је примарни задатак сваког друштва па и нашег. Сва друштва су била, свако на свој начин, друштва учења и знања, али је знање било **повластица појединаца** и њему није могао приступити и користити га свако. **Тајност** је била основна метода у његовом начину сазнавања и коришћења. Епоха **просветитељства** је формулисала и истакла основне идеје напретка, а то су идеје универзалних могућности приступа знању, слободе у његовом коришћењу и свом постајању и живљењу, једнакости имања, коришћења и јавности знања, на којима данас и почива **идеја** стварања **учећег друштва тј. друштва знања.** Садашње постојеће технологије то и омогућавају и дају основу постојања таквог универзалног друштва тј. **информатичког друштва.**

Сматра се да нико не сме да буде искључен из образованог друштва где је **знање опште добро** које је доступно свима, што је и законски обезбеђено. „Универзалном декларацијом о људским правима“ (чланови 13,19,27) као и симултаним растом светске Интернет мреже, мобилне телефоније, дигиталних технологија, телекомуникација и компјутерске науке и информатике. У сваком случају можемо закључити да технолошки напредак тј. настанак и развој технолошких иновација омогућава стварање тј. убрзану производњу нових знања, а оно омогућава развој креативности и даљих иновација на добробити постојећег и будућег умреженог и глобалног информатичког друштва.

Из ових разлога, а и из потребе побољшања квалитета васпитно-образовног процеса, сматрамо да је потребно:

1. Проучавати, анализирати и експериментисати са новом информационо-комуникационом технологијом
2. Указивати, истицати, иницирати и објашњавати просветним радницима могућности и нужност примене и коришћења савремене образовне

технологије у нашем образовном процесу и процесу учења како би могли припремити своје ученике за живот и рад у двадесет првом веку.

Пошто се очекује да ће развој информационо-комуникационих технологија бити трајан процес и са све већим могућностима примене и коришћења у целокупном животу и раду људи па и у васпитно-образовном процесу, овај Симпозијум, као завршни облик многобројних истраживања из различитих области људских делатности, тј. научних области, наставне праксе, педагошко-психолошких дисциплина, пружио је и пружа могућност нашим стручњацима да на њему изнесу резултате својих истраживања, да упознају јавност са њима и да укажу на њене могућности у васпитно- образовном процесу у односу на начине примене и коришћење. Ова књига је управо резултат њихових истраживања.

Садржај књиге чине истраживања наших и страних аутора на пољу стручног усавршавања, коришћења и примене информационо комуникационе технологије у савременом информационо технолошком образовању, која су већином изложена на Петом међународном симпозијуму под називом „**Технологија, информатика и образовању – за друштво учења и знања**" који је одржан 19. и 20. јуна 2009. године на Факултету техничких наука у Новом Саду.

У њој су обрађене следеће тематске области:

- Програми и начини школовања, припрема и усавршавања наставника из области техничког и информатичко-технолошког образовања;
- Иновирања, прилагођавање, концепција и начини реализације наставних планова и програма информатичко-технолошког образовања на свим нивоима школовања;
- Материјални услови и могућности реализације циљева и задатака информатичко-технолошког образовања;
- Могућности научно-истраживачког рада из области примене и коришћења информационих технологија;
- Иностранa искуства на овом пољу у односу на начин примене и коришћења нове технологије у образовном процесу;
- Могућности повезивања садржаја из области информатичко-технолошког образовања са садржајима других предмета и научних области;
- Настанак, циљеви и садржаји „Европске димензије образовања" и наше могућности уклапања у њу, итд.

Циљ књиге је да изазове интерес за могућности, значај и улогу савремене информационо комуникационе технологије у свакодневном животу и раду људи новог миленијума. Радови у књизи представљају **аутентичне** и оригиналне ставове и тврдње њихових аутора, у чији квалитет и начин излагања приређивачи нису могли да интервенишу сматрајући да су их њихови аутори изнели према својој стручности и компетенцијама.

