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THE EFFECTS OF COMPUTER-ASSISTED TRAINING IN PRIMARY EDUCATION

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Abstract: *Technology advances exponentially, and with it, education is faced with a great challenge: to prepare the next generation for the world of tomorrow, for professions that do not yet exist, for technologies that have not yet been discovered, with teaching resources now in place and with knowledge held today. Undoubtedly, computer-assisted training has become a very important element of modern pedagogy.In this paper we intend to present the experimental results of the implementation of computer-assisted training in primary education, at the third grade, experiment conducted within a Romanian elementary school. The stage of the formative intervention aimed at transforming the classical lessons into interactive activities, to increase the interest in the learned content and, last but not least, to improve quality of the school results for the elementary third grade students.*

Keywords: *computer-assisted training (CAT); information and communication technology (ICT); school results; primary education;*

1. Introduction

There is a consensus among educators and decision-makers that digital technologies have spawned a new generation of students who see the world in a different way. The "New Millennium Learner" is an expression used by The Organization for Economic Cooperation and Development (OECD) in 2006 to describe the population for which digital technologies already existed at the time of their birth and thus grew with these technologies, such as computer, internet, mobile phone and similar devices (OECD-CERI, 2006). There are other terms describing this generation, and, implicitly, the children of today - "digital natives" or "generation I" (Internet). In school, however, it would be exaggerated to think of all students as a homogeneous mass of "digital students" – each student has his own learning style and a unique character. However, we agree with Brown (2001, p. 70), according to which "today's digital children" use ICT to meet, play, date, and learn. It is an integral part of their social life; it's how they acknowledge each other and form their personal identities."

1.1. Computer-assisted training in European context

Over time, four key trends have emerged in the development of ICT tools (Romanian Government, 2012, p. 10), namely:

- The abundance of educational resources available online and the high level of student participation in online environments;
- The increasing access to the Internet, including through mobile devices (phones, tablets, etc.);
- The development of a global market, products and services, and also work;
- The increasing share of cloud technologies (stored on a central server accessible from anywhere) and the decentralization of ICT support services.

One of the targets of the European 2020 Strategy, materialized in the Digital Agenda, emphasizes the key role of ICT in delivering the political, economic, social and educational goals for 2020, promoting creativity and innovation through the use of new ICT tools. According to the Agenda, Member States need to expand their services on the integration of new technologies through national education policies, modernizing education and training services, including ICT in national curricula, evaluating learning outcomes, and training and professional development of teachers and trainers (European Commission, 2010).

Under the Human Capital Operational Program 2014-2020, Priority Axis 6 - Education and Competencies, we find the following two specific objectives relevant to the present work (cf. European Union & Romanian Government, 2015):

O.S.6.5. The increasing number of educational offers focused on skills training and the use of digital / ICT solutions in the teaching process. This specific objective results in an optimized and attractive curricular offer in primary and secondary education level, focusing on key competency training, including for disadvantaged children.

O.S.6.6. The improvement of skills of teaching staff in pre-university education level in order to promote quality educational services oriented to the needs of students and an inclusive school. This specific objective aims at forming and developing the digital competences of pre-university teaching staff in order to promote quality educational services oriented to pupils' needs and an inclusive school.

1.2. Computer-assisted training in the Romanian educational system

The computerization of education represents "a pedagogical strategy adapted / adaptable at the level of education policy in the conditions of the cultural model of the post-industrial, computerized society" (Cristea, 2002, p. 182). Concretely, by the computerization of education it is meant the exploit to the maximum of the advantages that modern technologies offer in the didactic approach of teachers.

Romania is currently undergoing the rationalization and restructuring of the school network aimed at increasing the efficiency of the system. However, much of the education infrastructure continues to be overcome and unattractive and limits the effectiveness of existing policies aimed at improving the quality of education. In Romania, an action at the national level of computerization of the educational system has started in 2001 through the program Computerization of the Educational System - program launched by the Ministry of Education and Research and supported by the Romanian Government. This program has helped to increase students' and teachers' access to modern technologies and the Internet through a set of projects and activities aimed at implementing ICT in pre-university education.The Strategic Document of the Government of Romania in which we find the objectives of ICT development is the Digital Agenda for Romania 2014-2020, supporting the necessary infrastructure, the means of communication and, last but not least, the development of teachers' digital competences through the initial training and continuous training to use modern teaching and evaluation tools (Romanian Government, 2014).

