



## HOW IN-SERVICE TEACHERS DEVELOP ELECTRONIC LESSONS

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**Abstract.** Computer assisted teaching (CAL) is considered to be a modern teaching method, but it is not widely used by teachers because lack of technology and adequate educational softwares in schools; or lack of teachers' knowledge on methodology and computer use. In order to select the most efficient educational software for their class, teachers should know, which are the most important features of educational softwares. It is also important that teachers can develop simple electronic lessons for their classroom, as not every school subject is well covered by educational softwares or the existing softs are not appropriate for every classroom. This paper presents a qualitative research on what in-service teachers consider important when choosing educational software; and how they use these features in electronic lessons developed by them. Teachers' answers about important features of a good educational software, and the electronic lessons made by them were analysed. The results show that even if most of the teachers know how a good educational software should be, many of them can't integrate these features in their electronic lessons because lack of computer knowledge or inadequate time allocated for developing this lesson. The results highlight the importance of organizing practical training courses for CAL.

**Keywords:** computer assisted teaching, educational software, multimedia in education

### Introduction

Computer assisted teaching (CAL) is considered to be a modern teaching method, it is attractive for pupils, and it is also promoted by the authorities in education. But CAL is not widely used by teachers because lack of technology and adequate educational softwares in schools; or lack of teachers' knowledge on methodology and computer use (Brinkerhof, 2006; Dawson, 2008). CAL is not a miraculous method, which always obtains high results; if it is not used properly, it can be less efficient than traditional methods. Thus it is important that teachers master the methodology of using different computer resources in the classroom.

One resource, which is more widely used, is the educational software (or electronic lesson). When using an educational software in the classroom, the first important step is the selection of the most appropriate one. Thus teachers should know, which are the most important features of an educational software. Teachers also need to know which software suits their class and how to integrate that software in the teaching/learning process. It is useful that teachers can develop simple electronic lessons for their classroom, as not every school subject is well covered by educational softwares or the existing softs are not appropriate for every classroom.

Romanian prospective teachers are generally equipped with the necessary knowledge, skills, and confidence to use computers in education and they are willing to use ICT in teaching (Bucur & Popa, 2013). In-service teachers still lack methodological skills and confidence to use computer resources in education, even if about 62% of them have participated in different ICT courses (Potolea & Noveanu, 2008). This could be explained by the fact that these courses usually highlights the technical issues of using ICT (Potolea & Noveanu, 2008), or they are more formalities for obtaining credits (Popa & Bucur, 2012).

This paper presents the results of a research on what in-service teachers consider important when choosing an educational software; and how they use these features in electronic lessons developed by them.

### Theoretical background

“There is a delight in a program that is rigorously consistent, elegantly clear and lean, where sound and vision are perfectly at one, or where the representation chosen neatly fits the ways that users think about what they are doing.” (Smith & Tabor, 1996, p. 42)

There are many criteria a good educational software should satisfy.

The first contact the user has with a software is the design. It is essential that the electronic lesson has an aesthetically pleasing and attractive design (Jacques, Preece, & Carey, 1995; Mirsha & Yong-Zhao, 1999). This design implies the adequate choice of the colours and the easy navigation. As regarding the use of different colours, the background and the text colour should be chosen carefully, in order to insure easy readability of the text (Pastoor, 1990). For an easy usability of the program, navigation buttons should be visible; they have to be in the same place on each screen, and the aim of each button should be clear (Wrench, 2001).

Electronic lessons could use different type of media. The most used media are images, which have to be simple (Marcus, 1992; Thompson, 1994), so graphical images are the most preferable (Pettersson, 1993; Rieber, 1994). Videos, animations, simulations also could be utilized, as these media could better present a phenomenon than images. The variety of media types in an educational software could be attractive for pupils, but different content support different type of media. It is also important that media used help learning and not distract pupils' attention from the content. For example, an animation could be interesting for a pupil, it could attract his/her attention (as an animation film), but it should be properly designed for contributing to the understanding of some phenomenon.

The contents should be adapted to the target users' knowledge and cognitive level (Sancar Tokmak, Incikabi & Yanpar Yelken, 2012), it should be scientifically and grammatically correct (Campanella et al., 2008), and it should be processed with a correct didactical approach. The principles of the programmed learning, as small steps, immediate feedback, active learning response (Skinner, 1958) should be implemented in the electronic lesson. Thus the theoretical contents should be divided in smaller parts, after each of these part some way of self-evaluation (i.e. some questions/tasks which can be evaluated by the computer program) should be included in order pupils get immediate feedback on their learning outcome. The type of the questions are also important, they should be of different type, addressing different cognitive levels (Campanella et al., 2008). In an educational software mostly select-response type items can be evaluated by the program. These items could be multiple-choice items, true-false items, matching, or rating. In case of a multiple-choice item is important that the incorrect answers are plausible choices which have the role to divert those pupils who are not sure on the correct answer (Suen & McClellan, 2003). Usually tests in educational softwares are for self-evaluation, thus it is important that in case of an incorrect answer pupils get the possibility to improve their knowledge or competencies, i.e. they get some explanation or they can reread part of the theory in order to be able to answer correctly.

