The use of computers in education Computer Assisted Learning (CAL)

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ABSTRACT:

By the end of the 20th century, communication information technologies (C.I.T.) have penetrated every sector of the everyday life. The continuous production of information and its continuous exploitation, mainly via the Internet, is a challenge in our era. More specifically, there is no doubt that we live in the age of the Internet and the World Wide Web, and it should be noted that computers are not only an asset for the information processing, but they also function as a means of contribution to teaching and learning. The development of the education sector has been a little slow, as far as the integration of computers in the curriculum is concerned, mainly due to high cost, but also because it has taken a while since the C.I.T. potential in the instructive and training practice was totally understood. Today's technologies constitute an integral part of the education system, not merely as an isolated cognitive object, strictly limited to the module of information technology, but as a teaching tool in other courses of the curriculum. Moreover, the e-learning system has been developed, thus rendering the computer a crucial part of the educational process itself.

Keywords:
computer assisted learning, behaviorism, sociocognitive, information and communication technology

Introduction

The use of computers in education began since 1960 and it became widely known with the term CAL (Computer Assisted Learning). As Levy (1997) has stated, it is described as ''the search and the study of the computer science applications in the language teaching and learning process''. The CAL system adopts a wide range of the new technology applications, as well as approaches for the teaching and learning processes. According to Warschauer (1996) and Lee, the method that has been followed all these 50 years has been divided into three basic stages which reflect the available technology, and some theories that have to do with learning with the respective pedagogical approaches. The CAL development stages are divided in the categories below:

- Behaviouristic CAL
- Communicative CAL
- Integrative CAL

In later statements, however, Warschauer disregards the distinction of the behaviouristic, communicative and the integrative CAL, and he goes on with a distinction that refers to the computer developments in the field of education, supporting their titles in specific theories of learning a language (Warschauer and Kern, 2000). In this respect, CAL is divided into these categories:

- structural
- cognitive
- socio-cognitive

One of the most important theories is Skinner's behaviorism theory. According to him, this specific theory focuses on behaviour and not on stimulus. To be more specific, it emphasizes the transmission of information and the modification of behaviour. A fundamental characteristic of Skinner's theory is the fact that proper teaching is based and

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depends on the proper teaching environment. Consequently, the new trend that was created in the way of teaching was named ''Constructivism'' and it was a mixture of the theories of Constructivism, of the Audiovisual method, as well as the Comparative method, which focuses on the inner function of our cognitive system, on its structure and operation. More specifically, the teaching in this approach is not transmitted, but it is a process of a personal construction, which is based on previous knowledge, where different methods are being included. Such methods are the Audiovisual method and the Oral-visual method. Especially the latter is of great importance, as it turned teaching into a science. Almost at the same time with the cognitive approaches of teaching, the Activity Theory has emerged, with Lev Vygotski as its main representative. According to this theory, there is no training activity outside the social, historical and cultural frame in which it takes part. What is more, in this theory, the basic roles are the roles of cooperation (cooperative learning) as a tool which contributes to the forming of the individual's identity. The teaching approaches of the sociocognitive theory are constituted by a complex group of tasks and they are based on the way of teaching in which one student teaches the other.

