

Challenges of Advanced Technologies and School of the Future

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The era of advanced technology claims a different individual. The individual that would undisturbed function in the era of digitalization and would better perceive and protect our environment with the help of accomplishments and benefits of advanced information and communication technology (ICT). There is no better time for learning and concretization of these values as in school. Nowadays pupils, the pupils of digital era, are more and more experienced in the usage of contemporary media and networks. That is why they require the modification of conditions and teachers' role in the school. Will new information and multimedia or hypermedia support for classrooms and new didactical ideas improve learning results, and stimulate innovation and greater pleasure towards learning and knowledge? All these questions will be answered in our contribution.

Key words: traditional school, school of the future, computer classroom, multimedia classroom, hypermedia classroom, education networks.

1 Introduction

Sociological and pedagogical-psychological researches (Gerlič, 2000) show us that there are more and more changes in the area of Slovene education lately, and the interest for school reforms strengthens in the education of developed countries. Political, economical and technical conditions, and also the development of social democracy require essential changes in existing education, which is frequent also in social, pedagogical and financial crisis. Today the most developed countries firmly step in the stage of development, which is called **highly developed information society**. That kind of society solves problems of industrial production deadlock with increasingly use of robotization, massive introduction of information and communication technologies and with impetuous science development and education. That kind of society strongly emphasizes the importance of **educational system informatization** in the area of contemporary information and communication technologies introduction and also the search of **contemporary-innovative forms** for learning and teaching (Keegan, 1993). In the last fifty years, innovations were against the old educational system rigidity. They should rather modernize school, forms and methods of work. They should concretize educational content and adapt to the interests and capability of pupils. They should solve current problems more successfully, which is an outcome of knowledge "explosion", contemporary technology, electronics, automatization and cybernetics. Hierarchical relations between teachers and pupils should be exceeded. Innovations and development should create an atmosphere, where a pupil could say "I am

learning" instead of "They teach us". They should assure team work for teachers, integrity of subjects and common responsibility of every item in educational work for the quality of school work as a whole. They should assure work and pedagogical conditions in the way pupils would not participate actively only at class, but they would also contribute to their own development as much as possible. Teacher's functions should be changed, so there would be less and less "walking encyclopedias" or "talking textbooks". A teacher would rather be a strategist, researcher, planner, pedagogical diagnostician, work organizer, counselor, pedagogical therapist and tutor of young generations.

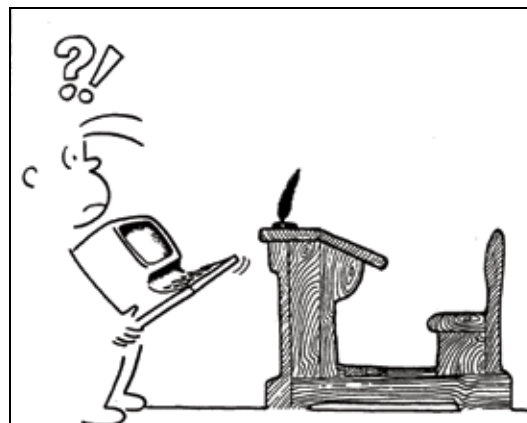


Figure 1: School and computer – problems with communication (Gerlič, 2000)

Nowadays, there are a lot of novelties in technics and school technologies, which are more or less familiar to teachers. They look at them rather modestly and use them inconsequentially. It is absolutely true that a lot of teachers do not know the function and pedagogical power of older and especially of contemporary ICT technologies. That is why they have negative attitude or they use them didactical unsuitably or even incorrectly. The many times heard statement that the research of common ICT technologies use effect in education is still in its early phase is certainly true. Because there are too few supposed researches and mainly they study the use of contemporary ICT technologies in didactical traditional (social) teaching forms and not in new ones, where their use is more perspective. Figure 1, entitled as *School and computer – problems with communication*, published in Italian magazine GOLEM, felicitously exposes indicated problems!

2 Didactical characteristic of historical era for ICT use in education

Historical review of ICT use in education and analysis of recent time era confirm the viewpoints of several authors that two factors had a deciding impact on the development of computer use in education:

- Programmed sequence learning with so called machines for learning and
- Quick development and improving the quality of computer and information technology.

