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# THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AS A LEARNING TOOL

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## Abstract

The use of Information and Communication Technology (ICT) as a learning tool has transformed education by enhancing accessibility, flexibility, and engagement. This study employs a literature review method to analyze ICT implementation in learning media development. Data sources include journals, books, articles, and research reports. Findings indicate that ICT facilitates interactive and student-centered learning, enhances critical thinking, and expands educational resources. Additionally, ICT shifts the teacher's role from an information provider to a facilitator. However, challenges such as digital literacy gaps, infrastructure limitations, and the potential for technology misuse hinder its optimal use. To maximize ICT's effectiveness, adequate teacher training, curriculum integration, and policy support are essential. This study highlights trends, challenges, and opportunities in ICT-based education while emphasizing the need for further research on its impact and best practices. The findings serve as a foundation for future studies on technology integration in education.

Keywords: *ICT, learning tool, education, digital learning, technology integration.*

## A. Introduction

In the current digital era, Information and Communication Technology (ICT) has become an integral part of various aspects of life, including education. ICT plays a crucial role in improving the quality of learning in both formal and non-formal education. With rapid technological advancements, various ICT-based learning media have been developed to support a more effective and efficient teaching and learning process. The

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progress of information technology allows individuals to connect, obtain, and disseminate information without being limited by time and place (Roza et al. 2023).

Conventional education, which relies heavily on lectures and textbooks as primary learning sources, is considered inadequate in meeting the demands of digital-era learning. Today's students are more accustomed to technology and tend to prefer digital platforms that offer a more interactive learning experience. Therefore, integrating ICT in education has become a solution to increase student engagement and enrich their learning experience.

ICT-based learning media offer numerous benefits, including access to a vast array of educational resources, flexibility in learning time and location, and the ability to create a more interactive and collaborative learning environment. For instance, e-learning enables students to study independently by accessing learning materials anytime and anywhere. Additionally, interactive multimedia and simulations can help explain complex concepts more comprehensively (Anwar and Murtopo 2024). One of the main advantages of ICT in education is its ability to provide broad access to various learning materials. With the internet, students can access textbooks, scientific journals, educational videos, and interactive modules, which significantly enhance their understanding. This allows education to extend beyond the traditional classroom setting.

Despite its advantages, the implementation of ICT in education still faces significant gaps between ideal conditions and reality. Many schools, particularly in remote areas, struggle with technological infrastructure limitations, such as unstable internet connections, inadequate supporting devices, and insufficient teacher competence in integrating technology into teaching. These challenges must be addressed to ensure that ICT implementation in education is widespread and effective.

The integration of ICT in education brings significant changes in teaching methods, student learning approaches, and school management. Teachers are no longer the sole source of knowledge but act as facilitators and learning companions. This shift provides students with more autonomy and responsibility in their learning process, transforming them from passive recipients into active contributors and knowledge sharers. Moreover, ICT allows students to engage in both independent and collaborative learning with peers (Dewi and Hilman 2019).

Additionally, not all teachers are prepared and competent in using ICT as a teaching tool. Some educators continue to rely on traditional teaching methods due to a lack of training and understanding of how technology can be effectively integrated into the learning process. Therefore, continuous training programs are necessary to enhance digital literacy and ICT-based pedagogical skills among educators.

Strategies for utilizing ICT in education must consider various aspects, such as infrastructure availability, human resource readiness, and appropriate learning models.

The use of Learning Management Systems (LMS), mobile-based learning applications, as well as virtual reality (VR) and augmented reality (AR) technologies, are some approaches that can enhance ICT-based learning effectiveness. Furthermore, ICT plays a strategic role in improving data processing efficiency through Management Information Systems (MIS). These systems support a more structured and optimal educational management approach. Effective management is key to the success of any organization, including education institutions. Without organized management, learning processes and school administration may face obstacles that hinder educational objectives (Ahmad Muntadzir 2024).

Research on the effectiveness of ICT in learning also indicates that technology use can enhance student motivation. Several studies reveal that students learning through digital media are more engaged and active in understanding concepts compared to conventional methods. This highlights that ICT is not merely a supplementary tool but a transformative factor that reshapes learning paradigms, making them more innovative and student-centered.

Global education demands collaborative learning based on Information and Communication Technology (ICT). ICT functions in storing, processing, and disseminating information, making it essential for improving learning quality. Its application is expected to foster students' critical thinking skills in problem-solving. In science education, ICT facilitates interactive experiments and simulations that are challenging to conduct in real laboratories, such as in physics and chemistry learning. This proves that ICT can serve as a solution to the limited laboratory facilities in schools (Chodzirin 2016).

