TEACHING AND LEARNING OF ECOLOGY FOR THE STUDENTS OF VOCATIONAL SECONDARY SCHOOLS IN MULTIMEDIA ENVIRONMENT

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Abstract: This is a multidisciplinary paper presenting a synthesis of informational, educational, and ecological factors. This author discusses the interrelationship between the aforementioned factors by means of an analysis of a comprehensive model of information-communication technology (ICT) support in the teaching and learning of ecology for students of vocational schools. In other words, the objective of the paper is to define accurately the manner, time, and extent to which computers, educational software, internet, as well as other modes of information – communication technology (ICT) are used in the ecology-related subjects taught in vocational schools, i.e. to offer a model of ICT support the implementation of which will be possible not only in ecology lessons, but other subjects with associated ecological contents as well.

Keywords*:* model; teaching and learning; computers; methods.

1. INTRODUCTION

The paper analyses the issue of information-communication technology (ICT) support in the teaching and learning of ecology in vocational secondary schools. This issue was the focus of author's MSc paper Matić, V. (1987) which argued that the implementation of computers in ecology lessons can significantly contribute to more efficient education as compared with more traditional approaches. On the grounds of the experience obtained through a research conducted previously on both the global and national level, the author has created an ICT model to provide support in the teaching and learning of ecology for students of vocational schools, which he deems could be successfully introduced in a teaching-learning process. Primarily, the model envisages the use of computers and other information technologies in the process of teaching and learning of ecology; however, if the model is modified to a certain extent, it can be also implemented in the teaching and learning of other subjects related with ecology.

The backbone of the model is the support by means of an IT programme developed and tailored to meet the needs of the conducted survey. Namely, it suggests a multimedia and interactive schoolbook on ecology depicting part of the syllabus called 'ENVIRONMENT AND ECOLOGY', a section of Biology course book, designated for the first and second-year students of vocational secondary schools (Vrček, Lj. (2007)). It is designed to be used together with other information technology toolkits (the Internet, LCD projector, Webcam, etc.) in the multi-media school environment.

The survey was carried out at Vukovar Vocational Secondary School on a sample of 400 first and second-year students and 10 teachers and associate educators whose opinion is relevant to this field.

The study was carried out through a comparative analysis of two groups of participants. Firstly, there was a group of the students that had lectures on the aforementioned topic in a traditional classroom where the lessons had been given in a traditional approach. Secondly, there was another group of the students that had learned about the same topic on their own in a multi-media environment (IT classroom) using the aforementioned application and access to the Internet as well as information technologies.

Then, all participants were divided into the groups of approx twenty students who were asked to complete a questionnaire about their opinion on learning ecology by means of IT support and determine whether it is more efficient than the traditional learning approach. The teachers and educators were asked to complete the same survey as a separate group. The results

of the survey clearly lead to a conclusion that the teaching and learning of ecology in vocational schools supported by IT programme is much more efficient than the traditional approach.

2. OBJECTIVE OF THE PAPER

The core objective of this paper is to indicate, based on theoretical research and the practical application of IT support in the teaching and learning of ecology in vocational schools, the statistically significant possibility of increasing the students' overall level and quality of knowledge on ecology. Naturally, besides the core objective, there are some secondary objectives, which include:

(1) Acquiring knowledge on the level to which IT support in the teaching and learning of ecology in vocational schools has effects on the quality and quantity of the acquired knowledge,

(2) Determining how time-efficient the result of applying IT support in the teaching and learning of ecology in vocational schools is compared with traditional approach,

(3) Illustrating the extent to which IT support in the teaching and learning of ecology in vocational schools influences the growth of the students' motivation in the overall educational process.

Determining the extent to which the model of IT support in the teaching and learning of ecology in vocational schools takes into consideration the wide range of students' individual abilities.

3. METHODS, TECHNIQUES AND RESEARCH INSTRUMENTS

Methods of induction and deduction, analysis and synthesis, simulation, compilation, and comparison are used in this paper.

The research techniques used in this paper are as follows:

(1) Analysis of professional literature,

(2) Tests,

(3) Observation-monitoring,

(4) Questionnaire,

(5) Data processing.

For the validity of the sample this research was conducted by means of a random sample of number of individuals from 30 class-groups learning different vocations at the Vukovar Vocational Secondary School.

