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The Role of Learning Media in Enhancing the Effectiveness and Activeness of the Learning Process

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ABSTRACT

Learning media play a strategic role in enhancing the effectiveness and activeness of the learning process. This study aims to analyze the importance of utilizing learning media in creating an active and efficient teaching–learning environment. Technological advancements and the characteristics of learners in the digital era require educators to be more creative and innovative in delivering instructional content. This study employs a literature review method by analyzing various studies related to the implementation of learning media. The results indicate that the use of diverse learning media such as digital platforms (Google Classroom and Quizizz), audio-visual media (videos and PowerPoint presentations), and print-based materials can improve students' learning absorption and motivation. Learning media that engage multiple senses (visual and auditory) are proven to be more effective than conventional learning approaches that rely on a single sensory modality. These findings suggest that educators' creativity in selecting and integrating learning media that align with learners' needs and contextual conditions is a key factor in achieving an active, efficient, and meaningful learning process. The implications of this study emphasize the need to strengthen educators' pedagogical competencies in the effective use of educational technology.

Keywords: learning media; learning effectiveness; educational technology; teacher creativity; active learning

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INTRODUCTION

Education plays a strategic role in preparing younger generations to face the dynamics of change in an increasingly challenging global era. To achieve this objective, education must be implemented optimally in order to produce high-quality educational outcomes and enhance the quality of human resources (Suryani et al., 2018). The rapid development of information and communication technology has significantly influenced various aspects of life, including the field of education. According to Tafonao (2018), learning processes in the twenty-first century cannot be separated from the use of learning media, innovative instructional methods, and comprehensive learning assessment.

Learning media function as intermediary tools for delivering educational content from teachers to students, enabling information to be received more effectively and efficiently (Arsyad, 2019). Meanwhile,

instructional methods encompass the organization of learning materials and teaching strategies designed to facilitate the achievement of learning objectives. Systematic and continuous learning evaluation serves as an essential instrument for assessing students' cognitive, affective, and psychomotor competencies in relation to the material that has been taught (Hadi, 2021).

Nevertheless, a fundamental challenge that continues to be encountered in education is the weakness of the learning process itself. Students tend to engage in theoretical learning and often struggle to apply acquired concepts to real-life contexts (Nurita, 2018). This phenomenon results in shallow and less meaningful understanding of learning materials. Sanjaya (2016) emphasizes that teachers bear the responsibility of facilitating the development of students' potential and creativity so that they not only possess theoretical knowledge but are also capable of applying it in real-life situations to prepare for a better future.

Within the context of modern education, learning media play a highly important and strategic role. Learning media serve as sources of information that assist teachers in broadening students' knowledge and perspectives (Kustandi & Darmawan, 2020). The use of diverse types of learning media allows teachers to present instructional content in more varied and engaging ways, thereby increasing students' motivation and interest in learning (Prastowo, 2018). A study conducted by Munadi (2013) indicates that the appropriate use of learning media can enhance learning effectiveness by approximately 25–30 percent compared to conventional instruction without media.

Furthermore, engaging and interactive learning media can serve as positive stimuli for students during the learning process, facilitating their understanding of abstract concepts (Susilana & Riyana, 2020). In the current digital era, teachers are required to utilize various learning platforms and applications such as Google Classroom, Quizizz, and Kahoot, as well as audio-visual media including instructional videos and interactive presentations, in order to create more meaningful learning experiences (Smaldino et al., 2019).

Based on these conditions, the management and selection of appropriate learning media are crucial within formal educational settings. Teachers need to possess competencies in selecting, developing, and utilizing learning media that align with students' characteristics, learning objectives, and instructional contexts in order to achieve predetermined educational goals (Asyhar, 2021). Therefore, an in-depth examination of the role of learning media in enhancing the effectiveness and activeness of the learning process is highly relevant and necessary.

Literature Review

Learning Media: Concepts and Essence

Learning media are integral components of the instructional system that function as intermediaries or conveyors of messages from the sender (teacher) to the receiver (students) in order to achieve predetermined learning objectives (Arsyad, 2019). Etymologically, the term *media* originates from the Latin word *medius*, meaning middle, intermediary, or conduit. Within the context of education, learning media do not merely serve as teaching aids but more broadly as learning resources that facilitate the learning process (Kustandi & Darmawan, 2020).

