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Needs analysis of mobile game-based learning media for visual communication design in padang vocational schools

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ABSTRACT

This study aims to analyze the need for mobile game-based learning media (MGBLM) in visual communication design (VCD) subject in vocational high schools. This study employs a quantitative descriptive approach using a survey technique involving two groups of respondents: 12 VCD teachers and 255 students from 12 public and private vocational high schools in Padang city during the odd semester of the 2024/2025 academic year. Data were collected through a likert-scale questionnaire and analyzed descriptively using percentages. The results of the study indicate a high level of need, with 96% of teachers and 94% of students indicating very needed for the integration of MGBLM in the VCD learning process. The study also found that teachers fully agree that mobile-based learning media should align with curriculum objectives and support student engagement through interactive visual learning. Similarly, more than 90% of students agreed or strongly agreed that they needed mobile game-based learning media that suited their learning styles and supported independent and enjoyable VCD learning. These findings emphasize the importance of developing mobile game-based learning media tailored to the needs of vocational high school students, especially in creative subject such as visual communication design. These results serve as a foundation for further development of educational media using structured models such as Hanafin and Peck. This study is unique because it specifically maps the needs for mobile game-based learning in VCD subject, an area rarely explored in Indonesian vocational schools.

INTRODUCTION

Globally, vocational education has been increasingly recognized as a crucial driver for preparing a skilled workforce capable of addressing the demands of the 21st century (Allen & van der Velden, 2011; Mulder & Winterton, 2017). Rapid technological and industrial transformations have made vocational education increasingly essential (Akour & Alenezi, 2022; Parua & Yang, 2024). Curriculum policies provide flexibility for vocational schools to align their curricula with industry needs and technological developments (Ahmadi & Ibda, 2019; Alvunger, 2024; Magagula & Awodiji, 2024). In this context, technology in education is considered one of the main keys to realizing dynamic and relevant 21st-century education, as technology-based learning media can significantly improve learning effectiveness according to student needs (Morina & Perera, 2025). Mobile game-based learning media, in particular, has emerged as an innovative global trend for increasing motivation and engagement among students, offering more interactive and meaningful learning experiences.

In Indonesia, vocational high schools (Sekolah Menengah Kejuruan / SMK) play a strategic role in producing graduates for the national workforce and creative industries. At vocational high schools, visual communication design (VCD) is included in the field of creative industry expertise. VCD is a branch of design that focuses on communication concepts through creative visual elements to convey messages. This subject is highly relevant in the digital era, where industries demand

professionals capable of producing high-quality visual works (Pertiwi et al., 2025; Vigoroso et al., 2020). The curriculum strongly supports the development of contextual VCD materials tailored to local needs such as advertising, multimedia, and branding (CP and ATP of the Merdeka Curriculum for VCD).

Through VCD learning at vocational schools, students are expected to acquire creative and digital competencies that are directly applicable in the workplace. However, in practice, many VCD teachers still rely heavily on conventional lecture-based methods, resulting in monotonous and less interactive learning environments. This situation contrasts sharply with the characteristics of Generation Z and Alpha students who have grown up with the internet and digital technology, and whose learning, gaming, and social interactions are deeply rooted in digital platforms (Annus et al., 2023; Duisenbekova, 2023; Weaver, 2024; Ziatdinov & Cilliers, 2021).

Generation Z and Alpha are generally unaccustomed to conventional methods such as learning through blackboards, since they are more familiar with interactive, game-based, and technology-driven experiences. In addition, not all vocational teachers possess the competencies and skills required to effectively integrate technology into learning; several studies indicate the need for specialized training in this area. Infrastructure is also a constraint, as not all vocational high schools have stable internet access or sufficient digital devices for online learning. These conditions make learning media in vocational high schools, including in VCD subjects, less varied and often unappealing for students who are already accustomed to engaging with digital environments (Fitriyadi, 2013; Hakim & Abidin, 2024).

The gap between students' digital habits and school learning media is increasingly evident. Generation Z and Alpha students in Indonesia are accustomed to using the internet for entertainment, games, and social media (Henry & Tjhin, 2025; Huwaida et al., 2024). However, a UNESCO as well as a Ministry of Education and Culture of the Republic of Indonesia report states that the majority of vocational high school students still use the internet primarily for entertainment and social media, not for self-directed learning or skill development. Low digital literacy among students also hinders this, as many students lack adequate device proficiency and digital ethics (Global Entrepreneurship Monitor, 2024, Triyono & Hariyanto, 2024). Additionally, the disparity between students' digital lifestyles and the static, conventional media provided at schools widens the learning gap. This mismatch not only reduces student motivation but also limits the potential of vocational education to prepare graduates who are adaptive to digital industry demands (Ghozali et al., 2024; Kurniawan, 2025; Safitri et al., 2025).