The analysis (Gerlič, 2007) indicated how suitable can be the division of historical development of ICT use in education on the three important and didactic characteristicly eras (Figure 2):

- Early era of ICT use in education or the era before microcomputers – PC,
- Microcomputer – PC era and
- The era of computer educational networks.

The initial situation of computer introduction or ICT can be graphically presented as corrected didactic triangle (it contains four basic factors of a lesson: a teacher, a pupil, a teaching content and an ICT with educational function – Figure 2a). Because of the initial enthusiasm and success of computer use during lessons it was annotated too big role and reduced teacher’s role. This is soon shown as a strategic mistake and corrected didactic triangle (Figure 2b) gets a new essence. The teacher gets his leading role back and ICT is used in every field of education, where it is pedagogical possible and logical (monomedia era). In the further development (the initial monomedia era) some defectiveness were soon shown of such approach and consequentially, the necessity for didactic triangle transformation into didactic square (Figure 2c), where all mentioned elements equally influence on the quality of educational system. Multimedia accession in education means an optimal use of several different media accessions and technologies simultaneously, in educational and didactic sense it means a big step ahead. With the help of multimedia we incorporate text, pictures, video, sound, animations etc. into a lesson interactively. With multimedia we can, for example, take a walk through history, fly between planets in the solar system, search the micro world of live and inanimate nature, search

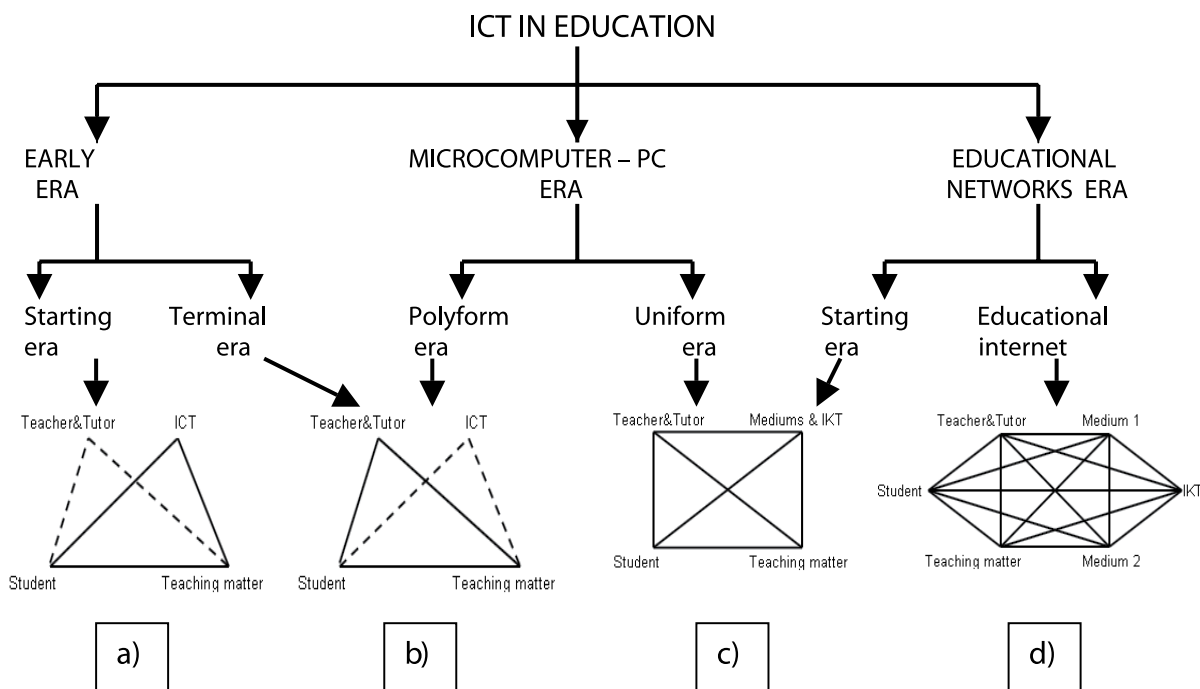


Figure 2: Didactical characteristic of historical era for ICT usage in education

for chemical structure of substances, listen to the music, learn language etc. With technological development of interactive possibilities and especially the most contemporary network technologies and accessions, simultaneous linking-selective use of ICT and the latest media (responder, interactive boards – tablets) didactic square is expanded into didactic polygon (Figure 2d), which in our opinion well illustrates didactic side of contemporary multimedia accession – hypermedia accession (hypermedia era).

