

TEACHERS' NEEDS AND READINESS FOR AI-ASSISTED AUGMENTED REALITY LEARNING MEDIA IN ELEMENTARY EDUCATION 5.0

NECESSIDADES E PRONTIDÃO DOS PROFESSORES PARA MÍDIAS DE APRENDIZAGEM EM REALIDADE AUMENTADA ASSISTIDAS POR IA NA EDUCAÇÃO BÁSICA 5.0

NECESIDADES Y PREPARACIÓN DEL PROFESORADO PARA MEDIOS DE APRENDIZAJE DE REALIDAD AUMENTADA ASISTIDOS POR IA EN LA EDUCACIÓN BÁSICA 5.0



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ABSTRACT

In the era of Education 5.0, teachers are required to integrate digital and intelligent technologies into their classroom practices. This study aims to analyze teachers' needs and readiness for AI-assisted Augmented Reality (AR) learning media in elementary education by identifying their current use of learning models and media as well as the factors influencing their implementation. Using a descriptive survey design, data were collected from 67 fifth-grade teachers across 18 elementary schools in Pekanbaru through a Likert-scale questionnaire distributed via Google Forms. The findings reveal that while most teachers hold positive perceptions toward the use of learning models and media, their actual implementation remains limited. Factors such as teachers' age, educational background, and technological competence were found to affect their readiness to adopt innovative media such as AI-assisted AR. These findings highlight the gap between pedagogical understanding and technological application, indicating the need for targeted training and professional development. The study provides empirical insights that can serve as a foundation for developing adaptive, AI-based AR learning environments that align with teachers identified needs and support meaningful learning in the context of Elementary Education 5.0.

Keywords: Teachers' Needs. Readiness. AI-Assisted Augmented Reality. Learning Media. Education 5.0. Elementary Education.

RESUMO

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Na era da Educação 5.0, os professores são instados a integrar tecnologias digitais e inteligentes às suas práticas em sala de aula. Este estudo tem como objetivo analisar as necessidades e a prontidão dos professores para o uso de mídias de aprendizagem em Realidade Aumentada (RA) assistidas por Inteligência Artificial (IA) na educação básica, por meio da identificação do uso atual de modelos e mídias de aprendizagem, bem como dos fatores que influenciam sua implementação. Utilizando um delineamento de pesquisa descritiva do tipo survey, os dados foram coletados junto a 67 professores do quinto ano de 18 escolas de educação básica em Pekanbaru, por meio de um questionário em escala Likert distribuído via Google Forms. Os resultados revelam que, embora a maioria dos professores apresente percepções positivas em relação ao uso de modelos e mídias de aprendizagem, sua implementação efetiva ainda é limitada. Fatores como idade, formação acadêmica e competência tecnológica dos professores mostraram-se determinantes para sua prontidão em adotar mídias inovadoras, como a RA assistida por IA. Esses achados evidenciam uma lacuna entre a compreensão pedagógica e a aplicação tecnológica, indicando a necessidade de capacitação direcionada e desenvolvimento profissional. O estudo oferece evidências empíricas que podem servir de base para o desenvolvimento de ambientes de aprendizagem adaptativos, baseados em IA e RA, alinhados às necessidades identificadas dos professores e capazes de promover uma aprendizagem significativa no contexto da Educação Básica 5.0.

Palavras-chave: Necessidades dos Professores. Prontidão. Realidade Aumentada Assistida por IA. Mídias de Aprendizagem. Educação 5.0. Educação Básica.

RESUMEN

En la era de la Educación 5.0, se exige a los docentes integrar tecnologías digitales e inteligentes en sus prácticas de aula. Este estudio tiene como objetivo analizar las necesidades y la preparación del profesorado para el uso de medios de aprendizaje de Realidad Aumentada (RA) asistidos por Inteligencia Artificial (IA) en la educación básica, mediante la identificación del uso actual de modelos y medios de aprendizaje, así como de los factores que influyen en su implementación. Utilizando un diseño de investigación descriptivo de tipo encuesta, los datos fueron recolectados de 67 docentes de quinto grado de 18 escuelas de educación básica en Pekanbaru, a través de un cuestionario en escala Likert distribuido mediante Google Forms. Los resultados revelan que, si bien la mayoría de los docentes mantiene percepciones positivas respecto al uso de modelos y medios de aprendizaje, su implementación efectiva sigue siendo limitada. Factores como la edad, la formación académica y la competencia tecnológica del profesorado influyen en su nivel de preparación para adoptar medios innovadores como la RA asistida por IA. Estos hallazgos ponen de manifiesto la brecha existente entre la comprensión pedagógica y la aplicación tecnológica, lo que indica la necesidad de formación específica y desarrollo profesional. El estudio aporta evidencias empíricas que pueden servir como base para el desarrollo de entornos de aprendizaje adaptativos, basados en IA y RA, alineados con las necesidades identificadas del profesorado y orientados a promover un aprendizaje significativo en el contexto de la Educación Básica 5.0.

Palabras clave: Necesidades del Profesorado. Preparación. Realidad Aumentada Asistida por IA. Medios de Aprendizaje. Educación 5.0. Educación Básica.

1 INTRODUCTION

Education has long been a serious concern of the Indonesian government in its role in improving the quality of human resources. Education is important at all levels of a country (Johnes et al., 2017; Alam et al., 2020). Education is the key to all quality progress and development, because with education human beings can realize all their potential, both as themselves and as a society. This is in line with the opinion (Kuswari et al., 2019) that education is a guiding effort, which is carried out consciously by educators (including parents) to students with the aim of developing students' potential to form a perfect personality. Basically, education functions to develop abilities and form a dignified character and civilization of the nation in order to educate the life of the nation (Utomo et al., 2020).