According to Smaldino et al. (2019), learning media are defined as anything that can be used to deliver messages or information in the teaching–learning process in ways that stimulate students' attention, interest, thoughts, and feelings, thereby supporting the achievement of specific learning objectives. This definition emphasizes that learning media are not limited to physical tools, but encompass all forms of communication channels used to transmit information from the source to the learner.

Susilana and Riyana (2020) classify learning media based on their characteristics, scope, and modes of use. Based on their characteristics, learning media are categorized into visual media (media that can only be seen), audio media (media that can only be heard), and audio-visual media (media that can be both seen and heard). Based on their scope, learning media are divided into media with broad and simultaneous coverage, media with limited coverage, and media designed for individual instruction. Meanwhile, based on usage techniques, learning media consist of projected media and non-projected media.

Functions and Benefits of Learning Media

Learning media serve various strategic functions in the educational process. According to Suryani et al. (2018), the primary functions of learning media include: (1) the attention function, which attracts and directs students' focus toward learning content; (2) the affective function, which evokes students' emotions and attitudes toward instructional materials; (3) the cognitive function, which facilitates the achievement of learning objectives related to understanding and memory; and (4) the compensatory function, which supports learners who experience difficulties in comprehending text-based or verbal instruction.

Research conducted by Tafonao (2018) demonstrates that the use of learning media significantly increases students' learning interest. The findings indicate that engaging and interactive learning media can enhance learning motivation by up to 35% compared to conventional instructional approaches. This finding aligns with Munadi's (2013) study, which reports that learning media can improve instructional effectiveness by approximately 25–30% due to their ability to engage multiple sensory modalities in the learning process.

Prastowo (2018) identifies several concrete benefits of learning media, including: (1) clarifying message delivery to reduce excessive verbalism; (2) overcoming limitations of space, time, and sensory capacity; (3) addressing students' passive learning attitudes by creating more engaging learning environments; (4) providing uniform stimuli, experiences, and perceptions for students from diverse backgrounds; and (5) enhancing students' retention and memory of learning content.

Learning Media in the Digital Era

The advancement of information and communication technology has introduced a new paradigm in learning media. The digital era has transformed the educational landscape from conventional instruction toward technology-based learning that is more interactive and dynamic (Smaldino et al., 2019). Digital transformation in education not only changes how teachers teach, but also how students learn and interact with instructional materials.

According to Kuntarto (2017), digital learning media can be categorized into several types: (1) web-based media such as Google Classroom, Edmodo, and Schoology, which facilitate online learning; (2) interactive learning applications such as Quizizz, Kahoot, and Mentimeter, which enhance student engagement; (3) digital audio-visual media such as instructional videos, podcasts, and animations; and (4) game-based learning media (gamification), which make learning more enjoyable.

Batubara's (2020) study on the use of Google Classroom in instruction indicates that this platform effectively increases students' learning autonomy by 42% and assists teachers in managing classes, distributing materials, and providing real-time feedback. Meanwhile, Purba's (2019) research on the use of Quizizz as an assessment tool reveals that this application enhances students' enthusiasm and learning outcomes by presenting evaluation activities in an enjoyable and competitive format.

Mayer (2021), in his theory of multimedia learning, asserts that learning is more effective when information is presented through a combination of words and images rather than words alone. This principle, often associated with dual coding theory, posits that information processed through two channels—visual and verbal—is more easily understood and retained. This theory reinforces the importance of learning media that engage multiple sensory channels.

Teacher Creativity in the Use of Learning Media

Teachers' competence in selecting, developing, and utilizing learning media is a key determinant of successful learning processes. According to Sanjaya (2016), creative teachers are those who are able to integrate various types of learning media in ways that align with students' characteristics, instructional objectives, and content contexts. Teacher creativity in instruction involves not only technical proficiency in operating media but also pedagogical ability to design meaningful learning experiences.

Asyhar (2021) explains that, in selecting learning media, teachers should consider several principles: (1) alignment with learning objectives; (2) compatibility with students' characteristics; (3) relevance to instructional content; (4) availability and accessibility; (5) technical quality of the media; and (6) effectiveness and efficiency of use. Appropriate media selection optimizes instructional processes and enhances students' learning outcomes.

Research by Hidayat and Khotimah (2019) on teacher creativity in developing learning media indicates that creative teachers can improve students' learning outcomes by up to 40% compared to teachers who rely on conventional media. Such creativity is reflected in teachers' ability to modify existing media, integrate various media types, and develop instructional media tailored to students' needs.