### Research

#### Research design

The research was carried out in the second semester of the university year 2012/2013 during Media Education classes at master level.

#### Research goal

The aim of this research is to study what features of an educational software in-service teachers consider important, and how these teachers implement the identified features in the electronic lessons developed by them.

## Research sample

The research sample was selected from the participants on Media Education course, 31 in-service teachers, all of them female, the average age of the sample is 31.45 years. As regarding school level where these teachers work, 14 (45.16%) respondents are pre-school teachers, 8 (25.81%) are primary school teachers, 5 (16.13%) secondary school (5<sup>th</sup> to 8<sup>th</sup> grade) teachers, and 4 (12.90%) high-school (9<sup>th</sup> to 12<sup>th</sup> grade) teachers. 6 (19.35%) of the respondents have never used an educational software in their classroom, 15 (48.39%) rarely use an educational software, and only 10 (32.26%) of the questioned teachers use frequently electronic lessons.

## Research methodology

The research tools were a short questionnaire and a criteria system for analysing the electronic lessons. The questionnaire contained three demographical questions and three questions related with educational softwares. The main question, formulated as an open question, asked teachers to describe the most important features of a good educational software.

Each student was asked to respond the questionnaire and to develop an electronic lesson in PowerPoint.

The data obtained with the questionnaire was processed statistically and analysed qualitatively (the open questions). The electronic lessons were evaluated based on the criteria system.

## Results and discussion

### Teachers' opinions about a good educational software

The question regarding how a good educational software should be was formulated as an open question. Most of the answers are very short (one teacher even responded only "good"), teachers didn't think in deep about the features of an efficient electronic lesson. We have chosen open question type instead of several of closed questions (i.e. enumerating features and asking teachers to rank them) in order to get a deeper view in their opinion. In the following we discuss some of the teachers' responses.

The following two descriptions contains many features of a good electronic lesson:

"A good educational software is adapted to the target group age; it is attractive, it presents the information in an attractive and interesting way; it actively involves the students in the teaching/learning process. It should not be loaded with too many images or information, which can distract pupils' attention. The content should be scientifically valid and correct, the images should be adapted to the pupils' age."

"A good educational software should be educative, attractive, and interactive. It has to be well structured and it should offer solving alternatives. Its content should be developed in an integrated way (i.e. to integrate knowledge and competencies from more domains and activity fields)."

This second description highlights two important features which are usually neglected: alternatives and interdisciplinarity. In order to suit every student from a classroom, the program should have alternatives for learners with different level of knowledge and competencies. Also nowadays the interdisciplinary approach of the scientific content is very important.

There are teachers who highlight the importance of the easy use of the program, the importance of the functionality of each element (links, videos, animations).

The opinion of a teacher refers to the importance of the teamwork between teachers and soft developers when creating an educational software. While developing an electronic lesson, the teacher has the main role in selecting and structuring the content, in didactically processing the content, in designing the pupil-program interaction, in developing the tasks for self-evaluation, etc.

In Table 1 we selected the most frequently appeared features. These features are collected from the freely formulated answers of the teachers, this explains the low occurrence of them. If these features had given in form of a list probably most of the teachers would have selected them as important.

**Table 1.** Features of a good educational software given by in-service teachers

Features	Number of occurrence
attractive	9
adequate difficulty level for the target group	6
easy to use	5
interactive	4
variety of used question types	2
variety of the used media	2
interdisciplinary approach	2
inclusion of animations	2
to facilitate learning	2

We could observe in Table 1, that the top three features given by the teachers are attractiveness, suitability, and interactivity.

### Analysis of the electronic lessons made by the teachers

Analysing the content of the electronic lessons, we could observe, that most of the teachers made only a short test (see Table 2). Only 3 teachers (9.68% of the sample) developed an electronic lesson which contains both theoretical parts and questions. This low percentage could be explained by the fact that 45.16% of the respondents are pre-school teachers.

**Table 2.** Content of the electronic lessons

	Number (percentage) of students
Only theoretical part	5 (16.13%)
Only questions	23 (74.19%)
Theoretical part and questions	3 (9.68%)

Regarding question types, 18 teachers (58.06%) used exclusively multiple-choice questions, only 2 teachers (6.45%) used a variety of question types (Table 3). These results are poorer than the results in case of pre-service teachers, were 44.64% used matching the pairs type items, 25.00% choosing from a group type items beside multiple-choice items (Marchis, 2013).

