

Revolutionizing Mathematics Education: Unveiling the Future-Ready Media Demands among Aspiring Educators

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Abstrak

Kemampuan berpikir kreatif matematis sangat penting bagi siswa sekolah kejuruan, baik Media pembelajaran dibutuhkan sebagai salah satu faktor pendukung utama dalam keberlangsungan pembelajaran. Penelitian ini bertujuan untuk mengeksplorasi persepsi calon guru terhadap kebutuhan media pembelajaran di era 4.0, khususnya pada pelajaran matematika. Penelitian berjenis kualitatif deskriptif ini menggunakan metode survei pada 47 mahasiswa Pendidikan Guru Sekolah Dasar pada salah satu Universitas di Yogyakarta. Teknik pengumpulan data menggunakan angket kuisisioner. Analisis data dilakukan dengan reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa media pembelajaran sangat diperlukan dalam proses belajar mengajar. Guru, sebagai tenaga pendidik, memiliki peran krusial dalam pemilihan media yang sesuai. Dengan tuntutan pendidikan abad 21, media pembelajaran harus sesuai dengan karakteristik siswa, materi pembelajaran, dan perkembangan zaman. Dengan demikian, integrasi media pembelajaran yang tepat guna sangat penting untuk diterapkan guna meningkatkan kualitas dan efektivitas proses belajar mengajar.

Kata Kunci: Era 4.0; Media Pembelajaran Masa Depan; Persepsi; Revolusi.

Abstract

Learning media is needed as one of the main supporting factors in the continuity of learning. This research aims to explore prospective teachers' perceptions of the need for learning media in the 4.0 era, especially in mathematics lessons. This descriptive qualitative research used a survey method on 47 elementary school Prospective teacher education students at a university in Yogyakarta. The data collection technique uses a questionnaire. Data analysis consists of data reduction, data presentation, and conclusion. The research results show that learning media is very necessary for the teaching-learning process. Teachers, as educators, have a crucial role in selecting appropriate media. With the demands of 21st-century education, learning media must be appropriate to student characteristics, learning materials, and current developments. Thus, the integration of appropriate learning media is very important to implement to improve the quality and effectiveness of the teaching and learning process.

Keywords: 4.0 era; Future Learning Media; Perception; Revolution.

I. INTRODUCTION

The Fourth Industrial Revolution has had an impact on various sectors (Kade et al., 2022). In this era, we live in a time of rapid technological development (Nabilah et al., 2021). Everything has become digitally based, and technology has become inseparable from modern life (Alim et al., 2023; Oktaviani et al., 2022). The emergence of the fourth industrial revolution has also influenced the birth of education 4.0, as technology has permeated almost every aspect of life, including the field of education.

We are currently in the 21st century, where education is expected to prepare individuals to face the challenges of the Fourth Industrial Revolution by providing relevant skills and utilizing technology in the learning process. Education in this era is no longer confined by space and time, as digital technology is incorporated into teaching and learning activities (Makaruku & Makulua, 2021). In this context, schools must be able to leverage and adapt to these technological advancements (Yunus & Mitrohardjono, 2020). Therefore, innovation is needed in the field of education, including innovative models of instruction, teaching strategies, and learning media. Teachers must create learning environments that capture students' attention and provide an enjoyable experience (Setyawan et al., 2020).

One subject that is often challenging to teach for elementary school teachers and difficult for students to understand is mathematics (Fauzi et al., 2020). Students often perceive mathematics as a difficult

and unenjoyable subject. This presents a unique challenge for teachers to create engaging and enjoyable mathematics lessons. Therefore, extra attention from teachers is necessary for this subject, including for prospective elementary school teachers.

As future elementary school teachers, their role is crucial. Prospective elementary school teachers are expected to learn and keep up with technological advancements. They must innovate in the use of learning media and be able to use or create media that aligns with the characteristics of elementary school students. This is because classroom learning today goes beyond traditional textbooks; it requires instructional media as supportive tools (Hidayati & Irmawati, 2019).

Elementary school teachers or prospective teachers need to have knowledge and understanding of students' learning media needs. They should be innovative in creating or using mathematics learning media that capture students' attention and provide an enjoyable learning experience. When students feel happy and engaged in their learning, they become more interested and motivated to learn (Faradila & Aimah, 2018).