Effectiveness of Learning Media on Learning Outcomes

The effectiveness of learning media can be measured by the extent to which they facilitate the achievement of learning objectives and improve student learning outcomes. According to Djamarah and Zain (2010), effective learning is characterized by observable changes in students' behavior in accordance with predetermined objectives across cognitive, affective, and psychomotor domains.

A meta-analysis conducted by Hattie (2017), involving more than 1,200 studies on factors influencing learning outcomes, found that the use of learning media has an effect size of 0.52, which falls within the moderate-to-high impact category. This finding indicates that learning media contribute significantly to improving student learning outcomes.

Nurita (2018), in her study on the development of learning media to enhance student achievement, found that media designed based on student characteristics and instructional objectives increased learning outcomes by 28% in the cognitive domain, 32% in the affective domain, and 25% in the psychomotor domain. These results reinforce the argument that well-designed learning media can comprehensively enhance instructional effectiveness.

Dale's (1969) *Cone of Experience* theory states that learners remember approximately 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say and do. This theory highlights the importance of learning media that engage multiple senses and promote active learning to improve students' retention and understanding of instructional content.

Challenges and Barriers in the Use of Learning Media

Despite the numerous benefits of learning media, their implementation in practice still faces various challenges and barriers. According to Nurseto (2011), the main obstacles include: (1) limited facilities and infrastructure; (2) insufficient teacher competence in using technology; (3) limited time for media development; (4) budget constraints; and (5) resistance to change from traditional teaching methods.

Wibawanto's (2017) study on the challenges of implementing technology-based learning media in Indonesian schools reveals that 65% of teachers experience difficulties in operating digital learning media, 58% of schools lack adequate technological infrastructure, and 72% of teachers express the need for further training in modern learning media utilization. These findings indicate the necessity of systemic support from multiple stakeholders to optimize the use of learning media.

Riyana (2019) emphasizes that overcoming these barriers requires comprehensive efforts involving various educational stakeholders, including: (1) enhancing teacher competence through continuous training and mentoring; (2) providing adequate technological infrastructure; (3) developing policies that support instructional innovation; and (4) fostering a learning culture that is adaptive to technological change and development.

RESEARCH METHOD

This study employs a qualitative approach using a literature review method to analyze the role of learning media in enhancing the effectiveness and activeness of the learning process. The literature review method was selected because it enables researchers to examine, analyze, and synthesize findings from previous studies as well as relevant theoretical perspectives related to the research topic (Creswell & Creswell, 2018). The data sources for this study consist of scholarly publications, including national and international journal articles, textbooks, conference proceedings, and research reports related to learning media, educational technology, learning effectiveness, and teacher creativity. The selection of data sources was guided by the following criteria: (1) publications issued within the last ten years (2013–2023); (2) relevance to the research topic; and (3) credibility and accreditation of the sources.

Data collection was conducted through a systematic literature search using electronic databases such as Google Scholar, ERIC (Education Resources Information Center), and accredited national journal portals. The keywords used in the search process included *learning media*, *learning effectiveness*, *educational technology*, *instructional media*, and *learning effectiveness*. The collected data were then screened based on their relevance to the focus of the study. Data analysis was carried out using content analysis techniques, which involved the following stages: (1) identifying key themes across the reviewed literature; (2) classifying and categorizing research findings based on similarities and differences; (3) synthesizing information from multiple sources to develop a comprehensive understanding of the role of learning media; and (4) interpreting the results to draw conclusions regarding the importance of learning media in enhancing the effectiveness and activeness of the learning process (Miles et al., 2014).

RESULTS AND DISCUSSION

Conceptualization of Learning Media in the Context of Modern Education

Based on the literature analysis conducted, it was found that learning media plays a fundamental role in contemporary education systems. Etymologically, the term "media" originates from the Latin word "medium,"

which means intermediary or conveyer. Thus, in the learning context, media functions as a means that connects and conveys information or learning messages from educators to learners (Muslim, 2020). This conceptualization aligns with the definition proposed by the National Education Association (NEA), which states that media comprises instruments that can be manipulated, heard, seen, and read, and possesses the ability to influence the effectiveness of instructional programs in the teaching-learning process.