Захваљујемо се свим научним и стручним институцијама и њиховим сарадницима који су подржали, учествовали и омогућили реализацију симпозијума и ове књиге, као што су:

1. СУОРГАНИЗАТОРИ:

Технички факултет – Чачак
Учитељски факултет – Београд
Филозофски факултет – Бања Лука, Реп. Српска, БиХ
Филозофски факултет – Ист. Сарајево, Реп. Српска, БиХ
Педагошки факултет – Сомбор
Филозофски факултет – Никшић, Црна Гора
Филозофски факултет – Скопље, Македонија
Филозофски факултет – Нови Сад

2. ИНСТИТУЦИЈЕ КОЈЕ СУ ДАЛЕ ПОДРШКУ ОРГАНИЗАЦИЈИ И РЕАЛИЗАЦИЈИ СИМПОЗИЈУМА:

Српска Академија наука и уметности – САНУ
Академија наука и умјетности Републике Српске – АНУРС
Српска Академија Образовања – САО
Црногорска Академија наука и умјетности - ЦАНУ
Министарство за науку и технолошки развој Републике Србије
Министарство просвете Републике Србије
Покрајински секретаријат за образовање и културу, Нови Сад
Градски секретаријат за образовање и културу, Нови Сад
Министарство просвјете и науке Републике Црне Горе
Министарство науке и технологије Републике Српске
Министарство просвјете и културе Републике Српске
Министарство за образовање и науку Републике Македоније
UNESCO – Национални комитет за ИКТ
Форум педагога СЦГ
Сојуз на просветните работници Републике Македоније

Проф. др Мирчета Даниловић

PEDAGOGICAL ASPECTS OF INTEGRATION OF ICT IN EDUCATIONAL PRACTICE
PEDAGOŠKI ASPEKTI INTEGRACIJE IKT U OBRAZOVNOJ PRAKSI

Sonja Petrovska [77], University Goce Delcev, Shtip - Pedagogical Faculty

Abstract - Today's world cannot be imagined without the use of information technology and computers. The intensive development in the area of information-communication technology once more puts the school in the position of being surprised and unable to deal with the technical-technological challenges of the 21st century. It is seriously demanded to integrate effectively the ICT within the educational instruction.

This paper represents a synthesis of theoretical and empirical findings that give a contribution to the creation of effective models of integration. Thus, the most important areas that the countries, the local governments, the schools and researchers should focus on are: promotion of the pedagogical component in the process of ICT integration in education, detection of the barriers for integration, and finding solutions for their suspension.

KEY WORDS: PEDAGOGY /ICT/EDUCATION /BARRIERS

Rezime *– Današnji svet se teško može zamisliti bez korišćenje informatičke tehnologije i kompjutera. Intenzivni razvoj u oblasti IKT još jednom postavlja školu u poziciji zatečenosti i nepripremljenosti da se suoči sa tehničko-tehnološkim predizvicima 21. stolječa i od nje traži efektivno inoviranje vaspitno-obrazovnog procesa.*

Ovaj rad pretstavlja sinteza teoriskih i empiriskih saznanja koja značajno doprinose u kreiranju efektivnih modela integracije. Znači, najvažnija podrucja kojima se trebaju baviti države, lokalne vlasti, škole i istrazivači su: promocija pedagoških komponenata procesa integracije IKT u obrazovanju, detektiranje barijere koje utiču na uspesnost integracije i pronalaženje praktičnih rešenja za njihova suspenzija.

KLJUČNE REČI: PEDAGOGIJA / IKT/OBRAZOVANJE/BARIJERE

1. ICT AND PEDAGOGY

"Educational systems around the world are under increasing pressure to use the new information and communication technologies (ICTs) to teach students the knowledge and skills they need in the 21st-century" (UNESCO, 2002, p.10). Following this claim and suggestion, national policies, more precisely educational policies, should seriously attempt to provide conditions for successful integration of ICT in the educational process.

