THEORETICAL FOUNDATIONS OF COMPUTER-AIDED LANGUAGE LEARNING

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Abstract

Computer-aided language learning (CALL) is a teaching model in which the computer is used as a course tool in foreign language teaching. After the Second World War, with the introduction of the computer into our lives, the idea that these tools could be used for educational purposes emerged and these tools began to be used in educational environments. Language learning is one of the fields that benefit from computers. Because computers have features that can meet the needs of language learning with the content they offer. As a matter of fact, computers have started to be used in language learning classes. Achieving the desired success from computers depends on many different factors, but it is not possible not to gain success by using these tools with appropriate methods and techniques within the framework of teaching theories. For this reason, it is necessary to know well what the theoretical foundations of language learning activities carried out with computers are based on. In this study, computer-aided language learning is considered within the framework of teaching theories and the relationships between them are explored. In this way, it is aimed to contribute to course activities to be prepared based on teaching theories in computer-aided language learning.

Keywords: Computer, language learning, behaviorist theory, cognitive theory, constructivist theory.

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INTRODUCTION

Despite In the simplest terms, language, which is a means of communication, allows the expression of feelings and thoughts, the reporting of wishes and desires, and the transfer of obtained information. Human beings use various tools in addition to face-to-face communication while performing these actions; many different tools and applications have been used for communication purposes from the invention of writing to the present day, and new ones continue to be created. With each new invention and development, new forms of communication and different language uses have emerged. All these innovations have made communication between people easier, more effective, and faster.

Computers, which entered our lives after the Second World War, were offered to the service of humanity with the incorporation of previous inventions and they have caused radical changes in many areas. These developments have led to the development of different perspectives and new tools and applications for language-related issues. It is possible to see the impact of these changes in many areas, from language learning to translation and from dictionaries to linguistics research. Although earlier technological developments that continued into the first half of the twentieth century influenced language-related studies, effective technology-based methods and applications could not be developed. However, after the Second World War, the opportunities offered by technology began to be used more effectively in many language-related subjects and particularly language learning.

Computer-aided education, on the other hand, is a model in which educational activities are carried out using computers. Computers were first used in educational institutions at the end of the 1950s in universities, first for administrative work and then for teaching purposes. Computer-aided education became widespread with various projects implemented in the 1960s and 1970s, and its importance has increased steadily ever since. Today, computers are indispensable resources in educational environments.

One of the areas affected by the development of computers is language learning. The most basic reason for this is that the needs of language learning can be met by the possibilities offered by new technologies. Language teaching does not consist of only teaching grammar rules; it is also necessary to teach the culture to which the language belongs. Computers are an important resource for bringing cultural characteristics into classroom environments and teaching students about the behaviors and lifestyles of speakers of that language and where and how the language is used.

In addition, there are rich technological opportunities for language learning as computers are capable of supporting individual learning. Computerized educational content that is prepared while taking individual needs and personal characteristics of students into account will provide great convenience for students to progress at their own pace, to correct personal shortcomings and mistakes, and to learn in the ways they most prefer. In addition, without time and space limitations, students will be able to continue their studies and participate in learning activities at any place and time they want.

One of the elements that ensure that computers are effective resources in language learning is the internet. With the widespread use of the internet in the 1990s, computers became multidimensional. The internet, which eliminates the concepts of place and space in accessing information and provides a connection to the world, offers multifaceted communication opportunities. Furthermore, with the emergence of Web 2.0, the concept

of social media transformed our understandings of communication into a more interactive concept. This has enriched language learning by giving it a new dimension.

Undoubtedly, the effective use of computers as teaching tools in language learning depends on the use of these tools not randomly, but by taking into account teaching theories and being aware of their theoretical infrastructures. In this study, computer-aided language learning is considered within the framework of modern teaching theories behaviorist, cognitive, constructivist and the relationships between them are explored. In this way, it is aimed to contribute to course activities to be prepared based on teaching theories in computer-aided language learning.

