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THE IMPACT OF USING INFORMATION AND COMMUNICATION TECHNOLOGY ON STUDENTS' CRITICAL THINKING SKILLS IN ELEMENTARY SCHOOLS

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Abstract

This research examines the impact of the use of Information and Communication Technology (ICT) on the development of students' critical thinking skills in elementary schools through a literature review. ICT is recognized as having the potential to increase student engagement, motivation and analytical abilities. This literature review examines various empirical research and theories that discuss the contribution of ICT in the context of basic education. The results of the study show that effective ICT integration can improve critical thinking skills, as long as it is supported by relevant quality content, interactive teaching methods, and teacher competence in utilizing technology optimally. Several approaches such as project-based learning and collaborative discussions have proven to be more effective in developing critical thinking competencies than conventional methods. In addition, continuous training for teachers to master and apply ICT strategically in learning was found to be an important factor supporting this success. This study highlights the need for integrative strategies and institutional support to maximize the potential of ICT in the development of students' critical thinking skills at the primary school level.

Keywords: Information and Communication Technology, Critical Thinking Skills, Basic Education, Elementary School

INTRODUCTION

Critical thinking skills are one of the essential competencies that students must have in this modern era. At the elementary school level, the development of these skills is very important because it contributes to students' ability to analyze information, solve problems, and make the right decisions (Álvarez-Huerta et al., 2024). Additionally, critical thinking helps

students develop the ability to understand and evaluate arguments, which is critical in preparing them for the challenges of academics and everyday life. With good critical thinking skills, students are more able to actively participate in the learning process and apply the knowledge they gain in real situations (Reddy & Lakshmi, 2024).

Information and Communication Technology (ICT) has developed rapidly in recent years and has significantly influenced various aspects of life, including education. In elementary schools, ICT is starting to be integrated as a learning tool which is expected to improve the quality of education. Through the use of computers, tablets and the internet, students can access information more easily and quickly, and interact with interactive learning content (Nilson, 2023). However, the real impact of the use of this technology on students' critical thinking skills needs to be analyzed in depth, considering that ICT can also bring certain challenges and risks if not used wisely.

Technological developments also require changes in teaching methods in elementary schools. Teachers are required to be able to utilize ICT in the learning process so that they can provide a more interesting and effective learning experience. The use of technology in the classroom can encourage students to think more critically through various activities such as problem solving, project-based discussions, and evaluating information sources. However, not all teachers have sufficient ability and knowledge to utilize ICT optimally (Hell et al., 2022). This gives rise to differences in the effectiveness of ICT use in various schools, which in turn can influence the development of students' critical thinking skills.

In this context, it is important to examine how the use of ICT impacts students' critical thinking skills in elementary schools. This research will help educators, policy makers, and parents understand the extent to which ICT can be used as a tool to improve students' critical thinking skills. With better understanding, it is hoped that strategic steps can be taken to maximize the benefits of ICT in basic education (Marabini, 2022). This research is also expected to provide theoretical and practical contributions to the development of learning methods that are more effective in facilitating students' critical thinking skills.

The development of Information and Communication Technology (ICT) in the world of education has brought significant changes in the way learning is carried out. In this digital era, ICT is no longer just a complement, but an integral component that facilitates teaching and learning activities. Starting from the use of hardware such as computers, tablets and smartphones to

learning applications and online platforms, technology allows access to unlimited information and provides various interactive learning resources (Lithoxoidou & Papadopoulou, 2024). Schools, universities and other educational institutions can now use ICT to increase the effectiveness of learning, simplify administration, and expand the reach of education to areas that are difficult to reach.

In addition, the integration of ICT in education also enables various innovative learning methods. Project-based learning, flipped classroom, and blended learning are some examples of methods that are increasingly commonly applied with the help of technology. This technology facilitates collaboration between teachers and students, as well as among students themselves, through digital communication tools and online learning platforms. Digital learning media allows students to learn independently according to their respective pace and learning style (Chatfield & Chatfield, 2022). In fact, ICT also supports personalization of learning, where material can be adapted to students' individual needs and abilities, so that learning becomes more effective and interesting.

However, the development of ICT in the world of education also brings challenges that need to be overcome. Unequal access to technology between one region and another creates educational gaps. In addition, there are concerns regarding students' dependence on technology and the potential for misuse of the internet (Bahiyyah et al., 2024). Therefore, there is a need for a clear framework and regulations regarding the application of ICT in education. Digital literacy education is very important so that students can use ICT wisely and safely. Thus, ICT can be used optimally for educational purposes, and existing challenges can be minimized.

