Focus-group research on modern techniques and multimedia tools implementation in teaching practice

Carmen-Gabriela Bostan*

Institute of Educational Sciences, 37, Str. Stirbei-Voda, Bucharest, Romania

Abstract

This paper studies the acceptance degree of physics teachers in using of computer and multimedia resources in didactical process, both in classroom and in laboratory school. The aim of this research is to prove the implementation of new technologies in teaching/learning physics as didactical tools. This may be a reference framework for rethinking school curriculum, teacher training and student-centered educational process.

1. Introduction

The policies of European Commission campaign for an education that can take place both online and offline in the school domain (courses, trainings and tests) or 'in the real world'. The education, training, instruction and learning are facilitated by formal educational institutions, but teaching is not limited to the teachers in schools.

In opinion of European Commission (European Commission, 2013) the multimedia technologies offers the opportunity to increase the level of efficiency and equity in education. The computers and Multimedia Open technologies enable anyone to learn anywhere, anytime, on any device, with the support of anyone. Most importantly, the education and knowledge can travel more easily across borders, the learning being an international process through cooperation via teachers and students networks. Teachers and students may interact without to be no longer limited in time and space, temporal-free and spatial-free learning environment. In addition to widening access to education, the wider use of new technologies could help reduce costs for schools and

* Corresponding author. Tel.: +4-021-313-6491; fax: +4-021-312-1447.

E-mail address: cagabosro@gmail.com
students, especially among disadvantaged groups. Modern technologies provide the opportunity for Europe to promote science, research and innovation in regarding the productivity, employment and labor market.

In this context, the input of modern techniques in teaching learning process is revolutionizing the schools life, and the classes which use the computer, interactive whiteboard, computer simulations of various experiments differ from traditional teaching class. Possibilities processing, recording and retrieval of information by computer induce of student knowledge and skills to a higher level. The school can use both non-specialized software, which have a general character that can be used in various areas, as well as educational software, designed specifically for its use in the classroom.

2. Research presentation

The hypothesis from which it started in the development of this research was to study the acceptance degree of physics teachers, in the context of the new education law, the inter- and trans-disciplinary approach of physics, in which an active role to be played by computer and multimedia resources. This result may develop a reference framework for rethinking school curriculum, teachers training and student-centered educational process.

The purpose of the research was to study implementation of new technologies by teachers in teaching/ learning physics, both in the classroom and in laboratory. The participating teachers were also young professionals, familiar with working with computer, as well as experienced teachers, methodologists, directors and inspectors.

Research technique used is focus-group technique (FG) applied on 70 physics teachers, organized into six groups of 10-12 people. Participating teachers were young staff, experienced teaching staff, meteorologists, managers and inspectors. The study also aims to be a response to the contents of the new education law in the conduct of the school curriculum for training students in the key skills inter and trans-disciplinary approaches.

In the scientific literature (Cojocaru D., 2003), the FG interview is focused on a particular theme, involving a number of 8 to 12 people, led by a moderator. This technique is a qualitative data collection concerning views, needs, perceptions and motivations of participants. Through FG technique the researchers can collect data, identify the needs and expectations of teachers, the way of thinking and way of expressing. The definition of the focus-group is (Cojocaru D., 2003) "a research technique in which data collection is made through support group interaction on a topic determined by the researcher". Participants discuss in a relaxing way, share the ideas, comments and influence each other; communication is normal, natural, with a high degree of fidelity to the subject discussed.

Interview Guide used in this research consisted of a number of eight questions.

3. Analysis of results from the research data

After processing the results arising from the discussions made during the course of each focus group, the views presented to the interlocutors, which have synthesized in a statistic for each question. It specifies that any opinion expressed was not circumvented in this study and the findings are consistent with the succession of questions in interview guide.

3.1. Do you use the computer in didactical process? (figure 1)

To this question, an 87% answered yes, while 13% said that there's no point of view using the computer in the physics classes, and in laboratory. There were views, among some conservative teachers, who expressed that "use of computer in class - rubbing with alcohol on a wooden leg". Among those with a positive attitude, a small percentage - 17% use the computer modeling, real time simulation of the experiments; most of the teachers integrate it in the assessment of students by developing projects, essays, portfolios. Some of the reasons could be the low budget, which does not allow schools to purchase some software, the school manager reluctance, the
difficulty of AEL system operation for all computers in the classroom - it connects and works optimally for less than 10.

![Diagram: Do you use the computer in didactical process?](image)

Fig. 1.

3.2. Do you use the Interactive Whiteboard in the classroom? (figure 2)

A significant number of participants - 78% - have declared that no, either because they have no such things in their school, or the Director narrows the access to whiteboard for "not spoiling it", or simply they will not to use it. A 22% percent of teachers have agreed that it is a very useful didactical means because it can provide information, show modelling and experiments simulation, it gains time, and the teacher can be focused on explanation of phenomena and not on transmission of information. Of these, only 11% use it frequently, the others 11% saying that they had a single Whiteboard in the school, which is not mounted in the physics lab and is difficult to perform physics class in the room where it is installed.