Integrating ICT in schools should not be perceived simply as using computers as tools, yet as a process which will ensure optimization of learning and teaching and will create a motivating educational environment. Although in educational practice still exists the dilemma related to the educational value of ICT, many researchers (Barker, 1999; Goodyer, 1999; Hannifin, 1999; Hayes, Schuck, Segal, Dwyer & McEwen, 2001) show its power in the transformation of the pedagogical context which implies:

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- a shift from 'instructivist' to constructivist education philosophies;
- a move from teacher-centered to student-centered learning activities;
- a shift from a focus on local resources to global resources; and
- an increased complexity of tasks and use of multi-modal information. [1]

According to Alexander (1992) teaching methods and pupil organization are the two aspects of pedagogy. These are included in Alexander's conceptual framework for educational practice (see Figure 1.1) where pedagogy is one of seven interrelated aspects. Alexander describes the dimensions of his framework as a minimum list rather than a fully comprehensive framework. This suggests that the pedagogy of ICT should be understood within a broader framework of educational practice. [2]

Figure 1 Educational practice: A conceptual framework

(R., Alexander, 1992, p. 184)

ASPECTS			CENTRAL EDUCATIONAL QUESTIONS
OBSERVABLE PRACTICE	CONTENT	whole curriculum subject/areas	WHAT should children learn
	CONTENT	Physical interpersonal	HOW should children learn And teachers teach?
	PEDAGOGY	teaching methods pupil organization	
	MANAGEMENT	planning operation assessment of learning evaluation of teaching	
IDEAS VALUES BELIEFS	CHILDREN	development needs learning	WHY should children be educated in this way? and WHAT is an educated person?
	SOCIETY	needs of society needs of the individual	
	KNOWLEDGE	children's ways of knowing culturally evolved ways of knowing	

To ensure wide basis for understanding the educational benefits of the integration of ICT in educational practice its pedagogical aspects need to be analyzed.

Taking into consideration that pedagogy is a science of education, and didactics deals with issues in teaching or learning and teaching processes, ICT integration in teaching, or more generally, in the educational process should be treated from a didactic or, more generally, a pedagogical aspect. There must be no dilemmas as to the fact that these aspects should be treated as related to the teacher's competence which is inevitable for successful completion of his professional duties:

- Good knowledge of taught subject matter.
- Good knowledge of the national curriculum, knowledge of global aims and tasks and competence to put them in operation through concrete educational contents.
- Knowledge and understanding of intended educational gains (knowledge, skills, competences, values, beliefs, attitudes) and developed knowledge, skills and valuing capabilities.

- Good knowledge of efficient methodological approaches to lesson design in different subjects and pedagogical leadership (social organization in the class, optimal arrangement and use of available resources).
- Knowledge of learning styles, different personal characteristics of pupils, even their social background.

In fact, only good professionals can further improved their teaching by using ICT.

Twenty years ago, the realization of the „Palm project" (Somekh and Davis,1991) provided evidence that there is positive transformation in the educational practice through integration of ICT. These changes are connected to the processes of learning and teaching, the position of the teacher and of the pupils. Somekh and Davis (1991) identified pedagogical change as the following types of progress:

- From a view of teaching and learning as discrete, complementary activities to an understanding that teaching and learning are independent aspects of a single activity.
- From a sequential to an organic structuring of learning experiences.
- From individualized to communicative learning.
- From a view of the teacher's role as an organizer of learning activities to one as a shaper of quality learning experiences.
- From a preoccupation with fitting teaching to a group, to knowledge that teaching needs to be suited to individuals, which calls for continual self-monitoring to ensure sensitivity to unintended forms of bias and discrimination.
- From a view of the learning context as confined to the classroom and controlled by the teacher to one of the learning context as a supportive, interactive, whole school culture
- From a view of technology as either a tutor or a tool to one where it is part of a complex of interactions with pupils, sometimes providing ideas, sometimes providing a resource for enquiry, and sometimes supporting creativity. [3]

However, one thing that has to be taken in consideration is that these positive changes will follow if ICT integration is realized in a learning environment based upon the principles of: Activity, Constructivist, Collaboration, Intentional, Complexity, Contextuality and Reflectivity.

Respecting the principals of Activity and Collaboration is possible only when the teacher has created an environment in which each pupil holds responsibility for his own and his group's results. Integrating ICT in the educational practice, apart from providing an opportunity to individualize teaching, it also offers opportunities for network studying which, in turn, naturally stimulates unity, exchange of knowledge and experience, and provides an opportunity to pupils to learn from their peers; to sum up, it provides social support, both in terms of the pupil- pupil and the teacher- pupil relationship. Thus, there need to be practical solutions which will make the educational process be pupil-centered.

