

# APPLICATION OF COMPUTERS IN MODERNIZATION OF TEACHING SCIENCE

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## ABSTRACT

The basic tendency of this paper is to point to the increasing application of information technology in teaching, and therefore also in the teaching of science and society. This means that educational process is constantly developing and improving, but teaching aids also are modernizing. Modern didactic and methodical knowledge are increasingly pointing out the shortcomings of traditional teaching and they offer solutions for overcoming these drawbacks, among the others, and through the modern informational technologies. In this sense, the use of computers is not just something that is recommended but it is becoming more necessary since it is the path to the active acquisition of knowledge and creativity. Multimedia teaching resources, contents and educational computer software enable students to critically use knowledge sources, to independently learn, analyze, systematize, compare and explore. The advantages offered by informational technologies are also in the fact that the teacher is relieved from one part of the obligation, teaching type, so it leaves him more time for the design of the teaching process. Purposefully use of teaching aids and forms of work, takes into account the capabilities of each student. The use of the computers and educational software in teaching provides a better flow of information since the presentation of information is performed through the multiple senses, so students can receive them visually or acoustically. Temporarily use of modern teaching aids (computers, educational software, etc.) allows students to come up quickly with different information and thus fulfill not only their increased interest in a particular area but also gain new knowledge.

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## 1. INTRODUCTION

In a society where informational technology affects all social segments and where the learning, work, and entertainment take place under a new, virtual environment are being created conditions for the emergence of the so-called informatic society that has the potential to grow into a knowledge society. This means that at the same time was developing and promoting the teaching process, but

also was modernizing teaching resources as well as technical equipment and tools used by the teacher and student.

We are witnessing a sudden and rapid development of science and technology, and in the field of education and teaching are also visible consequences of the scientific and technological revolution that brings new opportunities. While in traditional education students are generally passive, teachers are guardians of knowledge, "the use of computers opens new opportunities for active learning in which the student as a researcher takes responsibility for his own learning. But the teacher still remains the creative holder of teaching, and the use of new technologies gives him new opportunities to encourage creative expression in children. Also, it is important to emphasize the positive impact on motivation for work and learning that new technologies can have, and as confirmed by many studies (Robertson and

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Good, 2005: 45, 58).

Innovations in program contents of subjects in schools will not lead to substantial changes if they do not provide a new strategy of teaching, enriched by a variety of forms, contemporary learning models, dynamic working methods, as well as the application of modern educational technology. The use of modern teaching aids enables that with their application, teaching material represents to students in an obvious, dynamic and interesting way, taking into account the age and capabilities of students.

In order to achieve the best results in the process of transfer and acquisition of knowledge, development of abilities and interests of students and thus improve the quality of the educational process, it is essential that teachers use the possibilities and advantages of modern teaching aids, computers, and other devices, as well as educational software on the most appropriate the way. New technologies have made from the computer a device without which one cannot imagine a more serious business, as well as the people's daily lives. Life by the computer and with the computer, in fact, is becoming quotidian.

Nowadays, students are exposed to a variety of multimedia content that is on every step. They are overwhelmed by the many different types of information, and their attention is focused on a variety of content. In such an environment it is necessary to improve and innovate the teaching so it can become more acceptable, interesting and useful to the students.

All this shows that under the pressure of computerization, school is losing more and more privilege to be the largest source of knowledge and new information, so at this time we must be aware of this fact. For these reasons, we have to make the school modern as soon as possible, using the currently applicable forms, methods, and modern teaching aids, so teaching would become more efficient, more creative and more rational.

## 2. TEACHING OF NATURE AND SOCIETY

The main purpose of studying an integrated subject Nature and Society is beside to gaining knowledge and skills children develop their cognitive, physical, social and creative skills, and at the same time they are learning and building attitudes and values of the environment in which they grow up, as well as the wider community. By introducing the natural

and social phenomena and legality children develop cognitive abilities, form the basic concepts and gradually build up a basis for the system concepts in the field of nature, societies, and cultures.

The best results are achieved if the children independently explore and come to experiential learning, get to know the world around them as a natural and social environment. Summarizing, supplementing and restructuring experiential knowledge of students and bringing them into contact with scientific knowledge, children's knowledge is being upgraded, checked and applied.

The overall objective of an integrated school subject Nature and Society is introducing themselves, their natural and social environment and develop skills for responsible life in it. This course represents a programming continuity of the integrated subject World Around Us in the first two grades of primary education.

The concept of the program clearly indicates the continuity in the increased development of knowledge in the natural sciences which is reflected in the selection of the program content in third grade. It also clearly highlights a new approach in the study of the past in this age which is exempt from the content of broader history, because the students acquire it harder.

In the subject, Nature and Society goals are given in two ways. Explicit objectives are clearly stated in the program content. Implicitly goals are "hidden" and they emphasize the educational component of education. Concretized through specific operational tasks and activities, and they are realized through a selection of content from the field of nature, societies, and culture.

What is noticeable is that the program of Nature and Society is relieved of factography and repetition. The changed concept of the program avoids repetition and allows upgrading knowledge, skills, skills, and attitudes. The conception of the subject includes training students to use different sources of knowledge, graphic and electronic media.

The program only determined the general objectives and tasks of Nature and Society as a whole, and further operational elaboration of goals and tasks was left to teachers as a kind of freedom in creating the teaching process.

The realization of the objectives and tasks through the offered content of the program Nature and Society are the common obligation for all participants in the educational process. Set goals and objectives are realizing,

primarily, through the educational process in the school, enriched with the other forms of activities within the school curriculum. For the purposes of this subject are particularly suitable: organized visits, walks, tours, classes in nature, designed excursions, wintering and summer vacations for the students and all other forms of ambient learning. Besides using officially approved textbook sets, in the program realization of the subject Nature and society it is recommended and wider use of literature and other information sources: printed, audio-visual and electronic media; especially authentic natural and human resources, as credible indicators of reality, phenomena and processes in the world in which we live.