Behaviorist Theory and CALL

The foundations of behaviorist theory were laid by John Broadus Watson in 1913. Watson explained learning as the establishment of connections between stimuli and behaviors, and he argued that behavior changes through reinforcement. According to Watson, both human and animal behavior can be observed. Because of this, Watson studied both human and animal behavior in the laboratories he created and he showed that the stimulus-response relationship is at the heart of behavior. He thus suggested that learning means establishing a connection between a stimulus and a behavior.

Behaviorists have considered learning processes in two ways: classical and operant conditioning. Using the concept of classical conditioning, Pavlov (1927) claimed that animals learn through action-reaction in his experiments on dogs, while another scientist, Edward Lee Thorndike, explained learning according to the coping principle, that is, with the relationship between stimulus-response and trial and error and he obtained his findings by conducting experiments on animals, similarly to Watson. "According to Thorndike, to get rid of a problem, individuals choose various reactions among the possible ones; they test them and adapt some successful stimulus-response bonds in their behavior according to the results, while they do not repeat the actions they made during their unsuccessful attempts" (Uçar, 2017, s. 337).

The fact that individuals have different characteristics such as interests, needs, learning style and learning speed made it difficult to respond to them correctly in the learning process and it caused the teacher to be inadequate in learning activities. Because it was not possible for the teacher to deal with each student individually. From this point of view, it can be expected that language learning activities that will be prepared based on the stimulus-response relationship and the reinforcement principle of behaviorist theory can be supported by contents provided by computers. In fact, computers can give instant feedback to students about their answers and offer them reinforcement, thus enabling them to achieve effective learning through the strengthening of stimulus-response bonds. On the other hand, behaviorists accepted the human brain as a blank slate and emphasized that this blank slate was processed through stimulus-reponse-reinforcement. In this direction, according to behaviorist theorists, the view that learning can occur with external factors has become widespread (Demircan, 2005, s. 195).

Skinner argued that a classroom environment should be created that is equipped with teaching machines and computers that will react correctly to students, help them learn on their own by progressing at their individual paces, and reward correct behaviors. He thought that reinforcement was very important in the shaping of linguistic behavior and

that teachers would be insufficient for giving large numbers of reinforcements; only teaching machines, he said, could do that.

In addition, the convergence of American structuralism and behaviorist psychology theory led to the emergence of a new method known as the audio-lingual method. "According to this method, which was developed based on the idea that the grammar-translation method is insufficient in language teaching, language learning first starts with listening, then comes speaking, reading and writing. Therefore, priority is given to listening activities" (Demirel, 1999, s. 42-43). Thus, learners learn to use linguistic structures in daily language by developing their ear-language habit skills.

In conjunction with the audio-lingual method, the importance of practice exercises has increased and new forms of exercises have emerged. New methods undoubtedly require new types of exercises. Therefore, traditional exercises based on grammar teaching are being replaced by exercises based on stimuli and reaction responses. In the audio-lingual method, listening activities are of primary importance and grammar is secondary. Oral activities are included most heavily and the view that grammatical structures are given implicitly within oral activities prevails. "According to this method, structure exercises are based on learning through association and generalization. There reflect the principles of behaviorist psychology. Different structures are produced by transformation based on the exemplary sentence structure. Thus, it is believed that automatic learning will occur through repetition, change and such similar structures" (Günday, 2005, s. 87). In other words, the linguistic structures that are aimed to be taught in this approach are expected to turn into habits with repetition activities.

Language laboratories, which emerged as application mechanisms of the audio-lingual method, were technological classrooms equipped with various tools such as voice recorders, radios, and televisions. There were separate booths arranged for each student in a hall. In these booths, there was a table and tools such as a table-mounted voice recorder, headphones, microphone, and a controller for all of the equipment. Students were able to listen to other students in other compartments individually and communicate with them. With the headphones, one could comfortably listen to students' voices one by one without disturbing others or interrupting their conversations.

As it is known, speech (performance) comes before ability (competence) in auditory-linguistic method. In this method, where oral language is a priority, reinforcement is of great importance and it is emphasized that learners should not use their mother tongue and that the target language should be taught by native speakers.

