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EFFECTIVENESS OF STUDENT INTERACTION AND ACTIVE ENGAGEMENT IN DIGITAL LEARNING

[1]Nurul Huda Ramadhan, [2]Ash Shofhu Mukarib Chilmi, [3]Puti Kemala Rizki, [4]Shafa' Fikriyah Zahirah Akram, [5]Suyani
[1,2,3,4,5] Institut Agama Islam Al-Zaytun Indonesia
Alamat e-mail : nurulrmdhn1510@gmail.com, ashshofhu@gmail.com, putirizki12@gmail.com, nurulrmdhn1510@gmail.com, hfzyani86@gmail.com

ABSTRACT

In today's digital era, the world is facing rapid technological advancement. Technology plays an important role in today's digital learning, but there are still many universities that do not fully understand and utilize the role of technology in teaching and learning activities. Therefore, this research aims to explore this issue by focusing on the use of technology to improve student interaction and engagement in digital learning. In addition, this research also aims to identify the impact of using technology in active learning. This study has several objectives, including: (1) to identify technology strategies to enhance student interaction and active engagement in distance learning; and (2) to identify and understand the positive impacts that can arise from the implementation of technology in the learning process. The method used in this research is a qualitative approach through literature review, where data is collected from various books and journals relevant to this topic. The results show that appropriate technology and learning models that are relevant to the development of the digital age have a significant impact on students' learning success. Learning models relevant to this research include: active learning, discovery learning, and mind mapping.

***Keywords**: Digital learning, interaction, active engagement, active learning, discovery learning, mind mapping.*

A. Introduction

Technology plays a very important role in the life of the era 5.0. It's existence is the main driver of various human activities, both in the realm of government, social, economic, cultural and educational. Education, as one of the key factors that determine the success of a country, is a teaching process carried out by educators to students. The main goal is to form individuals who have intellectual abilities, skills, and social and spiritual values in order to prepare them to face future challenges(Pare & Sihotang, 2023). In this context, the world of education is required to constantly adapt to technological developments in order to improve the quality of learning. Various countries are also trying to integrate technology into the education system, because changes and innovations in this field are needed in order not to be left behind

by the advances caused by technology.

With the passage of time, the application of modern technology has spread to various areas of life, including education. An equally important method is the use of media in digital learning, which aims to create a more meaningful and higher quality learning experience. Digital learning is a tool that stimulates students to improve their skills in accordance with the times, and provides them with opportunities to improve their critical reasoning and problem-solving skills through communication and collaboration.

According to Nanang Hidayat et al. (2019, p. 10), digital learning can be defined as a digital processing system that supports active learning, knowledge construction, inquiry, and exploration. It enables remote communication and data sharing between teachers and students in different classroom locations. One of the positive effects of online learning in the digital age is the increase in individual participation and creativity. One of the positive effects of digital learning is the ability to be more active and creative.

The tradition of conventional learning is often identified with classrooms that contain students, instructors, and equipment such as chairs and tables. Methods commonly used in conventional teaching include lectures, discussions, and group learning activities. Assessment is usually done through written or oral assignments. However, this method often turns students into passive objects, receiving information without feedback. As a result, students tend to be less active, experience a decrease in critical thinking skills, and have low motivation to learn. This minimal involvement in conventional learning has an impact on the low potential for developing critical skills and decreasing student creativity and innovation in the learning process.

Previous studies have shown that social interaction between students in technology-enhanced learning methods is much more effective than interaction in conventional classrooms that do not use technological media. In traditional classrooms, students tend to only be able to interact physically (face-to-face) in the classroom, with limited interaction outside of the classroom (Lin, 2019).

From the study, it can be seen that technology can be integrated into distance education. The use of technology in the field of education is a way out for educators and students, as they can continue to learn despite being far away from each other. In education, technology comes in various forms, including applications and platforms that facilitate the process of teaching and learning activities. These include software, hardware, Internet use, web-based learning, educational games, augmented reality, and virtual reality. Some applications that can be used are WhatsApp Group, Google Classroom, Zoom, and Google Meet. With technology, students can quickly access a variety of information. On the other hand, teachers can be creative in delivering materials in interesting and varied ways, making the learning process more dynamic and less monotonous, which in turn can increase students' enthusiasm for learning. With technology, students and teachers gain more freedom and flexibility in the learning process.