The learning process in schools is one of the educational processes. Learning is not he learning process in schools is one of the essential dimensions of the educational process. Learning is not merely a transfer of knowledge from educators to students (teacher-centered), but an interactive process in which students are encouraged to actively seek, process, and construct knowledge independently so that learning becomes student- centered (Aufa et al., 2020)). This aligns with the view of Brown., 2018, who emphasizes that student-centered learning focuses on learners' needs, abilities, interests, and learning styles, while teachers act as facilitators who design experiences that stimulate independent and critical thinking.

Various programs are prepared to improve the quality of education, one of which is by developing the curriculum. An effective curriculum should reflect the philosophy, objectives, objectives, learning experiences, instructional resources, and assessments that a particular educational program consists of (Alsubaie, 2016). Therefore, education in Indonesia often undergoes curriculum changes, starting from the curriculum in 1947, 1952, 1964, 1968, 1975, 1984, 1994, 2004, 2006, 2013 to the present day the independent curriculum is used. This independent learning curriculum is in accordance with the ideals of national education figures, namely Ki Hajar Dewantara, who prioritizes the freedom of independent and creative learning (Ardianti & Amalia, 2022). Within this curriculum, learning is designed to allow more time for concept comprehension and competency development through varied, contextual learning activities

One important determinant of curriculum success is the learning model employed by teachers. The learning model represents a systematic instructional design that organizes learning experiences to achieve specific objectives (Trianto, 2011). It serves as a pedagogical guide for planning and implementing classroom instruction (Joyce et al., 2016). However, despite understanding its importance, many teachers continue to rely on traditional, lecture-

based methods characterized by teacher dominance, passive students, limited questioning, and textbook dependence typical of schooling in many developing countries (Retnawati et al., 2011). This traditional paradigm emphasizes teaching rather than learning, limiting students' opportunities for creative and critical engagement. While teachers acknowledge the importance of using innovative models (Dafit, 2017), many still face obstacles in implementing them effectively within the classroom context (Winda & Dafit., 2021)

The rapid transformation toward Education 5.0 represents a major paradigm shift in global education. Unlike previous eras focused solely on digitalization (Education 4.0), Education 5.0 emphasizes collaboration between humans and intelligent technologies to create learning environments that are adaptive, personalized, and immersive (Morze et al., 2023). Within this framework, Artificial Intelligence (AI) serves as the analytical brain of education capable of diagnosing learners' strengths and weaknesses, generating individualized learning paths, and providing real-time adaptive feedback (Holmes et al., 2019; Zawacki et al, 2019)

Simultaneously, Augmented Reality (AR) serves as the sensory bridge that connects learners with knowledge through visual and interactive experiences. AR technology overlays digital objects and simulations onto real-world environments, allowing learners to visualize abstract concepts in engaging, contextualized ways (Ibáñez et al, 2018; Chang & Hwang, 2022). When AI and AR are integrated forming AI-assisted AR learning media, they can create adaptive, data-driven learning ecosystems. AI analyzes student performance and tailor content dynamically, while AR immerses learners in interactive visualization that stimulates cognitive and emotional engagement (Chou et al., 2023)

Such integration provides immense potential for elementary education, particularly in supporting reading literacy and conceptual understanding. However, the success of AI-assisted AR media largely depends on teachers' pedagogical and technological readiness. Teachers must not only master the use of the technology but also understand how to embed it meaningfully within pedagogical frameworks that promote inquiry, collaboration, and reflection (Eickelmann et al, 2020). Hence, exploring teachers' needs and readiness toward learning models and media becomes a foundational step in designing future adaptive, AI-driven instructional systems that are both innovative and realistic in classroom implementation.

The implementation of Indonesian learning in several schools shows variations in the approach used. Based on the results of the interview, teachers in one of the schools stated that they use a problem-based learning model. In other schools, teachers reported that the method applied was expository learning combined with assignments, questions and answers,

and sometimes discussions. Observations conducted at the school support these findings, showing that teachers often apply expository learning in the language learning process. However, the results of interviews at different schools show significant differences; In grade V, teachers do not apply the problem-based learning model as previously reported, but only use lectures, questions and answers, and assignments according to students' books. Therefore, when learning relies solely on lecture methods, students may have difficulty understanding the material effectively.

The findings above emphasize that teachers tend to use expository methods and do not apply relevant learning models to support elementary school students' reading literacy. Similar to the findings of Widodo (2019) teachers in reading classes often neglect model-based instruction. As a result, students lack opportunities for creative thinking and problem solving. Teachers rely heavily on textbooks as the primary learning source, without employing innovative models that could strengthen comprehension and engagement. Consequently, learning objectives are not achieved optimally.

In addition to instructional strategy, learning media are a crucial component of the learning process. In the modern era, media cannot be separated from effective pedagogy, as they clarify abstract concepts, stimulate students' thoughts and feelings, and enhance active participation (Puspitasari & Hanif, 2019). Educational media possess transformative potential to shape learners' attitudes and behavior toward creativity and dynamic change (Heinich et al, 2002; Sadiman, 2014). However, observations reveal that the use of learning media among teachers remains suboptimal. Interviews with several grade 5 teachers indicated that they generally use static picture media, attached to the board with glue, whose small size often limits visibility. This aligns with research by (Mustika & Ain, 2020), showing that conventional visual aids are ineffective in explaining abstract concepts that require interactivity and multisensory engagement.

