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Need Analysis of Digital Microlearning Materials with Scaffolding for Generation Z Pre-Service Teachers in Islamic Primary Education

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Abstract

This study aims to analyze the need for digital teaching materials based on microlearning with scaffolding to support Generation Z pre-service elementary school teachers. The research method used was a quantitative descriptive survey, with data collected through an online questionnaire filled out by 216 Generation Z students, pre-service teachers in the Madrasah Ibtidaiyah Education Study Program (PGMI) at UIN Maulana Malik Ibrahim Malang, Indonesia. The study results indicate that most students have adequate access to digital devices and the internet and a strong preference for the blended learning method. Students also prefer short and interactive video-based teaching materials, which support flexibility in arranging time and place of study. These findings emphasize the importance of developing microlearning teaching materials for the characteristics of the digital native generation. Scaffolding is identified as a supportive approach in compiling microlearning-based teaching materials. Therefore, it can provide gradual guidance

that helps students understand the material more deeply. All in all, this study provides insight into developing teaching materials that are adaptive, effective, and in line with learning needs in the digital era.

Keywords: *microlearning, scaffolding, Gen Z.*

Abstrak

Penelitian ini bertujuan untuk menganalisis kebutuhan bahan ajar digital berbasis microlearning dengan scaffolding untuk mendukung calon guru SD Generasi Z. Metode penelitian yang digunakan adalah survei deskriptif kuantitatif, dengan data dikumpulkan melalui kuesioner daring yang diisi oleh 216 mahasiswa Generasi Z calon guru Program Studi Pendidikan Guru Madrasah Ibtidaiyah UIN Maulana Malik Ibrahim Malang, Indonesia. Hasil penelitian menunjukkan bahwa sebagian besar mahasiswa memiliki akses yang memadai terhadap perangkat digital dan internet serta preferensi yang kuat terhadap metode blended learning. Mahasiswa juga lebih menyukai bahan ajar berbasis video yang singkat dan interaktif, yang mendukung fleksibilitas dalam mengatur waktu dan tempat belajar. Temuan ini menekankan pentingnya pengembangan bahan ajar microlearning bagi karakteristik generasi digital native. Scaffolding diidentifikasi sebagai pendekatan yang suportif dalam menyusun bahan ajar berbasis microlearning. Dengan demikian, scaffolding dapat memberikan bimbingan bertahap yang membantu mahasiswa memahami materi lebih dalam. Secara keseluruhan, penelitian ini memberikan wawasan tentang pengembangan bahan ajar yang adaptif, efektif, dan sejalan dengan kebutuhan pembelajaran di era digital.

Kata kunci: *pembelajaran mikro, scaffolding, Gen Z.*

INTRODUCTION

Technological developments have major implications for Generation Z, born and raised in the digital era. Generation Z, commonly known as digital natives, stands out from earlier generations, particularly in the way they process and utilize information (Alruthaya et al., 2021; Bhalla et al., 2021). They tend to be more responsive to technology-based learning approaches, such as mobile devices, learning applications, and interactive media combining text, images, videos, and simulations. This generation also prefers short, fast, and focused learning formats, following their character who are accustomed to consuming information instantly through various digital platforms (Lissitsa & Kol, 2016). Therefore, digital technologies such as microlearning and interactive video offer innovative solutions to meet the learning needs of this generation.

Microlearning is a learning approach that offers content in small, focused chunks that can be accessed and learned quickly. The term refers to a learning method designed to deliver learning material in short bursts, typically 3 to 5 minutes per module, and often utilizing digital technologies, such as video, mobile applications, and online platforms (Dolasinski & Reynolds, 2020; Dwinggo Samala et al., 2023). In 21st-century education, the microlearning approach is becoming increasingly relevant given the learning style of Generation Z, who are more accustomed to consuming information quickly and repeatedly. This generation grew up with easy access to the internet and various digital platforms providing short but dense content, making microlearning one of the most effective methods to engage them in learning (Belkaisse & Manel, 2023).

The main advantage of microlearning is its flexibility and ease of access, allowing learners to engage with the learning materials anytime and anywhere. Due to this high accessibility, learners can learn at a time that suits them best and revisit the material as needed. This allows learners to learn at their own pace and based on their individual needs (Mohammed et al., 2018). Moreover, this approach has also been effective in increasing retention and comprehension, as learners are not burdened with much information to learn at once but can instead focus on smaller, more digestible topics (Ghafar, 2020).

In addition to increasing student engagement, microlearning also supports more personalized learning. Microlearning content is often tailored to individual needs and preferences, allowing learners to choose materials that match their level of understanding. This approach can strengthen personalized learning, as learners can control the flow and intensity of their learning (Monib et al., 2024). With technologies such as learning analytics, microlearning content can be further optimized to suit everyone's learning patterns, thereby increasing the effectiveness of learning in a broader context (Giurgiu, 2017).