The rapid advancement of IT, particularly the internet, has enabled the development of improved information services in educational institutions. In higher education settings, IT applications have materialized into an online system that supports academic services and financial administration. This online system allows universities, such as UIN Alauddin Makassar, to provide better information services to their academic community and the general public through the internet. Other educational services facilitated through the internet include online course materials and academic as well as financial administration processes, accessible to anyone in need (Muhammad et al. 2011).

However, it is important to note that ICT implementation in education also presents challenges, such as distractions caused by non-educational technology use, including social media and gaming, which can divert students' attention. Therefore, ICT strategies must be carefully designed with appropriate pedagogical approaches to maintain a strong focus on learning objectives.

Various government policies have been implemented to support ICT integration in education, including school digitalization programs, ICT device provisions, and the

development of national online learning platforms. However, real-world implementation still encounters challenges, particularly in ensuring equal access and readiness of human resources.

Based on these issues, this study aims to examine the role and effectiveness of ICT utilization in learning, as well as to identify challenges in its implementation. It also seeks to offer strategies and solutions to optimize ICT use in education. By understanding various aspects of ICT as a learning tool, this study hopes to contribute to the development of technology-based educational policies and provide practical recommendations for educators and policymakers to enhance learning quality in the digital era. ICT holds immense potential in transforming the learning process by offering more interactive and engaging educational experiences. However, to maximize its benefits, a well-planned implementation strategy and support from various stakeholders are essential to ensure ICT is effectively utilized in the education sector.

## B. Method

This study employs a literature review method to explore the role of Information and Communication Technology (ICT) in the development of learning media. A literature review is a research approach used to systematically examine and analyze previous studies to gain a deeper understanding of a specific topic (Denney and Tewksbury 2013). By reviewing existing research, this study aims to identify key concepts, trends, challenges, and opportunities related to the integration of ICT in educational settings.

The data for this study are obtained from various sources, including peer-reviewed journals, books, academic articles, research reports, and credible online publications. The selection of literature is based on relevance to the research topic, ensuring that only high-quality and up-to-date sources are considered. Data collection involves reading, summarizing, and analyzing these references to extract meaningful insights regarding the application of ICT in learning media (Andriani 2022).

The analysis process includes identifying recurring themes, patterns, and findings across different studies. By comparing and synthesizing multiple perspectives, this study provides a broader understanding of how ICT influences learning media, its benefits, and potential limitations. Additionally, this approach allows researchers to assess the effectiveness of ICT-based learning tools, explore best practices, and recognize factors that impact their successful implementation (Sugiyono 2019).

To ensure the validity and reliability of the findings, a rigorous evaluation of the collected literature is conducted. This includes critically assessing methodologies, theoretical frameworks, and results presented in previous studies. By structuring the analysis systematically, this research aims to present a well-rounded and objective discussion on the subject.

Through this literature review, the study contributes to the academic discourse on ICT in education by synthesizing existing knowledge, identifying gaps in research, and providing insights that may guide future studies. The findings are expected to serve as a foundation for further exploration into how technology can enhance teaching and learning processes effectively.

## C. Finding and Discussion

### 1. Definition of Information and Communication Technology (ICT)

Information and Communication Technology (ICT) refers to the integration of two main components: hardware and software. Hardware includes all physical devices that can be used and interacted with in a technological system, such as computers, servers, and networking devices. On the other hand, software consists of applications or programs developed through programming processes to perform various functions within a technological system (Widianto 2021). In its application, ICT can be classified into two main aspects. First, Information Technology, which involves processes related to data management, manipulation, and processing using various technological tools. Second, Communication Technology, which focuses on utilizing different devices and methods to transmit and receive data between systems.

Conceptually, ICT is not limited to technological devices and systems but also includes various activities related to processing, storing, distributing, and exchanging information in different forms and media. It encompasses a wide range of technological resources used for communication and information management, including computer networks, satellite systems, hardware and software, as well as technology-based services such as video conferencing and email. In the field of education, ICT has become increasingly important as technology advances. Its integration in learning enhances access to educational resources, improves the effectiveness of lesson delivery, and helps overcome communication barriers between teachers and students (Supinah and Soebagyo 2022)

In an educational context, learning resources refer to all types of references, materials, and media that support the learning process. The use of ICT in education can be facilitated through various digital tools, such as computers and interactive multimedia. Implementing technology in learning is expected to boost student engagement by stimulating their interest, emotions, and attention toward the subject matter. Additionally, technology helps address various learning challenges, including physiological, psychological, cultural, and environmental barriers (Dewi and Hilman 2019)

From an educational perspective, technology-based learning media play a crucial role in reducing monotony in the learning process. Interactive media can serve as an

effective tool for presenting information in an engaging and easily understandable manner. Furthermore, technology assists educators in delivering lessons more systematically and comprehensively. This makes learning more dynamic, engaging, and accessible to a wider range of students with different learning styles (Pratama and Lestari 2020).