**Table 3.** Question types used in the electronic lessons

	Number (percentage) of students
Only multiple choice questions	18 (58.06%)
One other question type beside multiple choice questions	11 (35.48%)
More question types	2 (6.45 %)

As the evaluation in educational softwares is mostly for self-evaluation purposes, it is important, that in case of an incorrect answer the pupil get the opportunity to catch up with his/her deficiencies. Only 6 electronic lessons (19.35%) offers the possibility for the pupil to learn in case of an incorrect answer, in 4 (12.90%) lessons the pupil can reread the text, in 2 lessons (6.45%) he/she gets additional explanations (Table 4). These results are also lower than in the case of pre-service teachers, where in 37.50% of the lessons the pupil is sent back to the theoretical part; in 32.14% of the lessons additional explanations are offered (Marchis, 2013).

**Table 4.** Program's response in case of an incorrect answer

	Number (percentage) of students
Tells that the answer is incorrect and goes back to the question	23 (74.19%)
Offers the possibility to reread the theory and goes back to the question	4 (12.90%)
Offers explanation and goes back to the question	2 (6.45%)
Goes to the next question	1 (3.23%)

There are 3 lessons in which on a slide there are more questions. It is difficult to evaluate the answer in this case, thus only one lesson managed to deal correctly with evaluating more questions in a slide. In 2 lessons the test is not interactive, the questions can't be answered in the program, and some of the question types are even generate-response types. In one electronic lesson the pupil can go further in the program without answering the questions.

Multimedia is an important aspect of electronic lessons. The only media used in these lessons is the image. There are lessons in which an animation or a short educational film would have been useful.

### Comparison between teachers' opinion and their realizations as regarding electronic lessons

In the following we make a comparison between how teachers think a good educational software should be and how they used these features in the electronic lessons developed by them.

The most frequently appeared feature in teachers' answer is attractiveness. An electronic lesson can be attractive, for example, by an attractive design. But only 5 lessons have a very attractive design; there are 4 lessons, which don't have any design (for example, all the slides have different colour scheme and structure); and 2 lessons with a very unattractive design. Many of the lessons was made for preschool or primary school pupils. For this age-group a story in the lesson is very attractive. Only 3 lessons have a story (for example, the pupil has to help a bee to find the honey, and while helping it she/he has to answer questions or has to read different information).

4 teachers highlighted the importance of interactivity. But one of these teachers made only a presentation of some theoretical content, without any pupil-program interactivity (the pupil only needs to click for the next slide).

2 teachers considered important the variety of question types. But one of these teachers used only multiple-choice questions; and the other one didn't make the questions interactive (she wrote the questions on the slide, but the pupils didn't have the possibility to respond those questions on the computer), she used even generate-response type items, which can't be evaluated by the software.

### Difficulties foreseen by teachers when using educational software

The most frequently presented difficulties are related with the inadequate equipment in schools, as not every school have a computer lab (i.e. it is difficult and inefficient to work frontally on a computer when using an educational software), or the computers don't have the configuration necessary for

some programs (i.e. the educational soft is running slowly or it frequently freezes). Another difficulty mentioned is the lack of adequate educational softwares in case of some school subjects. Also teachers are aware that sometimes there are difficulties in using those programs by the teacher or by the students due to lack of computer use knowledge. Another difficulty mentioned is related with pupils' attitude during computer assisted learning, they could use other computer resources instead of the soft chosen by the teacher, and it is difficult for the teacher to supervise every pupil's work.

## Conclusions

The results show that only one third of the in-service teachers use educational software frequently. Some of them are not willing even to think deeply about the features of an effective educational software, giving very short answers to this open question.

Seeing in whole teachers' answers, they contain many features which describe a good educational software. Some of the teachers even mention issues regarding developing such an electronic lesson, as the importance of team-work between teachers and soft developers.

Analysing the electronic lessons developed by the teachers, most of them are very simple and don't have the features enumerated by the teachers. The simplicity of the programs could be explained by the fact that almost half of the teachers works in pre-school, one quarter of them in primary school. Comparing the results from this research with the results regarding pre-service primary school teachers (Marchis, 2013), we observe, that the electronic lessons developed by pre-service teachers are more complex. This could be explained by the average age of the two sample groups, as pre-service teachers are younger and they master many computer use skills even from the high-school. Also it seems that pre-service teachers allocated more time for developing the electronic lesson than in-service teachers.

We could also conclude, that even many teachers know how a good electronic lesson should be, they don't incorporate those feature in their lessons. This could be explained by the lack of computer use knowledge or by the short time dedicated for developing the lesson.

Teachers foreseen many difficulties when using educational software in the classroom, as lack of technology, lack of adequate educational software, or lack of computer use knowledge.

This research's conclusions are limited as the sample size (31) is small even for a qualitative research. This research should be extended to more teachers and more aspects (for example, which are the differences between those teachers participated in ICT training and those without such a training).

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