Researches, which were performed under UNESCO, confirm so called Hebenstreit's division of countries into high developed, developed and developing countries in our analysis of development use of ICT in education (Gerlič, 2000). Three phases of ICT introduction in schools (Roblyer et al., 2007) are characteristic for all these countries:

- The first – experimental phase (monomedia era), which has already began in high developed countries before 1970, in developed countries before 1980 and in developing countries after 1980. For this phase less national oriented projects are characteristic, which were performed by small groups under leadership of higher education institutions and with the financial aid of region and state school authorities. They studied the possibilities of ICT incorporation into traditional school organization with very expensive and unsuitable hardware.
- The second - developmental phase (multimedia era) presents the intensity search of ICT incorporation into traditional educational forms and the search of connections with new didactic movements or educational system – reform experiments. ICT in schools understands this era as didactic innovation that is why it is studied according to many national and international projects. Characteristics for this era are many strategies of ICT introduction into educational process, greater adaptation of hardware and software for school needs and emphasizing the sense of suitable preparing of didactic equipment and teacher's education.
- The third – stabilization phase (hypermedia era) presents the degree of ICT use development in education where it losses "aureola" of innovation and starts to use as a normal, but very efficient system of the most contemporary education technology in every field of life and school work.

3 Didactic – technological example of development use trends of ICT in education

If we make some analysis and apply discussing issues on an example (for a set time) of didactic-technological designed classrooms we see that with the quick development of automatization and electronics technological achievements were quickly applied in school

work, which should improved organization and quality. In the sense of classrooms, the first response was the system of **electronic classrooms**, usually for performing linear or branch programmed learning. In the didactic sense it represents the corrected didactic triangle, which with decreased teacher's role (Figure 3) and with the help of picture, sound and simultaneous feedback (Interactive Response System) reaches bigger motivation, individualization, differentiation and greater pupils' activity. Technological and didactic weaknesses of electronic classrooms improve **computer classrooms** (monomedia era), which in the didactic sense present corrected didactic triangle (Figure 3) with less or more rendered teacher's role and linking role of ICT, which is used in educational system as individual (demonstration computer) or mass form (computer classroom for individuals or team work). With more and more efficient ICT and multimedia technology so called **multimedia classrooms** are being formed. They incorporate hyper interactive text, pictures, video, sound, animation etc., and in didactic sense present the transformation of didactic triangle into didactic square (multimedia era). With technological development of interactive possibilities and especially the most contemporary interactive ICT technologies, which incorporate educational presentational (Interactive Whiteboard Systems, Interactive Display Frames, AirLiner Wireless Slates, Interactive Tables, Document Cameras, Interactive response systems etc.), videoconference, mobile and interactive video technology (technologies of virtual reality also undergo the development) into whole-class learning or small-group and individual learning we get **hypermedia classrooms** (figure 4), which expand the didactic square into didactic polygon (hypermedia era).

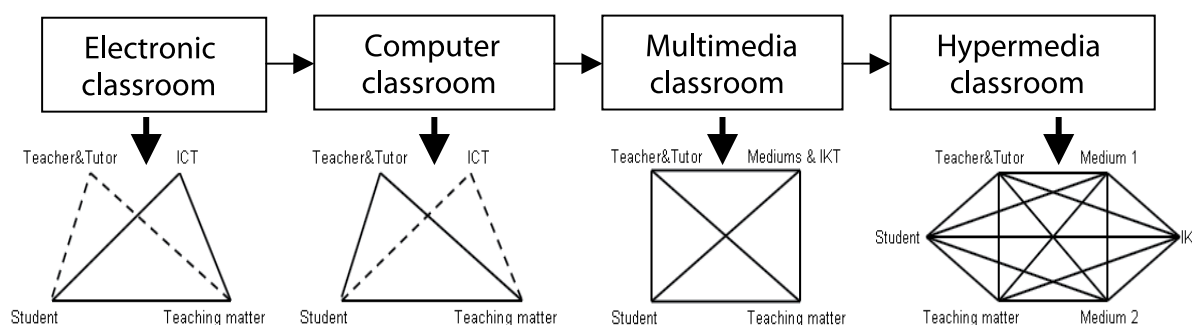


Figure 3: Didactic – technological characteristic eras on the example of the electronic-computer classroom development