2. Advantages of using innovative technological pedagogy

Technology and education are a great combination if they are used together with a coherent motivation and a correct vision. With the help of new technologies, teachers, students and parents have a variety of learning tools available. Here are some of the ways that technology can help improve educational performance (cf. Lloyd, 2010):

- Teachers can collaborate to share their ideas and online resources - they can communicate with other teachers around the world instantly, respond to the shortcomings of their work, refine methodologically, and provide students with topical content;
- Students can develop valuable research skills at an early age - technology gives them immediate access to an abundance of quality information, unprecedented learning acceleration;
- Students and teachers have access to a vast collection of materials - there are lots of rich and credible websites available on the Internet that both teachers and students can use; The Internet also offers a variety of knowledge and does not limit students to a single person's opinion;
- Online learning is now an equally credible option - face-to-face interaction is immense, especially in small classes, but some students work better when they can progress at their own pace; online education is now accredited, changing the way we see education in general.

There are countless situations that have highlighted the improvement of education through the use of new technologies. Technology can be a major tool, both from the perspective of a pedagogical resource and from the perspective of a tool for connecting with the younger generation. Analysing the methods of using new technologies in instructive-educational activity, Lynch (2017) outlined the following features:

- Active involvement with learning material - technology is interactive, and students learn by acting, researching and receiving immediate feedback; this helps students become passionate about what they learn, they can now study using interactive software instead of looking at a static image.
- Real-world case approach – this model encourages the use of day-to-day issues in the classroom; using the Internet, pupils can document the issues addressed in real time and in accordance with the curriculum; this helps students understand the lessons learned in relation to situations, problems and real people;
- Simulation and modelling – simulation software allows the teacher to present to the class real phenomena that would be impossible to observe without the help of technology; with the help of specific simulation tools, students can observe planetary movements, how a tornado is formed or how dinosaurs lived; modelling software provide similar facilities - instead of static patterns and static models used in previous decades, these tools allow pupils to observe the dynamics of the particularities of these models.
- Forums, discussion and debate areas – using the Internet and software applications, students can create online groups, WEB pages and virtual communities that connect them in real time with other students and teachers around the world; they can receive feedback from teachers and can share questions and uncertainties about their lessons; reading the opinions of others, students can refine their thinking, reaching higher and deeper levels of understanding.
- Working groups – technology-based education does not involve a classroom with learners learning individually, looking at manuals, working groups boost collective activities, discussions and debates, and encourage democratic group dynamics.
- Coaching – teachers become facilitators; they are no longer just instructors who deliver a lesson; they guide and orient the student's activities as a coach, provide feedback and guidance to the class so that students receive appropriate academic information and training, they guide students into competence development in problem-solving, research and decision-making;
- Formative assessment – teachers ensure that students learn not only concepts, but also

ways of using the technological resources they have at their disposal, activities involving technology often require critical thinking skills and problem-solving skills.

3. Research methodology

The psycho-pedagogical experiment presented in this paper aims to investigate the effectiveness of computer-assisted training as a result of the implementation of specific didactic approaches to the Mathematics discipline in the primary education in the third grade.

3.1. Purpose and objectives of research

The aim of the research is to identify the formative effects of the use of new technologies in education, in the teaching-learning-evaluation process in the third grade, by obtaining answers to the following research questions: 1) Do students get better grades with the help of computer assisted training? 2) Are the students more involved / motivated to learn specific content following the use of computer-assisted training?

The research has the following specific objective:

O. Investigating the effectiveness of computer-assisted training in teaching, learning and evaluating specific content in Mathematics discipline, in the 3rd grade.

3.2. Research hypotheses

I.1. The systematic use of computer-assisted training in didactic activity within the Mathematics discipline in the third grade contributes significantly to the improvement of learning performance, reflected in the performance of the students' grades.

I.2. The systematic use of computer-assisted training in didactic activity within the Mathematics discipline in the third grade determines the increase of the involvement / motivation for the study of its specific contents.

3.3. Research participants and research tools

The two classes, the experimental and the control class, have the same number of students and the same gender structure, respectively 24 pupils, of which 13 girls and 11 boys. In the experimental class there is a pupil with special educational needs.