The audio-visual method is also referred to as the CREDIF or St Cloud Method in the literature. It is known that the method was developed for teaching French by Gubernia and Revenc in the 60s. Germain (1993, s. 16), classifies foreign language teaching methods as linguistic, psychological and integrated trends, and deals with Auditory-linguistic and Audio-visual methods in the category of integrated methods (methods focused on the nature and teaching of language). Besse (1985, s. 21-24) has four distinctive features of these methods. Associated with the basic criterion. In this context, the first criterion is about whether linguistic indicators will be taught in foreign language activities and whether the mother tongue will be used. The second criterion is related to how grammar is taught. The third criterion is the choice of dialogue and text to be used in the method books, and the fourth criterion is the use of materials, the originality of these materials, the order of the subjects, their suitability for the level of the learners and

their learning needs, etc. It is related to the issues. So much so that CREDIF, in its study on French dictionary and grammar teaching in 1954, pointed out that 1475 words at the first level and 1609 words at the second level are sufficient for teaching French at the basic level (Besse, 1984, s. 39-44; Germain, 1993, s. 153-163; Cuq & Gruca, 2005, s. 261).

On the other hand, Mihaela Ivan defines the Auditory-Visual method, which is shaped according to the behavioral theory, by giving priority to the spoken language, the most frequently used words in the vocabulary, with implicit and inductive grammar exercises and teaching French without resorting to the mother tongue (Ivan, 2006, s. 17).

By the 1970s, a new approach to language learning emerged. This new perspective, known as the transformational generative approach, was developed by Noam Chomsky, in opposition to behaviorist-structural linguistics. The new approach was widely adopted and interest in language laboratories gradually began to decline; they lost their importance in the early 1980s. However, at the beginning of the 1990s, first with the widespread use of computers and then with the introduction of the internet into our lives, language laboratories began attracting interest again while changing in size. Computers equipped with multimedia tools, new software and programs, and language laboratories that made use of the opportunities offered by the internet were designed to meet the needs and expectations of language learning and offer a more interactive environment.

According to behaviorists, the environment has a great influence on the organism and the behavior of the individual is shaped by the stimuli coming from the environment. Individuals learn behaviors that are reinforced and punished by observing other people. A similar process operates in language learning. Therefore, it is necessary to equip the language learning environment with appropriate stimuli so that students can give correct responses. Computer is one of the most important tools that can present appropriate stimuli. Because sections from real life can be brought to the classroom environment through the computer and an environment suitable for the real can be created. Students can acquire linguistic habits by observing the behavior of people speaking the language they are learning.

Behaviorists think that social interaction has an important place in the success of the individual. Social interaction, on the other hand, has gained a different dimension with the transformation of smart phones into computers, the spread of social media and the enrichment of its content. With these tools, students had the opportunity to interact easily with people who spoke the language they learned. On the one hand, students have the opportunity to see and comprehend the language they have learned from many different aspects, and on the other hand, they have the freedom to act according to their individual needs. As a matter of fact, according to Kazazoğlu (2014, s. 41), "substitutions, which are the product of interactive conversations, have the feature of 'authentic language' and provide foreign language learners with new words and grammatical structures with rules. As a result of this communication, students have gains aimed at increasing intercultural competence as well as linguistic development."

Cognitive Theory and CALL

Cognitive theory, which emerged as a reaction to behaviorist theory within the framework of Chomsky's studies in linguistics and Ausubel's learning theories, sees learning as a cognitive process controlled by the individual. Chomsky's works titled Syntactic

Structure, published in 1957 and Aspects of Theory of Syntax, published in 1965, argues that behaviorist theory has missing aspects in terms of learning and it caused a paradigm shift in this field. The views put forward by Chomsky led to the emergence of a new linguistic perspective. This new approach does not consider language learning as a process of acquiring habits and conditioning; rather, it considers it as a cognitive process. The views put forward by Chomsky have also formed the foundations of cognitive theory.