In the teaching of Nature and Society are applied all types of teaching materials: natural teaching aids, models, maps, photos, and applications. However, in the selection of aids, the teacher should opt for those assets that will optimally respond to the content and tasks of teaching units, as well as to abilities of students.

The subject of nature and society is, in fact, the result of the didactic and methodical transformation of the content that comes from living and inanimate nature, from history, geography, production, sociology, ecology, techniques, technology, traffic, general culture, work culture, education, arts and everyday human life. Students are not acquainted with the undesignated contents, which is requiring both didactic and methodical transformation of the content of natural and social sciences.

Professional activities teaching about nature and society should serve primarily as the basis and resource of pedagogical work for the realization of pedagogical tasks, forming of the basic concepts of nature and society, developing of interests, curiosity, and capacity for understanding natural and social phenomena at the age of the students. Knowing the skills development of the students at this age is one of the requirements for the design of educational content about nature and society (Stanimirović and Andjelković, 2003; 45).

The criteria for selection of the content from the natural and social sciences, techniques and technology, art and everyday human life may be found in the philosophical, scientific and pedagogical discourse. Philosophy criteria contribute to more neatly and objective consideration of the content of teaching and its spiritual-scientific concepts. Respecting of scientific criteria in the choice of teaching content ensures coherence, confidentiality, and accuracy of knowledge about nature, man,

and society. Appreciation of the pedagogical criteria allows for the curriculum to be devoid of superfluous positivist designed and unsuitable student teaching content (Ibid.).

Compatibility of the contents of teaching about nature and society with the aim of education is viewed and evaluated based on the selected content with the aim of education in general, with the goal of primary education and the goals and tasks of teaching about nature and society. Compatibility of the subject contents of Nature and Society with age, especially psychophysical and educational capabilities of students - respecting of this requirement in the selection and methodical processing of the contents of teaching Nature and Society, provides the appropriateness of the content in terms of size, depth, and the sequence of the psychophysical and educational characteristics of the pupils.

The spatial and temporal closeness of the contents to the pupil or the principle of the proximity environment binds also the builder of the teaching content in Nature and Society and their implementers (teachers), to choose those elements that are spatially and temporally close to the living conditions of the students. Representativeness and timeliness of the teaching content allow the compiler of the program, and later to the teacher, to independently regulate the scope and depth of the teaching content about nature and society and thus to make their content appropriate to the students' age abilities.

Content that teacher introduces in teaching, and content that belong to the knowledge of the proper science or other systems of human knowledge, should be such that: they represent basis for the development of organized conceptual and other relevant knowledge, not isolated and primarily factual situation; to represent a good basis for the expansion of the existing knowledge and the continuous development of the new knowledge; to be in order to prepare children to apply, in new situations, what they have already learned (Ibid., 49).

The role of the teacher is not only in terms of assistance that he provides to the students but also in terms of planning, organization and creating conditions for performing teaching activity, as well as providing the necessary aid when it is required. Therefore, he has the important task, in teaching the subject Nature and Society, to make it clear from the beginning that all the ideas and performances are subject for verification and not only those that students have, but also those which explains the teacher or textbook. A

teacher's primary role is that through various activities continuously improve and develop the student's knowledge of specific problems, whereby he has a dominant role in the creation of a social climate in the classroom. This is achieved the best with the help of the obvious means at the time, as well as with the application of information technology.

### 3. ROLE OF MODERN EDUCATIONAL RESOURCES IN TEACHING SCIENCE AND SOCIETY

In the didactic literature, as well as in school practice, there are different opinions regarding the general name for devices used to serve teachers and students in the teaching process. According to the contemporary understanding of cognitive processes, teaching resources are the material basis for the cognitive activity of the students, and therefore they are used in all stages of the educational process. One of the most general formulations of the actuating means is: a teaching means are didactic-methodical designed objective reality (Poljak, 1984, 55).

Teaching aids eliminate the disadvantages of the primary sources of knowledge. Broadly, teaching aids are all subjects that are used in teaching, taking into account the most important pedagogical, psychological and methodological principles. Teaching resources are sources of knowledge. Teaching aids are the part of the material bases of the labor by which the goals and tasks of teaching are achieving (Filipović, 1977, 124).

One of the most acceptable classifications of the teaching resources is the division of the verbal, visual, auditory, audio-visual and textual teaching tools. Teaching aids are tools for the application of the actuating means. These include: overhead projector, slide projector, applicator, magnetic board, radio, tape deck, TV, VCR, computer, projector-beam. In recent years, in the didactics is applied the term didactic media (Vilotijević, 2007, 424).

Modern teaching aids facilitate the efforts of students and teachers and allow a tighter connection between theory and practice, culture and civilization, knowledge and skills of the individuals, generations and society as a whole. Teaching aids are brought revolutionary changes not only in the didactic thought but also teaching practice of all institutions of general education and professional

character.

The basic functions of teaching aids are achieving of the obviousness, encouraging the intensification of the teaching and the development of intellectual and other capabilities, to achieve rationalization and cost-effectiveness of the teaching and they represent a material support to thoughtful students' activities.

The importance of teaching aids in the educational process is very large. Based on how much they are using teaching resources depends on the working atmosphere at the class, attention, and activity of the students, emotional relationship with the teacher and the subject. Using teaching aids are being developed visual, auditory and other sensory abilities, thinking and emotional, physical and moral dimensions of personality (Filipović, 1977, 124).

The items that are used in teaching may be found in nature or has been produced, and represent the last word of the technique. With the help of modern teaching aids such as educational software, the electronic laboratory for multimedia teaching can significantly enrich teaching. At the same time, opportunities are provided for teachers and students to get rid of many routine tasks, to express greater degree of creativity and that education receives the characteristics of constructivist attitude towards learning, which is the tendency of modern teaching systems (Abdulwahed, Nagy and Blanchard, 2008; Robertson & Good, 2005). By using appropriate teaching aid it will be easier for teacher to adapt teaching to the prior knowledge, interests, and abilities of the students. This aids significantly contribute to the faster modernization of the forms, methods, and procedures in the classroom, so students will learn more by seeing, exploring and solving problems.