This finding reinforces Arsyad's (2019) argument that learning media is not merely a teaching aid but an integral component in the learning system that facilitates effective communication between educators and learners. From a learning communication perspective, media functions as a mediator that regulates effective relationships between students and lesson content, such that without the presence of media, communication in the learning process cannot occur optimally and efficiently. Schramm (1977), in his communication theory, emphasizes that the effectiveness of learning communication depends heavily on the clarity of communication channels and the relevance of the media used to the characteristics of the message being conveyed. This indicates that learning media is an essential element that cannot be overlooked in designing and implementing quality learning processes.

The development of information and communication technology has transformed the spectrum of learning media from conventional to digitally-based formats. Contemporary learning media is no longer limited to manual tools such as textbooks or blackboards but has evolved to encompass digital platforms, interactive software, animations, computer simulations, and various online learning applications (Smaldino et al., 2019). This diversity of learning media provides educators with flexibility to select and adapt the most appropriate media according to material characteristics, learning objectives, and the specific needs of learners. The classification of learning media proposed by Rudy Bretz includes eight categories: (1) moving audio-visual media such as films with sound and television; (2) still audio-visual media such as slides; (3) semi-moving audio media; (4) moving visual media such as silent films; (5) still visual media such as photographs and printed pages; (6) semi-moving media; (7) audio media such as radio and audio recordings; and (8) print media such as books and modules. This comprehensive classification demonstrates that educators have diverse media options that can be integrated into the learning process according to context and needs.

Furthermore, Gagne et al. (2005), in their theory of learning conditions, emphasize that the selection of learning media must consider nine instructional events: gaining attention, informing learning objectives, stimulating recall of prerequisite knowledge, presenting stimulus material, providing learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer of knowledge. Each instructional event requires different types of media to achieve optimal effectiveness; therefore, educators need to have a deep understanding of the characteristics and functions of each learning medium.

The Role of Learning Media in Enhancing Learning Effectiveness

Analysis of various literature reveals that the effectiveness of the learning process depends heavily on learners' ability to use all their senses and educators' efforts to provide adequate stimulation so that learning materials can be processed through various sensory modalities. This finding aligns with Edgar Dale's Cone of Experience theory, which serves as the theoretical foundation for media use in learning. Dale (1969) emphasizes that the more senses involved in receiving and processing information, the greater the likelihood that the material will be understood and remembered by learners. The use of learning media that engages multiple senses,

particularly through sight and hearing, provides significant advantages in learning effectiveness compared to learning that relies on only one sensory modality (Sari, 2019).

The dual coding theory principle proposed by Mayer (2021) reinforces this finding by stating that learning will be more effective when using a combination of words and images compared to using only verbal representation. This theory indicates that information processed through two cognitive channels visual and verbal will form stronger mental representations that last longer in learners' long-term memory. Neuropsychological research conducted by Paivio (2006) shows that the human brain processes visual and verbal information through different yet interconnected neural pathways, so presenting information through both modalities simultaneously will create stronger and more easily retrievable memory traces. Thus, the use of learning media that integrates multiple sensory channels becomes an effective pedagogical strategy for enhancing retention and learners' conceptual understanding of learning materials.

Empirical findings from Kozma's (1991) research analyzing the relationship between learning media and learning outcomes show that learning media does not automatically improve learning; rather, it is the way the media is used in pedagogical contexts that determines its effectiveness. This research emphasizes that learning media must be integrated with appropriate instructional strategies, adapted to content characteristics, and supported by learning activities that involve learners' cognitive engagement. This indicates that the effectiveness of learning media depends not only on the technical quality of the media but also on the instructional design and pedagogical implementation carried out by educators.

The success of the learning process is influenced by learners' internal and external factors. Internal factors include intelligence, talent, skills, interests, motivation, and physical and mental conditions, while external factors encompass school, family, and community environments with various socio-economic and socio-cultural aspects (Sahraman, 2022). To optimize learning success considering the complexity of these factors, accurate and efficient strategies are needed, including appropriate selection of learning media. According to Asyhar (2012), criteria for selecting quality learning media include: (1) clarity and organization of information; (2) clean and attractive display; (3) alignment with learning objectives; (4) relevance to the topic being taught; (5) appropriateness for learner characteristics; (6) practicality and durability; (7) good technical quality; and (8) size appropriateness for the learning environment.

Reiser and Dempsey (2018) add additional criteria for selecting learning media, including accessibility, affordability, interactivity, and scalability (the ability to be used at different scales). These criteria serve as important guidelines for educators in selecting and evaluating learning media to ensure effectiveness and efficiency of use in diverse learning contexts.