Chomsky pioneered cognitive research by drawing attention to mental states in language learning. The concepts of deep structure and surface structure, which occupy an important place in Chomsky's theory, were used in this field for the first time and gained wide acceptance. With this approach, called generative transformational grammar, Chomsky suggested that individuals can speak a language without having grammar. This, he argued, is because individuals are born with a system of rules called a deep structure that allows them to understand and speak sentences they have never heard before, and then these rules are processed in the mind and transformed into a system called a surface structure that allows an unlimited number of sentences to be produced.

The generative transformational grammar approach continued developing in progressive steps after it was first put forward by Chomsky and it has maintained its relevance to the present day, having gone through various stages. According to Özsoy (1997, s. 9), "these stages differ from each other in terms of the nature of the components that make up grammar, the form of phrase-structure rules that produce structures in language, the content of transformations that derive surface structures, and the nature of the principles and conditions that determine universal grammar."

Cognitivists believe that the principles put forward by the behaviorist approach are insufficient to explain the basis of learning. According to them, there are cognitive processes at the heart of learning. In other words, learning is shaped by an organism through processes such as perception, remembering, and thinking. Proponents of cognitive learning hold the opinion that learning can occur through the processing of information even without reinforcement, which the behaviorist approach considers one of the most important elements required for learning to occur. Furthermore, past experiences hold an important place in this theory, because in the learning process, the organism first perceives what something is about, then understands it, and finally remembers its relationship with past experiences and behaves accordingly. In a sense, cognitive learning involves making sense of events as a result of past experiences.

Cognitive theorists suggest that the learning process is similar to data processing and they compare our minds to computers. Güneş (2011, s. 132) explained this as follows: "There are various memories in our brain such as visual, auditory, verbal, symbolic, semantic, fast, slow, and the information obtained from outside comes to these memories through the five sensory organs and is processed at certain stages. The information learned in this process, which proceeds in harmony, is gradually stored." Aydın (2000, s. 187), on the other hand, expressed it as follows: "Man is constantly faced with the bombardment of inputs from his environment. However, a person chooses some of them to remember or use later and perceives them through the sensory organs. Then, the decoding process takes place. Decoding is the making of new information meaningful by associating it with what exists in the mind and storing it for later use. This information is recalled and used when necessary."

Computers are among the most important resources for processing, coding, and organizing information because computers offer massive volumes of visual and auditory contents that are both interesting and motivating. In particular, multimedia tools, with which elements such as sound, text, graphics, and animation, which complement each other and are used together, have important functions in processing information into memories. These contents, which are among the remarkable features of computers, make the teaching process more efficient by stimulating multiple sensory organs and increasing interaction. In addition, computers can facilitate the learning process of an individual by performing behaviors such as feedback and reinforcement that an individual needs during information processing.

In addition, computers can be used to activate processes of cognitive theory such as perception, understanding, and remembering and to gain the ability to communicate. Having rich visual and auditory contents can enable effective learning to be realized by enriching the learning environment. The use of different types of contents such as audio, graphics, images, and videos together plays an important role in both attracting the attention of students and increasing their motivation, as well as in the gaining of communication skills.

Cognitive theorists emphasize the concepts of creativity, skill, and communication based on the approach that language will be learned consciously, and they consider language learning from a perspective that holds that oral communication skills should be developed as well as written communication skills. The communicative approach that emerged from this idea has adopted the view that language is a means of communication and that communication between people is also valid in language learning. Undoubtedly, the increase in interpersonal and intercommunal communication with the spread of mass media has played a very important role in the emergence of this idea.

The concept of communicative ability, which Dell Hymes put forward in 1972 as the main purpose of foreign language teaching, has also had an important role in the emergence of the communicative approach. Hymes criticized Chomsky's views on the concepts of performance and acquisition, referring to them as incomplete, and proposed the concept of communicative ability in response. "According to Hymes, learning a language means that learners are perceiving the culture of the foreign language they are learning and reacting appropriately to situations with their speech. Therefore, the phenomenon of culture created by the environment and society means that humans, as members of society, have knowledge, faith, art, values, morality, law, and so on, and this all constitutes the most important part of the communicative approach as a whole, which includes all kinds of skills and habits" (Güngör, 2015, s. 124-125).