All ICT teaching activities should be goal-focused, as including any innovation for the sole purpose of decorating the lesson leads to formalization, and the road to the desired goal is complicated in an unnecessary way. Disrespecting the principal of Intentionality may suspend the conditions that stimulate pupils to come up with new ideas, and then integrate them with prior knowledge in order to make sense or make meaning or reconcile a discrepancy, curiosity, or puzzlement.

The complexity of the problems which pupils face in their attempts to deal with the contents of the educational curriculum should also be taken into consideration when developing curriculum which would include ICT; and the lessons learned should be applied in real situations through simulations. Pupils should be required by technology-based learning to articulate on what they are doing, the decisions they make, the strategies they use, and the answers that they found.

2. RESEARCHERS ABOUT BENEFITS OF INTEGRATION OF ICT IN EDUCATIONAL PRACTICE

Ittigson and Zewe (2003) point out that teaching Mathematics with the help of ICT improves the way mathematics should be taught and enhances student understanding of basic concepts, promotes greater collaboration among students and encourages communication and the sharing of knowledge, gives rapid and accurate feedbacks to students and this contributes towards positive motivation. The use of ICT in mathematics classroom also allows them to focus on strategies and interpretations of answers rather than spend time on tedious computational calculations, supports constructivist pedagogy, wherein students use technology to explore and reach an understanding of mathematical concepts. They confirm that this approach promotes higher order thinking and better problem solving strategies. Students would then use technology to concentrate on problem-solving processes rather than on calculations related to the problems [4].

Becker and Ravitze (2001) found that teachers with reasonable expertise in using computers, when five to eight computers are available for use in the classroom, and where they believe strongly in a constructivist pedagogy tend to regularly use computers in the classroom. Teachers engaged with peers in collaborative and leadership roles and who thus influence their peers more than most likely to have their students exploit computer resources during class. [5]

A recent research project conducted by BECTA (2004) (British Educational Communications and Technology Agency) investigated the effects of ICT on educational attainment, based on evidence from the published research literature. This study found positive effects of ICT on pupils' attainment in almost all the National Curriculum subjects (England), particularly regarding mathematics and English at all key stages. However, even this report emphasizes that the success of ICT' integration depends mostly on the pedagogical-didactic approach of teachers and their experience. The impact on attainment is greatest for those ICT resources that have been integrated in teachers' practices for a long time. The authors concluded that ICT has a positive impact on pupils' learning when the use of ICT is closely related to learning objectives and when the choice of how to use ICT is relevant to the teaching and learning purposes. [6]

Passey, D., Rogers, C., Machell, J., McHugh, G. and Allaway, D. (2004). investigated the effects of ICT on pupils' motivation. A sample of 17 schools from across England was surveyed. It found that ICT positively impacted on motivation, particularly in relation to engagement, research, writing and editing and presentation. Pupils reported that the Internet, interactive whiteboards, writing and publishing software, and presentational software were the most useful. There was also evidence that ICT positively influenced attitudes towards school work and school behavior. [7]

American researchers performed a meta-analysis of 26 studies conducted 1992-2002 that focused on the comparison pupils' writing with computers vs. paper-and-pencil. This analysis found significant mean effect sizes in favor of computers in relation to the quantity as well as the quality of the writing. The researchers also found that the writing process is more collaborative, iterative and social in computer classrooms as compared to paper-and-pencil environments, and they concluded that pupils who use computers when learning to write are not only more engaged and motivated in their writing but also produce written work that is of greater length and higher quality.[8]

3. FACTORS THAT RESTRICTS TEACHER'S USE OF ICT IN THE CLASSROOM

The barriers identified in the literature can be broadly grouped into three levels: those relating to the individual (teacher-level barriers), those relating to the institution (school-level barriers) and those relating to the system.

On the individual level the lack of ICT skills of teachers and the updating of these skills is a major barrier as it affects teachers' choice of a specific ICT much more than professional consideration. This, on the other hand influences the capacity of teachers to embrace new pedagogical practices with ICT.

The unpublished results of our three-year research, which dealt with the barriers of integrating ITC in the educational practice and was based on a sample of 145 teachers teaching 1st through 4th grade in primary schools, show that:

- Teachers need broader knowledge on ICT.
- Teachers need information in the choice and availability of resources.
- Teachers think that effective and efficient teaching does not necessarily involve integration of ICT.