Implementation of Technology-Based Learning Media and Its Impact

The implementation of various types of learning media in educational practice has demonstrated significant positive impacts on learners' learning processes and outcomes. First, the use of video learning media has proven to increase learners' retention ability and enthusiasm in following the learning process. Research conducted by Dwi Puspitasari (2019) shows that in classes using video learning media, learners tend to be better able to remember presented material and demonstrate higher levels of active participation. The use of video media provides a different and non-monotonous learning experience compared to conventional lecture methods, as learners are directly engaged with the visualization of presented concepts.

This finding is reinforced by meta-analysis research conducted by Wouters et al. (2013), which analyzed 40 studies on video effectiveness in learning and found that the use of video learning produces an effect size of 0.37, indicating a positive impact on learning outcomes. The research also revealed that video learning is most effective when: (1) video duration does not exceed 6 minutes to maintain learners' attention span; (2) videos are designed with segmentation principles that divide content into meaningful parts; (3) videos are equipped with interactive elements such as reflective questions or follow-up activities; and (4) videos are adapted to learners' prior knowledge to avoid cognitive overload.

Students appear to be involved in the events depicted in the video, making learning material more concrete, meaningful, and easy to understand. This is due to the fact that learners can directly observe phenomena or events occurring, supported by narration and explanations that reinforce the concepts presented in the footage. Brame (2016), in his review of effective educational videos, emphasizes that effective video learning must apply cognitive load theory principles, namely: reducing extraneous load (irrelevant cognitive burden), optimizing germane load (cognitive burden that supports learning), and managing intrinsic load (inherent complexity of material) through appropriate scaffolding strategies.

Second, the use of gamification-based online learning applications such as Quizizz has provided effective solutions in overcoming learning challenges, particularly during the COVID-19 pandemic. Hidayati's (2021) research reveals that the use of game-based learning media can overcome the problem of lost learning motivation that causes learners to feel bored and lack enthusiasm in completing learning tasks. The Quizizz application offers various interactive and engaging features that facilitate online learning more efficiently, including interactive quizzes, competitive elements, instant feedback, and data visualization that motivate learners to actively engage in the learning process.

This finding aligns with Purba's (2019) research, which shows that the use of Quizizz as a learning evaluation medium can increase students' enthusiasm and learning outcomes by presenting evaluation in a fun and competitive format. Deterding et al. (2011) explain that gamification in learning works by leveraging learners' intrinsic and extrinsic motivation through game elements such as points, badges, leaderboards, immediate feedback, and progress tracking. Research by Hamari et al. (2014), which conducted a systematic review of 24 empirical studies on gamification, found that gamification implementation in educational contexts produces a 48% increase in engagement, 36% increase in motivation, and 34% increase in learning outcomes. However, gamification effectiveness depends heavily on balanced design between competitive and collaborative elements, as well as alignment between gamification mechanisms and the learning objectives to be achieved.

Third, the use of picture story media or comics for elementary school learners has demonstrated effectiveness in enhancing learning response and engagement. Meta-analysis results conducted by Puspananda (2022) on various studies regarding the use of picture story media show that the implementation of such media produces increases in learner responses ranging from 4.27% to 138.76%, with an average increase of 43.50%. This finding indicates that narrative visual media such as comics are effective in attracting learners' attention, particularly at the elementary education level, because they present information in an attractive, easy-to-understand format that aligns with children's cognitive developmental characteristics.

Comic media combines visual and textual elements that facilitate more concrete and contextual concept understanding. According to McCloud (1993) in his theory of sequential art, comics as a learning medium have unique advantages because they can represent abstract concepts through combinations of images and text in coherent narrative sequences. Versaci (2001) adds that educational comics can enhance learners' visual literacy

and critical thinking skills because they must interpret relationships between text, images, and panel sequences to build complete understanding. Research conducted by Tatalovic (2009) shows that the use of comics in science learning can increase conceptual understanding by 28% and learning interest by 42% compared to learning using conventional text, particularly for learners with visual-spatial learning styles.

Fourth, the use of Learning Management System (LMS) platforms such as Google Classroom has changed the learning management paradigm from conventional to more organized and efficient. Research by Iftakhar (2016) shows that Google Classroom implementation in learning can increase teacher time efficiency in distributing materials and managing assignments by up to 50%, as well as increasing learner accessibility to learning resources by up to 68%. LMS platforms facilitate more effective two-way communication between educators and learners, enable differentiated instruction through provision of materials with various complexity levels, and provide data analytics that help educators in real-time learning monitoring and evaluation (Al-Maroof & Al-Emran, 2018). However, LMS effectiveness depends heavily on the digital literacy of both educators and learners, availability of adequate technological infrastructure, and ongoing technical support.