Technological advancements have also encouraged the use of computer networks in education, allowing students to access learning materials more broadly and interactively. Computer-based learning is characterized by several key aspects, including: (1) the use of computers as primary learning tools; (2) the development of competency-based systems tailored to educational needs; (3) the application of various learning strategies, such as tutorials, drills, problem-solving, simulations, and educational games; (4) the development of content that aligns with students' characteristics and needs; (5) enhanced interaction in the teaching and learning process; (6) flexibility in content delivery methods; (7) improved motivation and student engagement; (8) fast and varied feedback mechanisms; (9) adaptability to different learning environments; and (10) the ability to accurately evaluate and document student learning outcomes (Miftah 2018)

When developing and utilizing technology-based multimedia learning, several key aspects must be considered, such as design, development, implementation, management, and evaluation. These factors ensure that the technology used truly enhances learning quality and maximizes its benefits for both students and educators. By integrating technology into education, a more innovative, interactive, and effective learning system can be established, ultimately improving overall education quality.

## 2. Definition of Media

Media refers to anything that serves as a channel for delivering messages and can stimulate students' thoughts, emotions, and motivation, ultimately encouraging the learning process. It encompasses all tools or resources that facilitate communication between the sender and receiver, helping to engage students' cognitive, emotional, and attentional aspects in a way that promotes effective learning (Anwar and Murtopo 2024).

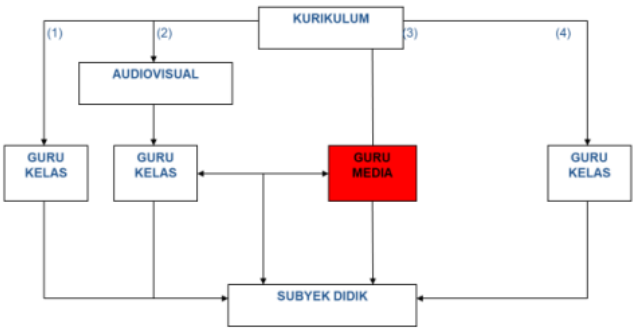


Figure 1. The Role of Media in Learning Patterns

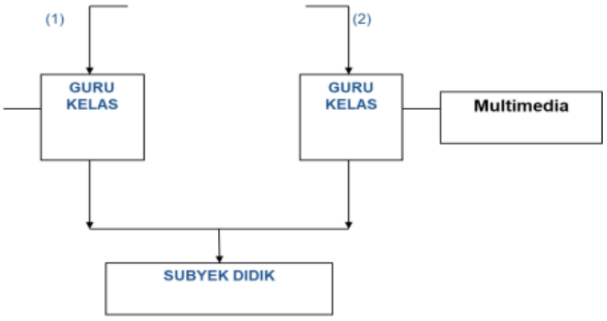


Figure 2. Experimental Learning Model

### 3. Effectiveness of ICT as a Learning Medium

Information and Communication Technology (ICT) plays a crucial role in education, whether in formal, non-formal, or informal settings. Its implementation aims to enhance equal access to education, ensuring that individuals from various backgrounds can acquire skills relevant to technological advancements. With the availability of technology-based learning tools, the educational process becomes more effective and efficient. As technology evolves, ICT has been integrated into learning environments both online and offline. The use of the internet has particularly transformed teaching methods, expanding the reach of education beyond traditional classrooms (Widianto, 2021).

ICT serves two primary functions in learning. First, it acts as a presentation medium, enabling teachers to use animations, videos, or software tools like PowerPoint to deliver lessons more engagingly. Second, it supports self-directed learning or e-learning, where educators assign tasks through online platforms such as websites or Learning Management Systems (LMS). These digital platforms encourage students to explore and gather information independently, fostering motivation and self-reliance in learning. Additionally, various digital learning resources, including electronic libraries (e-libraries), e-books, emails, mailing lists, and online discussion forums (newsgroups), further enrich students' educational experiences.

The key advantage of using ICT in education lies in its interactivity and flexibility. Some notable benefits of ICT-based learning media include: (1) utilizing computers as essential learning tools; (2) incorporating multimedia to make learning more engaging and less monotonous; (3) offering flexibility by allowing students to access learning materials anytime and anywhere; and (4) enabling seamless data exchange, facilitating effective communication between teachers and students or among university lecturers and students.