As elementary school teachers or prospective teachers, they must have knowledge and understanding of the learning media needs that align with students' characteristics and keep up with the changing times. Learning media is crucial in the teaching and learning process in the classroom (Nurfadhillah, Cahya Tri Ramadani, et al., 2021; Saddam Husein, 2018; G. W. Utomo et al., 2022). Therefore, the perceptions of teachers, prospective

teachers, and elementary school students regarding this matter are important. Perceptions play a vital role in learning, as they reflect an individual's assessment and understanding (Mania & Alam, 2021). Perceptions represent someone's perspective in solving a given problem (Margot & Kettler, 2019). Hence, this article examines the perceptions prospective teachers regarding the Future-Ready Media Demands among Aspiring Educators.

II. METHOD

This study is qualitative descriptive research with survey method aimed at describing the perceptions of prospective teachers regarding the need for mathematics as the Future-Ready Media Demands among Aspiring Educators. The sample for this study consisted of 47 elementary school Prospective teacher education students at a university in Yogyakarta.

The research design used in this study includes problem formulation, data collection, data analysis, and conclusion drawing. The data collection instrument used in the study is a questionnaire. Data collection techniques involve using a Likert scale questionnaire through Google Forms distributed to prospective elementary school teachers. The results obtained from the questionnaire and interviews will be processed and used to obtain information regarding the perceptions of teachers, prospective teachers, and students regarding the need for mathematics learning media in the digital era. Two factors related to the need for learning media are used as reference points in the research

questionnaire, namely functional and structural factors.

Table 1.

Perceptions of Prospective Teachers Indicators Regarding the Need for Mathematics Learning Media in The Digital Era

Factor	Indicator
Functional	Clarifying the presented material
	Facilitating the learning process
	Providing systematic and logical delivery of the material
Structural	Enhancing the ability to understand the material
	Streamlining the learning process
	Using time efficiently
	Relevance to the current era

Then, the processed data will be converted into intervals (Table 2).

Table 2.

Conversion of Mathematics Learning Media Needs Questionnaire

Interval (%)	Interpretation
$80.0 \leq X \leq 100.0$	High
$60.0 \leq X < 80.0$	Moderate
$X < 60.0$	Low

Source: Buranda & Bernard (2019)

After the data collection, data analysis is conducted. The data analysis technique used in this research follows the steps proposed by Miles and Huberman (Sugiyono, 2019). These steps consist of three phases: Data Reduction, Data Display, and Conclusion Drawing. By following these steps, a comprehensive analysis of the collected data can be achieved, leading to a deeper understanding of the research topic.

III. RESULT AND DISCUSSION

Data on the prospective teachers' perception of the need for mathematics learning media in elementary schools were collected through a survey questionnaire

distributed via Google Form. The questionnaire was administered to 47 students majoring in elementary school teaching. The obtained information regarding the prospective teachers' perceptions of the need for mathematics learning media in elementary schools will be presented in Table 3.

Table 3.
Results of Questionnaire Processing: Prospective Teachers' Perceptions

	Indicator	Result (%)	Description
Functional	Clarifying the presented material	86,24	High
	Facilitating the learning process	82,02	High
	Providing systematic and logical delivery of the material	82,87	High
	Enhancing the ability to understand the material	79,68	Moderate
Structural	Streamlining the learning process	74,57	Moderate
	Using time efficiently	72,34	Moderate
	Relevance to the current era	84,91	High

Based on Table 3, specifically in the functional factor, the analysis results indicate that the perception regarding the clarity of the delivered material using learning media obtained a percentage of 86.24% with the category "High." This implies that almost all students in the Elementary School Teacher Education program agree that the use of learning media can make the delivered material clearer. The analysis results indicate a

percentage of 86.24% with the category "High," implying a high level of agreement among the students.

Furthermore, the analysis reveals that the use of learning media facilitates the learning process. The obtained percentage is 82.02% with the category "High," indicating that almost all students agree that learning media can make the learning process easier. Additionally, the analysis shows that the use of learning media enhances the systematic and logical delivery of the material. With a percentage of 82.87% and the category "High," almost all students agree that learning media contributes to a more systematic and logical presentation of the material, as media can provide direct experiences to students.

In the functional factor, the perception regarding the ability to enhance understanding through the use of learning media obtained a percentage of 79.68% with the category "Moderate." This indicates that some students agree that learning media can enhance students' understanding. However, it is important to note that the ability to understand the material is not solely dependent on the use of learning media but can also be influenced by other internal and external factors not mentioned in this study. Therefore, the role of the teacher is crucial in providing understanding to students regarding the taught material.