In this context, mobile game-based learning media offers significant potential as an innovative solution. Mobile game-based learning media can provide an interactive and enjoyable learning environment aligned with the interests of the younger generation. Such media also enhances students' self-regulated learning by strengthening metacognition, motivation, and learning behaviors (Zhang, 2024; Zheng et al., 2024). Similarly Azis et al. (2025) found that educational games (e.g., Kahoot!, wayground, Quizlet, and Minecraft: Education Edition) not only increase students' motivation and active engagement in the learning process but also help develop their critical and technical thinking skills. In other words, integrating game elements into the VCD learning context has the potential to make the learning process more "real" and motivating, as well as provide students with problem-solving experiences relevant to the real world.

National and global trends support the importance of innovation in digital vocational learning. The 2024 APJII survey reported that internet penetration in Indonesia reached 79.5%, dominated by Generation Z users (34.4%) (Halim, 2024; Halim & Hidayat, 2025; Silmi & Lailiyah, 2024). This indicates that most vocational high school students already live in a broad digital ecosystem. However, Herlina et al. (2024) noted that digital literacy among vocational high school students remains low, necessitating enhanced digital capacity-building, such as through ministry programs and ICT training for teachers to bridge this gap. The government and schools are beginning to promote the use of technology and digital learning media as part of the vocational education revolution. Therefore, the development of mobile game-based learning media is highly relevant to these policies and the practical needs of students (Prima et al., 2025).

Previous studies have begun to explore games in visual communication design and vocational education. The results of Kristanto et al. (2019) show that the development of educational

games for vocational high school students successfully improved students' understanding of material that was previously considered difficult, where only 30% of students were able to achieve the learning objectives. The findings of Insani et al. (2025) indicate that the development of mobile game-based learning media on the subject of basic principles of videography for VCD students was deemed highly feasible and effective for use. Similarly, the results of (Ninghardjanti et al., 2021; Hasanah et al., 2024a) show that the development of Android-based game learning media in the subject of Fundamentals of visual communication design (VCD) was able to improve the quality of learning. Furthermore, these findings also prove that Android-based game learning media are not only feasible and practical but also relevant as a learning solution that can be accessed anytime and anywhere, while also enhancing students' motivation to learn in the VCD subject. However, research specifically mapping the needs for mobile game-based learning media (MGBLM) in VCD education at vocational high schools remains very limited. There has been no in-depth study examining the analysis of mobile game-based learning media needs for VCD learning, despite the curriculum strongly encouraging design based on contextual needs.

To address this gap, the present study analyzes the needs for mobile game-based learning media (MGBLM) in visual communication design (VCD) subject in vocational high schools in Padang City. Conducted during the odd semester of the 2024/2025 academic year. The analysis focuses on three aspects: curriculum fit, content appropriateness, and learning style adaptability. Academically, this research contributes by filling an underexplored area of vocational education literature, particularly in VCD learning. Its novelty lies in simultaneously examining teachers' and students' perspectives, offering a more comprehensive understanding of needs prior to media development. Practically, the findings provide recommendations for teachers to adopt more interactive strategies, for developers to design engaging and curriculum-aligned mobile applications, and for policymakers to support infrastructure and funding that ensure equitable access to digital learning. These contributions establish a strong foundation for designing sustainable MGBLM using structured models such as Hanafin and Peck.

METHOD

Research Design

This study employed a quantitative descriptive approach using a survey method to analyze the need for mobile game-based learning media (MGBLM) in Visual Communication Design (VCD) subject at vocational high schools. The approach aimed to systematically describe the phenomenon based on numerical data, without manipulating variables. Meanwhile, this survey-based research aims to describe a phenomenon, condition, or need based on quantitative data obtained from a group of respondents through direct data collection using survey instruments, such as questionnaires or surveys (Mohajan, 2020; Ramdhan, 2021; Sugiyono, 2019; Waruwu et al., 2025). The research flow can be seen in Figure 1.

