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Distance Education: An Analysis of Learning Theories in an E-learning Environment

Abstract

The article concerns theoretical considerations on psychological concepts of learning in the context of e-learning. The author begins the theoretical analysis by reviewing the literature, including behavioural, cognitive and humanistic theories. Based on a detailed analysis, cognitivism is indicated as a theory that has particular application in e-learning, especially due to the continuity of the teaching process and adapting the content to the student's level. An example of a cognitive model is D. Kolb's model, which can be effectively used in e-learning because it includes closed cognitive-experimental processes. The basic argument for adopting cognitive theories as dominant in e-learning is their ability to maintain the continuity of the educational process, which can be effectively implemented via e-learning platforms. A key element connecting cognitive theories with e-learning is the Multiple Coding Theory, which suggests that the transfer of knowledge becomes more effective when it takes place through different channels, enabling reception through several senses.

Keywords:

learning theories, cognitivism, e-learning, distance learning

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1. INTRODUCTION

Contemporary information society, characterised by the dynamic development of technology in the 21st century, poses new demands on higher education institutions. People expect educational institutions to meet the needs associated with functioning in the modern world of technology. In the face of continuous technological progress, knowledge alone is not sufficient; efficient utilisation of knowledge and the ability to generate new information become crucial.

Higher education often does not effectively adapt to these requirements, evident in teachers' transmission of ready-made knowledge. Many believe that the structure of higher education is too rigid and requires substantial changes. In response to these challenges, an alternative may be information technology in the form of distance education, also known as e-learning.

E-learning, popular in economically developed countries, has become an effective alternative in education at various levels, from elementary schools to higher education. It is a dynamically evolving form of education, offering new and valuable possibilities.

The effective implementation of e-learning requires its foundation in appropriate learning theories, and their analysis forms the basis of this study. The theoretical analysis of psychological learning concepts in the context of e-learning begins with an attempt to present the most important of these concepts. The literature review encompasses a wide range of theories, from the behavioural approach through cognitive (both cognitive and constructive) to the humanistic concept (Walat, 2007).

Before identifying the main learning concepts relevant to academic e-learning, a brief characterisation of each of these theories will be conducted.

2. LEARNING THEORIES – AN OVERVIEW

The behaviourist concept of learning, being the oldest among those mentioned, is based on the assumption that the learning process is closely tied to concepts such as "stimulus", "response", "reward", and "punishment". According to this theory, humans are considered externally controlled entities, meaning they function as reactive systems, and their behaviour is conditioned by the influence of the external environment (Kuźmicz, 2015).

This learning concept is founded on two main assumptions. Firstly, "learning" is a category of processes occurring in classical conditioning, encompassing asso-

ciations between stimulus events. Additionally, it includes processes in instrumental conditioning, where instrumental behaviours produced by the organism impact the environment and induce changes in it. Secondly, a fundamental proposition of this theory is the belief that the behaviour of all organisms can be described using the same general principles related to the learning processes (Walat, 2007).

According to behaviourists, knowledge is a collection of existing information (resulting from the work of scientists), and the mind of the learner/student is treated as an empty vessel to be filled with knowledge. A key aspect of this theory is the lack of necessity for the learner to understand the knowledge being acquired.

Classical behaviourism refers to works from the early 20th century, including those of I. Pavlov, B. Skinner, and J. Watson. Pavlov's research demonstrated that animal reactions to specific stimuli are conditioned by the type of stimuli, and the animals can learn these reactions. As a result of Pavlov's studies, the possibility of acquiring conditional reflexes (now understood as classical conditioning) was established. This discovery became a major criticism of behaviourist theory, with one of the most common accusations being the comparison of humans to animals while completely disregarding higher-level reactions in humans (Meger, 2012).

Despite facing significant criticism, behaviourists attempted to apply the results of their research to the world of humans. It was noted that humans, as beings with five senses (sight, hearing, smell, touch, and taste), have a full spectrum of possibilities for acquiring new information from the external world.

B. F. Skinner, an American psychologist, attempted to enhance learning efficiency by applying behaviourist theory. His significant achievement was the introduction of what is known as programmed instruction, considered by many researchers as one of the key accomplishments of behaviourism. This form of teaching involved presenting specific "chunks" of information to the learner and assessing the outcomes. In the case of a correct response, the learner moved on to the next material portion. In the event of an incorrect answer, the learner revisited the material from previous sessions (Meger, 2006).