Besides the students, teachers and associated educators, a school pedagogue took part in this research that greatly enhanced the quality of the results.

The research was carried out in the following stages:

(1) Developing the research project design (designing the project, accepting the research project, making the layouts and protocols, and testing the software),

(2) Collecting the data (collecting the data that enabled the assessment of the hypothesis made),

(3) Classifying and processing the obtained data (processing the data, presenting the given results, summarising the most valuable results of the research and final discussion).

The following methods of processing the data statistically were used in this paper: IDA analysis (Initial Data Analysis), EDA analysis (Exporatory Data Analysis) and synthesis.

Prior to the research, the students were given no information on the contents of the research. However, the teachers and associated educators were informed about the contents and techniques of collecting and processing the data shortly prior to the commencement of the research.

Having done the tests, the students were given the evaluation forms which enabled them to give their own assessment of the validity of the IT support model in the teaching and learning of ecology in the school they are attending. Their remarks and suggestions will have huge significance for the first revision of the developed IT support model.

The research was executed in the 2008/2009 and 2009/2010 school year.

A. The role of IT support in teaching and learning ecology for students of vocational schools

Analysing the syllabus, educational plans and programmes of the vocations for which the research was conducted, it was determined that apart from ecology, there is a whole range of school subjects that deal with ecological subject matter. It was therefore, concluded that IT support in the teaching and learning of ecology could be implemented in the teaching and learning of other school subjects providing that certain modifications to the model are made.

B. IT support in the teaching and learning of Science

In addition to the teaching and learning of ecology, the school syllabus associated with protection and improvement of workplace conditions and life environment is present in other school subjects. Analysis of the syllabuses and framework educational programmes shows that the ecological themes are also present in the teaching and learning of science. Finally, social studies courses also touch on related themes. Table 1. shows science courses whose syllabus tackle ecological issues.

Table 1. Overview of science courses whose syllabus tackle ecological issues

No.	School Subject	Programme –Vocation							
		Agricultal tehnician phyto pharmacist	Technician nutri-cionist	Hotel tourist techni-cian	Tourist and hotel business administra-	Waitor	Cook	Hairdresser	Beautician
1.	Biology	■	■						
2.	Biology with Ecology			■					
3.	Biology with Hygiene and Ecology				■				
4.	Ecological food production		■						
5.	Work Safety, Hygiene and Sanitation		■						
6.	Plant protection	■							
7.	Biology and Ecology					■	■		
8.	Practice	■	■	■					

The research was conducted on a sample of four 4-year vocational courses the and four 3-year vocational courses. These included the courses providing training for the following vocations: agricultural technician phyto pharmacist, technician nutritionist, hotel tourist technician (as one group), and tourist and hotel business administrator, waiters, cooks, hairdressers and beauticians.

Taking into account all particularities and differences in these programmes, we find out that the IT support model tested in this research can be implemented in the teaching and learning of this group of school subjects. It goes without saying that the model used should be modified to meet the needs of each case and adapted to the programme of each individual course.

C. IT support in the teaching and learning of social studies

The number of the social studies classes which touch on ecological issues is small. However, as they do cover topics and themes which are related to ecology they should not be neglected. On contrary, the IT support model tested in the conducted research can also be used, with minor modifications, in the teaching and learning of social studies provided that it takes into account all factors related with the group of science school subjects. Table 2. shows social studies course whose syllabus tackle with ecological issues.

Table 2. Overview of social studies course whose syllabus tackle with ecological issues

No.	School Subject	Programme – Vocation							
		Agricultural tech-nician phyto phar-macist	Technician nutri-cionist	Hotel tourist tehni-cian	Tourist and hotel business administra-	Waitor	Cook	Hairdresser	Beautician
1.	Ethics	■	■	■	■	■	■	■	■
2.	Geography	■	■	■					
3.	Tourism – associated geography				■				
4.	Practice	■	■	■					

In order to undertake this research, the author developed a multimedia and interactive course book on ecology which combines part of a Biology course book for the first and second-year students which compresses the ecological issues, student's personal remarks, Biology teacher's remarks, experiments carried out at the school laboratory and as a field works, videos and sound database.