"The introduction and use of the media in education meet at least two expectations: First, education is becoming more accessible, the physical barriers of the distance of space and time are overcome, and secondly, the media allow the improvement of the quality of education in didactic terms" (Blažič, 2007, 21). This means that the use of educational software, the electronic laboratory for multimedia teaching and other informational resources ensure a better way of learning, permanent memory and safe identification of what is remembered. The advantages of using modern teaching aids are such as easier preparing and performing teaching, independent work of the students and application of acquired knowledge in practice.

Modern teaching aids stimulate the cognitive activity of the students in the process of acquiring knowledge and developing an interest in self-employment. Technical devices quickly put in using the teaching tool which contributes to the greater economy of the class. Modern educational technology with using multimedia system create a precondition for engaging all the senses in the process of acquiring new knowledge, develop students' creativity and ensures their greater class and learning participation. Students can connect new knowledge with existing and to concentrate on the context and concepts rather than on facts (Abdulwahed, Nagy and Blanchard, 2008, 1).

All this shows that the new media and informational technology enrich the sources of the knowledge and that the teacher is no longer the only source of knowledge. First of all, we are thinking of the cable television, the computer, and the Internet. The main problem in using these media (particularly in younger age students) are doubts whether these sources are relevant and whether they are adjusted to the level of knowledge and maturity of the students. Therefore, the role of the teacher is very important and they need to prepare for the implementation of innovations in education in order to get the most from their use and thus move from traditional to modern school (Stošić and Stošić, 2013, 13).

Teaching aids that should activate the pupils and encourage them for independent, originative and creative attitude towards what they adopt, request of the teacher far greater activity and involvement in the preparatory stage and a different approach to the whole organization of the teaching. This is why teachers underused teaching resources and multimedia content, despite the fact that the knowledge of the students is gained without them are largely formalistic, so in teaching dominating receptive acquiring of the knowledge, cultivate the memory, neglect of thought processes and self-acquisition of the knowledge (Budić, 2006, 181). This problem can be partially solved by using the hypertext or the hypermedia because they can be controlled in terms of the resources, and students are free to use them if desired. It encourages students to appreciate the study of the literature as an additional source because it serves them, and they were not imposed on them, and on the other hand, allows and encourages the intellectual development of the children (Dillon and Gabbard, 1998, 322).

The use of computers and software with

multimedia content effectively suppresses formalism and verbosity from the teaching. Their use increases the activity and encourages students, fosters independence in the work, developing a sense of comprehensive review and analysis of the problem, sharpens the ability to observe, apply a variety of the practical activities, upsets the traditional relationship student - teacher and build a completely new partnership relationship between them. With the mentioned multimedia content can be achieved fully understanding of the content in some subjects and open the way for learning through the projects, and radically transform the work in the school and classroom (Abdulwahed, Nagy and Blanchard, 2008; Vilotijević, 1999; Dillon and Gabbard, 1998).

In this sense, electronic learning (e-learning) is now the key term that refers to the process of modernization of education under which the definition of the American Association ASTD (American Society for Trainers and Development) in 2001 means the methodology by which teaching content or activities learning are delivered by electronic technology. This definition embraces all diversifying names and specific forms of e-learning: E-learning, Web-Based Learning, Web-Based Instruction, Internet-Based Training, Distribute Learning, Advanced Distributed Learning, Distance Learning, Online Learning, Mobile Learning, Remote Learning (Glušac 2012, 5).

The essence of this doctrine is that it is easier and increased by using the ICT technologies and it is considered as flexible learning which includes a numerous strategies and technologies that support the learning process or the acquisition of knowledge and skills not only for students in the formal education process but also for all the users in the process of lifelong learning. When it comes to e-learning in the process of institutional educational interactive communication, it does not exclude existing methods of work in teaching, but complements them and enrich (make achieving of educational goals easy by meeting individual needs of students).

Considering that by using educational software, students progress according to their own abilities, they master the curriculum content at their own pace, they can return to a vague content and receive additional information, and at any time have the feedback on their achievements, it is incomprehensible why they do not sufficiently use in practice.

Multimedia content simultaneously engages multiple senses of student and thus contribute to a complete experience and un-

derstanding of the processes and phenomena. Through multimedia systems, it can provide simultaneous presentation of the text, video images (fixed or mobile), audio (speech and music), graphics and efficient search, process and store the valuable information (Mijanović, 2004, 253).

Of all the subjects in the elementary grades, the most appropriate content for the application of multimedia content has the object World around us / Nature and Society. Teaching this subject, based on interesting, authentic and interdisciplinary content, allows active, independent and creative participation of the students in all stages of the learning process. Similar conclusions brought and Jones (Jones, 2003) in a study conducted in Australia in the similar facilities.

To encourage greater class participation is necessary involvement of most students' senses, which can be achieved only with the new informational technologies that allow the student to simultaneously observe, listen, think and perform certain actions by moving a cursor on the screen. Multimedia features represent the integration of the images, text, audio, and movie into a single computer system and, if used in combination with the innovative teaching models, they can contribute to the improvement of teaching Nature and Society.

The advantage of information technology and educational computer software is that the students are given the ability to perceive and understand the phenomena and processes which are happening in nature slowly or too quickly, and those tiny the one that the naked eye can not perceive, or so large and away that man's senses are not able to register them. Multimedia movies and animations, if necessary, can be speed up, slow down, magnify, reduce or repeat as many times as necessary. Multimedia contents of educational software occupy students' attention and because they can interest students for the problem, bring it closer to life and didactic format it, so that the student arrives at the desired knowledge and critical approaches him, but also provide important feedback on student's understanding and progress (Abdulwahed, Nagy and Blanchard, 2008, 3-5).