As education continues to evolve, the demand for ICT-based learning media is increasing. Therefore, its implementation must be supported by adequate technological infrastructure, including both hardware and software. Additionally, teachers play a

crucial role in optimizing the use of ICT to enhance the quality of education. In Indonesia, the integration of ICT into teaching and learning has become a necessity, especially in the digital era. With effective use of technology in education, learning processes can become more dynamic and impactful, contributing positively to students' academic development (Rezhki et al. 2022).

### 4. Advantages and Disadvantages of Using ICT as a Learning Medium

The integration of Information and Communication Technology (ICT) in education has significantly accelerated the flow of unlimited information. ICT drives fundamental changes in teaching methods, student learning patterns, and school management systems. As a result, the role of teachers has evolved from being mere providers of knowledge to facilitators who guide students through the learning process. Despite its many advantages, the implementation of ICT still requires technical preparation, training, and adaptation to ensure effective application (Widianto 2021).

As a learning medium, ICT offers several advantages over traditional methods. One of its main benefits is promoting independent learning among students. In conventional face-to-face learning, classroom interactions are often imbalanced, with teachers dominating the learning process while students play a passive role as listeners. This dynamic can lead to a lack of student engagement, with some students becoming distracted by side conversations or losing focus on the material. By leveraging ICT, students can independently access learning materials through various digital resources such as interactive modules, e-books, and educational videos. Teachers then serve as facilitators, guiding students in analyzing and critically evaluating the topics being studied.

Moreover, ICT provides flexibility in the teaching and learning process. Students can study anytime and anywhere using digital devices, eliminating the constraints of time and location. This flexibility benefits students with different learning paces, allowing them to adjust their study schedules to their most productive times. Additionally, technology-based learning fosters creativity and student engagement. The interactive features available in digital learning encourage students to think critically and innovatively when understanding academic content. Another advantage is the broadened access to information, enabling students to explore educational resources from both domestic and international sources.

For educators, ICT also offers numerous benefits in supporting teaching effectiveness. One key advantage is that teachers are no longer the sole source of knowledge, as students can independently gather information from various digital platforms. This shift allows teachers to focus more on providing in-depth explanations and facilitating discussions. Additionally, ICT enhances teaching efficiency by offering interactive media that can boost student interest and motivation. With technological

assistance, teacher-student interactions become more dynamic, both in face-to-face settings and online learning environments. Another benefit of ICT is its ability to systematically organize the learning process, helping educators develop more effective and structured teaching strategies (Widianto 2021)

Despite these advantages, the use of ICT in education also presents several challenges. One major issue for students is the potential for technology misuse. Many students become more interested in non-educational content, such as online gaming or social media, diverting their focus from learning objectives. Furthermore, technical challenges like unstable internet access pose significant obstacles, particularly in areas with limited technological infrastructure. Network disruptions can hinder the learning process and create frustration among students. Another drawback is the reduced face-to-face interaction between teachers and students, which may affect the effectiveness of verbal communication and knowledge transfer.

Educators also face challenges in adopting ICT. Not all teachers possess the necessary digital skills, especially those accustomed to traditional teaching methods. This digital divide can result in ineffective lesson delivery due to teachers' limited ability to utilize digital learning tools. Additionally, the success of ICT-based learning heavily relies on students' independence in finding and understanding online materials. Variations in students' comprehension levels can make it difficult for teachers to assess the overall effectiveness of digital learning. Another challenge is regulating students' access to relevant information, as unrestricted internet use can lead to distractions and exposure to unrelated content (Mukaromah 2020).

Considering both its advantages and disadvantages, the use of ICT in education must be accompanied by well-planned strategies to maximize its benefits. Teachers should receive adequate training to effectively integrate technology into their teaching methods. Moreover, student supervision should be strengthened to ensure they remain focused on their learning objectives. With the right approach, ICT can serve as a powerful tool to enhance the quality of education and prepare students for the challenges of the digital era.

## D. Conclusion

The use of Information and Communication Technology (ICT) in education has significantly transformed how teachers teach, students learn, and schools manage their systems. ICT not only accelerates the dissemination of information but also shifts the role of teachers from mere knowledge providers to facilitators who support students' independent learning processes. With ICT, students gain flexibility in learning, enhance their creativity, and access a wider range of educational resources.

However, the integration of ICT in learning also presents challenges. Some

students tend to misuse technology for entertainment, such as playing online games, while technical issues like unstable internet connections can hinder the learning process. Additionally, educators may face difficulties in mastering technological tools and controlling student engagement in ICT-based learning.

Despite these challenges, the advantages of ICT in improving learning effectiveness outweigh its drawbacks. Therefore, adequate training for educators and policies that support the optimal use of ICT are essential. With the right approach, technology can serve as a powerful tool to enhance educational quality and prepare students for the demands of the digital era.

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