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IMPACT OF IMPLEMENTING IT TOOLS IN ELEMENTARY SCHOOLS ON PUPILS' MOTIVATION LEVEL

Dragana GLUŠAC[1], Žolt NAMESTOVSKI[1,2], Valerija KREKIĆ-PINTER[2]

[1]University of Novi Sad Technical Faculty "Mihajlo Pupin", [2]University of Novi Sad Hungarian Language Teacher Training Faculty

Key words: IT tools, elementary school, motivation level

Prof. dr
Dragana GLUŠAC

Mr
Žolt NAMESTOVSKI

Doc. dr
Valerija KREKIĆ-PINTER

Abstract: *The main aim of this paper is to describe the possibilities of implementing IT tools in elementary schools. Our survey assessed the differences in motivation levels in an experimental and in a traditional educational environment. In the experimental educational environment we used modern teaching tools like computer, interactive whiteboard, projector, interactive and multimedia software support, while in the traditional education environment there were mainly printed materials and traditional teaching tools. The results of our questionnaire and the number of reactions during the teaching process determined the motivation level of pupils.*

1. INTRODUCTION

Today, in the time of expressed importance of information technology in our society, we cannot imagine a serious business or daily life on this planet without computers. In fact, living in front of and with computers has become a common routine. Network communication, interactivity and fast transmission of information are also important in the life of individuals who live in the information society. Adoption and development of such skills are the main prerequisites for these citizens to become full participants of the information society, and therefore are of particular importance (Zs. Námesztovszki, M. Takács, D. Glušac, 2011).

If the main goal of the educational system is to prepare students for living in the information society, for lifelong learning and e-learning, it is impermissible to lack IT skills at end of the process of formal education. While new technologies can help teachers enhance their pedagogical practice, they can also assist students in their learning (Bingimlas, 2009). In the information society of nowadays, implementation of modern technologies is of key importance. The intensity and methods of this implementation define the efficiency of learning. Different learning environment, the methodological characteristics of IT learning and different prerequisites for learning, all result in different outcomes at the end of the learning process. Nevertheless, correctly used hardware, software and methodological principles help to realise a more effective educational system. The implementation and application of modern technologies have some methodological characteristics. Students have to face IT contents not only within IT course, but also during learning other subjects, as well as in their everyday life.

The best solution for teaching IT contents is the method when every student has his/her own computer during classes in informatics labs. Due to this structure of teaching, every student has an active role. The ultimate goal of teaching IT contents is to build up a system of skills, which is flexible and can be improved (can be used in other software and hardware environment). It also prepares students for using several IT tools, for independent learning, for searching and classifying contents from the Internet, for safe use of the Internet and for the challenges of e-learning. The extent to which technologies can facilitate dialogue is the extent to which they succeed as educational tools (Johnson, 2011).

Teaching methods can be frontal, individual, pair work and teamwork. Depending on the intensity of their application, we can classify educational environment into:

Traditional educational environment: traditional teaching tools and traditional forms of work have predominance in educational processes. This environment is determined by frontal forms of work and traditional teaching tools (for example: models, printed documents, photographs, collections and albums). Computer and other IT hardware are not present in this educational system.

Combined educational environment: this educational environment is determined by one computer and one projector per class or group. Computers and projectors are used by teachers, in most cases for presenting PowerPoint shows or contents from the Internet. Teaching takes place in

classrooms, and information technologies are used for supporting teachers' performance.

Interactive educational environment: determined by intensified application of modern hardware and software tools in educational processes. Teaching takes place in informatics labs. Apart from computers and projectors, there are interactive whiteboards, response systems and multimedia tools. The greatest advantages of this system are the interactive form of work, animated students, frequent feedback information, modifiable contents (files) and the use of multimedia. The disadvantages are time-consuming preparation for school classes, potential technical problems (with hardware, software and power failure), necessary hardware tools and basic hardware and software knowledge.