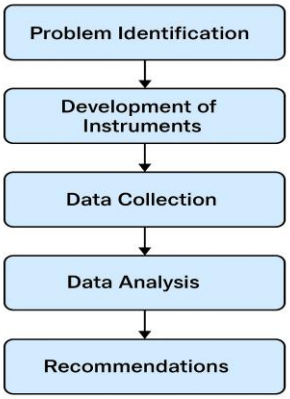

Figure 1. Research Flow

In this research flow, Figure 1 shows that the researcher identified the problem by reviewing previous research literature, then created a research questionnaire for teachers and students, collected data by distributing the questionnaire to teacher and student respondents, analyzed the data, and made recommendations related to the development of mobile game-based learning media (MGBLM) in VCD learning.

The study was conducted during the odd semester of the 2024/2025 academic year at public and private vocational high schools in Padang City, West Sumatra Province. The participants consisted of two groups: 12 VCD teachers and 255 students from 12 public and private vocational high schools in Padang City. A purposive sampling technique was applied because the research required respondents with specific characteristics directly related to visual communication design (VCD) teaching and learning. For the teachers, the inclusion criteria were: (1) actively teaching VCD subjects at the time of the study, (2) having a minimum of two years of teaching experience, and (3) being directly involved in the implementation of the Merdeka Curriculum in VCD. For the students, the inclusion criteria were: (1) currently enrolled in the VCD expertise program, (2) having taken at least one semester of VCD-related subject, and (3) representing both public and private vocational schools to capture diverse learning contexts. By using purposive sampling, the study ensured that the selected participants had adequate knowledge and experience to provide valid and relevant responses for the needs analysis of mobile game-based learning media (MGBLM).

Data were collected using a structured questionnaire developed based on three indicators: (1) curriculum fit, (2) content appropriateness, and (3) learning style adaptability. The questionnaire employed a 5-point Likert scale (1 = Not needed, 2 = Less needed, 3 = Half needed, 4 = Mostly needed, 5 = Very needed) (El-Sabagh, 2021; Premlatha & Geetha, 2015; Surahman & Surjono, 2017). The use of a 5-point scale was chosen because it is widely applied in educational research, provides a broader range of responses, and allows participants to express their level of agreement more precisely. Content validity was established through expert judgment involving two specialists in vocational education and instructional media. The reliability test using Cronbach's Alpha showed that the instrument was reliable. Thereafter, data collection was conducted by distributing the questionnaire directly to respondents at the schools. The questionnaire grid for teachers in this study is presented in Table 1. The questionnaire grid for student in this study is presented in Table 2.

Tabel 1. Teacher Questionnaire Blueprint

Indicator	Statement
Curriculum fit	1. Learning media must follow the learning outcomes in the VCD curriculum. 2. The current VCD curriculum can be supported with mobile game-based learning media. 3. I need learning media that supports formative and summative assessments in the curriculum. 4. Mobile game-based learning media can be adapted to the material structure in the syllabus. 5. I believe digital media can help achieve the basic competencies of VCD. 6. Learning media needs to provide feedback for students.
Content Appropriateness	1. VCD material requires strong visualization to enhance student understanding. 2. I find it difficult to explain visual concepts without the help of interactive media. 3. Mobile games are very suitable for presenting design simulations and graphic elements. 4. Learning media should be able to include image, video, and audio content according to VCD material. 5. I want media that allows students to practice design concepts digitally. 6. I need VCD media that presents case studies or real-world problems.
Learning Style Adaptability	1. My students understand more easily with visual media than with text. 2. Many of my students are interested in learning involving simulations and challenges. 3. Game-based learning media is more suitable for the current digital generation. 4. Students need flexible learning that can be accessed from mobile phones or laptops. 5. Learning through games can motivate students to study independently. 6. I believe students' current learning style is more suited to interactive and visual media. 7. Students are more active when learning through games or challenges. 8. I need media that can adjust to students' learning pace.

Tabel 2. Student Questionnaire Blueprint

Indicator	Statement
Curriculum fit	1. I want learning media that helps me understand the objectives of VCD lessons. 2. I need learning media that I can use outside class hours. 3. I feel the need for visual aids to achieve the learning outcomes set by the teacher. 4. I need media that can help me study independently according to the material taught. 5. I want a learning game that matches the material in the book or syllabus.
Content Appropriateness	1. I understand VCD material more easily if presented through images, videos, or simulations. 2. VCD is too difficult to understand if only through books or lectures. 3. I want to learn VCD with an application that has an attractive display. 4. I want to try games that can help me understand design elements. 5. I need learning media that provides visual examples when learning design.
Learning Style Adaptability	1. I understand VCD material more easily if presented through images, videos, or simulations. 2. VCD is too difficult to understand if only through books or lectures. 3. I want to learn VCD with an application that has an attractive display. 4. I want to try games that can help me understand design elements. 5. I need learning media that provides visual examples when learning design. 6. I enjoy learning using a mobile phone or tablet. 7. I prefer learning through games rather than reading long texts. 8. I feel more motivated when using media like games or digital quizzes. 9. I like learning VCD by trying it directly, not just listening. 10. I get bored quickly if only listening to the teacher without interactive media. 11. I often study independently using applications. 12. I enjoy lessons presented as challenges or missions in games. 13. I am more focused when learning with attractive and interactive visuals 14. I want to have learning media that I can access anytime and anywhere. 15. I prefer learning visually and through hands-on practice rather than long texts.