## 4. APPLICATION OF COMPUTERS IN TEACHING SCIENCE AND SOCIETY

### 4.1. Computer software models in function of modern teaching

Today in the field of education in elementary school, when we are talking about to modern teaching, different models of software are used under the name educational computer software. This software include programming languages and the specific organization of teaching and learning based on logic and pedagogy. Considering the great potential of computers and digital technology, the conditions for the unlimited development of computer modeling and simulation are created. Application of software model in teaching has an aim, not only making the technical literacy of students but also contact with computer technologies and possibilities of their use. In this sense, educational computer software in teaching in general, including the teaching of Nature and Society, teaching content represent to the students at the obvious, dynamic and interesting way, taking into account the age and abilities of the students.

Educational computer software (ECS) is the intellectual technology and include ready-made computer programs that can be used within the content of the teaching, and who help and guide the individual learning phase. With the question of creating software and multimedia didactic teaching strategies a great number of domestic authors were dealing (Mandić, 2003; Matijević and Topolovčan, 2017; Nadrljanski and Nadrljanski, 2008; Radosav, 2005), giving a significant, primarily, theoretical scientific basis. However, until today there is still a great deficiency in the offer of any practical and of methodical solutions of the mentioned problems (Stanojević et al., 2017, 186).

Considering a large number of versions, the problem of classification of the educational software (ECS) is a very complex task, because it requires a certain standardization. Every year, the number of new solutions increasing, so it is understandable why none classification can not take the final, and that a large number of scientists pay attention to the classification of software for the various reasons, there are also the different classifications. For the classification basis is usually taken as a criterion learning method, the tool in the educational process, independence of the management, uses of computers and classifi-

cation by the subjects. In most classifications, there are stated the same models or types of software, but it is depending on the criteria of classifying and ranking explained their specialty. There are many criteria for the classification of multimedia educational computer software, which indicates that this area is very complex and that the educational software is very diverse. Classification of software in this paper was carried out according to the following criteria: The methodological, pedagogical and psychological, cybernetic and information and computer criteria (Nadrljanski, Soleša 2002, 104).

In the world today, many programs are developing that have been tested in controlled conditions and that showed that the possibilities they offer in the area of the independence of students in work, constructivist approach, and obtaining timely feedback can significantly improve the educational processes (Abdulwahed, Nagy and Blanchard, 2008, 8; Dillon and Gabbard, 1998, 322). With us, one such program is an educational software program Prirodnjaci (Naturalists) to the program for independent learning and it deals with the contents of Nature and Society for the third grade of the primary school. In our country, educational computer software can usually be found as an integral part of the textbook, that is, in the form of electronic books. Publisher "Kvarkmedija" from Užice has been working, for several years, to enrich the multimedia applied in schools.

Today in Serbia by issuing textbooks for primary schools many institutions are dealing, but none of them are not seriously engaged in producing educational software in general, and this applies to software in the teaching of Nature and society in the third and fourth grade of elementary school. However, Institute for textbooks and teaching aids has released discs Azbuka, I teach Latin, History and Geography, Mathematics textbook, and in addition to the World around us and Entertainment grammar, there are available and Guardians of Nature, Use your head and release AMSS Behavior in traffic. In addition to the World around us, which was conducted as a game of "Do not be madman" and is intended for the first and second class for determining the acquired knowledge about nature and society that surrounds them, no serious work. With so properly designed learning content in the form of "play" setted learning objectives are achieving more easily and more quickly and with better students' achievement, motivation is significantly higher, and teaching becomes

better and more efficient (Glušac, 2012, 30).

## 4.2. Educational software in the function of effectively teaching of nature and society

Educational computer software with electronic sources of informations provides an overview of the documents in accordance with individual abilities, backgrounds and interests of students. It, in combination with other models of work, reduces defects of the teaching classes.

In essence, these software motivates students to acquire knowledge and encourage the need for increased speculative activity, which involves solving problems and conscious application of knowledge in new situations. Educational softer raise the level of computer literacy of children that they need in further education, providing learning through projects and encourage diversity in the work method (Jones, 2003). Jones stresses that although I cannot be a complete substitute for concrete materials, especially at an early age, educational software and materials significantly complement and enrich the children's educational experience (Jones, 2003, 5). In the development of educational software included teams of experts because it is very complex programs appropriate, first of all, the age of students, and then written in a simple and understandable language.

When the teaching of science and society is concerned, today is observed a negative phenomenon that is related to an insufficient supply of educational software that follow the curriculum of the subject. This question is important because computer education programs may be helpful to teachers and in the preparation and during the teaching process.

Given that the program content of the subject World around us / Nature and society is very complex, it is natural that it needs a different ways of introducing and preparing students for the processing of new materials, because they are complex and belong to different areas of teaching. In this regard, use of computers in teaching Nature and Society should be introduced gradually and systematically, in order to have a better effect, From content in the field of nature and society, through computers, the most successful topics could be addressed in the living nature, as teachers can enjoy a multitude of films and animations about animals and plants.

Here we will list some program con-

tents from the subject Nature and Society in the third and fourth class which are suitable for the application of multimedia programmed materials within the educational computer software.

Third grade:

- Weather conditions and their significance for the living world,
- The connection of life communities and the role of man in preserving the natural balance,
- Circulation of water in nature,
- The population of our region,
- The mutual influence of man and the environment.

Fourth grade:

- Grouping a living world on the basis of similarities and differences (division into empires),
- Flora of our country,
- Fauna of our country,
- Domestic animals and cultivated plants,
- Man is part of nature, conscious and social being.

These software contents, within educational computer software, include the use of shorter documentary film inserts, animation of individual phenomena and processes, and the use of a multitude of images that will enable better understand the content for a students.

Creating presentations and handling the program within educational computer software is relatively simple and does not require great IT knowledges, so that each teacher with elementary computer knowledge can do similar (semi-programmed) materials. Creation involves breaking up the contents of the selected teaching unit into smaller logical units grouped by weight, and formulating appropriate tasks for their exact solutions. The presentation of content within educational software can only be present in a part of the time - introductory, central or final, which depends on the content are being processed, knowledge, interests and abilities of students.