![Diagram: Do you use the Interactive Whiteboard in the classroom?](image)

Fig. 2

3.3. How do you assess the use of computers and of the multimedia tools in teaching? (figure 3)
56% of teachers using multimedia tools have agreed that the use of computer and of the multimedia tools contribute to a better understanding of physical phenomena and to the inter- and trans-disciplinary approaches on the daily life and natural phenomena. 44% of respondents said that excessive computer use can have a dual effect, can affect negatively, and students can adopt a passive attitude.

Fig. 3.

3.4. Do you use the AEL laboratory in physics teaching? (figure 4)

33% of participants use AEL Laboratory, but only 11% use it frequently. Because the network does not work correct for all stations, teachers have installed AEL soft on each computer. A significant number - 67% do not use AEL system; some of them use the computer in the assessment, projects, essays, PowerPoint presentations for homework.

Fig. 4.

3.5. What are the implications of using computers in physics lab? (figure 5)

The majority of the teachers - 89% have agreed that the inclusion of computer and of other digital means in
teaching is beneficial, especially if is corroborated with the laboratory experiments: modeling simulations or real-time experiment. In addition, the experimental data collection, processing and plotting them is beneficial in the achievement of laboratory experiments.

3.6. Do you give your students as homework to make projects on computer? (figure 6)

An overwhelming majority - 90% of teachers admitted that give students as a homework, the development of projects - presentations on computer. This is beneficial on the one hand, when those projects relate inter and trans-disciplinary knowledge, awakens students' curiosity to find explanations for natural phenomena encountered in life. Among those teachers, a small fraction, about 5%, engage students in the realization of modeling of experiments or creation the scientific sites. On other hand, an excessive use leads to routine and there is a danger that students use papers already posted on the internet. 10% of respondents said that problem solving "with the pencil on the paper" is more useful than "wasting time in front of the computer", for which they never give students to work the school projects on computer.
3.7. What is your opinion about the involvement of digital technology in education? (figure 7)

Only 22% of participants’ teachers in the focus group responded that they have no idea how digital technology will involve in education, the difference of 78% expressed their conviction that digital technology will become increasingly integrated into the education process. Among these, 22% said that the involvement of the computer, is not only in the presentation of knowledge, but also in exploring new areas related with physics, the development of students skills for design and modeling experiments. 56% of participants agreed that digital technology will become a indispensable necessity.

![What is your opinion about the involvement of digital technology in education?](image)

**Fig. 7.**

4. Conclusion

Although digital technologies are fully integrated into the way people interact, at work, when they are engaged in business and doing trade, ICT are not yet fully exploited into the education system and training in Romania.

The study shows that the vast majority of teachers (87%) use digital resources in the didactic process. Of these, 70% use modern resources during the assessment process of students through the elaboration of projects, essays, portfolios. Most teachers use information and communication technology (ICT) primarily for preparing teaching materials - posters, educational movies or PowerPoint presentations, not to work with students during classes as computer modeling, experimental simulations in real time, collection/ analysis of experimental data and plotting (17%).

The vast majority of teachers (78%) do not use the interactive whiteboard in teaching. Among those who use it, a large percentage respectively half (11%) rarely use it, but does not specify how often. Only a small proportion of respondents (11%) said that they used as didactical mean. It can be concluded that the interactive whiteboard is used in the educational process at a rate of 89%. This is due to the small number of existing interactive whiteboards in the schools, on the one hand, and on the other hand, teachers do not know how to use it.

Using the computer and multimedia tools in teaching is considered beneficial by 56% of teachers that using it effective (87% of the participants in this study). A significant percentage (44%) points out that an excessive use of the computer may induce students a passive attitude.

From this research result that implementation of the AEL system in schools does not have expected performance because it is used in a proportion of 11%. The implications of inclusion the computer in physics classes are considered positive, especially in data processing in laboratory work, plotting or observing physical
phenomena which cannot be reproduced in the laboratory school. 90% of focus group participants have recognized that they give as homework realization of projects through the computer.

22% of teachers surveyed are skeptical regarding the evolution of formal learning via computer. Their skepticism was justified by the huge costs that are imposed, the development of digital resources for teachers and students, tablets for students and teachers. The majority of 78% believe that IT resources will be increasingly more integrated into the educational process. It speaks even a reversed learned - Flipped classroom in which the student scroll the learned material at home (manual in digital format), the teacher's role being to provide digital content for learning at home / in class, and as tutor in the learning process and the time required consolidation and perform experimental work increases considerably.

The conclusions that it can be drawn in present study are:

- teachers are eager to improve their digital skills;
- there is availability from some talented physics teachers, to programming the didactical experiments;
- there are the conservative teachers who do not consider the progress as a beneficial intervention in school.

Unless policies are changed, the introduction of computers, of interactive whiteboard, of the tablet in school becomes a necessity. Teachers will need to adapt to new technological developments so that the school to be contemporary with modern times in which we live. The possibilities of processing, recording, modeling, searching and retrieval of information by computer induce knowledge and skills to a higher level for students.

Measures are required in the educational environment as follows:

- support for teachers to acquire digital skills and new and interactive didactical methods;
- support the development and availability of open educational resources (OER), and MOOCs ;
- connecting classrooms and the use of digital devices and digital content, including OER ;
- mobilize the educational actors and of civil society to change the role of digital technologies in educational institutions.

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