The collected data were analyzed descriptively and quantitatively using percentage techniques based on the score of each item on each indicator, with the following formula (Riduwan, 2022):

$$\text{Persentage} = \frac{Total\ score\ obtained}{\text{Maximum score}} \text{ x } 100\%$$

Furthermore, the analysis results were interpreted in the form of percentages and categorized into needs analysis based on the criteria in Table 3.

Tabel 3. Criteria for MGBLM Media Needs Analysi

No.	Percentage	Description
1	1-20	Not needed
2	21-40	Less needed
3	41-60	Half needed
4	61-80	Mostly Needed
5	81-100	Very Needed

Source: (Nisaa et al., 2024)

RESULTS AND DISCUSSION

The results of this study were obtained from the distribution of a needs analysis questionnaire to VCD subject teachers and students. The analysis of the 12 VCD subject teachers from public and private vocational high schools in Padang showed the following: (1) The indicator of alignment with the MGBLM curriculum showed an average of 98%, categorized as very needed; (2) The indicator of alignment between MGBLM and VCD learning materials showed an average of 95%, also categorized as very needed; and (3) The indicator of alignment between MGBLM and students' learning styles showed an average of 96%, categorized as very needed. These findings indicate that the majority of teachers (more than 90%) believe that VCD learning materials require a more visual,

interactive, and digitally oriented teaching approach. Teachers also noted that the current teaching media are static and unengaging. The detailed results of the MGBLM needs analysis from teachers' perspectives on the VCD subject are presented in Table 4.

Table 4. Results of Teacher Questionnaire Analysis

No.	Indicator	Percentage	Average percentage	Category of analysis results
1	Curriculum fit	98		
2	Content Appropriateness	95	96	
3	Learning Style Adaptability	96		Very need

Table 4 shows that teachers place the greatest emphasis on curriculum fit, followed by learning style adaptability and content appropriateness. This indicates that teachers prioritize the alignment of media with the curriculum and national learning standards, while still considering students' learning styles and the quality of content. This can be visualized in Figure 2.

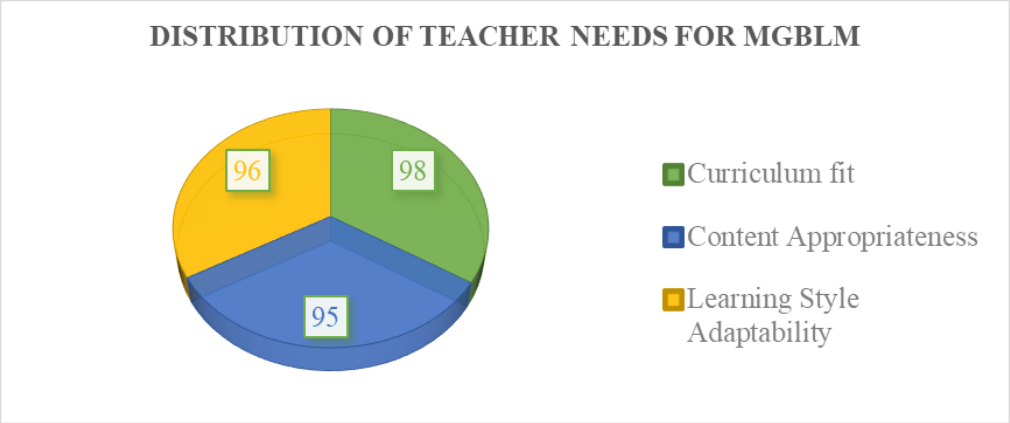

Figure 2. Distribution of teacher needs for MGBLM in VCD

In line with the teachers' analysis results, the findings from 255 student respondents in grade XI of the Computer and Network Engineering (CNE) program at public and private vocational high schools across Padang City who participated in VCD learning revealed the following: (1) the indicator of curriculum fit for MGBLM showed an average of 96%, categorized as very needed; (2) the indicator of MGBLM alignment with VCD learning materials showed an average of 97%, categorized as very needed; and (3) the indicator of MGBLM alignment with students' learning styles showed an average of 90%, categorized as very needed. These findings indicate that the majority of students (more than 90%) perceive a strong need for MGBLM, suggesting its significant potential to address students' needs for adaptive, interactive, and relevant learning media in line with the characteristics of the digital generation. Moreover, MGBLM is expected to enhance students' motivation, engagement, and learning outcomes in vocational education settings. The detailed results of the students' need analysis questionnaire regarding MGBLM in VCD subjects can be seen in Table 5.