In order to obtain information about the level of development of pupils' specific competences in mathematics and data on their involvement / motivation in the learning process, we used as a research tool the docimological tests and the questionnaire survey.

3.4. Phases of the psycho-pedagogic experiment

3.4.1. Pre-experimental stage

In this first step, the pupils' initial training level was established at the time of initiation of the experiment, for both the experimental class and the control class. After applying the initial tests on Mathematics, we analyzed the results of the students of the two classes and found that the level of their initial training was similar, the groups being relatively homogeneous.

3.4.2. Stage of formative intervention

The content units handed over with the digital manual, multiple educational software, using the interactive blackboard and the Google Classroom platform, subordinated to the "Fractions" unit of learning, were: 1) Writing and reading fractional units; 2) Fractions. Numerator and nominator and 3) Comparison and ordering of fractions.

3.4.3. The post-experimental stage

At this stage, a final evaluation sample was applied, identical for the two classes, and the differences between pupils' results were determined.

4. Analysis and interpretation of research results

4.1. The results of the psycho-pedagogical experiment

In this section of the article we focused our attention on the first hypothesis of our study, which assumes that "the systematic use of computer-assisted training in didactic activity within Mathematics discipline in the third grade contributes significantly to the improvement performance in learning, performance reflected by the increased grades of students".

4.1.1. Results of the pre-experimental stage

It can be seen in figure no. 1 that there are insignificant differences between the initial knowledge of the students in the two analysed groups, which are slightly weaker overall in the experimental class. This is partly explained by the fact that, as expected, the pupil with SEN has achieved weaker results in the initial assessment.

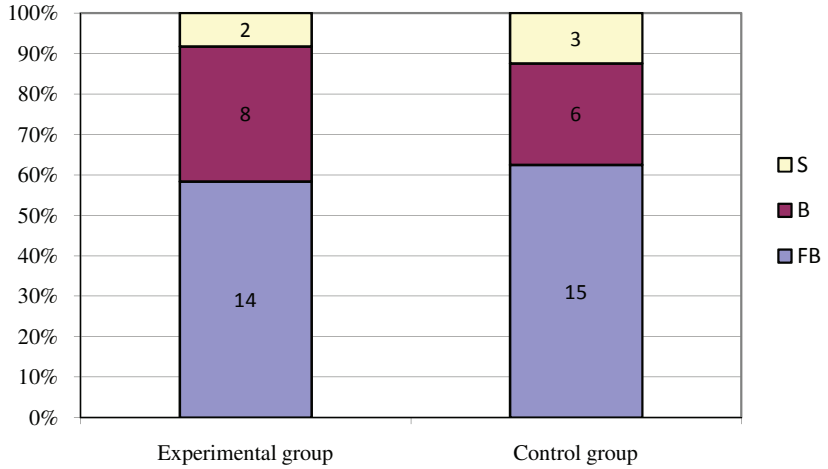

Fig. 1. Results of the initial evaluation

4.1.2. Results of the post-experimental stage

There can be seen in figure no. 2 notable differences between the two classes, marked by the strong increase of the results in the final evaluation of the experimental group compared to the results of the initial evaluation, all the students of the experimental group obtaining the "Good" or "Very good" grades.

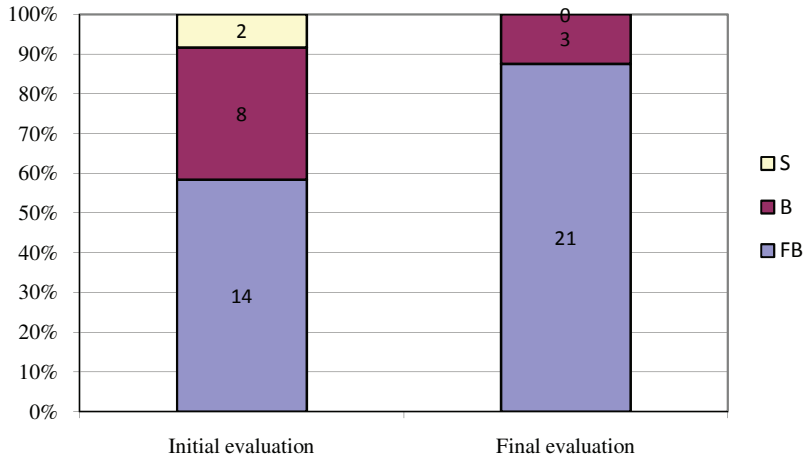

Fig. 2. The comparative results of the experimental class

The comparative results of the two classes obtained in the post-experimental stage are presented in figure no. 3.