In fact, the reason why they don't have positive attitudes towards the necessity of applying ICT in the educational practice is that they haven't been properly introduced to the benefits of ICT. The negative attitude of these teachers has most probably been determined by their insufficient training in terms of integrating contemporary ICT in the educational practice, even though the majority of them have already undergone some kind of training.

On school level, ICT infrastructure and access to ICT is still a major issue. As often shown the availability of technology alone is not the only factor for successful integration of ICT, but its absence or poor quality due to insufficient maintenance is a crucial hindrance. Schools without sufficient ICT resources are clearly missing out on the extra educational opportunities ICT can offer. Even though the Macedonian Government has integrated the project – A computer for every child – in primary schools and all computers have been set up and are ready to use, still, teachers point out that there are problems with the technical support, as well as with the discomfort of pupils in working in classrooms in which there is a computer on every desk. Teachers point out that the negative effects which computers have on the health of children if overused and the insufficient space in the classrooms so as not to hamper the movement of pupils.

Other inherent barriers at school level are organizational set ups which are linked to leadership issues and a strategy for ICT. Despite the fact that Macedonia does have a

strategy for the development of information society in which the role of education is emphasized, yet, there are hardly any primary schools which have integrated aspects of ICT in the educational practice as a part of their vision for development. The latest evidence shows that ICT strategies, in order to be effective, need to be integrated into the overall vision of the school. Moreover, where headmasters have used ICT to develop the school's values, teachers perceive a more positive impact of ICT.

The evidence also proves the recurrent claim of reducing system level barriers mainly that of existing assessment and evaluation methods which do not take into account new competencies acquired by using ICT in learning. Teachers are under pressure in reaching the standard objectives and fear that schools using ICT will be less performing than traditional schools. [9]

In the Republic of Macedonia there are pilot projects being implemented which aim at integrating standardized instruments for the assessment of pupils through ICT and connecting these new assessment instruments to proposed standards for accomplishments in the National Curriculum. The development of learning software and digitalized contents is still in its beginning. However, one of the biggest priorities of the Macedonian Government is to computerize society and develop computer literacy. Thus, the National Strategy for the Development of Education in the Republic of Macedonia (2005-2015) has been developed, and its priorities are defined as:

- The entire teaching staff must be computer literate by 2010.
- The entire teaching staff must use ICT in the teaching process by 2015.
- Every 4th grade pupil must begin to work with computers by 2007.
- Providing every school with sustainable access to fast internet connection.
- Connecting every classroom to local internet networks by the end of 2010.
- Reaching the principal of 5-15 pupils working on one multimedia computer by 2015.
- To provide access to support services and online educational resources by the end of 2010.

The Government project for the application of ICT in education is working intensively on the process of training teaching staff in three levels: technical training, applying educational materials in teaching and managing changes/innovations. In that context, schools, universities and training centers have already begun with the realization of the idea to take the role of local centers providing knowledge which is versatile and available to all. The politics in this field is based on the principals and suggestions of the European Employment Strategy and the National Lifelong Learning Strategies; and this is why we believe that the integration of ICT in the educational process will give the desired results.

4. CONCLUSION

Supply determines demand. Not every market supply leads to prosperity in any field of human existence. What is our point? Integrating ICT in the educational practice should not be supported only as a result of the fact that ICT has become dominant in the world markets, but because there is precise evidence for its educational value. Integrating ICT in the educational process results in higher academic accomplishment of pupils develops their collaboration capabilities, motivates them to be active, promotes critical and creative

thinking, and can facilitate in learning the reading and writing technique and develop speech competences.

Creating innovations in the educational practice in terms of integrating ICT in teaching must not be treated as a technical issue. ICT integration should be treated as optimization of learning and teaching processes. The basic prerequisites for the development of a successful ICT integration model are: providing materials and technical support, a vision shared by all educational institutions in terms of integrating ICT, training every teacher to have the appropriate knowledge, skills and competence in terms of working with computers and educational software, which will offer opportunities to cover the overall teaching process which is based on the principals of: Activity, Constructivist, Collaboration, Intentional, Complexity, Contextuality and Reflectivity.

5. LITERATURE

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