The class of teaching Nature and Society with the application of educational computer software should, for example, begin by combining the dialogical and monologic methods and demonstrating the educational activities of the educational type. The teacher asks questions that are planned by the game activities, and the students give answers which are leading up to the name of the teaching unit. After discovering what will be learned on time, the teacher gives detailed instructions to students

about how to work on educational-computer software. In order to motivate students and the announcement of the teaching unit, you can use the crosswords, associations, songs and the like. The use of associations can be even more fun if it is organized in the form of a competition, by which we encourage and develop the competitive spirit of students.

Educational software, such as Recovery, Kogot's multimedia games or multimedia quizzes, within ORS and computer-mediated teaching, can be successfully applied to achieve the goals of the introductory part of the time. These games generally include multi-choice questions and provide timely feedback on the accuracy of students' responses, which additionally contributes to motivation for work. Then, multimedia games are often suited to enrich themselves with other content, such as cartoons, educational emission inserts, or records of concepts that are studied in the context of teaching of Nature and Society.

The advantage of multimedia text in teaching of Nature and Society through the presentation of computer software is that it can be used at all stages of the time - introductory, main and final part, so that there is almost no teaching unit that cannot be illustrated and deepened with text. Here's what the sequence of moves in the work of co-educational software looks like:

At first, the student, as the first information, gets a cover page that contains keys with names of teaching units within the course of nature and society teaching, which are included in the software. By clicking on the button, electronic material opens in the form of instructions for the student's independent work. The instruction contains an explanation of what (what are the contents of the ORS), then how (the mode of work on the programmed material) and the end why (the importance of the content for further learning) the student will work. After the instructions for the work (introductory article) the unit is being processed. It consists of a certain number of "steps", i.e. the information that constitutes parts of the teaching material. The advantage of software learning is that different content is interconnected with links, which allows students to switch to content of other parts, can give them additional knowledge of what they are interested in, and then can return to the same page and continue to read the text. Linking the text allows to overcome the boundaries between teaching topics and units, to meet the need for new information or deeper explanations, and most importantly, according to some authors,



it leads to a natural form of learning that is characteristic of the human mind (Dillon and Gabbard, 1998, 323).

In the case of software Naturalistics, we give the possible sequence of activities in the process of acquiring knowledge.

At the beginning, there are questions that require recognizing knowledge. The discovery of such questions by students is that, based on the study of multimedia material, they recognize the answer that is true between the several answers offered. When a student chooses a response by clicking a word or image, he receives feedback at the same time as to whether his answer is correct or not. If the answer is not correct, the educational computer software automatically displays a slide with an additional explanation or returns the student to the same slide, again trying to solve the task set. If the answer is correct, the student moves to the next slide containing new multimedia information and questions for whose answers a higher quality of knowledge is required. In this case, questions have no answers, so students are obliged to formulate sentences themselves. Educational software also here provides feedback on the accuracy of the response.

What is specific to all educational software, and therefore ORS Naturalists, is the constant presence of feedback (Abdulwahed, Nagy and Blanchard, 2008, 8), which allows the student to know what he has learned at all times, what is not, in what has made a mistake and how to correct the error. Feedback, whether positive or negative, can be given in the form of sound effects or in the form of text. They can be like applause, cuts from cartoons, recorded voice of a teacher, or texts that appear after clicking on the answer appear over the entire screen, also in the function of positive or negative corroboration.

On the Internet, free services that facilitate the preparation and organization of the teaching material are increasingly present. Also, e-learning models that can be used in classrooms are all more accessible, which are based on properly prepared texts, photographs, films, audio recordings, presentations, electronic evaluation, educational games and quizzes, interactive software, etc. These learning resources can be recharged and supplemented, actualized and coordinated with the needs of learning. It is possible to thematically connect the contents from different sources, comparing them and thus further encouraging and fostering of exploratory- critical and synthetic-analytical potential of the students. In

this way, teachers (and students) would have access to numerous electronic learning materials and teaching (Solaković et al., 2012).

The most frequent resources used for the implementation of e-learning in classrooms are sites that are designed for the teachers to facilitate the implementation of e-learning in the traditional classroom. Some of these Web addresses are: <http://veseleklupe.wordpress.com/about>, <http://www.zbornica.com>, <http://www.zbornica.rs>, <http://www.kreativnaskola.rs>, <http://veseleklupe.wordpress.com/about>, <http://riznica.wordpress.com>, <http://klikdoznanja.edu.rs>, <http://www.deteplus.rs>, <http://naukica.wordpress.com>, <http://uciteljskoblogce.wordpress.com>, <http://www.umotvorine.net>, <http://www.razredna-nastava.net>, <http://ispeciparecideci.wordpress.com>.

Hilčenko (2013) quotes access through the use of animated films in the context of e-learning, and it is also interesting the access through the use of a blog (for a particular subject in a particular class), as well as the learning platform ([pid3.blogspot.com](http://pid3.blogspot.com)). Šikl, Novković and Spasojević (2014) did an analysis of such sites in Serbia and in the region from the aspects of the presence of the contents from the following categories: planning of teaching, realization of teaching, preparing lessons, multimedia, evaluation of students' work, creative ideas, useful links, educational games, educational texts and the ability to communicate. The conclusion is that the sites that are available to the teachers are fairly comprehensive, in addition to the contents from all segments of classes they also provide the ability to communicate and thus provide higher quality and feedback effects of the application of e-learning in the classroom.

### 4.3. Changed role of teachers and students in modern computer class

In the history of the school, for a long time, traditional teaching was held with a teachers' lecture at its center. It was at the center of the educational process and the exclusive source of knowledge it taught and determined how successful learning was.

However, the new concept of school and learning is based on new conditions and on information technologies that put students in the center of the educational process with all their specificities and possibilities. But the role of teachers in the new circumstances is of immense importance because it changes in the new multimedia educational environment.

By doing this, the teacher becomes an organizer who designs, initiates, and supports his learners in independent search within the educational computer software.