Skinner's concept was based on several principles in the learning process (Strychowski et al., 2003):

Breaking down the material into small steps: Educational material was divided into small fragments, facilitating knowledge assimilation.

Activating students: Students were engaged in the learning process through various forms of activity, such as filling in gaps in the text or selecting from several correct answers.

Immediate reinforcements: After each correct answer, immediate confirmation followed to reinforce positive behaviour.

Individualisation of the pace of content assimilation: The learning process was adjusted to each student's individual pace of knowledge acquisition, allowing flexibility in the teaching process (Walat, 2007).

Programmed instruction, regardless of its type (linear, branched, or mixed), like the preceding tenets of behaviourist theory, has faced severe criticism. According to H. Berner, it assumes very limited autonomy for humans since (in line with behaviourist theory) it treats learning as a precise program of student activities (Berner, 2006). This method was seen as a recipe for effective education, where each student's task was to comply (effectively submitting entirely) with a pre--established sequence of activities. The program does not consider the learner's predispositions and interests, and, crucially, has no dimension for the influence of thinking and other advanced cognitive processes.

The second learning theory mentioned is the cognitive concept, closely associated with cognitive psychology, which focuses on studying human cognitive processes. The peak of cognitivism occurred in the mid-70s, encompassing philosophy, psychology, sociology, computer science, and neurology. The initial moment for this theory was in 1956, related to meetings of leading thinkers and advocates of this thought. Prominent psychologists involved in this development include M. Minsky, J. McCarthy, and G. Miller. This period was characterised by extensive criticism of behaviourism, exemplified by N. Chomsky's review article on B. Skinner's book *Verbal Behavior* (Donderowicz, 2014).

In line with J. Kozielecki's (2000) words, emphasising that an effective method of criticising existing scientific systems is constructing new ones, these scientists attempted to create a psychological portrait deviating from the "mechanical" approach to learning, characteristic of behaviourism.

The cognitive concept is not too uniform and consists of many versions that are not always consistent with each other. However, each of them has fundamental assumptions, on which cognitivists fully agree.

According to proponents of this theory, a "person is neither a puppet entirely controlled by the external environment nor an undeveloped actor dependent on unconscious driving forces; instead, they are an autonomous subject (individual) who largely decides their own fate, who generally acts consciously and purposefully in an increasingly complex labyrinth of modernity" (Kozielecki, 2000).

In the context of cognitive theory, a fundamental principle is the rejection of the assumption that the learner is merely a "black box" – a passive object, which was the main assumption of behaviourists. Cognitivism posits that the learner is the central subject in the learning process, actively assimilating knowledge (Bruns, 2006). The processes of knowledge assimilation, treated as continuous phenomena,

form the foundation for analysing research on modern education from a cognitive perspective. According to this theory, humans accept and accumulate knowledge and actively participate in its interpretation, creation, and transmission through language, thereby assigning value (Kuźmicz, 2015).

Cognitive theories encompass areas related to cognition, thinking, information processing, and problem-solving. Cognitive research focuses on the perceptual--motor experience of reality and symbolic mental representation (Siemieniecka & Siemieniecki, 2016).

The ability to generate new knowledge through creative and innovative thinking becomes a central point. Within cognitive theory, people constantly construct new technologies, create works of art, and develop new philosophical systems. It demonstrates that their minds go beyond the limits of acquired information, contributing to the development of culture as humanity's most significant achievement (Kozielecki, 2000).

The key proposition of cognitive theory is the assumption that every person engaging in learning enters the process of acquiring knowledge with their own set of existing information. Noteworthy is also the assumption (completely overlooked by behaviourists) that each learner possesses individual abilities and preferences for processing knowledge (Inhelder Piaget, 1958).

Cognitive (cognitivist) learning theory further assumes that a specific element (issue) can be remembered when it is integrated into a larger, pre-existing whole, as a self-reliant and creative individual, humans are capable of shaping themselves (Walat, 2007). There is a necessity for proper communication between the teacher and the student, ensuring the adaptation of content to the learner's level.

The third learning theory is the so-called constructivist concept, which, like cognitivism, belongs to the group of cognitive theories. Its roots date back to antiquity, where elements of constructivism were evident in the works of philosophers such as Aristotle, Socrates, and Plato. Over the centuries, thinkers including J. Locke, I. Kant, and H. Pestalozzi developed the idea of constructivism. The modern form of constructivism results from research by 20th-century scientists, including J. Piaget, L. Vygotsky, and J. Bruner.