1. The three stages of CAL

Technology has been used in the educational process for almost 50 years now. As this paper evolves, every stage is being separately analyzed, in order to identify the contribution of every single stage to teaching. The first stage, the behaviouristic one, was developed in the 1950's, when the first language laboratories were established, and the first phase of the use of computers in teaching began. It was first developed during the 1960's and 1970's. It is worth noting that it was influenced by and based on the behaviouristic learning model, and this CAL method shows that it had the repeated learning through drills as a characteristic. The software that was designed during that period was applied to universities in the USA on big computers, known as ''mainframe computers''. As Lee (2000, ch.5) mentions, the computer was considered to be something similar to a teacher robot who was never tired. The learner autonomy was non-existent, while the evaluation was on a true or false basis. It is thus obvious that the feedback was restricted and the learning was not promoted, keeping the learner interest low. At this stage, CAL was based on the rules of scheduled teaching, according to the rules of behaviourism and constructivism, which have the closed system of teaching as a basic characteristic; that is to say that the computer had the role of the teacher and there was emphasis on grammar and syntax. The criticism which was shown to this pedagogic method enabled the transition to a much needed new era. Nevertheless, the behaviouristic method has had a significant influence in the development and design of many educational applications which are computer- based, even in our days. The second period, the communicative one, appeared in the end of the 1970's and in the beginning of 1980's, while the behaviouristic approaches in the teaching had been rejected, not only on a theoretical, but also on a pedagogic level, and when personal computers became more accessible to the educational environment. At this stage, the teachers began to create simple CAL programs, incorporating the pedagogical principles of that time and the methodology which would be used in the classroom. Those programs were text-restructuring and simulation programs (Levy 1997).

Accordingly, the progress that technology had and the new prospect for the use of technology in teaching, led to the appearance of the combinative or the integrative period in the mid-1990's and became powerful through the development of laptops that support the use of the Internet, the LAN, the multimedia and the hypermedia (Warschauer, 1996). It was, in other words, based on a much more sociocognitive consideration of teaching,

which uses genuine environments and emphasise the combination of all skills. As a result, a great emphasis on the interaction through genuine communication situations was shown. With the term ''interaction'' we do not refer to the interaction between the student and the computer, but to that which a student can achieve with other students through the computer. Technologically speaking, the multimedia and the Internet have set a new dimension to the communicative character of computer use in the education sector. The multimedia software which was developed and designed in this phase of CAL had a lot of advantages in relation to the previous ones. However, despite the obvious advantages of the multimedia software, until now, they had failed to reach its full potential, mostly because of the problems in the programs themselves, and because at the same time it is difficult to create genuine communication environments (Warschauer and Kern, 2000). The Internet, on the other hand, can create conditions of genuine communication. The computer is used as a means of interaction and as a mean of access in communicative situations as well (Warschauer and Kern, 2000).

At he same time, communication via the Internet is used nowadays at a larger scale, and it is a field of great scientific interest (Kern, 2006). The Internet is used not only as an environment of communication, work and learning. As far as the e-training is concerned, there is an extensive reference to it throughout the following chapters of this research, as it is a very significant point for the teaching process, and especially for its teaching through computers. The three stages that have already been mentioned do not fit into the above mentioned diagrams precisely. While every new stage emerged, the previous ones continued to exist. It should be mentioned that, in previous years, the term CAL was used solely to describe the use of the Internet, that is to say the survey and the study of the applications of the computer during the teaching and learning. Later on, this meaning

was used to describe the fact that the students would have the possibility to learn in any environment which is related with the computer (Kern, 2006). Nowadays, in order for the use of the computer to be declared through the Internet, the term ''blended learning'' is used. In other words, this concept involves the teaching which combines teaching in the classroom with the use of the Internet. The term "information and communication technology" (I.C.T.) is also used in the global bibliography. Regardless of the various terms that it is assigned, the fact is that the Internet is used for the teaching and learning with the assistance of plenty of computing applications. Nevertheless, we conclude that the attention is not anymore on the computer as a technological breakthrough, but gradually the attention is paid on its natural incorporation in the learning process, taking a prominent place at the training process.

2. The role distribution of CAL
3.1 Computer role

Computers are gaining a more and more significant role in our lives. They have already changed the way we live, work and learn radically. The computer is able not only to process a large amount of data very quickly, but also to be used in various functions. That is, it can be used in painting, as a video or music player or just as a combination of all the above with the new multimedia technologies. At this point we should refer to the three models that Taylor (1980) has suggested in the understanding of computer application in education (Tutor, Tool, Tutee — The Three Modes of Using Computing in Education). In the first one, the computer works as a teacher. In the second model, the computer works as a student and in the third one as a tool. In order for the computer to work as a teacher, it has to be regulated by an expert. The computer presents some material and the learner responds. The computer then evaluates the answer, and the evaluation of the results determines which aspect of language it should

provide the learner with as the procedure continues. The computer/teacher keeps extensive archives for every learner and has an inexhaustible and flexible method to guide him/her through the material. When functioning as a student, the computer needs the teacher or the learner to speak to it in a language that it understands. In other words, they need to learn how to program the computer, either by using a programming language, or special programs which simplify this procedure.