Since innovations must become the way and style of teachers' work in school, and since responsibility is very high, each teacher must be trained in innovation and the use of innovative work models in the teaching of individual subjects. This means that they need to have a very specific theoretical knowledge and practical skills for programming, introduction to teaching practice, monitoring and evaluation of an innovative work model. This capability implies not only the knowledge of content, i.e. knowledge from the field of expertise in which innovation is carried out using an innovative model of work, but also a very specific methodical knowledge (Bandur, 2007, 8).

Since the teacher as the manager of the teaching process is irreplaceable, just as the computer as a teaching tool is so far "perfect", then it is a solution to combine the advantages that the teacher has, as an individual, with the advantages of modern technology, in the way that better results in teaching of Nature and Society would be achieved.

For a long time, pedagogical science has determined that each student of the individual is himself or herself with his own special specialties, ranging from character, temperament, interest, experience or living conditions. This diversity implies that the student must develop his own learning methods and manage the learning process, which relates to the choice of materials, planning, the pace of learning and the use of modern educational technology.

Namely, in the new concept of education called. Net-generation students, it is not enough to organize the teaching that is focused on the students, it is necessary more than adjusting to different learning styles - it is necessary to leave the students themselves to the "command" of learning. Increasing the autonomy of the students in this regard is the right active, participatory learning, and the role of the teacher is changing to such an extent that the difference between him and the students almost completely disappears (Downes, 2005). It changes the perception of time and with that the need for further modernization of educational technology is more progressive.

In the context of modern educational technology, computer technology and information technology enable students to assume responsibility, control the choice of content in a multimedia environment, evaluate their learning and activity. Computers also allow

learning to continue at any time and any In addition, modern computers provide the possibility of simultaneous use of multimedia sources of knowledge, which, certainly, contributes to a faster and more complete adoption of materials and a lasting memory of the learned.

Accordingly, research has shown that modern technology and the opportunities it provides should be used cautiously and rationally, and that, for example, linking should not completely replace other forms of multimedia such as film, because it has not been shown to be effective in all situations. Namely, it has shown the greatest success in students who already had developed abilities and affection for research tasks, such as tasks requiring a literature review and comparison of data. For students with less abilities, and for other types of tasks, there were significantly more successful tools and methods of learning (Dillon and Gabbard, 1998, 345).

Teaching contents that are presented to students by multimedia content and computers not only modernize nature and society teaching and raise it to a higher level than traditional ones, but also put students into the position of an active participant. Since multimedia software at the same time allows that students independently acquire knowledge, solve problems, tasks, answer questions, search the appropriate databases, simultaneously check the accuracy of the response and, after the operations are done, to correct their mistakes, "empty Odo "excluded continuous feedback that follows each step in the work of student activities (Arsović, 2006, 570).

Educational software provides optimal individualized work, where the speed of learning and promotion largely depends on his abilities, with constant feedback acting motivated.

According to the RS Official Gazette, some of the objectives of the course "From toys to computer" are to train students for the use of educational programs, programs and drawing tools, the use of computers in the game, and so on. Particular attention should be paid to mouse operation and the use of computer for writing text. The focus of work in the third grade should also be oriented towards students' use of computers in teaching and learning ("Official Gazette of RS", 3/2011).

However, with all legal proclamations, students of the first two grades of elementary school are still under-qualified for self-learning using a computer. Teacher can demonstrate certain objects, beings, phenomena and processes through the frontal form of work, using computers or other media carriers. On

this occasion, it should be taken into account that the content is presented with as little text as possible and with the use of images, animated elements, sound effects and movies.

Thus, practitioners make everyday effort to organize learning more flexible in terms of time and environment of teaching, to enrich the teaching materials and make them more interesting for students and that students become a part of teaching process in a greater way and they are motivated and actively building their knowledge according to their abilities and needs and are carried in a way that promotes their overall situations development. In the application of e-learning, students' learning is more dynamic, more independent, more responsible, critical thinking permeated learning. It is evident that e-learning in this regard provides a numerous of the features that ensure the further development of the educational process.

New competencies are expected from the teacher for the organization of the modern teaching characterized by dialogue and interactive access that is supported by e-learning. Effects of its application in teaching are conditioned by the professors' skills to find a large number of Internet content that would contribute to achieving the setted goals, to successfully incorporate e-learning in their teaching, to monitor the progress of students in such learning and evaluates it in the context of the development of students. Also, it is necessary to trains students systematically since the beginning of school to use technology in learning, to foster in students the need for such a form of education and the desire for continuous self-learning and self-processing.

Taking into account the reality in most schools in Serbia and insufficient financial capacity of the state to complete the technical and technological equipment, as well as the value of traditional organizations which continue to lack the e-learning (socio-emotional component of direct interpersonal communication), we see a solution in the model of e-learning, which combines the advantages of both conceptions of teaching (Blended Learning). The teacher by using this mixed model of e-learning, facilitate the transition to self and to the students to new ways of organizing students' learning while retaining the advantages of organizations classical education and supplementing it with e-learning. We believe that in the near future, a joint venture e-learning as a flexible combination of classical teaching, e-learning and distance learning will be dominant system of work in schools. It is in-

evitable that the weather will, in perspective, make teachers to become computer-educated, schools better technical equipped and information and communication tools all the more perfect, that will make e-learning to develop new capabilities and reduces defects related to direct social interaction.

If it is expected from the teacher and the professor to form and educate generations of the future carriers of social change, then they should be enabled more significant than before and the continuous training and development of competencies that are necessary for that kind of work (from the initial education, through the seminars and courses that schools and vocational associations should do more to financing. This, especially as the younger generation, in particular, is extremely interested in the wider use of the various opportunities ICTs in teaching. For now, it turned out that teachers are trained to use innovations in education, but they are not sufficiently trained to apply the advantages of using the Internet in the same (Stošić and Stosić, 2015, 468).