An 'assessment test' adds a special interactive feature to the course book offering the students the opportunity for self-assessment, revision and check of the individual and group results. The majority of students find this way of learning more efficient and effective than the traditional approach.

Unfortunately, it must be stated that in our country there is a lack of educational software tailored to the teaching and learning of ecology. In particular, this lacuna affects the students of vocational schools. This means in practice that the teachers have to develop educational software on their own; as was exemplified by this research. Another option is to purchase relevant software from abroad and adapt to meet local needs.

In this light, it is most realistic to expect that educational software will be developed by ecology teachers themselves. They should be thought of as project leaders who will seek the advice and assistance of other experts (software designers, sociologists, and pedagogue).

The model used in this project tailored to meet the needs of this research is only one example of how this can be done. It is the result of the author's long-term questioning of the problem of how to put together information technology, ecology and education. It is derived from a carefully maintained web diary, which Dave Winer defines as 'personal records on the web site and part of community'. In terms of methodology, this consists of a blog on the Internet available to all those sharing the same interest and a place where they can give their personal remarks and suggestions and in that way, they can contribute to better final solution.

D. Computers and modern information technologies aimed at the teaching and learning of ecology in vocational schools

Computers have posed a challenging task for all those striving for the enhancement of educational processes and the introduction of innovative elements to increase the overall quality of education. Owing to the fact that they are an exceptionally suitable means of communication between students and teachers, computers also play an important role in the teaching and learning of ecology for students of vocational schools.

Learning ecology by the young, notably the students of vocational secondary schools by means of computers and other IT toolkits is a relatively new activity which has not been elaborated in detail yet. The research conducted by the author of this paper shows that the application of appropriate IT support makes it possible to eliminate a whole range of weaknesses featured in a traditional approach to the teaching and learning of ecology. They are as follows:

(1) Insufficient productivity and efficiency,

(2) Insufficient application of the acquired knowledge and skills in practice,

(3) Teaching and learning that are not adapted to individual abilities of students and insufficient motivation to learn,

(4) With the dominance of a verbal teaching methods in traditional approaches,

(5) Lack of efficient observation of knowledge attainment, etc.

The research shows that, besides computers, it is possible to use other information technology toolkits, e.g. TLP and LCD projector, overhead projector with LCD panel, cassette player, video, etc. in the teaching and learning of ecology for the students of vocational schools. Naturally, access to the Internet is a must-have.

A whole range of new toolkits that can be used as IT support in the teaching and learning of ecology and other subjects associated with ecological themes have appeared on the market lately.

Particular advantages in the teaching of ecology for the students of vocational schools are provided by the *micro camera*. It is most frequently used in the teaching and learning of Biology and Chemistry, and it enables the reproduction of the fine details on a TV screen or LCD projector. It enables direct reproduction of images/pictures and graphs from the course books which significantly improves the quality of teaching and learning and, in parallel, saves time for the teachers when preparing the lectures. In addition, this camera can be connected to a microscope by means of a special adapter to gain enlarged images on an LCD projector or TV screen.

An important component of IT support in the teaching and learning of ecology in vocational schools is an interactive electronic board. Combined with MIMIO Xi technology, a common white-board becomes interactive. Instead of ordinary ones, electronic felt-tips are used for writing. The written text can be stored in the memory of a computer and reused whenever needed. This technology allows the teachers to add the images and graphs as well as texts from other programmes. It can be written in 48 colours and projected by an LCD projector or be shown on a TV screen.

Naturally, modern multimedia-supported teaching and learning cannot be imagined without a Web camera, VHS camera, and quality digital camera. These are the tools that are used not only for projection of the teaching materials, but also enable the teachers to develop new materials. It is not a rule, but in most cases, the best quality teaching materials used in multimedia teaching are created at schools. As stated in the introduction, such materials are developed by teachers of different professions (subject teachers, pedagogue, sociologists, etc.).

Input and output units which provide access to the desired information as well as automatic acceptance of the data from the environment play an important role in the dissemination and learning of ecology. These units consist of the following elements: a TV camera, a microphone, a scanner, etc. They generate the multimedia entities such as videos or audio records, etc.

All information technologies listed here, including the educational software designed by the author of this paper, were used for modelling the IT support for the teaching and learning of ecology for the students of vocational schools. The product is ILS type model, which integrates teaching and learning ecology.