According to the communicative approach, mental processes such as understanding and grasping information rather than memorizing have an important place in the language learning process. According to Demirel (1999, s. 51), "after the mental process they have gone through, the aim is to enable students to put what they understand and grasped into the field of practice. For them, communication is a process of existence that is necessary for the individuals to search and find themselves."

There are various features of the classroom environment in which the communicative approach is applied. Freeman (1986) explained this by focusing on the teacher's role in the classroom. The teacher prepares and organizes the activity, but because it is essential for students to take active roles, the teacher withdraws and observes the activity process.

In this process, the active observer might take on the role of a referee. A classroom where lessons are taught with a communicative approach can never be a quiet classroom, according to Freeman. During most of the lessons, students speak and often stand up to perform given tasks according to the structure of the activity (Yıldız & Tepeli, 2015, ss. 274).

With the prevailing opinion that the classical methods used in language learning are not sufficient, another idea arose that it is necessary to take advantage of technological developments. The use of all kinds of visual, auditory, and verbal materials in language learning will enrich the course activities and make lessons more enjoyable. According to Günday, who emphasized the importance of such materials (2015, s. 102), "these materials support the communicative and functional use of language in a real environment. It can include a newspaper article, an advertising poster, a movie trailer or a song. Such materials also increase the motivation of the student."

The communicative approach has placed equal emphasis on teaching the four basic language skills. In particular, creating an authentic classroom environment by bringing audio and visual materials into the classroom is seen as being very important for the development of these skills. Such technologies meet the requirements of this method.

Today, computers and mobile phones, which have become computers in their own right, are very important resources that provide massive amounts of the audio and visual contents needed in classrooms where the communicative approach is applied. Social media, in particular, offers great opportunities for the implementation of this approach as a new environment for communication and interaction. Using these environments as teaching tools can increase the interest in the communicative approach and make great contributions to the more effective implementation of this approach.

Constructivist Theory and CALL

Constructivists characterize constructivist theory as a philosophical perspective rather than a teaching theory. The constructivist approach first emerged with the work of scientists such as Bruner, Piaget, Wygotsky, Galserfeld. The theory is discussed in three forms in the literature as cognitive, socio-cultural and radical constructivism. Cognitive constructivism was shaped around the views of Piaget and Bruner and focused on how learning takes place in the minds of learners. Socio-cultural constructivism has adopted the principle of Vygotsky's collaborative learning and group work, knowledge is shaped within the framework of the society and culture in which one lives. Radical constructivism, on the other hand, advocated the principle that Galserfeld learners can learn according to their individual differences (Akınoğlu, 2014, s. 432-433).

When constructivists take cognition as a basis for their ideas, the views they put forward show similarities to the views of cognitivists. However, constructivists have also clearly outlined their own unique point of view. Şimşek (2004, s. 123) expressed the difference between constructivists and cognitivists as follows: "The difference between constructivist theory and cognitive theory is that they start from the same concepts in a sense and come to different conclusions by adding their own philosophical interpretation to these concepts."

In constructivist theory, it is argued that learning cannot be realized by transferring information to the student; for it to eventually occur, students must process, make sense of, and structure the information in their minds. Labédie and Guy (2001) explained this process as new information being obtained in light of preliminary information, examined,

made sense of, integrated with that preliminary information, and constructed in the mind. Construction in the mind does not entail piling information on top of each other, accumulating, or memorizing; it entails establishing connections between pieces of information through thinking, understanding, questioning, and problem-solving (Çekin, 2013, s. 99). "At the same time, this theory, which connects the formation of knowledge to the learner, suggests that there is a close relationship between the learner's biological, mental, cultural, social and linguistic development" (Günday, 2015, s. 38).