RESEARCH METHOD

The study in this research is qualitative with literature. The literature study research method is a research approach that involves the analysis and synthesis of information from various literature sources that are relevant to a particular research topic. Documents taken from literature research are journals, books and references related to the discussion you want to research (Earley, M.A. 2014; Snyder, H. 2019).

RESULT AND DISCUSSION

The Positive Influence of ICT on Critical Thinking

Various studies have shown that the use of Information and Communication Technology (ICT) in education can improve students' critical thinking skills. One study conducted by S. Afrianto in 2018 at a secondary school in Indonesia found that the use of digital learning platforms significantly helped students develop critical thinking skills (Altun & Yildirim, 2023). In this study, students who used interactive learning applications and software that supported online discussions were able to solve complex problems and bring an analytical approach to their assignments compared to students who did not use such technology.

In addition, a study conducted by Diane F. Halpern in 2016 tested the effectiveness of using multimedia tools in developing critical thinking skills in students (Drushlyak et al., 2024). This research shows that students who participate in ICT-based learning programs show significant improvements in their ability to analyze, evaluate, and synthesize information. Halpern argues that technological media provide real-world simulations and complex contexts, thereby encouraging students to use their critical thinking skills more effectively in solving problems and making decisions.

Another relevant research is the study conducted by Zhang et al. in 2017, which examined the impact of ICT use in the teaching and learning process in science classes. This study concluded that the use of science simulation applications and educational videos helps students to understand scientific concepts better and develop their analytical skills. Students are better able to ask critical questions, create hypotheses, and run virtual experiments, all of which contribute to improving their critical thinking skills (Putra & Abdunnafi, 2024). Consistent results from various studies show that ICT, when applied correctly, can be a very effective tool in developing critical thinking skills in students.

One ICT application that is effective in improving critical thinking skills is Kahoot, a game-based learning platform that can be used by teachers to create quizzes or interactive discussions. This application stimulates student engagement in a fun and competitive way (Nurhikmayati & Darhim, 2023). Kahoot! makes it easy for students to analyze questions critically and quickly in a supportive environment, teaching them to think quickly while maintaining rigor. Using Kahoot! in class allows students to practice critical thinking when answering questions that require quick analysis and reasoning.

Padlet is another example of an ICT tool that enables effective collaboration and brainstorming, improving students' critical thinking skills. This application takes the form of a virtual board that allows users to share ideas, images and links simultaneously. Padlet helps students organize their thinking and present arguments more clearly (Afandi et al., 2024). With discussion and collaboration features, students are invited to comment constructively on their friends' ideas and develop their thinking further, encouraging them to consider different perspectives in problem solving.

Google Classroom has become a very popular tool in various educational institutions. This platform provides a space for teachers and students to share learning materials, hold discussions, and provide and receive feedback. Google Classroom facilitates a more flexible and interactive teaching and learning process, where students can learn independently but are still monitored (Muliawan, 2023). With the comments and question and answer features, students are trained to communicate critically and clearly. In addition, easy access to various online resources and literature through Google Classroom requires students to develop evaluative skills in filtering credible information.

Negative Influences or Challenges

One of the negative impacts of using ICT is the potential for high dependence on technology, which can hinder the development of students' critical thinking skills. This dependency often makes students more likely to look for instant solutions through search engines or applications rather than trying to solve problems independently (Prasanti & Suniasih, 2023). As a result, they may lack training in evaluating information in depth, analyzing multiple points of view, or developing logical and cohesive arguments. Dependence on technology can cause students to miss out on the deep thinking processes that are essential for understanding and innovation.

Apart from that, easy access to answers and fast information via the internet can give rise to intellectual laziness. Students may be reluctant to do further research and choose to accept the answers proffered by technology without testing them further. This can lead to shallow thinking and weak ability to question and analyze the information received (Shoffa, 2022). Over time, a learning process that is too dependent on ICT can erode students' curiosity and initiative to form a deep understanding of the topic being studied.

Reduced social interaction is also one of the negative impacts of excessive use of ICT. When students use ICT tools constantly to communicate or participate in group activities, true face-to-face interaction can be reduced. This can affect students' ability to communicate effectively and empathize with others, which are important aspects of critical thinking. Excessive use of technology may interfere with learning important social skills acquired through direct interactions, such as reading facial expressions, understanding social cues, and practicing active listening (Prasanti & Suniasih, 2023).