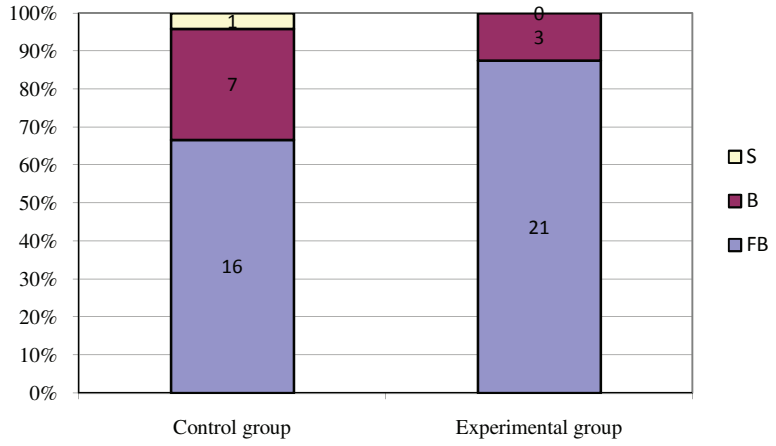

Fig. 3. The results of the two classes in the post-experimental stage

Given the presented data, we confirm the first hypothesis of our study in which we assumed that "the systematic use of computer-assisted training in didactic work within Mathematics discipline in the third grade contributes significantly to improving learning performance, performance reflected by the increased grades of students".

4.2. Survey results based on questionnaire

In order to be able to verify the second hypothesis that "the systematic use of computer-assisted training in didactic activity within Mathematics at the third grade determines the increase of involvement / motivation to study its specific contents," I used a questionnaire with four items. They enabled students to select multiple variants of response.

The questionnaire was administered to students in the experimental class. Centralized responses are presented in the following tables.

Table 1. Students' answers to the question "What activities did you like the most?"

(24 replies, 100%)	activities on the multi-touch board
(19 responses, 79.16%)	activities with VR glasses
(8 answers, 33.33%)	activities with the Google Classroom application and the use of mobile phones

Table 2. Table 2. Students' Responses to the item "Check in the box corresponding to the answer you agree to"

(24 replies, 100%)	I'm interested in learning many interesting things using the computer and at school
(20 answers, 83.33%)	I'm much better focused when the teacher uses new things at school
(16 answers, 66.66%)	I work better in team with my colleagues
(24 replies, 100%)	I would like all the lessons to take place in the same manner
(10 replies, 41.66%)	We got better grades
(23 replies, 95.83%)	We have a much better understanding of the lessons

Table 3. Students' answers to the question, "Which devices would you like to use more in lessons?"

(24 replies, 100%)	multi-touch board
(24 answers, 100%)	mobile phone

Table 4. Students' answers to the question "Rate how the lessons in which you used your computer, phone and other applications were interesting and demanding"

	To a large extent	Not at all	To some extent
a. attractive	24 100%	0	0
b. demanding	0	22 87,50%	2 12,50%

Considering the results of the questionnaire presented and interpreted above, I believe that the second hypothesis of our study is confirmed, according to which "the systematic use of computer-assisted training in didactic activity within Mathematics of the third grade determines increasing involvement / motivation to learn its specific content."

5. Conclusions

The key to effective learning is effective teaching. Teachers who embrace the use of new technologies in teaching-learning activities with the necessary logistical support provided by the management of the educational institution can transform the learning environment into an attractive one, adapted to the needs of new generations of students.

When technology is properly implemented – as a complementary element – it significantly influences students' results. Like other innovations in education, the impact of technology depends on how it is integrated into teaching. Here we highlight the need to develop initial and continuous teacher training programs in the field of digital competences specific to teacher training, investment in school provision, implementation of ICT governance standards and policies in education and their integration into the current work of teacher.

Digital natives need teachers to transform their learning experience into an individualized, pupil-centred approach in which the teacher discards the role of a "single actor on stage", possessing all the knowledge and becoming a "guide" from the side", a true guide of the student on his way to knowledge. And for this, computer-assisted training and the use of modern technologies are one of the most effective approaches.

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