Figure 4: Hypermedia classroom

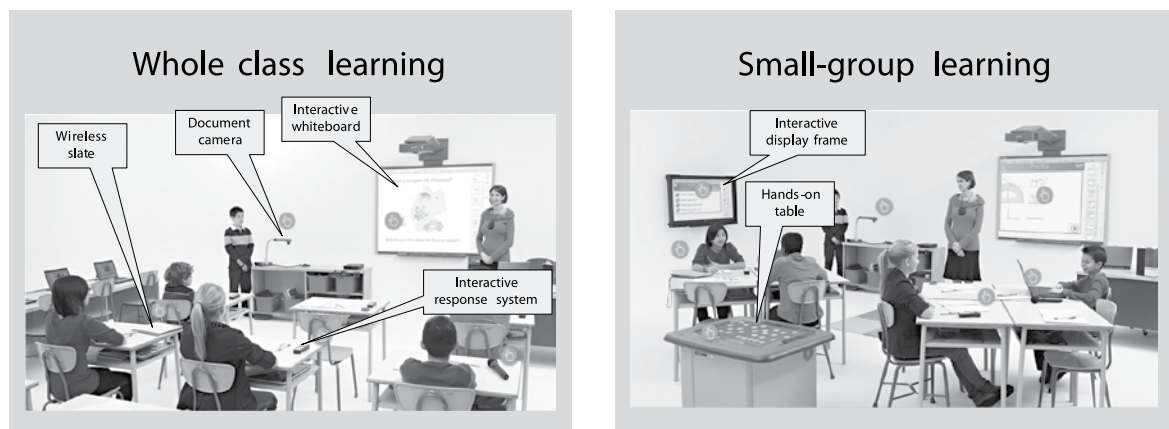


Figure 5: Contemporary information and communication technologies in school

4 Conclusion

It is obvious, that advanced technology claims a different individual. The individual that would undisturbed function in the era of digitalization and would better perceive and protect our environment with the help of accomplishments and benefits of advanced information and communication technology. It is also obvious, that there is no better time for learning and concretization of these values as in school. Nowadays pupils, the pupils of digital era, are more and more experienced in the usage of contemporary media and networks. That is why they require the modification of conditions and teachers' role in the school. The new information and multimedia or hypermedia supported classrooms and new didactic ideas will certainly improve learning results and stimulate innovation and greater pleasure towards learning and knowledge. That is why we have to arrange that kind of learning environment, teachers, and especially understandable school leadership and school

political institutions. The results will certainly not disappoint us!

5 Literature

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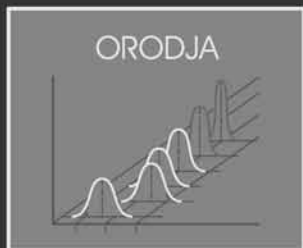
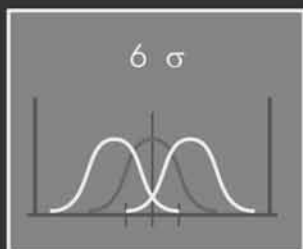
interest are didactic of physics, didactics of computers in education – ICT, educational technology, computer video production (video production, coding), multimedia (didactic and design), distance education and tele learning, internet application design, new video technologies (internet; VOD, cable TV), IKT technology for handicapped persons, electronic designing.

Izzivi novih tehnologij in šola bodočnosti

Doba napredne tehnologije zahteva drugačnega posameznika; takšnega, ki bo lahko nemoteno deloval v dobi digitalizacije in bo lahko s pomočjo znanj in prednosti napredne informacijsko komunikacijske tehnologije bolje spoznal in varoval okolje. Ni boljšega časa za učenje in konkretiziranje takih vrednot kot v šoli. Današnji učenci, učenci digitalne dobe, so vse bolj veščji v uporabi sodobnih medijev in mrež, s čimer zahtevajo spreminjanje razmer v šoli kot instituciji in tudi spremenjeno vlogo učiteljev. Bodo nove informacijsko in multimedijško oz. hipermedijško podprte učilnice in nove didaktične ideje izboljšale učne rezultate in spodbudile inovativnost in večje veselje do učenja in znanja? To se sprašujemo in na to bomo skušali v našem prispevku odgovoriti.

Ključne besede: tradicionalna šola, šola prihodnosti, računalniška učilnica, multimedijška učilnica, hipermedijška učilnica, izobraževalna omrežja

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