The word *motivation* is of Latin origin that has incorporated into English and other languages. The meaning of the Latin word *motivus* is cause of movement. Psychological disciplines frequently use this concept for examining learning process, feelings and memorising. It also appears in the vocabulary of interdisciplinary sciences, such as sociological psychology, criminal psychology or psychology of work.

Motivation is an important determinant of human behaviour, being based on needs and the influence of the environment.

Fig. 1. Causes of behaviour

The term *motivation* often appears in education as well. The problem of students' motivation is as old as the educational system or schools. It has been known for long that students' interests are different and depend on the subject. The motivation level of some students is higher concerning natural sciences, while others prefer social sciences, art or sports. Previous scientific researches have proved that students' motivation level is in connection with their predispositions and talents.

Several psychological studies have demonstrated that the level of intelligence defines the ability to successfully attain the content and to be efficient in learning only up to 50%. The other 50% is based on non-intellectual factors, such as the factor of motivation.

External motivation, in this case, is related to the educational environment, since the examined group was taught in a modern educational environment and with new teaching methods. In this environment, the sources of higher motivation level are in feedback information, which appear interactively and with the help of multimedia. The contents to be taught are organised into smaller units and allow learning by smaller steps at the individual's own learning pace. This way, students' motivation level is stimulated significantly, as the results of every action are visible and marked during the whole learning process. Interactivity is not limited only on active students' hardware and software, but it expands on the teacher and other members of the class or group as well. Additionally, the environment of learning, innovations and modern technology also motivate students. Information in this form is more interesting for pupils and closer to their visual attitudes. With the teacher's directions, students get access to information over their own activities.

2. SUBJECT OF RESEARCH

The subject of this research is the motivation level of students in traditional and in interactive educational environments.

For this purpose, we have designed a traditional and an experimental model of teaching at the same time, which includes teaching contents from the subject *From toys to computer* (a facultative subject in the lower grades of elementary school), teaching unit titled *Electronic messaging*, and teaching content: *E-mail – Rules of communication on the Internet*. The participants of the survey were third form pupils (9-10 years old children). This content was selected as suitable for digitalisation and presentation in both educational environments. Meanwhile, pupils' previous knowledge about this content is small (the known concepts are computer and the Internet), therefore the differences in their motivation levels depend on the used methods and educational tools.

Traditional school classes were held using traditional blackboards and whiteboards, printed pictures and worksheets.

Fig. 2. Teaching in traditional environment

In the experimental (interactive) model of teaching we have implemented an interactive whiteboard, a projector, a computer, educational software (created in SMART Notebook 10) and printed worksheets. Projected materials were used for frontal work; teaching at the interactive whiteboard was used for individual work (solving interactive lessons), for doing exercises and for revision. This powerful and increasingly prevalent technology opens up opportunities for learners to generate, modify, and evaluate new ideas, through multimodal interactions, along with talking. Using it can, thereby, support numerous new forms of dialogue that highlight differences between perspectives, and make ideas and reasoning processes more explicit (Hennessy, 2011).

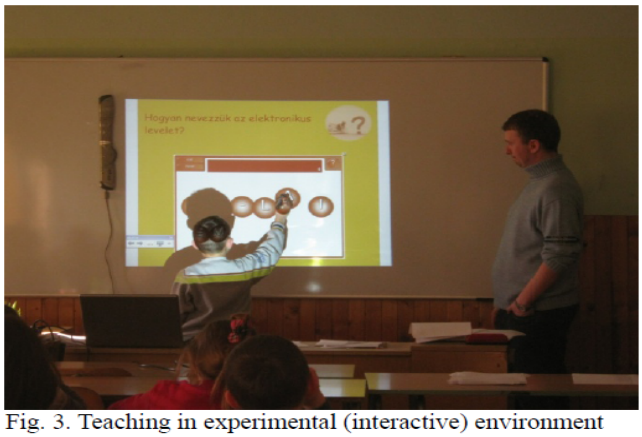

Fig. 3. Teaching in experimental (interactive) environment

3. OBJECTIVE OF RESEARCH

The objective of our research is to create two parallel educational models, and to explore and analyse these models. The main goals of the research are to:

- Measure the motivation level in traditional and experimental educational environments using a questionnaire
- Measure the motivation level in traditional and experimental educational environment using the technique of "the number of reactions"
- Process the measurement results and compare the outcomes of the two models

4. RESEARCH HYPOTHESIS

After theoretical preparation and the analysis of international experience and results in this scientific field, we formulated the main hypothesis of this paper:

- The implementation of IT tools in primary schools has positive impact on increasing pupils' motivation level.