These findings underscore a pressing need to redefine learning media through technology-enhanced, intelligent solutions. Traditional tools are insufficient to meet the demands of Education 5.0, where learners must engage with dynamic, multimodal, and adaptive experiences. AI-assisted Augmented Reality (AR) represents a promising alternative, offering interactivity, visualization, and adaptivity simultaneously. In language learning, for example, AR can visualize text structures, vocabulary, and narrative flow in 3D environments, while AI algorithms analyze learners' reading behaviors and provide tailored scaffolding (Chang & Hwang, 2022). Such innovations can transform passive reading into an active, exploratory process that enhances comprehension and critical literacy.

Nevertheless, the success of these innovations depends on teachers' readiness and contextual needs. Teachers must perceive technology not as an additional burden but as a pedagogical partner that amplifies their instructional impact. Therefore, analyzing teachers' needs and readiness regarding learning models and media is a critical first stage in building adaptive AI-based learning systems that are pedagogically sound and practically implementable in Indonesian elementary schools.

The use of learning models and media has become increasingly relevant in today's educational landscape, where technology advances rapidly. Teachers face the challenge of integrating various tools and intelligent systems to create engaging, interactive, and effective learning environments. Hence, this study aims to analyze teachers' needs and readiness for learning models and media as a foundation for developing AI-assisted Augmented Reality learning media in the context of Elementary Education 5.0. The results are expected to identify factors influencing teachers' readiness to integrate intelligent technologies, as well as provide an empirical foundation for designing adaptive learning systems that enhance both teaching quality and student literacy outcomes.

2 METHOD

This study employed a quantitative survey research design aimed at obtaining a comprehensive and systematic description of teachers' use of learning models and media in elementary schools. The survey design was selected because it enables the collection of empirical data from a relatively large sample, providing both breadth and depth in understanding teachers' perceptions, needs, and readiness (Creswell & Creswell, 2018). This design is particularly appropriate for generating baseline data that can inform the development of AI-assisted Augmented Reality (AR) learning media and adaptive learning systems.

The population of this study consisted of elementary school teachers in the city of Pekanbaru, Indonesia. Using purposive sampling, 67 fifth-grade teachers from 18 public and private elementary schools were selected as respondents. The sample was chosen to ensure adequate representation across schools with varying levels of technological resources, teaching experience, and demographic characteristics. This diversity allows for a richer analysis of teachers' needs and readiness in relation to pedagogical and technological innovation. Data were collected through a structured questionnaire designed specifically for this study. The research instrument was constructed based on a review of pedagogical and technological integration theories, particularly the TPACK framework (Mishra & Koehler,

2006), the Technology Readiness Index (Parasuraman, 2000), and the Technology Acceptance Model (Davis, 1989).

Each item was rated using a five-point Likert scale, where 1 = Strongly Disagree and 5 = Strongly Agree. Prior to data collection, the questionnaire was validated by three experts in educational technology and instructional design to ensure content validity, clarity, and relevance to the study objectives. Reliability was tested using Cronbach's Alpha, yielding a coefficient above 0.80, indicating a high level of internal consistency. The data collection process involved three key stages:

1. Preparation and validation, including expert review, pilot testing, and final revision of the questionnaire.
2. Administration, in which the questionnaire was distributed online via Google Forms to facilitate broad participation and efficient data management. Respondents were given one week to complete the questionnaire.
3. Verification, where all responses were checked for completeness, and invalid entries were removed prior to analysis.

Ethical considerations were observed throughout the process. Participation was voluntary, and informed consent was obtained from all respondents. Data were collected anonymously and used solely for academic purposes.

The collected data were analyzed using descriptive statistical techniques, including frequency distribution, percentage, mean, and standard deviation. These measures were used to identify general trends and patterns in teachers' responses regarding the use of learning models, learning media, and technology readiness. In addition, data visualization through bar charts and cross-tabulation was used to explore relationships between variables such as teachers' age, education level, and media use frequency. The analysis results were interpreted in light of contemporary frameworks on AI-assisted adaptive learning systems, connecting empirical findings to the broader theoretical discourse on Education 5.0. The overall research procedure followed these systematic stages:

1. Identification of research problem (limited use of innovative models and media).
2. Instrument development (questionnaire design and validation).
3. Data collection via Google Forms.
4. Data analysis using descriptive statistics.
5. Interpretation and discussion, connecting findings with teachers' readiness for AI-AR-based adaptive learning media.

The methodological design ensures that the results are valid, reliable, and relevant for informing future development of intelligent, adaptive learning environments in elementary education.

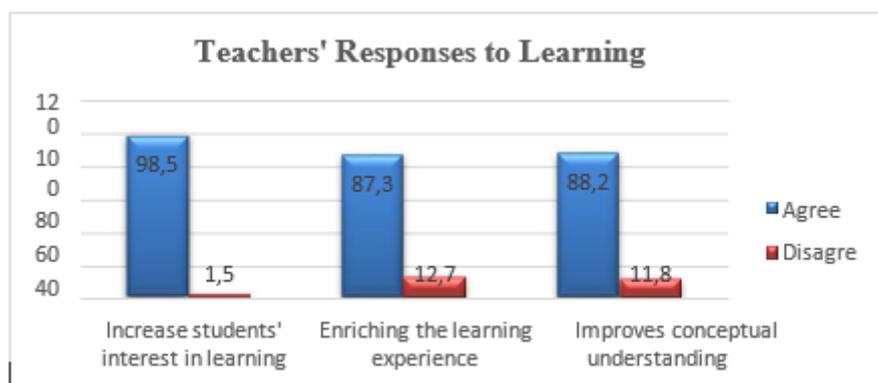
3 RESULTS AND DISCUSSION RESULTS

The following are the results of the needs analysis obtained through filling out a questionnaire through google form with a total number of respondents being 67. The results showed that respondents gave very positive responses to the benefits of using learning media and variations of learning models in the context of learning in elementary schools. The following are the results of the use of media and models for elementary school teachers based on research:

1. Teachers' Responses to Learning Media

This response is an important aspect in evaluating the effectiveness of the use of technology in the learning process in elementary school. Through filling out questionnaires, teachers gave their views on the extent to which the use of learning media has enriched students' learning experiences, increased their engagement, and improved their understanding of subject matter. Positive responses from teachers will indicate that learning media has become an effective tool in supporting the achievement of learning objectives, while negative or neutral responses indicate challenges or opportunities for improvement in the application of learning media. By understanding teachers' responses to learning media, appropriate strategies and adjustments can be made to improve their use in the future. Furthermore, the following diagram shows the distribution of the percentage of positive responses from respondents to the benefits of using a variety of learning media:

Figure 1



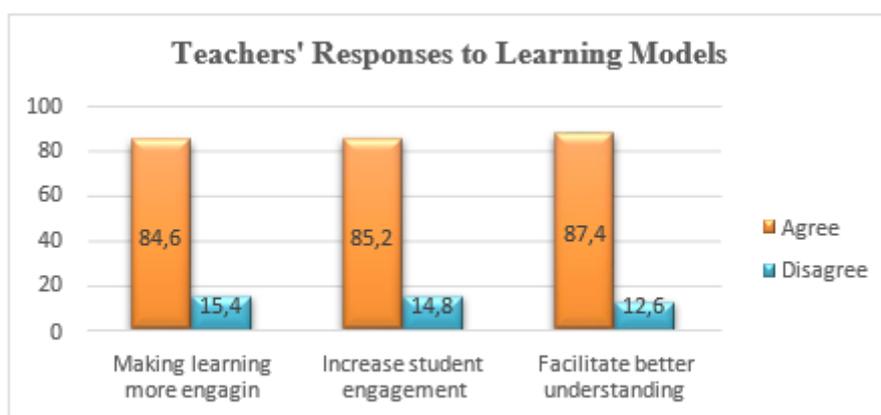
Based on the diagram above, the majority of respondents, reaching 98.5%, stated that the use of learning media can increase students' interest in learning. Meanwhile, 87.3% of them believe that learning media can enrich students' learning experience. In addition, as many as 88.2% of respondents considered that the use of learning media could improve students' understanding of concepts. This positive response shows a strong awareness among teachers of the importance of utilizing technology in the learning process. The perception that the use of learning media can increase students' interest in learning and enrich their experience gives an indication that this approach is considered relevant and beneficial in helping students better understand lesson concepts.

The findings above reveal that although teachers recognize the pedagogical value of diverse models and media, the extent of their practical application remains limited. This indicates a transitional stage in teachers' pedagogical development, where awareness of innovation exists but the ability to operationalize it is still constrained. To interpret this phenomenon more deeply, it is important to analyze the patterns of model and media use in the broader context of Education 5.0, which emphasizes collaboration between humans and intelligent technologies

2. Teachers' Responses to Learning Models

This response is an important aspect in evaluating the effectiveness of various learning methods applied in elementary schools. Through filling out questionnaires, teachers provided their views on the extent to which the variety of learning models has helped improve student engagement, concept understanding, and their learning atmosphere. Positive responses from teachers will show that the learning models implemented have been effective in creating a motivating and useful learning environment. On the other hand, negative or neutral responses indicate the need for further adjustment or development in the implementation of learning models. By understanding teachers' responses to the learning model, appropriate strategies and adjustments can be made to improve its use in the future, as well as have a positive influence on student learning outcomes. Furthermore, the following diagram shows the distribution of the percentage of positive responses from respondents to the benefits of using learning model variations:

Figure 2

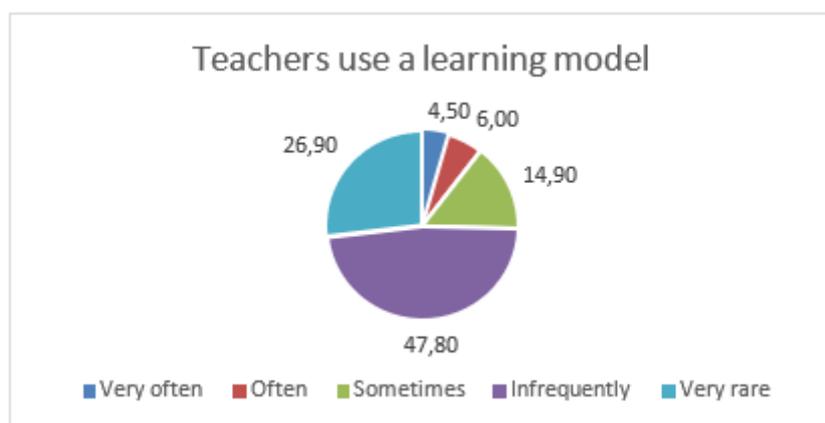


Based on the diagram above, most respondents also agreed that the use of a variety of learning models can make learning more engaging (84.6%), increase student engagement (85.2%), and facilitate better understanding (87.4%). These results reflect a strong understanding from teachers about the benefits of applying diverse learning models in the learning process. This high percentage of positive responses shows that teachers in elementary schools strongly support the use of a variety of learning models as a strategy to create a more engaging, interactive, and effective learning environment. It also reflects their awareness of the importance of actively involving students in the learning process to facilitate deeper and ongoing understanding.