According to the constructivist approach, our knowledge is not an objective reflection of reality but the result of a construction process in the individual's mind (Schwabe et al., 2001).

A central element of this theory is the activation of the individual learner, as it is a necessary condition for constructing knowledge in their own mind. The outcome of this process is also the ability to convey knowledge to others, which is a significant component of the constructivist idea, understood as a central element

of collaboration (cooperation). The name of the theory refers to the crucial role of knowledge construction. The learner is treated as an independent system that, receiving stimuli from the environment, processes them according to their own capabilities and predispositions.

The essence of information reception is understood as a momentary change in the energetic state, recognised by internal organs, serving the process of knowledge construction. This process remains closed until new stimuli, which interact with the constructed knowledge, are introduced (Grotlüschen, 2003).

The key idea of constructivism is to understand knowledge as the result of a process of meaning-making by individuals and society. According to this theory, the brain plays a crucial role, treated as a collection of neuronal units enabling information processing in a parallel and simplified manner (Kuźmicz, 2015). This theory places significant emphasis on the intellectual maturity of the learner, manifested in the belief that the responsibility for the learning process primarily lies with the student.

According to Z. Meger (2006), the essence of constructivism is to move away from creating theoretical problems (as in cognitivism) that need to be solved. Both problems and the path to their solution should be generated independently. Knowledge acquired based on constructivist concepts can be easily transferred to solving everyday problems as it arises from the needs of everyday life.

Based on the work of R. Kerres and M. Keil-Slawik, it can be observed that there are three fundamental forms according to which the learning process takes place in the constructivist theory. Among them, we distinguish the following forms:

- learning as construction (creating new structures in the individual's mind),
- learning as reconstruction (acquiring new and integrating it with available knowledge),
- learning as deconstruction (disrupting existing schemas) (Keil-Slawik & Kerres, 2003).

Within this concept, these forms are closely related, and the learning process encompasses various actions such as interest, recall, experience, sensory perception, emotions, as well as psychological and physical activities.

Modern constructivism is based on the relationship between participants in the knowledge construction process. Dialogue between the teacher and the student is a key form of understanding the world. It is also essential to construct knowledge through dialogue with culture. According to A. Zybertowicz (2001), "in the process of developing scientific knowledge, what is social is no less important than what is cognitive" (p. 127).

The last of the mentioned theories is the humanistic concept of learning. One of its precursors was the representative of the Renaissance from the 15th century, M. Montaigne, who presented his thoughts in the work *Essays* (Kuźma, 2013). The humanistic theory of learning mainly originates from contemporary philosophical trends such as pragmatism, existentialism, and phenomenology. Among the main figures shaping the modern understanding of this theory are thinkers like J. Dewey, C. Rogers, or A. Maslow.

J. Dewey believed that knowledge should be understood as a process in which reality constantly changes, and learning mainly involves problem-solving.

In the works of C. Rogers and A. Maslow, references to humanistic psychology can be noticed, according to which the fundamental property of human nature is development guided by internal factors. Consequently, the forces determining its course lie within the individual. Internally conditioned development of learners is the most important property of human nature. According to the humanistic theory, "man, as the subject of educational interests, is a unique structural and functional unity, so he cannot be reduced to the sum of component elements such as values, needs, behaviours, and thoughts" (Kuźma, 2013, p. 30).

In the humanistic approach, a significant direction is recognising that the main force shaping human actions is the pursuit of self-realisation and developing one's potential. According to the humanistic theory, self-realisation is a unique feature of individuals who feel this need. According to A. Maslow, only a "handful" of people in each group are driven to real actions by this force (Kozielecki, 2000). S. Roller adds that the ultimate goal of education is to assist individuals in the process of self-formation, accompanying them in the search for their own humanity (Wojnar, 1987).

H. Kwiatkowska also presents the humanistic theory of learning, emphasising that the main practical goal of this theory is to support the teacher in assisting the student in achieving authenticity and discovering their own "self" (Kwiatkowska, 1988).

According to W. Walat, the teacher's first task is to understand the student by seeing the world as they see it. By understanding their thoughts and accompanying emotions, the teacher can change their behaviour. The role of the teacher is not limited to presenting educational content but is expanded to assist in extracting their personal meaning. All didactic means take a back seat because their significance is determined based on their usefulness for the previously mentioned self-realisation of students (Walat, 2007).