Table 5. Results of Student Questionnaire Analysis

No.	Indicator	Percentage	Average percentage	Category of analysis results
1	Curriculum fit	96		
2	Content Appropriateness	97	90	
3	Learning Style Adaptability	90		Very need

Table 5 shows that students place content appropriateness as the most dominant indicator, reflecting a strong need for interactive, engaging, and digitally relevant learning content. This is

followed by the curriculum fit indicator, which is also rated very high, indicating that students prioritize enjoyable and relevant learning experiences. Meanwhile, the learning style adaptability indicator is also considered important, although slightly lower than the other indicators. This indicator reflects students' expectations that learning media should align with their technology-based learning habits. This can be visualized in Figure 3.

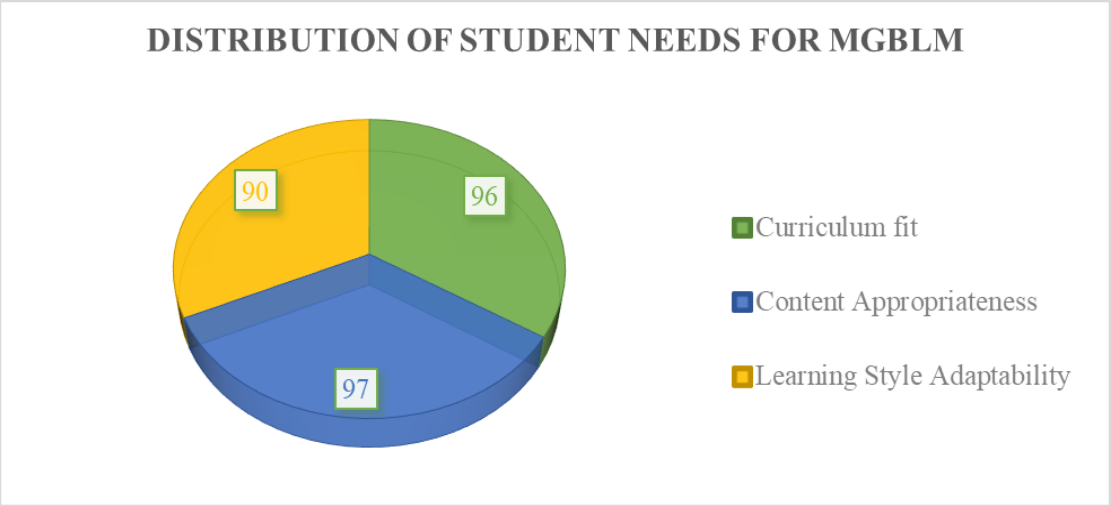

Figure 3. Distribution of Student Needs for MGBLM in VCD

Based on the above analysis, a comparison between teacher and student needs for using MGBLM in VCD subjects is presented in Figure 4.