Moving on to the structural factor, the analysis reveals that the use of learning media contributes to a smoother learning process. With a percentage of 74.59% and the category "Moderate," some students agree that learning media can make the learning process more seamless. However,

it is essential to recognize that the smoothness of the learning process is not solely dependent on the use of media but can also be influenced by other internal or external factors not addressed in the study.

Moreover, the analysis shows that the use of learning media can make the utilization of time more efficient in delivering the material. With a percentage of 72.34% and the category "Moderate," some students agree that learning media can contribute to more efficient time management in the delivery of the material. During the material delivery process, the teacher's role is crucial in providing understanding to students. This allows for more effective and efficient utilization of time in aligning students' understanding of the taught material.

Lastly, in the structural factor, the perception regarding the relevance of learning media to the current era obtained a percentage of 84.91% with the category "High." This indicates that almost all students agree that the media used by teachers in the learning process should consider the advancements and demands of the current educational landscape.

The analysis of Prospective students' perceptions in the Elementary School Teacher Education program can also be visualized in Figure 1, a bar chart representation.

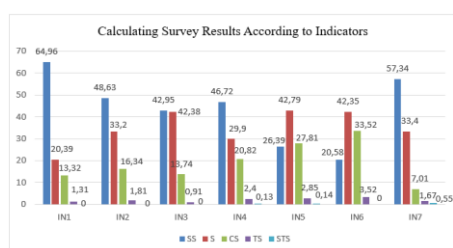


Figure1. Processing the Survey Results on Prospective Teachers' Perceptions

Based on Figure 1, it can be observed that for the first indicator regarding the use of instructional media to clarify the material presented, the calculation results show that 64.96% of prospective teachers strongly agree that instructional media can facilitate the delivery of lesson material. Visually, instructional media can help students organize information (Kurniawati & Koeswanti, 2021; Sapriyah, 2019). Instructional media can convey messages more clearly without being limited by space and time (Magdalena et al., 2021). Based on this percentage, it can be concluded that, on average, students of the Elementary School Teacher Education Study Program agree that instructional media in mathematics is necessary to clarify the material presented. This is because, through instructional media, teachers can design media according to the needs of the students and the material to be taught, making the media more effective in delivering information to the students.

The calculation results for the second indicator regarding facilitating learning can be seen in Figure 1. The results show that 48.63% of prospective teachers strongly agree and 33.20% agree that instructional media can facilitate the learning process. Learning media plays a crucial and practical role in the learning process, making it an indispensable part of the educational system. Media and the activity process are integral components of the educational world (Kandia et al., 2023; Limin & Kundiman, 2023). The instructional media used in the classroom can serve as a variation that facilitates the transfer of

information from teacher to student (Pramerta et al., 2022).

The results for the third indicator regarding the ability of instructional media to make the presentation of material more systematic and logical show that 42.95% of prospective teachers strongly agree and 42.38% agree that instructional media in mathematics is necessary to make the presentation of material more systematic and logical. Using instructional media is essential to attract students' attention and stimulate the learning process (Nurmawati et al., 2020; Yanti et al., 2019). Especially in mathematics education, which is often considered difficult and boring, media that can capture students' attention is needed. Through the use of media in learning, this can develop students' cognitive mathematical abilities (Muhaimin & Juandi, 2023).

The calculation results for the fourth indicator regarding the use of instructional media in mathematics to enhance students' understanding of the lesson material can be seen in Figure 1. The results show that 46.72% of prospective teachers strongly agree and 29.90% agree that using instructional media in mathematics can improve students' ability to understand the lesson material. The use of interactive instructional media consistently provided by teachers to students can motivate students to engage in every learning activity, thereby enhancing their understanding of mathematical concepts (Nugraha & Rusmin, 2015; Putra et al., 2020). The implementation of interactive instructional media by teachers also optimizes the use of time, allowing students to focus more on the material being taught during the

learning activities. Consequently, students' abilities in mathematics will improve, and their interest in learning and academic performance will increase (Alim et al., 2020, 2023; Hodiyanto et al., 2020).