3. Use of Learning Models

The use of learning models is a key factor in creating an effective learning environment in elementary schools. In developing learning strategies, it is important for teachers to pay attention to the various learning models available and choose the one that best suits the needs of students and the subject matter being taught. Through filling out questionnaires, teachers' responses to the use of learning models can provide an overview of the extent to which various learning approaches have been implemented in primary schools. The following are the results of the questionnaire filled out by the teachers regarding the use of the learning model:

Figure 3

**Table 1***Teachers' responses to the use of learning models*

Yes	Range	Criterion	Frequency	Percentage
1	86 – 100	Very often	3	4,5%
2	76 – 85	Often	4	6%
3	60 – 75	Sometimes	10	14,9%
4	55 – 59	Infrequently	32	47,8%
5	< 54	Very Rare	18	26,9%
Total			67	100%

The results showed that the use of the learning model in the classroom by respondents varied, with the majority of respondents assessing that the use was infrequent or even very rare. Of the total 67 respondents, as many as 18 people or around 26.9% stated that they rarely use the learning model in classroom learning. Meanwhile, 32 people or about 47.8% of the total respondents revealed that they rarely use the learning model. Meanwhile, around 14.9% of respondents said that they only occasionally use the learning model. The percentage of more active use, such as "frequently" and "very often", was recorded lower, with only 6% of respondents stating that they use the learning model frequently, and 4.5% stating that they do so very often.

These findings show a pattern that shows the low application of the learning model in classroom learning in elementary schools. In addition to the table above, the results of the questionnaire filled out by the teachers regarding the use of the learning model can be explained with the help of the following diagram:

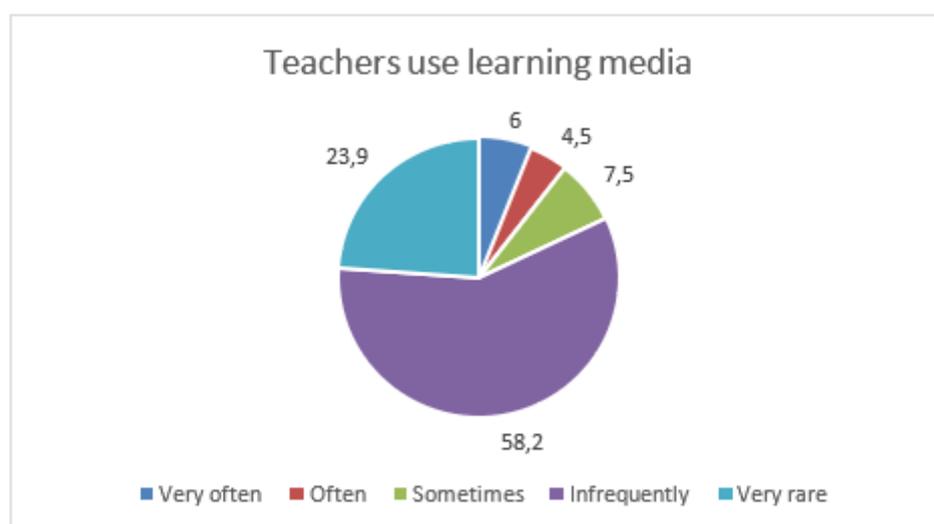
4. Use of Learning Media

The use of learning media is very important in basic education. Through questionnaires, the authors collected data to find out the extent to which learning media was used and how it affected the learning process. This explanation will help in presenting the results of the questionnaire analysis that will be described next.

Table 2*Teachers' responses to the use of learning media*

Yes	Range	Criterion	Frequency	Percentage
1	86 – 100	Very often	4	6%
2	76 – 85	Often	3	4,5%
3	60 – 75	Sometimes	5	7,5%
4	55 – 59	Infrequently	39	58,2%
5	< 54	Very Rare	16	23,9%
Total			67	100%

Then the results showed that the use of learning media in classroom learning by respondents tended to be low, with the majority of them stating that the use was infrequent or even very rare. Of the total 67 respondents, as many as 16 people or around 23.9% stated that they rarely use learning media in classroom learning. Meanwhile, as many as 39 people or around 58.2% of the total respondents revealed that they rarely use learning media. Only a small percentage of respondents stated that they use learning media with a higher frequency, of which 5 people or about 7.5% stated that they sometimes use learning media, 3 people or about 4.5% stated that they use learning media frequently, and 4 people or about 6.0% stated that they do it very often. These findings highlight the low application of learning media in the context of learning in elementary schools. In addition to the table above, the results of the questionnaire filled out by teachers regarding the use of learning media can be explained with the help of the following diagram:

Figure 4

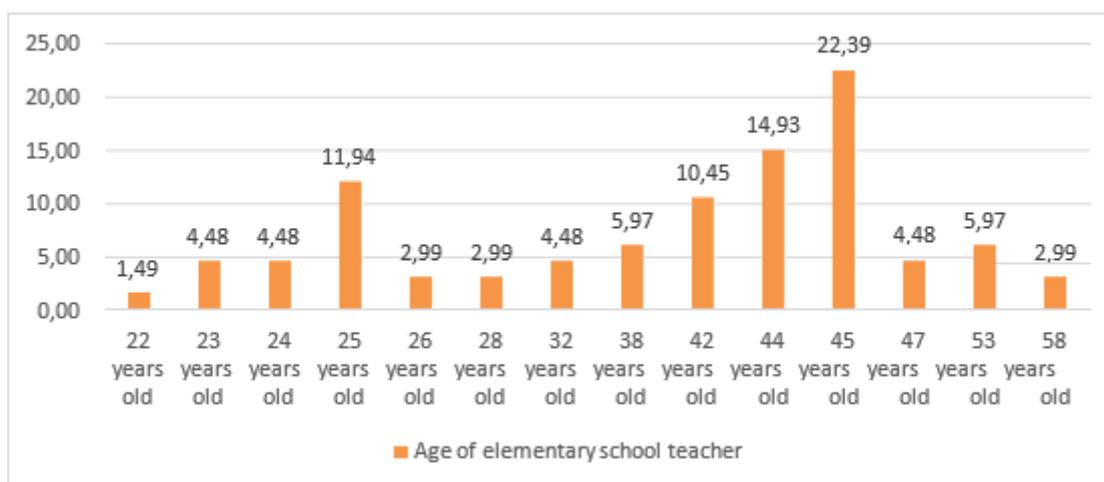
The findings reflect a transitional stage in the pedagogical development of elementary teachers—where there is awareness of the need for innovation but insufficient readiness to implement it effectively. The predominance of expository models and static media suggests that teachers' instructional practices are still positioned within Education 3.0 and 4.0 paradigms, which emphasize information transfer rather than adaptive learning. In contrast, Education 5.0 requires a human– technology partnership, where teachers are supported by intelligent systems capable of adaptive feedback and multimodal interaction (Holmes et al., 2019; Morze et al., 2023)