#### **4.4. Advantages and disadvantages of using computers in teaching**

According to research carried out by scientists from the United States, Great Britain and Russia, it can be said that "computer-based lessons are more rational, that students gain more quality, lasting and, in practice, much more applicable knowledge than those acquired in the teaching of traditional (Suzić, 2003, 43). These opinions are prevalent in spite of deficiencies that are also evident, and can be related to the lack of interaction in teaching, the problem of privacy and copy-right (Mantiri, 2014, 590).

The teaching and learning process with the whole group can be simultaneously personalized using computer technology. This means that each student has the opportunity to work - acquires certain skills, skills and abilities, according to his own rhythm and level of engagement. The degree of student's progress will depend on his / her knowledge, activities and computer educational technology.

Given that educational programs are formed by teams of IT and computer experts, it is natural that these programs are better and guarantee a high level of science and motivation, with almost unlimited possibilities of obtaining additional information.

When presenting appropriate educational content, the computer has the technical

and programmatic capabilities for children to simultaneously animate more cognitive senses, thus gaining better performances, concepts and facts.

Unlike traditional-type teaching, here the student is almost never in doubt about whether the problem was properly understood. "Thus, each individual can realistically realize himself, more objectively evaluate his intellectual, character, willingness and all other characteristics of importance for his own progress and development" (Havelka, 2000, 137). This primarily because modern ICT encourages intellectual curiosity of students, his personal approach to the problem solving and individual style of working and thinking (Mitić, 2014, 105).

A student using a computer quickly and efficiently learns the appropriate teaching content, so he has more time to focus on problems and phenomena of particular interest. If it encounters more serious difficulties, it receives adequate instructions from the computer to overcome the problem.

Modern computers have extremely high technical and informational capabilities, with high speed search and processing information. There is also an Internet connection for searching and consulting a variety of databases. With the help of this technology, teachers and students can also try to form their own libraries and repositories of knowledge (articles, photos, materials collected on school trips, excursions, recreational classes ...). Comments of the students always show that students are very interested in this method of teaching work and that the changes in work, like the use of the Internet to gather information, are really good.

The curricula can be active/interactive researched, and students can work independently or collaboratively, in the context of the constructivist approach and achieving inter-integration of the subject. With this approach, it is enabled mastering material according to the individual characteristics of the students (learning styles, so-called personalization of learning). When it comes to hypermedia applications for learning, simulations, it can be used also for individual and cooperative learning. How contents and requirements of this system can be also very complex, it is more recommended to use them for cooperative learning, for mutual exchange and assistance and adequate teachers' feedback-a (Stanković and Stanojević, 2017, 44).

Effective learning with the help of a computer is no longer related to an institution,

a cabinet, a working day, or an hour. An individual can study certain issues at home, on a trip, excursion, regardless of the time and place of his current stay. The computer is not only used to acquire knowledge and learning, but also for a very efficient management of the teaching process.

Despite many of the stated advantages of using computers in education, there are certain weaknesses. There is a problem of difficult programming of certain content-thematic units. It seriously complicates computerized education and continues to focus only on educational or material-cognitive problems to the detriment of the educational dimension, although they constitute an integral component of a unique educational process. Then there are problems of adapting to the needs and abilities of students, as well as an adequate program selection, theme, and modeling (Dillon and Gabbard, 1998, 345).

Since a computer and student communicate in writing, he does not have the ability to hear the lively word of the teacher, which negatively reflects on the enrichment and improvement of his speaking ability. It has completely denied direct verbal communication face to face.

If the goal of teaching and learning is to achieve educational goals and tasks, the teacher is obliged to work on the students in their own example, engagement and behavior. In the process of computer education, there is no such example, a pedagogical model and an ideal that the students can imitate.

The computer gives very reliable feedback, but it can not go into diagnosis - why a particular student is lagging behind in the work, what is blocking him. The teacher, by his personal example and power of character, discovers and develops with the majority of his students the best.

In the end, some researches carried out in the world has shown that educational software often does not correspond to the cognitive, physical and emotional level of children's development, and warns that in their development, care must be taken to avoid damaging children's development (Jones, 2003, 4).

Therefore, teaching in general and consequently the teaching of Nature and Society with the application of information technologies has a number of advantages over traditionally organized teaching. There is no doubt that, in terms of the ability to adapt learning to the individual attributes and abilities of students, the use of diverse sources of knowledge, more successful monitoring and more

objective evaluation, computer teaching is in serious advantage. However, when it comes to affirmation of educational function, acting on students by personal example, knowledge of the emotional, mental and general psychophysical structure of students; setting diagnoses about the causes of mistakes and problems that burden individuals, the possibilities of computers are minor in relation to the power and influence of teachers.

## 5. CONCLUSIONS

Computer era in which we live more and more frequently imposed requirements for modernization and radical changes in the implementation of the teaching process in order to overcome the weaknesses of still dominant traditional teaching. At the time of information technology and general mobility of the society, traditional ways of learning and presenting teaching materials to the students become uninteresting and impractical. In order to increase their motivation, it is necessary for teachers to modernize teaching materials in order to make them more attractive for learning. In this regard, insists on modern teaching, which includes the introduction of the innovative models, and the use of modern teaching aids.

We have seen that from all the subjects in the lower grades of the elementary school, the most appropriate content for the application of the multimedia contents has the subject World around us / Nature and Society. Thanks to interesting, authentic and interdisciplinary content, in teaching this subject, using modern technology, it is allowed active, independent and creative participation of the students in all stages of the learning process.

It is known that teachers as initiators of the change, do not show enough enthusiasm or they fear from the outcome of the use of modern teaching aids, so they very rarely use them in the classroom. This applies not only to simpler technical devices but also to a more modern and more complex computing and computer equipment, which requires a solid IT knowledge. However, despite the many advantages offered by informational technology, the teacher has also released from a portion of the obligation of teaching type, which leaves him more time and energy for creativity and design of the teaching process in teaching nature and society. Therefore, the faster the pace of change in the field of ICT, diversity, and breadth of available scientific knowledge,

obliges all teachers to continuously learn and be in accordance with the time, because of their students and themselves. "Then when teachers accept and open their eyes towards the educational potential of the technology they will come out from irregular, outdated circle of teaching-learning-teaching" (Stanković and Stanojević, 2017, 47).