The results for the fifth indicator regarding the ability of instructional media to facilitate the learning process can be seen in Figure 1. The results show that 42.79% of prospective teachers agree and 26.39% strongly agree that using instructional media in mathematics can facilitate the learning process. Instructional media can convey information quickly without being limited by space and time (Magdalena et al., 2021; Wahidin et al., 2022). This allows teachers to focus the material being presented through instructional media. Additionally, instructional media enables teachers to present learning experiences that cannot be directly brought into the classroom.

The calculation results for the sixth indicator regarding the use of instructional media in mathematics to make time use more efficient can be seen in Figure 1. The results show that 42.35% of prospective teachers agree and 20.58% strongly agree that using instructional media in mathematics can make time use more efficient. Keeping up with 21st-century technological advancements, teachers can utilize technology to create engaging instructional media. The use of technology-based instructional media can make time use more efficient and support distance learning (Khairunnisa & Ilmi, 2020; Muhassanah et al., 2022). This rapid technological development also requires teachers to be quick in adapting and utilizing it in the field of (Chusna et al., 2022).

Furthermore, the results for the seventh indicator regarding the need for instructional media in mathematics to be relevant to current developments show that 57.34% of prospective teachers strongly agree that the use of instructional media in mathematics must keep up with the times and be relevant to contemporary learning demands. We have now entered the 21st century with technological advancements in all fields. Therefore, teachers must be able to utilize this technology in education (Gabriela, 2021; Martyani & Yamalia, 2023). The integration of technology in education can be achieved by teachers through the use of audio-visual media, which provides better understanding by simultaneously engaging students' auditory and visual senses.

Based on the survey questionnaire distributed to elementary school teacher education students, it was found that instructional media is highly necessary in mathematics education. Mathematics is often considered a challenging subject, requiring media that can provide an enjoyable learning experience for students (Chusna et al., 2022; Rindengan, 2023). Prospective elementary school teachers face the demand to adapt to current advancements. They must be able to adjust their teaching methods to meet the educational needs of the contemporary era (Syelviana & Sri, 2019). Therefore, the knowledge and skills of elementary school teacher education students, as future teachers, are crucial for effectively utilizing technology and integrating it into their teaching practices.

Currently, we are in an era dominated by digital technology (Firmadani, 2020; Zahwa & Syafi'i, 2022). Insights from interviews conducted with elementary school teachers and students reveal that students tend to be more engaged when teachers use media such as videos, PowerPoint presentations, and visual aids through projectors. Additionally, students show greater enthusiasm when they can participate in interactive learning activities, such as game-based quizzes using digital platforms (Sitorus et al., 2022). They find lessons more enjoyable when they can actively participate and interact with the media being used.

The use of instructional media has become an urgent need in the current education system. It supports the achievement of learning objectives and enhances student motivation, leading to more satisfactory learning outcomes. This is supported by research conducted by Nurfadhillah et al. (2021) and Saddam Husein (2018), which highlights the urgency of integrating instructional media into the teaching process. The use of instructional media makes learning more effective, thereby facilitating the achievement of learning goals (Alya et al., 2023; Khairunnisa & Ilmi, 2020).

In the implementation of instructional media, teachers play a crucial role in selecting media that aligns with students' characteristics (Kandia et al., 2023; Oktaviani et al., 2022). It's not uncommon for teachers to use media that may not resonate with their students, leading to boredom and limited impact. Therefore, teachers must be capable of selecting media

that matches students' characteristics, ensuring that the application of instructional media leaves a positive impression on students (Alim et al., 2023; Primamukti & Farozin, 2018; Utomo, 2018). When teachers can choose the right media, the use of instructional media becomes increasingly important in the learning process. Hence, it's essential for educators to keep up with the times and select media that suit students' characteristics and needs, whether in audio, visual, or audio-visual forms.

IV. CONCLUSION

The urgency in the teaching and learning process is crucial. The role of teachers as educators is highly needed in selecting instructional media that align with the characteristics of elementary school students. In this digitally driven 21st century, there is a demand for media that can keep up with technological advancements. As time progresses, teachers are expected to innovate in implementing instructional media in their teaching practices. Technology has permeated all sectors of life, including education.

21st-century education also requires the development of students' skills, including communication, collaboration, critical thinking and problem-solving, as well as creativity and innovation. With the demands of modern education, there is a need for instructional media that align with students' characteristics, the subject matter, and can keep up with the changing times. However, in the realization of digitally-based 21st-century education in the era of the fourth industrial revolution,

there are still various challenges, such as limited teacher capabilities to adapt to technology or inadequate infrastructure and facilities in schools.

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