This model includes a multimedia informational system which simultaneously deploys various forms of information (texts, graphics, animation, music, speech) by means of interactive communication with the user. Modelling of this type of informational system requires good knowledge of informational, educational, and ecological factors and their inter-relationship in order to define the time, manner, and the extent to which computers, software, Internet as well as other information – communication technologies are used in an educational process in vocational schools. Normally, this model has combined aim of enabling the implementation of the tailored model in teaching and learning ecology with the learning and teaching of all other subjects which deal with ecology-related themes.

E. Informational laboratories and IT classroom in the teaching and learning of the students of vocational schools

National pedagogical standards of secondary educational system in the Republic of Croatia (National gazette – NN, No. 63/08 and No. 90/10) regulate uniformed conditions of a quality for educational procedures and the successful realisation of goals and tasks in secondary school system. In terms of facilities designated for exercising the vocational schools' syllabuses, the standards do not require multimedia classrooms. However they regulate that schools must have IT classrooms (laboratories) equipped with a computer network consisting of a server and fifteen computers.

This was the reason that the experimental part of this research was carried out in the IT classroom of Vukovar Vocational Secondary School. The hardware tailored for equipping the IT classrooms of secondary schools in Croatia approved by the Ministry of Science, Education

and Sports of the Republic of Croatia was used. In addition to this hardware, we used the educational software developed for the needs of this research by the author of this paper.

The backbone of the model of IT support in the teaching and learning ecology for the students of vocational schools used in this research is a model based on a multimedia and interactive course book on 'ENVIRONMENT AND ECOLOGY' designed as an application which joins the external modules of specific purposes. The application encompassed the teaching materials of the aforementioned topics from the course book (P. Hotomski, 2004), out of which the author has used the integral text. This course book was intended for the first and second-year students of vocational schools, so that it was the reason why the research was conducted on this group of research subjects.

To develop the multimedia and interactive ecology book, we used Microsoft Visual Studio 2008 and ASP.NET platform Framework 3.5. The application was developed as a webpage in order to make it available to all those interested in it. This was produced along with a guided code for all platforms. It supports Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight.

One crucial characteristic of this multimedia book is its interactivity. Hence, the book included a self-assessment test section, a check-your-result section, and a revise section. Fig. 1 shows the home page.

Fig. 1 Home page

Interactive features add special quality to the multimedia book by providing a 'self-assessment test' through which the respondents carried out a 'test- yourself task'. This offered the students a possibility to revise and check their individual and collective test scores (Figure 2-5).