From the results of the questionnaire analysis, it was revealed that the use of learning media by teachers is still relatively low in the context of classroom learning. The majority of teachers tend to rarely use learning media as a means of support in their teaching process. In addition, the findings show that the use of learning models in the classroom is also not carried out consistently, with the majority of teachers rarely applying variations of learning models in every meeting. This phenomenon reflects a significant gap between the potential of learning media and the practices carried out by teachers in the reality of classroom learning. This illustrates the challenges faced by the education system in integrating learning technologies and innovations into everyday classroom practices.

5. Factors that can lead to the lack of use of learning models and media by teachers in elementary schools

Identifying and understanding the factors that influence the lack of use of learning models and media by teachers in elementary schools is a critical step in developing effective strategies to improve the application of technology in the learning process. Thus, an in-depth understanding of the factors that influence the use of learning models and media can help form a holistic and sustainable strategy in improving the quality of learning in elementary schools. The following is a visual representation of the age data of elementary school teachers in the form of a diagram below:

Figure 5

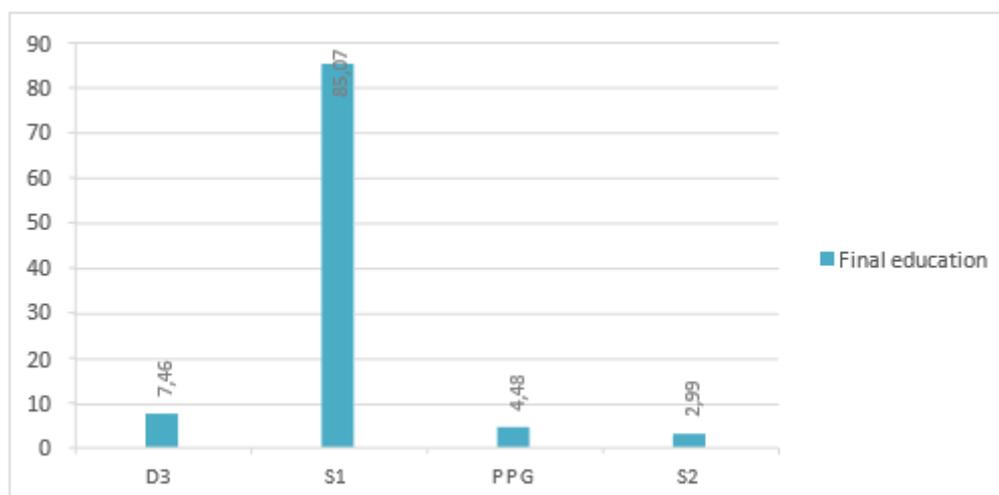


The low use of learning media and the variation of learning models in the context of learning in elementary schools seem to be influenced by the age factor of teachers. From the results of filling out the questionnaire by 67 respondents, as many as 41 respondents or around 61.2% of the total respondents were over 40 years old. The low use of learning media and variations in learning models in the context of learning in elementary schools can be caused by several factors related to the age of teachers. First, the lack of technological skills is one of the main obstacles. Teachers over the age of 40 may not have the same level of proficiency in the use of technology as younger generations. In addition, skepticism towards technology can also affect its use. Some older teachers may feel that traditional learning methods are more effective than new learning mediums. Furthermore, the lack of motivation to learn new technologies is also an important factor. Teachers who have been teaching for a long time may feel satisfied with the methods they have mastered, so they are not motivated to develop new skills. Finally, the challenge of adapting to change also plays a role. Older teachers may tend to stick to familiar practices rather than trying new things, making it difficult for them to introduce new variations of learning models.

Furthermore, the low use of learning media and the variety of learning models in the context of learning in elementary schools can also be influenced by the teacher's last education factor. From the results of the questionnaire conducted, it can be seen that most of the teachers have a last educational background at the S1 level, reaching around 85.07% of the total respondents. This significant number shows the dominance of undergraduate education background as the last knowledge possessed by the majority of teachers at the primary level. On the other hand, only a small percentage of respondents have an educational background at the Teacher Professional Education (PPG) level, which is around 4.48%. Meanwhile, D3 educational backgrounds cover about 7.46% of the total respondents, and

only a small percentage have a S2 degree, which is around 2.99%. There is a visual representation of the final education data of elementary school teachers in the form of a diagram below:

Figure 6



This last educational factor can provide an overview of the teacher's level of understanding and skill in terms of the use of learning media and the variety of learning models. Teachers with higher education backgrounds may have better knowledge and skills in adopting innovative learning technologies and methods. However, the relatively low number of teachers with a background in undergraduate education suggests that they may have limited access to advanced education that delves into modern learning strategies.