In the context of digital learning environments, it is crucial to understand how to increase motivation to achieve student interaction and engagement. Understanding the factors that influence student interaction and engagement in digital learning environments enables educators to develop more effective strategies for designing engaging and motivating learning experiences. Learning techniques used in education have evolved with the advancement of digital technology. In the past, learning was often passive due to teachers' exposure-based teaching methods without two-way communication. Today, however, technology has enabled more interactive, collaborative, and problem-based learning approaches. Through the use of various media, students can actively and directly engage in problem solving and critical thinking, all of which support the development of their new skills. In the past, printed books were the main source for learners. However, with the presence of technology today, information can be accessed through various means such as e-books, the Internet or learning videos. Learners can now learn through a variety of media, from sound, video, animation to text, which makes it very easy to understand and absorb information.

The researcher raises this issue with several objectives, including to identify and understand the positive impacts that arise from the application of technology in learning and the benefits obtained. Fundamentally, the quality of education depends on the quality of the learning process. Effective learning needs to be supported by sophisticated technology, which is a challenge for educators to adapt to make learning more effective and efficient, and to improve the quality of education and learning outcomes. It is also important to understand how technology can enhance student interaction and engagement in active learning. In addition, technology should help to produce a generation that will be able to compete in the future. However, education must also be aware of the challenges that may arise from the presence of technology.

Based on this statement, the researcher formulated several main questions, namely: (1) How do interaction and active engagement affect the effectiveness of distance learning? and (2) what strategies can be used to improve students' interaction and active participation in distance learning? The researcher hopes that this article can provide significant benefits to the readers, as well as a valuable reference for future research.

B. Method

This research uses a qualitative approach with an in-depth literature review method. This approach was chosen to gain a comprehensive and detailed understanding of the phenomenon under study in a specific context. Qualitative research methods are approaches grounded in philosophical principles used to investigate scientific conditions (experiments), where researchers act as instruments, employing data collection techniques and qualitative analysis that focus primarily on meaning. This research employs the literature review method. (Sugiyono, 2018)describes Literature Study as an examination of theoretical materials and other sources pertaining to the values, cultures, and norms that exist within the social context under investigation. For this research, the author opted for a library study or literature review by gathering references from various journals, articles, and books connected to the title.

The data analysis techniques used were content analysis and thematic analysis. Content analysis was used to identify and categorize information that appeared in the data in order to find relevant patterns and themes. On the other hand, thematic analysis was used to explore the major themes that emerged from the data, allowing the researcher to uncover deeper meanings as well as relationships between concepts. The combination of these two techniques ensures that the data is analyzed systematically and in depth, resulting in valid and reliable findings.

C. Result and Discussion

Through a qualitative literature study approach, this research reveals various perspectives raised by previous researchers regarding effectiveness of student interaction and active engagement, thus providing a more comprehensive insight.

A. The concept of interaction and active engagement in digital learning

Social interaction is an important aspect of the learning process. Distance learning should not replace the social interaction that normally takes place between students and their peers. Therefore, it is important for educators and parents to create opportunities for children to interact directly with their peers and develop their social skills. Fundamentally, humans engage in learning as social beings, with an emphasis on behaviors that promote social interactions that support the outcomes of academic learning activities. The primary task of education is to encourage people to behave democratically, to be integrated and capable of action at both the individual and community levels, in order to improve the quality of life based on productive social democratic principles.

Interaction is an inherent human characteristic that emphasizes the formation of relationships between people. This paradigm asserts that it is impossible for individuals to escape interaction with others. Therefore, the learning process should be a means of preparing learners to interact extensively with society, to develop democratic attitudes and behaviors, and to increase the productivity of learning activities. Interaction plays an important role in the social-emotional development of learners. Therefore,

there needs to be a balance between online learning and social interaction in the education of students.

Active engagement can be defined as a state in which a person participates and pays attention to what is going on. It involves a person's interest, motivation, and attention to something. Active engagement helps and encourages individuals to develop important skills and relationships with others.

The implementation of active engagement in learning involves several important aspects. First, students participate physically, mentally, emotionally, and intellectually in any learning process. High levels of concentration and motivation to complete tasks within the allotted time reflect this engagement. Second, students absorb knowledge immediately through hands-on experiences, such as doing activities directly, interacting in groups, and working with friends, so that the concepts and principles taught are more easily understood.

In addition, students try to create an environment that supports the learning process. They also actively seek out and use various learning resources that are relevant to the learning objectives. Students' involvement can be seen in the initiatives they take, such as answering and asking questions and trying to solve problems that arise in the learning process. Another feature of active engagement is two-way interaction between teachers and students. Equal participation of students is essential so that no one student dominates the discussion or question and answer session (Rahayu Sri, 2022).