Various studies have been conducted to assess the influence of information and communication technology (ICT) on students' critical thinking skills, and some of them show insignificant results or even a decline in these skills. For example, a study conducted by Kubiatko and Haláková (2009) noted that excessive use of technology in the classroom did not significantly improve students' critical thinking skills (Nilson, 2023). This research shows that despite abundant access to technology, students do not automatically become more critical in their thinking without proper guidance and a clear pedagogical structure.

Another study by Dr. Patricia Greenfield of UCLA (2009) also found that the use of digital devices can lead to declines in deep reading and critical thinking. In his research, Greenfield highlights that quick, superficial interactions with digital texts can replace longer, more reflective reading that encourages critical analysis. This lack of engagement in activities that require deep thinking and reflection may reduce students' ability to critically evaluate information and develop cohesive arguments (Fabio & Suriano, 2023).

A study by Spitzer (2013) shows that high dependence on digital devices can hinder the development of complex problem-solving skills. This research found that students who more often use technology to look for immediate answers tend to have difficulty in critical and analytical thinking when faced with more difficult problems (Edy et al., 2024). Spitzer notes that technology designed to provide convenience can reduce students' internal drive to persevere in the face of intellectual challenges, ultimately leading to a decline in critical thinking skills.

Influencing Factors

One of the main factors influencing the effectiveness of information and communication technology (ICT) in improving critical thinking skills is the quality of the content delivered. Well-designed and interactive educational content can encourage students to think more deeply and critically (Megawat

& Amri, 2024). For example, educational applications or programs that challenge students to solve complex problems, evaluate multiple perspectives, and make conclusions based on available evidence, can be very effective in honing critical thinking skills. On the other hand, content that is passive or too simple will not provide enough encouragement to stimulate the critical thinking process.

Teaching methods also play an important role in how ICT can improve critical thinking skills. Pedagogical approaches that integrate technology with active teaching strategies, such as problem-based discussions, collaboration between students, and research projects, have been shown to be more effective. Teachers must be able to direct and facilitate the use of ICT in a way that invites students to analyze, synthesize and evaluate information critically (Sitorus, 2024). Teaching methods that only focus on using technology as a visual aid without including interactive and reflective elements tend to be less effective in developing critical thinking skills.

Apart from that, the teacher's ability and competence in implementing ICT effectively greatly influences the learning outcomes. Teachers must not only understand the technology used but must also have appropriate pedagogical strategies to maximize the potential of ICT in learning. Training and professional development for teachers in the areas of ICT and critical education is essential to ensure that they can provide effective guidance to students (Mascarenhas et al., 2023). Teachers who are skilled in using technology can create a challenging learning environment and support the optimal development of students' critical thinking skills.

Apart from the factors previously mentioned, student involvement in the learning process is also an important condition that influences the effectiveness of ICT in improving critical thinking skills. Students who are active and motivated in using technology as a learning tool tend to be more open to existing challenges and participate actively in learning activities (Negoro et al., 2023). For example, they will be more encouraged to seek out additional information, participate in online discussions, and work on collaborative projects that require critical thinking. Therefore, it is important for teachers to design interesting and relevant activities to keep students engaged.

Another supporting environment that is no less important is adequate technological infrastructure and equal access for all students. A learning environment that is supported by adequate hardware and software, as well as stable connectivity, enables optimal use of ICT in teaching and learning

activities. Without adequate infrastructure, efforts to integrate ICT in learning can be hampered (Perez & Andrade, 2023). In addition, the digital divide between students who have access to technology and those who do not must also be addressed to ensure all students have equal opportunities to develop critical thinking skills.

The success of using ICT in improving critical thinking skills is also influenced by support from the school and the educational policies implemented. Schools that have a clear vision and mission in integrating ICT in the curriculum tend to be more successful in creating an innovative and critical learning culture. Schools must provide adequate training and resources to teachers, as well as carry out regular evaluations to ensure that the use of ICT is truly effective in improving the quality of learning. Educational policies that support the comprehensive use of ICT will also provide a strong foundation for teachers and schools to implement this strategy consistently (Lopez et al., 2022).

CONCLUSION

Information and Communication Technology (ICT) has great potential to improve students' critical thinking skills, but its effectiveness depends on several key factors. First, the quality of the content used must be relevant, interactive, and support the development of critical thinking skills. Second, teaching methods that integrate ICT need to be designed in such a way that they encourage active participation and critical analysis through approaches such as project-based learning and collaborative discussions. Finally, the teacher's ability and skills in using ICT effectively in the learning process are the main determinants of the success of ICT integration. Continuous training for teachers to master technology and pedagogical strategies, as well as support from the school, is key in optimizing the role of ICT in developing students' critical thinking skills.

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