Constructivist theory is opposed to placing the problem of learning in the classroom entirely on the teacher; instead, it is in favor of having that responsibility shared by the teacher and the student. However, it emphasizes the importance of taking into account individual differences rather than perceiving the class as a whole. The learning environment should be created by taking into account the individual differences, interests and needs, and strengths and weaknesses of students. Providing interactive environments where students take and share responsibility, allowing for discussion and consultation, is important in constructing information. As a result, one of the most important views of the theory is that learning is individual.

Constructivist theory considers language learning as a mental construction that the students establish by improving their linguistic and mental skills through their own efforts rather than memorizing the rules of the language. Therefore, it is necessary to understand the logic of the language rather than what students will be taught. In addition, it is important to actively use the language, because constructivists, who advocate for the development of students' language and mental skills, approach language teaching developmentally and interactively. Along with these points, the social environment and experiences are also of great importance in learning. The influence of the social environment on the emergence of the student's knowledge and skills, attitudes, and behaviors is highly significant. Processes such as the production of new information in light of past information and the interpretation and understanding of information are also involved in language learning; in other words, students learn a language by interacting with others and improving their mental skills. There is no doubt that this requires working in cooperation. Language learners can ensure that their linguistic development and mental development proceed together by continuing activities collaboratively.

Constructivist theory further argues that computers have an important place in creating environments in which students actively participate in the learning process, develop mental skills, interact, and structure their knowledge. Students need to be well directed in order to follow through with this process efficiently. Computers can help teachers both in monitoring students' in-class activities and evaluating their performances; thus, computers contribute to a teacher's correct guidance of their students. In crowded classrooms, it is quite difficult for teachers to manage this process by themselves, and computers provide great convenience for teachers to guide students in a healthier way by keeping track of students' information.

It is necessary to use computers effectively in foreign language courses based on constructivist theory because different types of content offered by computers and the internet, such as audio, video, animation, videoconferencing, chat applications, social networks, and web sites, make important contributions to the constructing of information by creating active learning environments.

Computers are also important resources for considering individual differences, which are among the basic principles of constructivist theory. With computers, it is possible to prepare and present course contents by taking into account the individual differences, interests and needs, and strengths and weaknesses of the student. A student can make it easier to construct information by participating in both individual and group work with a computer and taking on different responsibilities. When the student performs activities by doing and experiencing them personally, the process of constructing information works more effectively.

In addition, in classroom environments where the constructivist approach is implemented, it is important that the content to be used on computers be relevant to real life. In other words, it must be content that will allow students to learn the language in its natural environment. The reflection of real-life environments will increase students' interest and motivation and will facilitate the constructing of information. As Aktaş and İşigüzel (2014, s. 133) noted: "Students do not feel obliged to construct what they hear and see in artificial learning environments, and in more general terms, they do not take pictures by observing what is happening in the outside world, on the contrary, they can personally construct the information in that environment by themselves, by seeing and experiencing the events."

CONCLUSION

Developments in technology have led to the emergence of different methods and techniques in the field of education as scientists have tried to adapt new technologies to their fields and have developed new methods and techniques. The most important reason for this is that the old methods and techniques are unsuitable or inadequate for use with new technologies as teaching materials. Technological innovations are being applied in the implementation of new teaching concepts adopted in the classroom in light of scientific developments. Computers in particular have been used as auxiliary resources and continue to be used today. There is no doubt that one of the areas most affected by technological developments is the field of language learning. The most basic reason for this is that the opportunities offered by technology meet the requirements of this particular field well because technology offers access to extensive visual and auditory contents for the development of the skills that are pursued in this field. It is possible to benefit from these contents effectively by using appropriate methods and techniques. Which methods and techniques should be used in which cases can only be revealed through scientific studies. It is impossible to fail to achieve success with course activities prepared within this framework. Using appropriate methods and techniques is possible only with sufficient knowledge of the relevant theoretical point of view. In this regard, being aware of the theoretical foundations of computer-aided language learning is of great importance in achieving success.

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