5. RESEARCH METHODS – TECHNIQUES, PROCEDURES AND MEASURING INSTRUMENTS

In the first phase of our survey we created two educational environments. In the traditional educational model we implemented traditional, while in the experimental model, modern teaching tools.

Table 1. Comparison of implemented tools in two parallel educational models

Traditional educational environment	Experimental (interactive) educational environment
▪ traditional board ▪ printed pictures ▪ worksheets	▪ interactive whiteboard (+ computer and projector) ▪ projected pictures from SMART software ▪ worksheets

After the parallel teaching, the participants of the survey filled in a questionnaire about their motivation level. Students had to grade the questions with marks from 1 to 5 (1 - not at all, 5 - completely yes).

The questionnaire included the following questions:

- How interesting was the class today?
- Would you like to learn more about *E-mail - Rules of communication on the Internet*?
- Were you glad when you went out to the table?
- What did you like the most in the class today?

The number of reactions (raising their hands) was determined in percentage for the whole class. In both environments, pupils were asked the same questions after learning the new concept (questions were used for revision and for exploring students' motivation level during classes). The motivation level was specified based on the number of reactions using video records, which recorded during the teaching process.

The following questions were asked in both educational models:

1. What can be done on computers?
2. How do we call connected computers?
3. What is the name of the global computer network?
4. What can be done on the Internet?
5. What was the topic of the poem?
6. What is the name of digital mail?
7. What do you need to send e-mails?
8. How do you create a new e-mail?
9. What is the meaning of the word *to*?
10. What is the name of the e-mail subject in English?
11. What function can you send the e-mail with?
12. Determine the exact sequence of the steps when you send an e-mail!
13. What function can you receive the e-mail with?
14. What function can you send a reply to a message with?
15. What is the name of the sender in English?
16. Click on the balloons (marks) that contain words necessary for sending e-mails!
17. What can be dangerous on the Internet?
18. What information is dangerous to share on the Internet?

With the comparison of the results in both educational models and after analysing the differences, we can prove or disprove our hypotheses.

6. POPULATION AND RESEARCH SAMPLE

The research was done in primary schools in Northern Vojvodina, in North Bačka district (6 elementary schools, varying number of classes). The control group (pupils who learned in a traditional environment) had 186 members, while the experimental one (students who learned in a modern environment) had 193 members.

The approximate equation of the control and the experimental groups was done based on the pupils' overall success in the first term, the parents' educational level, the pupils' gender, place of residence (city/village) and the suggestions of the teachers.

The previous knowledge (measured with 16 questions about e-mails and the rules of communication on the Internet) reached 10% in the control group and 11% in the experimental group. This fact also proves the equality of the two groups.

7. ANALYSIS OF EMPIRICAL DATA

The analysis and processing of the results were performed using questionnaires, video records and computer software SPSS 19 and Microsoft Office Excel 2007.

In the questionnaire, the first question asking how interesting the class had been, was marked with average marks: 4.78 by pupils in the traditional environment, while students from the experimental environment had graded it 4.99. The marks of the more interesting teaching process are direct indicators of pupils' motivation level.

In the second question, which was formulated as "Would you like to learn more about *E-mail - Rules of communication on the Internet*?", pupils in the traditional environment answered with an average mark of 4.31, while students from the experimental environment graded 4.99. This question measured the motivation level of pupils indirectly, because the interesting topic itself, though secretly, involved an interesting environment and model of teaching.