However, the role that has contributed to the spread of computer use is its role as a tool. When the Internet emerged, this role was extended and the computers were considered to be a means of global communication and a source of genuine material, as it has been mentioned before. The role of the computer as a tool includes the use of programs. Such programs are the text editors, logistics, databases and communication tools, such as the RSS, the e-mail, the video conferences via computers and others. Lee (2000) has discussed plenty of other reasons why computer technology should be used in learning. Learning via computer could provide the learners with experiential practical learning, push them to learn, help them improve their academic performance and increase the available authentic communication materials. What is more, it can encourage the interaction between the teachers and the learners, place emphasis on individual targets, allow the learners to use multiple sources of information and create a feeling of global understanding. As Kenning and Kenning (1983) state, the special attribute of the computer as a means of education is its ability to interact with the learner. Books may explain the rules and provide the readers/learners with the right answers, but the learners' wrong answers cannot be analyzed. The computer, however, guides the learners and it is able to correct their mistakes, while being able to comprehend the rules behind the right answer.

3.2 Teacher role

According to the above theories, it becomes evident that the teacher does is not considered to be the only source of knowledge anymore, which was a basic characteristic of the teacher-centred classroom in the 1960's. Nowadays, the teacher contributes significantly to the learning process as organiser, designer, controller and evaluator. With the incorporation of the computer in the learning process, the teacher has to evaluate and choose the appropriate educational software, which s/he will adjust to the needs of his/her students. The teachers are responsible for the organisation of the lesson, the design of the material and the appropriate learning activities. In an attempt to make the teaching process more concrete with the use of new technologies, the teachers are not substituted; their role is merely altered and facilitated, and his teaching work is more complete. In any case, it needs to become understood that the new technologies are an effective means of teaching, its goal being to make the teaching process easier without the substitution or elimination of any of the roles of the parties involved, and especially those of the teacher

3.3 Learner role

The use of the computer upgrades the learner's role as well. Learners do not receive the knowledge passively anymore, but they become independent and responsible for their learning. More specifically, Dickinson (1993) states that the autonomous learners:

- Learn to comprehend the goal of the teaching process.
- Set their own learning goals.
- Choose and use the appropriate learning strategies.
- Self-evaluate the progress their learning has.

Computers have the characteristic that they pay great attention and give instant feedback to the learners, and they adjust to the individual rhythm of learning of each of them. They are also able to cover their needs and interests by

giving them the appropriate linguistic material and, as a result, the learners themselves have the possibility for autonomy.

3. Educational benefits of CAL use

Considering the aforementioned application types and the possibilities of their exploitation in the learning, one can comprehend that computers have the ability to assume several roles, and that they are now the most popular means of mass communication. Considering their availability, flexibility and their user-friendly technology, computer exploitation in the learning process seems to have an abundance of educational profits. Consequently, we could summarize the positive features of computer incorporation in the educational process in the following points (Lee, 2000):

- Creation of learning motives.
- Individualization of the learning process.
- Experiential learning.
- Genuine study material.
- Greater interaction.
- Independency of the unique information source.
- Global agreement.

4. Disadvantages of CAL use

On the other hand, there is the riposte to all the benefits discussed above, which do not however annul their positive contribution of CAL in education. They are summarized below:

- Naturally, the software is arbitrary and inscrutable, and this is because it represents the inner structure and the complexity of the programmer's way of thinking.
- Social isolation and loneliness on the part of the learner.
- The cost of this new technology
- Lack of teacher's technical and theoretical knowledge of the

new technology and of the computers in general.

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