In today's digital age, the use of technology in digital learning brings many benefits to the education system. Technology allows for better interaction and engagement with students, which is essential for improving their understanding. This interaction can be between students and teachers, with peers, or with learning materials. For example, interaction with the teacher occurs when the teacher explains the material and students ask questions or discuss problems they have encountered. Meanwhile, interaction among students can take the form of group discussions or collaborative projects, and interaction with the material can include reading, watching, or completing exercises.

Student engagement is closely related to the vibrancy, interest, and motivation they bring to learning. When students are actively thinking and analyzing information, they demonstrate a high level of engagement with knowledge. In addition, a high level of interest in a subject also reflects a high level of affective engagement.

Digital learning can be defined as teaching and learning activities that take place without direct interaction, using available technology. This type of learning has the potential to improve students' thinking skills. Through higher-order thinking tasks such as analysis, evaluation, and creation, students can hone their ability to process information and solve problems. By interacting with online learning materials, they can also develop critical thinking skills.

In addition, digital learning encourages students to be critical thinkers. Through online discussions, forums or collaborative activities, students learn to understand different points of view, ask questions and present their own arguments. This process not only helps them develop critical thinking skills, but also helps them gain a deeper understanding of the information at hand.

B. Problems with technology-based learning

There are various obstacles to overcome in the adoption of technology-based education.

The disparity in access to technology across different locations is one of them. Students and teachers are unable to use technology that is more useful than traditional learning methods because of this technological divide. Additionally, some parts of Indonesia still lack access to digital devices like computers and cellphones, which makes it challenging for educators and pupils to use technology for learning (Endrawati Subroto et al., 2023). This may result in a gap in the availability of digital education, leaving certain students or areas with limited access to it at a disadvantage when it comes to using technology for learning.

Another issue that needs to be taken into account is the deficiency of technological expertise and training among educators. In order to enhance the quality of instruction and learning and equip students to meet the needs of a rapidly changing world, educators must possess the necessary

technology capabilities. In response to technology advancements, education is currently shifting toward responsive and adaptable learning. Teachers need to be proficient in the newest technologies in order to mentor their kids and produce noteworthy outcomes (Salsabila et al., 2024)

The second obstacle can be the presence of unfavorable content online, which is another one that is hard to go past. because not every presentation of content is suitable for the user's age. due to the possibility that the displayed content may include offensive language, sexual content, violence, and the dissemination of false information.

The final issue raised by researchers is how well-suited the curriculum and instructional resources are to new technological advancements. To stay current and useful, the curriculum and instructional materials must be updated frequently to reflect technological advancements. To identify needs and opportunities for incorporating technology into learning, curriculum developers, technology specialists, and education practitioners must work together.

Discussion

Possibilities to advance technology-based learning making education more accessible is one of the opportunities presented by the development of technology-based education. Technology has made it possible to access educational resources at any time and from any location, circumventing time and location restrictions. Students who previously might have had trouble obtaining traditional education—such as those who reside in distant places or have physical limitations—now have opportunities. Additionally, learning flexibility can be increased through technology-based education. In a setting that is pleasant for them, students can study. Students' motivation to learn can be influenced by comfortable surroundings, and this can have an impact on learning results (Evi Martina et al., 2020).

Furthermore, technology enables the customization of education. For instance, by utilizing artificial intelligence with proper features, it simplifies and introduces innovation in the educational landscape. This technology facilitates the creation of learning experiences that are more engaging, dynamic, captivating, and collaborative. As a result, it can

enhance student engagement and participation in tackling the challenges posed by rapid digital advancements. Nevertheless, in addition to requiring sufficient technology, we also need learning theories and models that align with present developments. Researchers have identified a number of theories and learning models that are quite pertinent to this study, including:

1. Behaviorism Theory

Behaviorism is an approach that views learners as passive, responding to stimuli from the environment. In this view, the learner is compared to a blank slate (tabula rasa) whose behavior is shaped by positive or negative reinforcement. Both positive and negative reinforcement increase the likelihood that a particular behavior will be repeated. Conversely, punishment-both positive and negative-works to decrease the likelihood that the behavior will be repeated. The term "positive" refers to the application of a stimulus, while "negative" refers to the removal of a stimulus. Therefore, learning can be defined as a change in an individual's behavior. Behaviorism was first studied on animals, such as Pavlov's famous experiments with dogs, before it was applied to humans. Behaviorism predated the approach of cognitivism and rejected structuralism as an extension of logical positivism. In addition, BF Skinner developed a school known as Radical Behaviorism, which includes specific features in the acceptance of mediation and the role of emotions that are different from other behaviorist approaches (Wibowo Hari, 2020).