Fig. 2 Questions

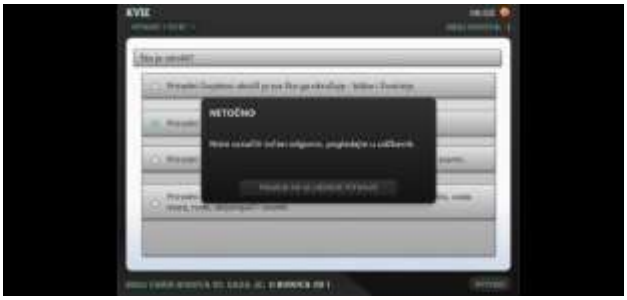

Fig. 3 Incorrect answers – go back

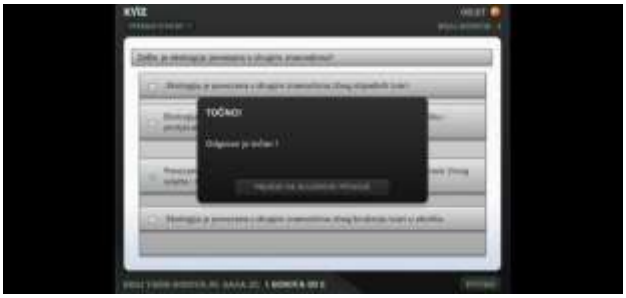

Fig. 4 Correct answers – next question

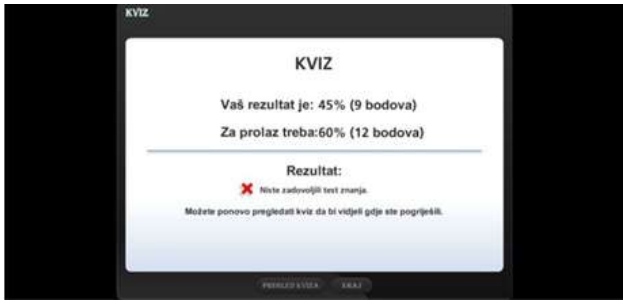

Fig. 5 Score

4. DISCUSSING THE RESULTS OF THE RESEARCH

With the aim of proving that this model of IT support in the teaching and learning of ecology for the students of vocational schools increases the overall efficiency of the educational process, i. e. in order to confirm the main thesis of this research I examined the data shown in Table 1 which is a synthesis of the results obtained from the respondents giving their answers to twenty questionnaire questions. The objective was to learn about their opinion on the advantages of the teaching and learning of ecology supported by the author's IT model comparing when compared with traditional teaching approaches. Only the correct answers were taken into consideration. Table 3 shows synthesis–based overview of the correct answers.

A comparative analysis shows that the IT supported teaching and learning was far more efficient than the traditional approach. Out of 400 respondents who took part in the research, 206 students (51.49%) that had learned in the traditional way gave the correct answers to the questions. This number was significantly larger among the students who had learned through an IT supported course.

Table 3. Synthesis–based overview of the correct answers obtained from a test given to students who had undertaken a traditional ecology course and students who had taken an it supported course

Question	*Tr*	*Ip*	*Tr [%]*	*Ip [%]*
1.	98	14	49,50	78,50
2.	96	18	49,00	79,50
3.	44	94	36,00	48,50
4.	27	95	31,75	48,75
5.	42	36	60,50	84,00
6.	86	70	46,50	67,50
7.	19	03	29,75	50,75
8.	08	72	77,00	93,00
9.	49	41	62,35	85,25
10.	58	57	64,50	89,25
11.	81	76	45,25	69,00
12.	53	14	63,25	78,50
13.	07	18	51,75	79,55
14.	98	74	49,50	68,50
15.	72	08	43,00	77,00
16.	08	38	52,00	84,50
17.	48	65	37,00	66,25
18.	10	99	52,50	74,75
19.	38	29	59,50	82,25
20.	77	47	69,25	86,75

The data shown in the table were used to calculate the ratio of the correct answers between the two research populations.

$$\sum_{Tr} = Tr_1 + Tr_2 + ... + Tr_{20}$$

$$\sum_{Tr} = 4119$$

$$\sum_{Tr}/20 = 205,95$$

$$\sum_{Ip} = Ip_1 + Ip_2 + ... + Ip_{20}$$

$$\sum_{Ip} = 5968$$

$$\sum_{Ip}/20 = 298,40$$

$$\sum_{Tr[\%]} = Tr_{1[\%]} + Tr_{2[\%]} + ... + Tr_{20[\%]}$$

$$\sum_{Tr[\%]} = 1029,85$$

$$\sum_{Tr[\%]}/20 = 51,49$$

$$\sum_{Ip[\%]} = Ip_{1[\%]} + Ip_{2[\%]} + ... + Ip_{20[\%]}$$

$$\sum_{Ip[\%]} = 5968$$

$$\mathbf{\sum_{Ip[\%]}/20 = 74,60}$$

The fact that 298 students (74.60%) answered the questions correctly indicates that the IT supported way of learning is more efficient than the traditional approach. In addition, it confirms the main hypothesis of the scientific

research work that ‘ the author’s applied model of IT support in the teaching and learning ecology for the students of vocational schools increases the overall efficiency of the educational processes.

Fig. 6 shows the correct answers by the respondents obtained from both traditional and IT supported approaches to learning. It clearly shows that the IT supported approaches to learning are much more efficient than the traditional approach to teaching and learning ecology.