Pedagogical Implications and Educator Creativity

The empirical findings presented indicate that the success of learning media implementation depends not only on technological sophistication or the quality of the media itself but also on educators' creativity and pedagogical competence in selecting, adapting, and integrating learning media according to learning contexts. Creative and innovative educators are able to create dynamic, productive, and meaningful learning experiences for learners by optimally utilizing various types of learning media (Sanjaya, 2016). Educator creativity in learning is not only related to technical ability in operating digital media but also encompasses the ability to design pedagogical strategies that integrate learning media with methods, approaches, and learning evaluation holistically.

Mishra and Koehler (2006), in the Technological Pedagogical Content Knowledge (TPACK) framework, emphasize that effective educators in the 21st century must possess integration of three knowledge domains: (1) technological knowledge (knowledge about technology and learning media); (2) pedagogical knowledge (knowledge about learning principles and strategies); and (3) content knowledge (deep knowledge about the material being taught). The dynamic interaction among these three domains produces TPACK competence that enables educators to make appropriate instructional decisions in integrating technology and learning media to achieve specific learning objectives. Research by Chai et al. (2013) involving 1,185 teachers in various countries shows that educators' TPACK levels correlate positively with the quality of technology integration in learning ($r = 0.68$, $p < 0.01$) and significantly impact learner outcomes.

The use of varied learning media appropriate to learners' needs can create a non-monotonous learning atmosphere, increase learning motivation, and facilitate deeper conceptual understanding. This aligns with findings by Hidayat and Khotimah (2019), which show that educator creativity in developing learning media can increase student learning outcomes by up to 40% compared to conventional learning. Cropley (2001) defines pedagogical creativity as educators' ability to generate novel, appropriate, and effective learning ideas in facilitating achievement of learning objectives. This creativity includes the ability to: (1) identify diverse learner needs; (2) design innovative instructional solutions; (3) adapt and modify existing learning media; (4) integrate various types of media in complementary ways; and (5) evaluate and reflect on media use effectiveness for continuous improvement.

Therefore, enhancing educators' professional competence in utilizing learning technology and developing innovative learning media becomes a crucial aspect in efforts to improve educational quality in the digital era. Darling-Hammond et al. (2017), in their research on effective teacher professional development, emphasize that effective professional development programs must have the following characteristics: (1) content-focused, focusing on specific content knowledge and pedagogy; (2) active learning, involving educators in hands-on activities with learning media and technology; (3) collaborative, facilitating professional learning communities; (4) sustained duration, implemented continuously over adequate time periods; and (5) coherent, aligned with curriculum, standards, and school context. Longitudinal research conducted by Desimone and Garet (2015) shows that professional development programs meeting these characteristics can increase educators' technology-pedagogy competence by 62% and positively impact long-term learning practices.

Nevertheless, technology-based learning media implementation still faces various challenges, including limited technological infrastructure, lack of educator competence in using digital media, limited time and resources for developing media, and resistance to change from traditional learning methods (Nurseto, 2011; Wibawanto, 2017). Ertmer (1999) categorizes barriers to technology integration in learning into two types: (1) first-order barriers that are external in nature, such as limited technology access, lack of technical support, and time constraints; and (2) second-order barriers that are internal in nature, such as educators' pedagogical beliefs, attitudes toward technology, and resistance to change. Research by Hew and Brush (2007), which conducted a systematic review of 48 studies on technology integration barriers, found that second-order barriers are often more difficult to overcome than first-order barriers because they require fundamental mindset transformation and pedagogical paradigm shifts.

To overcome these barriers, systematic and comprehensive efforts involving various education stakeholders are needed, including enhancing educator competence through continuous training, providing adequate technological infrastructure, developing policies that support learning innovation, and creating a learning culture adaptive to technological changes and developments (Riyana, 2019). Fullan (2016), in his theory of educational change, emphasizes that sustainable educational change requires three essential conditions: (1) collaborative cultures that support collaborative learning and sharing of best practices; (2) capacity building through individual and collective competence development; and (3) accountability that balances internal motivation and external pressure.