Thus, the last education factor of teachers, especially the dominance of S1 educational background, can be one of the factors that affect the low use of learning media and the variety of learning models in elementary schools. Teachers with a S1 education background may not have enough knowledge or skills related to technology and innovation in learning. Therefore, further efforts are needed to improve teachers' understanding and skills. Thus, they can be more effective in utilizing technology and implementing innovative learning models in classroom learning, thereby providing a more diverse and meaningful learning experience for students.

4 DISCUSSION

In interpreting the results of this study, it is important to understand the context and findings obtained from the questionnaire distributed to teachers. The results of this survey provide in-depth insights into the use of learning media, variations in learning models, and

factors that affect the application of technology in the learning process in elementary schools. The following discussion will elaborate on the findings in detail, including teachers' responses to learning media, the effectiveness of learning model variations, and analysis of factors that affect the use of media and learning models in the context of basic education.

Teachers' Responses to Learning Media

The results of the study show that teachers in elementary schools have a very positive view of the use of learning media. The majority of teachers feel that learning media, such as images and videos, not only increase students' interest in learning but also enrich their learning experience. This view shows that learning media functions more than just an aid; It plays an important role in making the learning process more interesting and relevant for students.

Teachers also acknowledge that learning media contributes significantly to improving students' understanding of concepts. Learning media not only has an appeal that

makes the subject matter more interesting, but it is also effective in explaining and visualizing complex subject matter. Awareness of the significant benefits of learning media is in line with the existing literature, which shows that the effective use of media can improve student learning outcomes and better achieve learning goals. This view is in line with the findings (Puspitarini & Hanif, 2019); Sari & Setiawan, 2018), which states that learning media that is used appropriately can be an efficient support tool in achieving learning goals and improving student learning outcomes. In addition, as previous research has suggested, learning media in the presentation of material by teachers has great benefits in improving students' ability to understand and digest information (Tamrin et al., 2017).

However, although positive responses dominate, challenges in the use of learning media remain. Limited resources, such as inadequate equipment and lack of technical training, can hinder the implementation of optimal learning media. Therefore, it is important to identify and overcome these barriers so that learning media can be used optimally to support the learning process in the future. Efforts such as improving teacher training and providing adequate resources need to be made to ensure that learning media can be used effectively and efficiently.

Teachers' Responses to Learning Models

The results showed that teachers in elementary schools responded positively to the variety of learning models applied in the classroom. Many teachers feel that the use of various learning models makes the learning process more engaging and effective in increasing student engagement. This varied approach is considered a successful strategy to motivate students and encourage their active participation in learning activities.

Furthermore, teachers also benefit from a variety of learning models in facilitating the understanding of subject matter. This indicates that diverse approaches in teaching methods can improve the way students understand and internalize the concepts being taught. Awareness of the benefits of this flexible and innovative approach underscores its importance in creating a dynamic and interactive learning environment.

Active learning strategies play an important role in transforming students from passive participants to active participants (Meyers, 1986). By using techniques such as small groups, scenarios, and case studies, students' critical thinking skills can be improved (Burbach et al., 2004; Larry & Mary, 2014). This approach is often referred to as student-centered learning, where students not only 'do' learning but also reflect on their learning experiences (Kusumoto, 2018; Bonwell & E, 1991)

Positive responses from teachers show that variations of learning models are well accepted as an effective strategy to improve the quality of learning in elementary schools. This approach supports the principle of meaningful learning, which emphasizes the importance of students associating new information with the knowledge they already have. According to Ausubel (Baharuddin, 2020), meaningful learning occurs when students are able to relate new information with previous experiences and knowledge, resulting in a deeper understanding and not easily forgotten (Gazali, 2016). Therefore, the application of a variety of learning models can enrich the learning process and help students gain a more complete and sustainable understanding of the subject matter.

Use of Learning Models

Although responses to variations in learning models are generally positive, research data show that the application of these models in classroom practice still tends to be low. Many teachers report that they rarely or even very rarely use varied learning models. This phenomenon shows that there is a gap between the theoretical understanding of the benefits of learning models and the reality in the field. Some of the factors that may lead to this low adoption include time constraints, lack of adequate resources, and lack of effective training in the implementation of these models. Teachers may find it difficult to integrate new learning models into a hectic schedule or may feel they do not have enough access to the tools and resources needed to implement them.

To address these issues, it is important to evaluate and address these barriers with a planned approach. The development of better and comprehensive training for teachers can provide them with the skills and knowledge necessary to implement learning models more effectively. Additionally, the provision of adequate resources, such as relevant learning materials and supporting technology, as well as strong administrative support, can help

facilitate the use of a broader learning model. By implementing these measures, learning models can be integrated more effectively into daily teaching practices, which will ultimately contribute to improving the quality of learning in primary schools as a whole.

The use of appropriate learning models is a key factor in determining the success of the learning process (Irviana, 2020). A model that meets good criteria will create an effective and efficient learning process (Mahjaty, 2017). On the other hand, an inappropriate model can result in various problems in learning, such as unclear material and lack of student involvement. Therefore, the role of teachers is very important in choosing and implementing appropriate and effective learning models (Li et al., 2021). The learning model functions as a systematic pattern in organizing the learning experience and serves as a guideline in planning and implementing learning activities. This opinion is in line with (Rubiah, 2016), which emphasizes that the learning model is a strategy used by teachers to carry out teaching and learning activities optimally. By understanding and implementing the right learning model, the quality and effectiveness of the learning process can be significantly improved, thereby creating a more productive and meaningful learning environment for students.