In humanistic theories of learning, four essential points characterising this concept should be considered. These include the following statements:

- the quality of learning depends on educational outcomes,
- students (students) are not forced to learn – they have freedom, which increases with age, in terms of selecting content and types of activities,
- the teacher does not demand knowledge – only fulfils the role of a guardian,
- there is no competition between students – they learn together and share knowledge (Bartkowiak, 2018).

3. LEARNING CONCEPTS IN THE CONTEXT OF E-LEARNING

Exploring behavioural theory in the e-learning context can be associated with its application in the educational process. Some authors dedicated to e-learning seek to utilise this learning theory, particularly in the form of programmed instruction (Penkowska, 2010). However, this proposition has faced severe criticism, similar to many behavioural theories, even before e-learning evolved into its contemporary form.

Behaviourists suggest a passive role for the learner concerning decisions about different stages of an e-learning course. It implies that the sole decision-maker in learning activities would be the teacher, providing specific knowledge portions based on the learner's educational achievements.

A correct understanding of e-learning is crucial for its effective implementation. Framed by behaviourist principles, an e-learning course would essentially be the "transmission of verified content distributed from the teacher through the network, with the interpretation of learning limited to memorising ready-made content" (Bartkowiak, 2018). The behaviourist concept simplifies the e-learning course to its basic form, significantly impoverishing the teaching process (Meger, 2012). When creating a course, it is essential to address it with the conviction that it caters to thinking individuals with specific (individual for each student) learning needs and expectations. Consequently, the behavioural concept is excluded as a leading approach in academic e-learning during our research.

On the other hand, the cognitive theory of learning, the second highlighted concept, has broad applications in the context of remote education.

In line with its principles, the teaching-learning process is continuous, directly reflecting on utilising e-learning platforms.

An example of a cognitive model fully adaptable to working conditions on an e-learning platform is D. Kolb's model. In this model, the cognitive process can

be divided into four elementary components (understood in e-learning as parts of an e-course), containing closed cognitive-experimental processes. Implementing all four operations forms a closed cycle of a specified process. The operational model's schematic is illustrated in Figure 1.

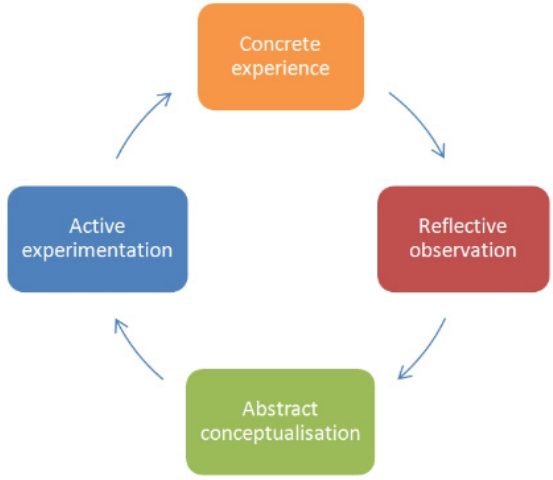

Figure 1. Schematic representation of D. Kolb's cognitive model in e-learning (Donderowicz, 2014)

This cognitive approach encourages active knowledge assimilation through interactive course elements. Learners are prompted to analyse, reflect, and apply knowledge in various contexts, making it well-suited for the online environment where diverse resources are available.

In conclusion, the choice between behavioural and cognitive approaches in e-learning design depends on educational goals, the target audience, and available resources. The cognitive concept aligns better with the idea of interactivity and developing analytical thinking skills, essential in today's dynamic educational landscape.

The first stage (experience) is the starting point for the entire learning process. It assumes that the foundation for further learning is based on personal experience and the practical application of acquired knowledge. At this stage, a crucial role is assigned to the learner/student, not the teacher, as in behavioural theory.

The second stage (observation and reflection) involves the analysis of newly acquired knowledge. In this step, the learner (student) can transform and verify the knowledge.

The third stage (theory) relates to drawing conclusions based on the assimilated theory. By comparing experience with newly acquired knowledge, the learner (student) develops their own theories (Perkowska-Klejman, 2003).

The final, fourth stage (practice) involves verifying the level of mastered knowledge. The learner (student) applies the acquired knowledge in practice and evaluates it through a test assessing its proficiency (Donderowicz, 2014).

A significant element of D. Kolb's model is its innovative approach to knowledge transfer by introducing interaction. This method has found widespread use, particularly in academic e-learning.