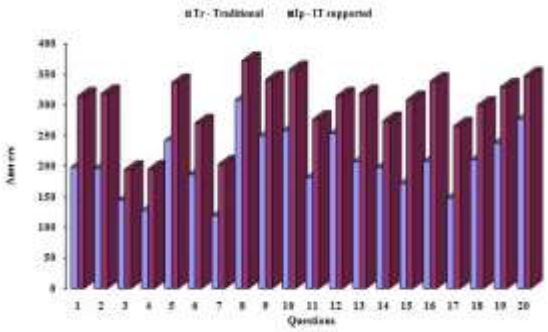

Fig. 6 Correct answers by the respondents obtained from both traditional and IT supported approaches to learning

A. Evaluation of the research-based results

Taking into account the subject, problem, objectives, and tasks of this paper it is possible to conclude that this frequently tackled and practical issue of up-dating not only the lessons of ecology and ecological awareness of the students of vocational schools, but education as a whole.

Today, modern ICT toolkits have become an inevitable part of a contemporary educational system. Having been invented and implemented in education, they have made the teaching and learning process prone to modifications. These modifications encompass not only the changes of and supplements to the school syllabuses and programmes of particular school subjects, including ecology as well, but also require completely different organisation of the educational process and the application of new teaching materials and tools along with adapted teaching methods, techniques and manner of teaching.

Regard to the scientific and social justification of the conducted research, it is must be said here that they have to be separated from each other and observed individually. Scientific research is aimed at gaining new knowledge and facts, which can significantly influence the society to change. These changes are most frequently noticeable in the quality of life of an individual and society in its whole.

To some extent, the social problems recognised scientifically initiate further research works associated with a particular area. The current global trends indicate a rise in the significance of ICT. In order to achieve optimal implementation of these technologies in education, it is necessary to determine the time, manner and extent to which computers, software, Internet, etc. can be used in the teaching and learning of ecology for the students of vocational schools, i.e. to offer a model of IT support whose implementation will be possible not only in the learning and teaching ecology, but also for other subjects dealing with ecology-related themes.

The results obtained through this research with no doubt lead to a conclusion that the state of the teaching and learning of ecology and other subjects with ecological themes is quite bad in terms of IT support (equipment) in the teaching and learning of ecology for the students of vocational schools. Having understood the current conditions, the author of this paper has made an attempt to give his contribution to the introduction of modern information technology into the teaching and learning of ecology for the students of vocational schools and indicate newly opened fields to be further researched.

Scientific justification is enhanced by statistical data obtained through a survey on 400 students and 10 teachers and associated educators of Vukovar Vocational Secondary School where the research was carried out. Analysis of the results indicates the current situation at the school in terms of IT equipment and the IT classroom, which is only occasionally used as a multimedia classroom. Additionally, the research provided information on the manner of teaching and learning of ecology in terms of the application of traditional approaches and IT

supported approaches to teaching. The teachers' opinion on the advantages of the IT supported teaching and learning of ecology is an exceptionally valuable contribution to the results of the research.

The following IT support toolkits are most frequently used in a teaching process: overhead projector, computers, Internet, and LCD projector. However, the ecology lessons are not carried out in a multimedia classroom, but in a traditional one. The most challenging problem they have to tackle within the teaching process is a lack of educational software tailored to meet the needs of teaching ecology. Naturally, other factors must be taken into consideration, e.g. insufficient training/skills of using the IT support, inability to use the IT classroom, etc.

The results of the research are encouraging in terms of the application of the educational software designed by the author of this paper given that all teachers who took part in the research shared the opinion that this model of teaching can significantly contribute to advancements and improvement in the teaching and learning of ecology for the students of vocational schools, and an overall increase of the efficiency of the teaching and learning process.

All interviewed teachers and associate educators had the opinion that the application of computers and other IT elements enhanced the teaching and learning of ecology for the students of vocational schools. As much as 70% of the interviewed teachers think that the model of IT support in the teaching and learning of ecology used here has had positive effects on the efficiency of the teaching and learning process. The noted that IT supported learning:

(1) Enhances the students' motivation (80% respondents)

(2) Shortens the time required for learning (60% respondents)

(3) Provides a higher level of information retention (70% respondents)

(4) Takes into account the individual learner's abilities and working rhythm (50% respondents),

(5) Enables students to score the acquired knowledge levels and test results (80% respondents).

Regarding the effects of IT on the speed of transformation of the humans' work and life conditions and functioning of the society as a whole, not only globally, but locally, the conducted research supports its social justification. Advancement of IT application in education, as a social subsystem, is a prerequisite for the betterment of the global society; thus the obtained results will surely do their bit in the modernisation of education in the future.