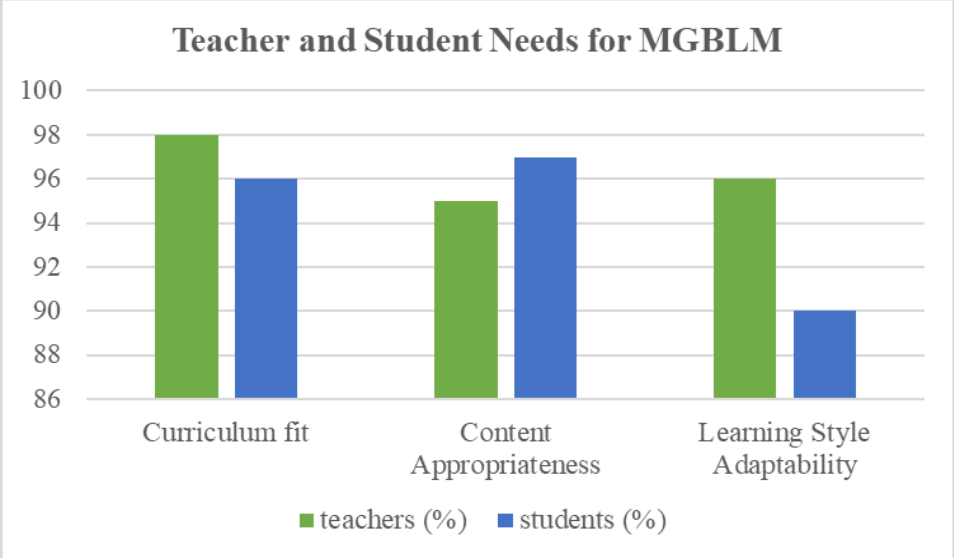

Figure 4. Comparison of Teacher and Student Needs for MGBLM in VCD

Figure 4 shows that teachers rated the curriculum fit indicator higher (98%) than students (96%), as they are more concerned with aligning the media with national curriculum standards. For the learning style adaptability indicator, teachers also gave a higher score (96%) compared to students (90%), emphasizing that the learning media used by teachers should be adjusted to the characteristics of the digital generation. Conversely, students gave a higher score on content appropriateness (97%) compared to teachers (95%), reflecting their need for learning content that is engaging, interactive, and aligned with digital learning styles.

Based on previous analysis data, this study found that both teachers and students at SMK Kota Padang showed very needed for the development of mobile game-based learning media (MGBLM) in visual communication design (VCD) subject. This is reflected in the high percentages across all indicators, including curriculum suitability, need for visual-interactive materials, student learning styles, and feasibility and interest. These findings are consistent with the research by Kristanto et al. (2019) which demonstrated the feasibility and effectiveness of educational games in improving learning outcomes, as well as Fathahillah (2022), who emphasized that game-based media can enhance student motivation and engagement in technical subjects.

The research by Insani et al. (2025) also supports these findings, where mobile game-based learning media was proven to enhance conceptual understanding and active participation in videography learning, which shares similar characteristics with VCD in terms of visualization needs and hands-on practice. Meanwhile, Hasanah et al. (2024b) study, which developed Android-based media for VCD subject, demonstrated high validity and practicality, supporting this study's findings that mobile game-based learning media is highly suitable for vocational high school students' needs. According to James et al. (2025), Luh et al. (2025), and Nadeem et al. (2023) their research also emphasizes that game elements such as points, levels, and badges can significantly increase student engagement and learning duration. Additionally, the use of mobile game-based learning media can improve learning outcomes by 32% compared to conventional learning.

The main difference between this study and previous relevant studies lies in its focus and scope. Previous studies have mostly examined the effectiveness of media after it has been developed, whereas this study is at the needs analysis stage, providing a more comprehensive initial overview of the aspects that need to be considered in the development of MGBLM using structured models such as Hanafin and Peck. In addition, this study combines the perspectives of teachers and students simultaneously, resulting in richer data for understanding the suitability of media with the curriculum, material characteristics, and student learning styles. Thus, this study not only reinforces previous findings on the potential of mobile game-based learning media in vocational education but also contributes new insights through a specific needs assessment for VCD subject in vocational high schools. This assessment can serve as a foundation for designing and developing effective, engaging, and relevant educational media that align with the requirements of the Merdeka Curriculum or the current national curriculum.

CONCLUSION

This study reveals that both teachers and students in 12 public and private vocational schools in Padang City show a very needed for the development of mobile game-based learning media (MGBLM) for visual communication design (VCD) subject. From the teachers' perspective, all indicators of curriculum suitability, VCD material, and student learning styles received a percentage above 95% in the "very needed" category. Meanwhile, from the students' perspective, the average need was also above 90%, indicating that MGBLM is perceived as relevant, adaptive, and capable of enhancing motivation and learning engagement. These findings align with relevant research highlighting the effectiveness of mobile game-based learning media in improving learning outcomes, motivation, and active student participation. However, this study offers a unique contribution by mapping needs prior to media development, comprehensively integrating both teacher and student perspectives. Beyond highlighting this strong need, the study recommends; (1) For teachers: Continuous training in integrating mobile game-based learning media into classroom practice; (2) For developers: Designing interactive and curriculum-aligned mobile game-based learning media tailored to students' digital habits; and (3) For policymakers: Supporting infrastructure and funding to ensure equitable access to digital learning media. These recommendations provide a foundation for future development of MGBLM using structured models such as Hanafin and Peck, ensuring both feasibility and sustainability in vocational education.

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