2. Theory of Cognitivism

Cognitivism emphasizes the importance of mental activities that occur within the individual, opening the "black box" of the human mind, which is essential to understanding the learning process. Mental processes such as thinking, listening, curiosity, and problem solving are the focus of research. Knowledge is seen as a mental construction in the form of schemas or symbols. Cognitivism defines learning as a change in schema. In response to behaviorism's view of humans as "programmed beings" who respond only to external stimuli, cognitivism emphasizes that humans are rational individuals who require active participation in the learning process. Their actions are the result of deep thought processes. Although changes in behavior can be

observed, they only reflect what is happening in the mind of the learner. Cognitivism uses the metaphor of the mind as a computer: information enters, is processed, and produces certain actions or results (Wibowo Hari, 2020).

3. Theory of Constructivism

Constructivism emerged as a response to traditional didactic approaches such as behaviorism and programmed teaching. This theory emphasizes that learning is an active process in which individuals construct their own knowledge based on personal experiences and hypotheses from the existing environment. Learners continually test these hypotheses through social interaction. Each individual has a different interpretation and process of knowledge construction. In the constructivist view, students are not blank slates (tabula rasa) filled with information, but rather individuals who bring past experiences and cultural factors that influence how they perceive situations. It is important to note that a common misconception about constructivism is the belief that instructors or teachers do not need to provide information directly. In fact, the role of the teacher is not to avoid teaching, but rather to enable students to construct their own knowledge. The theory asserts that all knowledge is built from the learner's prior knowledge base, regardless of the teaching method used. Even when listening to a lecture, students are actively engaged in constructing new knowledge (Wibowo Hari, 2020).

1. Active Learning Model

Active learning is an approach that emphasizes the active participation of students in the teaching and learning process. This approach encourages students to interact directly with learning materials, their peers, and the teacher so that they can develop a deeper and more relevant understanding.

Active learning, which can be interpreted as learning with enthusiasm and active participation, is an educational model that encourages the management of the learning system through active means. The goal is to produce students who are capable of learning independently. In this approach, students become the main subject in the learning process, so that learning is student-centered. Students are required to actively participate, not just listen to the teacher's lectures. Thus, active

learning is a method that aims to increase students' participation in the learning process by motivating them (Effendi, 2016).

Active learning involves students directly in the learning process (Baharun, 2015). Through active participation, students can think, analyze, and develop a deeper understanding of the subject matter. Understanding the impact of active learning on students' learning success is very important in preparing teachers to create an effective learning environment. Teachers' limited knowledge in using learning methods, including conventional methods, can also affect students' learning outcomes (Ramadhan, 2021). Therefore, understanding how active learning can improve students' learning success will help teachers design more effective strategies, create engaging learning experiences, and motivate students to reach their learning potential. According to (Kadi T, 2021) the characteristics of active learning include: (1) the learning process focuses not only on the delivery of information by the teacher, but also on the development of analytical and critical thinking skills about the topics being discussed; (2) students are actively involved in activities related to the material; (3) emphasis on exploring values and attitudes related to the subject matter; (4) students are invited to think critically, analyse and evaluate; (5) rapid feedback occurs during the learning process. In addition, the correct use of technology will improve the quality of education today. Various tools and platforms have been made available to support active learning, including in the context of face-to-face learning. Active learning models can also be integrated with digital technology, creating a more engaging and interactive learning experience through digital media and platforms.

2. Discovery learning Model

According to (Kodir, 2018), discovery learning is a model that is designed in such a way that students can discover new knowledge, in whole or in part, in their own way. In this learning process, all elements from the strategy to the findings are completely derived from the students' exploration. Through this model, students are encouraged to formulate hypotheses. They are also guided to carry out an investigation that will lead them to a conclusion. The aim of this approach is for students to construct

their new knowledge independently, while at the same time improving their thinking skills. The main characteristic of discovery learning is that students discover principles or concepts for themselves by identifying and organising information, thus building more solid knowledge and developing their intuition.

Discovery learning is designed with an emphasis on experiential and interactive activities. Experiential activities mean that teachers should be able to motivate students to develop knowledge, skills, values and attitudes through practical experience. Trainers need to use a variety of methods such as stories, games, visual tools and other engaging techniques to stimulate participants' curiosity. In addition, the trainer has a role to play in guiding students to think, act and reflect in new ways. The technique of applying the discovery learning model can vary, but the aim is the same: to help students achieve the end result through direct experience and independent learning. By exploring different situations or conducting experiments, students will be better able to remember concepts and acquire new knowledge.