Namely, in order to raise the quality of teaching to a higher level, it is necessary to change the concept of the work, overcome teaching with the teacher in the "lead role" and turn to more sophisticated strategies for achieving educational tasks.. It is good that the most teachers, in the choice of teaching methods, teaching aids and forms of work, take into account the capabilities of each student. With that is more respected individual differences of the students, and makes it possible for every student to develop at a pace that suits him. The use of computers and educational software in teaching provides a better flow of information since the presentation of information is performed through multiple senses, so students can receive them visually and acoustically. Appropriate use of the modern teaching aids (computers, educational software, etc.) allows students to quickly come up with different information and thus fulfill not only their increased interest in a particular area but also to gain a new knowledge.

The multimedia approach of teaching in general and particularly in the study of integrated content in the teaching of Science and society is one of the most trusted solutions for the modernization of teaching. The use of computers is not just something that is recommended but something that is necessary, since it is the path to the active acquisition of the knowledge and creativity. Through modern informational technology, students learn more by seeing, exploring and solving problems, they encourage them to the mobility and independence, mark the degree of sensory information that indicates things, phenomena, and their characteristics. Multimedia teaching resources, contents, and educational computer software enable students to use a critical source of knowledge to independently learn, analyze, systematize, compare and explore. In this sense, the main goal of this work is to draw attention to the general pedagogical expert and the scientific public and to highlight the wide range of the opportunities that are offered by e-learning in the educational process, and it is already at the level of classroom teaching.

E-learning offers significant opportu-

nities for the teachers to improve the educational process in this regard. If we look at the e-learning in the pedagogical context, it is “interactive or two-way process between the teachers and students, with the help of electronic media, with the emphasis on the learning process, while the media are only adjuvant that completes that process” (Simović and Čukanović-Karavidić, 2010, 762). According to one of the most common definitions “e-learning means any form of education in which educational content is delivered in electronic form (Fallon, Brown, 2003, according to Petrović, 2009, 265). In the context of teaching situations, application of the media is broadcasting educational content through the interconnected interactive media and it provides different methods and forms of learning.

The fact that the use of ICT is the imperative of modern teaching, it can also be seen in the *Strategy for Development of Information Society in Serbia (2010, 13)*. Although didactics continuously gives his theoretical contribution in this regard (cybernetic didactics, developmental and constructivist approach to learning), methodological (practical) implementation is not nearly at a satisfactory level. The needs for innovative projects in education are distinctive because there is a large gap between scientific-technical achievements and the needs of labor, on the one hand, and the quality of the educational process, on the other (Novković Cvetković, Stanojević, 2017, 54).

Therefore, at the present time, the teaching process is almost unthinkable without the use of the Internet and educational computer software. ORS includes programming languages, software tools, a certain organization of teaching and learning, and contains a variety of educational programs that are intended for students of different ages, based on logic and pedagogy (Nadrljanski and Nadrljanski 2008, 169). Educational software explicitly represents various strategies and teaching techniques that are specified by author and they allow their controlled application with the aim of adopting more productive content that the student, by using the system, needs to overcome. The main role of educational software, as modern interactive media is to enable, create prerequisites accelerate them: the process of students’ learning; understanding of educational content; activity of the students in the learning process; mastering the learning process at all levels, starting from the knowledge of the basic facts about the processes, phenomena and events, through their understanding through thought-processing, to the

practical application of knowledge.

The most important value of the educational software is that with its help can be achieved a multimedia approach to teaching. There are many features of multimedia applications, represented in educational software, that enhance the educational process: visual presentation of skills; a broad base of available knowledge; indices; researching (students are researchers that with the help of “guides”, “tour”, etc., which are orientation in mastering the material, get to needed information); students’ individual style (emphasis on internal insight, discovery, exploration, conceptual knowledge and understanding of mutual relations); simulation (except for navigational interaction, students can use simulation, various intellectual tools, playing games, such as “what if” type material “Why-so” and similarly); realization of communication networks, through which group simulations can be realized, to create opportunities for discussion and exchange of opinions, reviews, information. (Stanojević et al., 2017, 188).

E-learning under conditions of existence abundance of the electronic resources of the teaching materials and in conditions of different shaping this material through the new teaching technology, it can be relatively easy to use in teaching work. The key is motivation and creativity of the teacher with adequate ICT competence in at least the minimum technical and technological conditions (they are constantly being improved, but they also regularly serve as a pronunciation) and with the basic informatics literacy of the students (which in turn is responsible the teacher because students and parents often favor an optional subject From the toy to the computer if it is on the teacher’s offer). It is understood that the teacher thorough knows planned courses that should be realized and based on them trials and adjusts contents available in electronic form for the implementation of e-learning in their teaching. ICT more competent teachers are increasingly engaging in designing their own database of electronic materials or websites dedicated to the students or colleagues. Increasing the volume of these resources and the expansion of choice contributes to the increasing popularization of e-learning among the teachers. More and more exchanges of experiences about the implementation of e-learning at all levels of communication and relations of teaching: teacher-teacher, student-student, and teacher-student, which opens new horizons in the innovation of teaching through modern technologies.

So, using educational materials in electronic form, in teaching has not only given a chance to the new pedagogical paradigms, but it imposes a new form of professional cooperation between the teachers themselves. The need and desire to design a material that is suitable for digital presentation, for each subject and for all generations, will displace individual authors and replace them with the creative groups. Once created electronic educational content is easily adjusted and upgraded in regards to the classic textbook (Writing scratch and by individuals). The ability of such a project is being built by the simultaneous development of a didactic-methodical and ICT competence of the teachers and competence of wider pedagogical repertoire (Stanojević et al., 2017, 189).

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The authors declare no conflict of interest.

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