Today, the advancement of IT application in education has a direct impact on the development and position of a society in the global world order. Therefore, this paper can be seen as a small contribution to the advancement of IT application in ecology-associated education for the students of vocational schools as a subsystems of education. The use of IT support in the teaching and learning of ecology and other school subjects dealing with ecology requires teachers to master IT skills. Only the teachers with excellent IT skills can successfully use the modern ICT in the teaching and learning process. Differently from our, I dare to say, poor experience in the implementation of these technologies in the teaching and learning of ecology, global experience is quite different given that IT assisted learning has become the norm over the last few decades. Due to this fact, we highlighted only the genera, namely initial guidelines of IT application and elaborated the global model of IT support in the teaching and learning of ecology for the students of vocational schools.

The scientific and social justification of the paper surely indicate the possibility of further theoretical and practical research in the field of the teaching and learning of ecology for the students of vocational schools by means of implementation of modern ICT in education approach with the aim of improving the educational process as a whole.

Most of the interviewed students find this way of teaching and learning much more efficient than the traditional one.

The research encompassed the assessment tests and measured the relevant parameters influencing the efficiency of this kind of teaching and learning. The measuring of the relevant parameters and analysis of the obtained results

were carried out by means of standard statistical methods.

The most significant scientific contribution of the research is a formal specification of the sum-total of educational methods and ICT for the realisation of support to a traditional education. Also, it is a proof of better quantitative and qualitative results of learning school syllabuses in the IT supported teaching and learning of ecology and other subjects that touch ecological themes.

The unique/original contributions of this research are as follows:

(1) It provides an analysis of the methods of the traditional approach to the teaching and learning of ecology for the students of vocational schools with the aim of developing an adequate model of IT support

(2) Selecting the most representative tasks of particular teaching units and adding them to a section called 'acquired knowledge assessment tests' enabling the interviewed students to do 'self-assessment tests', revise and see the individual and collective test results,

(3) It created a novel, interactive course book on ecology in real conditions and demonstrated its effectiveness through testing it on the sample of the students of Vukovar Vocational Secondary School and provided an overview of the results of its implementation.

5. CONCLUSION

Through the history of humanity, there have been the technological advances that can be implemented in a teaching and learning process to make it more efficient. The early 21st century has been marked by the application of modern ICT so that a traditional approach to teaching and learning is gradually losing its previous significance.

Hence, teaching and learning of ecology and other subjects touching ecological themes is becoming interdisciplinary. This indicates that interdisciplinary teaching is becoming increasingly important and that cross-curriculum teaching and learning has become an indispensable factor in the teaching and learning of ecology for the students of vocational schools.

The most crucial challenge tackled in this research, is the role of IT support in the teaching and learning of ecology for young. This research demonstrated that IT supported learning enhances the teaching and learning process.

The objectives and tasks of the research were obtained by means of science-based analysis of the quality and quantity of the extent to which the traditional technology and information-communication technology aimed at educational purposes, level of the teachers' education and skills in the application of modern educational technologies to teaching and learning ecology, and development of a model of IT support in teaching and learning ecology for the students of vocational schools.

In addition, the general hypothesis of this research work has been confirmed: 'the model of IT support used in the teaching and learning of ecology for the students of vocational schools enhances the overall efficiency of the teaching and learning processes.

Along with taking into account the fact that the teaching and learning of ecology and other subjects dealing with ecology themes in the IT-based school environment becomes interdisciplinary, it is necessary for the teachers to put additional effort to master the use of these technologies, which is not the case in traditional education.

The Internet as a global network becomes a medium in a global communication and provides almost an infinite source of teaching materials for all school subjects, including ecology as well. The use of these resources in the teaching and learning of ecology for the students of vocational schools is largely dependent on the teacher's competence to evaluate correctly the available educational software, but authentic teaching materials on ecology in line with the objectives and tasks of school syllabuses, plans, and programmes.

Today, educated teachers are the source of economic power enabling development of the modern society. Education in developed countries is the best profit-gaining sector, but it asks for permanent improvement of the methods, means, and processes of teaching and

learning. In this process, the computers and modern information – communication technology (ICT) play a significant role which affects the efficiency of the teaching and learning process; hence the teaching and learning of ecology for the students of vocational schools, too.

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