Analysing cognitive-based models indicates a focus on creating problem situations regardless of the learning process stage, analogous to D. Kolb's approach. Introducing a problem into the teaching-learning process adds value, stimulating active student engagement and initiating problem-solving. This feature of cognitive principles is fully reflected in the format of courses available on e-learning platforms in the academic environment.

The versatility of this approach lies in students encountering a problem situation that can be solved in several ways. One option is organising an online meeting with the instructor, presenting the problem, theories, and their solutions.

Another option involves providing the student with a pre-prepared course by the instructor, including a problem situation. The student is almost independently solving the problem using their experience, knowledge, and available online resources. The final action should be presenting the problem solution through renewed contact on the e-learning platform with the course instructor. This approach emphasises student autonomy and the ability to solve problems in diverse ways.

Another link directly connecting cognitive learning theory with e-learning is the theory of dual coding. Transmitting knowledge through multiple channels (using multiple senses) is more effective. Contemporary e-learning courses often include text, graphics, animations, tables, videos, and other channels presenting content simultaneously (Redish, 2003).

Analysing the principles of academic e-learning aligns with cognitive learning theory. This concept involves active student engagement in the learning process, perfectly matching the interactive nature of academic e-learning.

Similarly, the third highlighted theory, the constructivist theory of learning, also shares common ground with academic e-learning. One key aspect favouring implementing the constructivist theory in e-learning is the potential for effective dialogue. E-learning platforms, the primary medium for e-learning, allow communication between the academic teacher and student as well as among students. Virtual meetings facilitate exchanging views on specific topics or collaborative

work on educational projects. Additionally, academic dialogue can be conducted through email or websites. According to constructivist theory, engaging in dialogue can positively impact motivation for learning, as online communication conveys not only knowledge but also values, playing a significant role in creating e-learning courses.

A crucial element indicating the realisation of e-learning in line with constructivist theory is the role of group work. Group work should be conducted through the e-learning platform via chat or video conferences (synchronous mode). The process starts with presenting a problem situation, which can use an e-learning course introducing the topic and presenting an overview of tasks and strategies for their execution.

The group should be divided at this point, with each participant receiving a specific task. The teacher needs to supervise the development of action strategies. The ability to communicate with other group members at any time is facilitated through dedicated areas (usually discussion forums or chats) on the e-learning platform. The concluding actions of the learning process are retrospection and summarising the tasks.

This method, rooted in constructivist theory, seems invaluable when not everyone can meet individual work requirements. In such conditions, individuals using this method can perform tasks without significant problems (Meger, 2006).

The last of the discussed theories, the humanistic theory, should not be considered the leading theory during our research. J. Kozielecki's words suggest that despite setting noble goals for the student, the creators of this theory did not develop specific methods to achieve them.

The theoretical works of the humanistic concept lack educational systems that would serve as an alternative to pedagogical solutions (Kozielecki, 2000). Therefore, although the humanistic theory can inspire academic education, its lack of a specific methodology poses challenges in the practical implementation in the academic e-learning domain.

4. SUMMARY

Summarising detailed considerations regarding the fundamental learning concepts, it can be concluded that academic e-learning is built upon the cognitive-constructivist theory of learning (cognitive theories), involving selected principles from the behavioural and humanistic theories.

Applying behavioural theory in academic e-learning is associated with transmitting content verified and distributed by the teacher through the network. The so-called programmed learning enables the precise definition of the student's activities during an e-learning course.

The humanistic theory of learning in the context of e-learning is connected to the need for self-realisation and knowledge updating for students. According to this theory, self-realisation is a unique characteristic for individuals experiencing this need.

The fundamental aspect supporting the application of cognitive theories as leading in e-learning is the continuity of the learning process, which can occur through e-learning platforms. The theory of Dual Coding connects cognitive theories and e-learning, indicating that knowledge transfer is much more effective when conducted through multiple channels (sensory reception through various senses).

Analysing the possibilities of creating contemporary e-learning courses, it can be observed that they can encompass various resources such as text, graphics, animation, tables, videos, and many other channels simultaneously presenting content. Cognitive theories are based on the relationship between participants in the "knowledge construction process". The role of dialogue in the teacher-student line is considered a fundamental form of understanding the world. Furthermore, according to cognitive theories, group work plays a crucial role. This work must be conducted through the e-learning platform, using features like chat or video conferencing (synchronous mode).

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