3. Mind Mapping Learning Model

According to (Buzan Tony, 2024), mind mapping is a very effective way to process information and recall it easily. (Zarkasyi, 2015)adds that the mind mapping learning model uses memory techniques with the help of concept maps, which combine coloured codes and symbols that are systematically linked to each other. This process involves both the left and right hemispheres at the same time.

From this explanation, it can be concluded that the Mind Mapping learning model is a learning technique that focuses on developing the learner's understanding, where they are instructed to analyse the information presented. The information is then presented in the form of a concept map chart or diagram based on the language style and creativity level of each individual. Mind mapping also has significant benefits in improving memory and recall, as the technique helps to organise information visually, making it easier to understand and remember.

C. The impact of interaction and engagement on learning outcomes

Active interaction and engagement in the learning process play an important role in achieving learning outcomes. When students are actively engaged, both individually and in groups, they are more likely to develop a deeper understanding and retain information better. This engagement not only increases motivation, but also creates a dynamic and collaborative learning environment where participants feel more responsible for their learning process.

First and foremost, good student-teacher interaction has a significant impact on learning success. The more intense and positive the interaction, the better the learning outcomes achieved by the students. Secondly, interest in learning plays an important role in determining the final learning outcome. In other words, the more interested students are in participating in the lesson, the better the results they achieve. Thirdly, the digital learning model used also has a big impact. If the model used is interesting and innovative, students will be more motivated to innovate, think creatively and improve their critical thinking skills.

Learning outcomes are also influenced by the availability of adequate digital learning facilities and infrastructure. Optimal use of digital media can increase student interaction and engagement, which in turn contributes to their learning success.

E. Kesimpulan

Based on the results of the content and thematic analysis, the concept of interaction and active engagement in digital learning environments is highlighted. Social interaction is highlighted as an important element in the learning process, emphasising that digital learning should not replace the usual social interaction between peers. This emphasises the importance of educators and parents in facilitating opportunities for learners to interact directly with their peers and develop social skills, thus promoting democratic behaviour and community engagement to improve quality of life.

Active engagement refers to the state in which individuals participate and pay attention to their learning process. It includes interest, motivation and commitment, and supports the development of skills and relationships. Important aspects of implementing active engagement in learning are that learners participate

physically, mentally and emotionally in the learning process, show high levels of concentration and motivation to complete tasks, and seek out resources relevant to their learning goals. Two-way interaction between students and teachers is essential to ensure that all students participate equally in discussions.

Problems with technology-based learning, the disparity in access to technology across different locations is one of them. Students and teachers are unable to use technology that is more useful than traditional learning methods because of this technological divide, that needs to be taken into account is the deficiency of technological expertise and training among educators. In order to enhance the quality of instruction and learning and equip students to meet the needs of a rapidly changing world, educators must possess the necessary technology capabilities, The second obstacle can be the presence of unfavorable content online, which is another one that is hard to go past. because not every presentation of content is suitable for the user's age. due to the possibility that the displayed content may include offensive language, sexual content, violence, and the dissemination of false information.

The final issue raised by researchers is how well-suited the curriculum and instructional resources are to new technological advancements. To stay current and useful, the curriculum and instructional materials must be updated frequently to reflect technological advancements.

In today's digital age, technology increases interaction and engagement between students, which is crucial to deepening their understanding. Different forms of interaction take place between students and teachers, between peers and with learning materials. The presentation of this article also highlights that learning in the digital age encourages critical thinking and allows students to explore different points of view through discussion and collaborative activities.

Here are some relevant learning theories that promote interaction and active engagement in digital education, including:

1. Behaviourism - Viewing learners as passive responders who are shaped by positive and negative reinforcement. Learning is defined as a change in behaviour.

2. Cognitivism - Emphasises mental processes in learning, sees knowledge as something constructed through experience and recognises the importance of active participation.

3. Constructivism - Suggests that learners actively construct knowledge based on personal experience and interaction with their environment, with the teacher's role being to facilitate rather than simply transmit information.

Other learning models that encourage interaction and engagement include:

1. Active Learning - Encourages direct student engagement with materials and peers, promoting independent learning and critical thinking.

2. Discovery Learning - Engages students in the discovery of new knowledge through exploration and inquiry, promoting deeper understanding and thinking skills.

3. Mind mapping - a technique that helps students organise and visualise information, improving memory and comprehension.

Finally, the article highlights the significant impact of interaction and active engagement on successful learning. Active engagement leads to deeper understanding and better retention of information. Positive student-teacher interactions, student interest in the subject matter, innovative learning models and access to appropriate digital resources all contribute to a successful learning experience.

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