Use of Learning Media

Learning media is a tool provided by teachers to stimulate and facilitate students in the learning process (Cilliers, 2021). This media can be in the form of audio, visual, or audio-visual. (Dziuban et al., 2018) states that media consists of various components in a student's learning environment that can encourage them to learn. (Cheung & Ng, 2021: Sung et al., 2016) adding that media includes any physical tool capable of presenting a message and stimulating students' interest in learning, such as books, movies, tapes, and videos (Tan, 2018).

The results showed that the use of learning media in classroom practice by teachers tended to be low, with the majority of teachers reporting that they rarely or very rarely used learning media in the teaching process. This phenomenon reflects a significant gap between the potential of learning media that should be able to enrich the learning experience and the real practices carried out in the classroom. The low frequency of use of this media can be caused by several factors. Resource limitations, such as a lack of adequate devices or limited access to technology, are often a major obstacle. In addition, the lack of effective training for teachers in integrating learning media into their teaching strategies also contributes to low usage. Teachers may also feel uncomfortable or lack confidence in using new technologies, which can hinder wider adoption of learning media.

To address this issue, it is important to conduct a thorough evaluation of existing supports and increase initiatives to facilitate the use of learning media. This includes

developing better and ongoing training for teachers so that they are better prepared and confident in using media as a learning tool. Strong administrative support is also needed to ensure that teachers have access to the necessary resources and can effectively integrate learning media in their practice.

In this modern era, learning media is an important element in the learning process, and the success of the material delivered by teachers is greatly influenced by the effectiveness of the media used (Mustaqim, 2016). By utilizing effective learning media, we can achieve a significant improvement in the quality of the teaching and learning process (Roof, 2018). The importance of technology in education today cannot be ignored. Many studies have been conducted on the development of ICT-based learning media, but there is still little focus on its use in elementary schools. The ability of teachers to integrate ICT into the learning process will also have a significant impact on students' ability to achieve learning goals (Porter, 2017); Nambisan & Luo, 2021). Therefore, teachers must be able to design creative and innovative learning that is integrated with the use of ICT (Yunus & Suliman, 2014). App-based or digital learning media provide visually and audio information that is visually and audio engaging and displays real-world events in virtual form to create more active and engaged learning (Degner et al., 2022). This is important, considering that technology that continues to evolve must be in line with its use in education, starting from elementary school.

Factors Influencing the Use of Learning Models and Media

Identifying the factors that influence the low use of learning models and media is essential to develop effective strategies. One of the main factors identified is the age of the teacher. The majority of teachers over the age of 40 may have difficulty adopting new technologies and tend to be more comfortable with traditional teaching methods. Lack of technological skills, skepticism towards technology, and lack of motivation to learn new technologies can be significant obstacles in the application of media and learning models. This is supported by the view (Winda & Dafit, 2021) that the factors that cause teachers to have difficulty operating IT-based media, such as laptops/computers, infocus, printers, and the internet, include lack of knowledge about technology, especially for more senior teachers, as well as difficulties in finding files due to lack of skills in managing and storing digital data. Thus, the combination of these factors can lead to low use of learning media and variations in learning models in elementary school learning

In addition, teachers' educational backgrounds also play a significant role in the application of media and learning models. Most teachers in primary schools have a final educational background at the S1 level, while the number of teachers with higher education

degrees, such as S2 or professional education, is relatively small. Teachers with advanced education generally have better knowledge and skills in adopting innovative technologies and learning methods. They may be more open and trained in using a variety of modern strategies in teaching. Conversely, the low proportion of teachers with advanced education suggests that many teachers may be less exposed to current learning strategies and in-depth training.

This combination of age and education level factors may explain why media use and variation of learning models in elementary schools are still low. Older teachers may have difficulty adopting new technologies and innovative learning methods, while limitations in continuing education may limit their knowledge of modern approaches to teaching. To address this issue, there needs to be more comprehensive training and adequate technical support for all teachers. Additionally, increasing access to continuing professional education will help teachers adapt to changes and developments in learning practices.

The analysis of teacher-related factors such as age, education level, and technological skill illustrates the uneven distribution of digital readiness among elementary teachers. According to the Technology Readiness Index (Parasuraman, 2000), users' optimism and innovativeness strongly determine technology adoption. The findings suggest that although teachers acknowledge the value of learning media, their limited exposure and digital confidence hinder integration. Therefore, these empirical patterns provide a diagnostic foundation for designing AI-assisted Augmented Reality (AR) learning media that align with teachers' needs and readiness in the context of Education 5.0.

Overall, the survey findings should not be viewed merely as limitations in teachers' practices but as opportunities for targeted innovation. By addressing the gaps in model and media utilization through AI-AR-supported learning designs, future educational frameworks can enhance both teachers' pedagogical competence and students' literacy outcomes in the spirit of Education 5.0.

5 CONCLUSION

This study revealed that although the majority of teachers gave positive responses to the use of learning media and variations of learning models, their implementation in the field was still relatively low. Most respondents acknowledged that learning media has significant benefits in increasing students' interest in learning, enriching the learning experience, and improving concept understanding. Similarly, variations of learning models are thought to make learning more engaging, increase student engagement, and facilitate better understanding. However, the results of the study show that the use of learning media and learning models in daily practice in the classroom is still rare. Factors such as the teacher's

age and their last level of education play a significant role in the low adoption of media and learning models. Therefore, further efforts need to be made to improve teachers' understanding and skills in utilizing technology and various innovative learning models. This includes providing additional training and support necessary to help teachers adapt to modern learning methods and tools, with the aim of creating a more effective learning environment and supporting student development in primary schools.

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