Over marking the question "Were you glad when you went out to the table?", students talked about their intention to participate in an interactive and individual form of work at the (interactive) board. This question practically measured the impact of the traditional environment (blackboard) and the modern environment (interactive whiteboard, interactive software, computer and projector). The average mark was 4.35 in the control group and 4.98 in the experimental group.

Beside the visible differences between the average marks of pupils from the control and the experimental groups, another significant indicator is that 7.69% of all marks in the experimental group was 5* (five with a star), although the task was to grade with marks from 1 to 5.

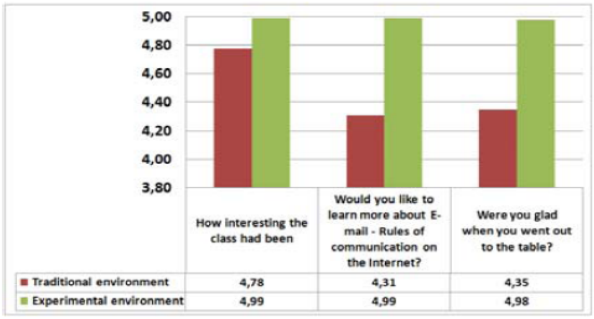

Fig. 4. The summarised results of the motivation questionnaire (1 - not at all, 5 - completely yes)

The last question of the questionnaire was formulated the following way: "What did you like the most in the class today?" Pupils could give their own opinion in this question, and they applied it for expressing the specialties and advantages of the given environment.

Table 2. Selected answers (by the number of responses) to the question: What did you like the most in the class today?

Traditional educational environment	Experimental (interactive) educational environment
When we wrote on worksheets	When I could went to the interactive whiteboard
Learning English words	Software games
When we viewed pictures	New contents in software

It is interesting that worksheets were present in both educational environments, but only pupils from the traditional one had mentioned them as the most interesting part of the teaching process. Similarly, pupils from the control group answered with complete sentences, while participants of the experimental environment usually answered with incomplete sentences, acronyms and smiley signs.

The motivation level of students was also measured with analysing video records made during the teaching process, where the motivation level was based on the number of their reactions (raising their hands).

In case of these video records, the number of reactions was expressed in percents (how much percent of the groups raised their hands for identical questions).

Table 3. Number of reactions in both educational models

Questions	Traditional educational environment	Experimental (interactive) educational environment
1. What can be done on computers?	45%	44%
2. How do we call connected computers?	15%	44%
3. What is the name of the global computer network?	51%	38%
4. What can be done on the Internet?	19%	50%
5. What was the topic of the poem?	18%	25%
6. What is the name of digital mail?	15%	44%
7. What do you need to send e-mails?	21%	56%
8. How do you create a new e-mail?	9%	25%
9. What is the meaning of the word *to*?	5%	31%
10. What is the name of the e-mail subject in English?	11%	19%
11. What function can you send the e-mail with?	18%	38%
12. Determine the exact sequence of the steps when you send an e-mail!	19%	38%
13. What function can you receive the e-mail with?	15%	44%
14. What function can you send a reply to a message with?	0%	31%
15. What is the name of the sender in English?	10%	19%
16. Click on the balloons (marks) that contain words necessary for sending e-mails!	16%	25%
17. What can be dangerous on the Internet?	35%	25%
18. What information is dangerous to share on the Internet?	19%	44%
Average	19%	36%

The average of the summarised results in the experimental group was higher for 17% than in the traditional group.

8. CONCLUSIONS

This scientific project has achieved its objectives. The motivation level of pupils in traditional and experimental models of teaching were analysed in detail. Supporting software was also created and implemented in the experimental environment, while at the same time, there were traditional educational tools and materials as well.

Beside examining statistical results and differences, we also observed the increased activity of pupils in the experimental model and students' attitude to individual work, while members of the traditional group usually answered together, without an intention to participate in forms of individual work. The reason for this was that the modern environment was more interesting with supporting feedback information from the educational software.

Higher motivation level was verified in two ways: analysing respondents' answers in the questionnaire and analysing the number of reactions on the same questions during the teaching process. Both methods confirmed the correctness of our hypotheses, transferred to significant scientific results and conclusions.

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