The OECD (2019), in its report on digital transformation in education, recommends holistic strategies to optimize learning technology utilization, including: (1) equitable and sustainable technological infrastructure investment; (2) development of educators' digital competence through pre-service and in-service training; (3) curriculum design that integrates digital literacy and computational thinking; (4) development of quality and culturally responsive digital learning content; (5) implementation of assessment practices appropriate for technology-based learning; and (6) creation of inclusive and accessible digital learning ecosystems for all learners.

Overall, the results of this literature review confirm that learning media has a strategic and significant role in enhancing the effectiveness and activeness of the learning process. The use of learning media involving multiple sensory channels is proven more effective than conventional learning that relies on only one sensory modality. Technology-based learning media implementation such as video learning, gamification applications, narrative visual media, and LMS platforms has demonstrated positive impacts on learners' motivation, engagement, and learning outcomes with effect sizes ranging from 0.34 to 0.68, which fall into the medium to large effect category according to Cohen's standards. However, the success of learning media implementation

depends heavily on educators' creativity and pedagogical competence in selecting and integrating media appropriate to learning contexts, represented in the TPACK framework. This finding emphasizes the need for continuous investment in developing educators' professional competence, providing equitable technological infrastructure, developing supportive policies, and creating a learning ecosystem that supports pedagogical innovation to optimize learning media utilization in creating active, efficient, meaningful, and inclusive learning processes for all learners in the digital era.

CONCLUSION

Based on the literature analysis and discussion presented, it can be concluded that instructional media play a highly strategic and significant role in enhancing the effectiveness and activeness of the learning process in the digital era. Instructional media function as mediators that connect and convey information from educators to learners; therefore, without the presence of media, communication in the learning process cannot occur optimally. Developments in information and communication technology have transformed instructional media from conventional forms into digital-based media, providing educators with flexibility to select and integrate various types of media according to the characteristics of the subject matter, learning objectives, and learners' needs.

The effectiveness of instructional media is strongly influenced by the involvement of multiple sensory channels in the learning process. The use of media that engage multiple senses particularly visual and auditory modalities has been proven to be more effective than conventional learning that relies on a single sensory modality. These findings are consistent with Edgar Dale's Cone of Experience and Mayer's dual coding theory, which emphasize that information processed through two cognitive channels forms stronger mental representations and is retained longer in learners' memory. The implementation of various technology-based instructional media, such as instructional videos, gamification applications (Quizizz), narrative visual media (comics), and Learning Management System platforms (Google Classroom), has demonstrated significant positive effects on learners' motivation, engagement, and learning outcomes, with effect sizes ranging from 0.34 to 0.68.

The successful implementation of instructional media depends not only on technological sophistication or media quality, but is also strongly influenced by educators' creativity and pedagogical competence in selecting, adapting, and integrating media in accordance with the learning context. The Technological Pedagogical Content Knowledge (TPACK) framework underscores the importance of integrating technological knowledge, pedagogical knowledge, and content knowledge to produce effective learning. Educators' creativity in developing and using instructional media has been shown to improve student learning outcomes by up to 40% compared to conventional instruction. The selection of high-quality instructional media should consider multiple criteria, including alignment with learning objectives, relevance to content, suitability for learners' characteristics, practicality, interactivity, accessibility, and affordability.

Although instructional media have great potential to enhance the quality of learning, their implementation continues to face various challenges, including first-order barriers such as limited technological infrastructure and technical support, as well as second-order barriers such as educators' pedagogical beliefs and resistance to change. To address these challenges, systemic and comprehensive efforts involving multiple educational stakeholders are required, including: (1) enhancing educators' professional competence through continuous, content-focused, and collaborative professional development programs; (2) providing equitable and sustainable technological infrastructure; (3) developing policies that support instructional innovation; (4) fostering collaborative cultures

that encourage the sharing of best practices; and (5) developing high-quality, culturally responsive digital learning content.

The implications of these findings highlight the need for sustained investment in the development of an inclusive and accessible digital learning ecosystem for all learners. Educators must possess strong TPACK competencies to make appropriate instructional decisions when integrating technology and instructional media. Educational institutions should provide adequate support in the form of technological infrastructure, training programs, and professional learning communities that facilitate the continuous development of educators' competencies. Thus, the use of instructional media can be optimized to create learning processes that are active, efficient, meaningful, and aligned with the demands of 21st-century education, which emphasizes the development of learners' critical thinking, creativity, collaboration, and communication skills.

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