In the context of teacher education for Islamic elementary schools, microlearning can be a practical solution to support the development of pedagogical competence more effectively and efficiently. Well-structured microlearning modules that incorporate scaffolding can provide gradual support that helps pre-service teachers develop a deeper understanding of pedagogical concepts while also preparing them to face the challenges of education in the digital era (Gill et al., 2024). The use of scaffolding in microlearning is an important element because the fragmentation of content that is characteristic of this approach requires targeted support enabling the learning to remains structured and meaningful. Microlearning content, which is presented in small chunks, can create challenges for students to integrate various elements of knowledge if not accompanied by adequate guidance. Therefore, scaffolding in microlearning can take the form of explicit guidance, examples, feedback, or gradual tasks that help students connect each piece of information into a larger framework of understanding (Khong & Kabilan, 2022; Sachdeva, 2023). With scaffolding, each microlearning unit can be designed to build students' abilities gradually. Thus, students not only memorize information but also understand the relationships between concepts in depth.

Despite the growing body of literature demonstrating the benefits of microlearning and scaffolding in digital education, there remains a significant gap in their integration for developing teaching materials tailored to Islamic primary school teacher candidates. Existing studies primarily focus on general education or technology-based approaches without adequately addressing the unique needs of Islamic education or pre-service teachers in this context (Senandheera et al., 2024; Shatte & Teague, 2020). For instance, while microlearning has been widely adopted in various educational settings, its application specifically in teacher education—especially within Islamic primary schools—remains underexplored. Research by Lee (2023) highlights the importance of scaffolding in microlearning without offering a detailed framework for applying this approach in teacher training programs with distinct Islamic educational values. Furthermore, several studies on scaffolding (Gill et al., 2024; Khong & Kabilan, 2022) emphasize its significance in learner support, but fail to explore how scaffolding can be aligned with Islamic pedagogical methods to enhance teachers' understanding of pedagogical concepts. Additionally, studies by Belkaisse & Manel (2023) and Bhalla et al. (2021) indicate that Generation Z learners have distinct technological needs

and preferences that demand further research into how educational models can be adapted for this group, particularly in Islamic teacher education contexts. While Cahyanto et al. (2024) emphasize the role of microlearning in enhancing early reading skills for pre-service elementary school teachers, the integration of such methods specifically for Islamic primary school teacher candidates remains underexplored. Therefore, this study aims to bridge these gaps by integrating scaffolding and microlearning in the development of teaching materials for Islamic primary school teacher candidates, aligning with the specific educational needs and values of Generation Z. By focusing on this demographic and educational context, this study contributes to a more holistic and contextually relevant pedagogical approach in the digital age.

This study aims to identify the need for the development of digital teaching materials based on microlearning supported by a scaffolding approach specifically designed for pre-service Islamic elementary school teachers from Generation Z. Specifically; this study seeks to explore how the concept of microlearning can be integrated with scaffolding strategies to improve conceptual understanding, pedagogical skills, and professional readiness of pre-service teachers in teaching in the digital era. By focusing on pre-service Islamic elementary school teachers, this study also aims to align learning technology with Islamic religious values and pedagogy to form teaching materials that are not only academically effective but also in line with the character and needs of Islamic education.

The significance of this study lies in its contribution to developing a teacher education curriculum that is more adaptive to the needs of Generation Z, whose learning preferences differ markedly from those of previous generations. As digital natives, Generation Z is accustomed to fast-paced, dynamic, and interactive learning experiences (Alruthaya et al., 2021; Bhalla et al., 2021). Research has shown that this generation requires learning approaches that are engaging, flexible, and personalized, making traditional, static methods less effective (Lissitsa & Kol, 2016). By utilizing microlearning, which delivers content in short, easily digestible modules, this study offers an innovative solution to enhance engagement and motivation in pre-service teachers (Dolasinski & Reynolds, 2020; Ghafar, 2020). Studies have demonstrated that microlearning can improve knowledge retention and learner engagement, particularly for digital natives who prefer bite-sized content (Belkaisse & Manel, 2023; Mohammed et al., 2018). Furthermore, this study incorporates scaffolding, a proven method that supports learners in progressively building their understanding by providing structured guidance (Khong & Kabilan, 2022). Through scaffolding, this research aims to provide a more structured pedagogical framework that facilitates not only the transfer of information but also the development of critical and reflective thinking skills—key components for pre-service teachers in the modern era (Lee, 2023; Sachdeva, 2023). Together, the integration of microlearning and scaffolding addresses the needs of Generation Z and enhances their readiness for teaching in the digital age.

METHODS

This study employed a quantitative approach with a survey design to collect numerical data that were then analyzed statistically to describe the need for digital microlearning teaching materials assisted by scaffolding for Generation Z pre-service elementary school teachers. Accordingly, a descriptive quantitative design was used in this study to provide a detailed description of the phenomenon being studied based on the data collected.

The population in this study was all pre-service teachers in Islamic primary education (PGMI), with the research sample consisting of PGMI students from the 2022 and 2023 intakes who were willing to fill out the questionnaire. This study involved 216 research respondents, with details of students from the 2022 intake (n = 101) and 2023 intake (n = 115). The average age of the respondents was 20.5 years. They were born between 2001 and 2006. The profle of respondents involved in this study is presented in the following Table 1.

Table 1. Profile of Research Respondents

Year of Birth	Number of Respondents	Age as of 2024
2001	4 (1.9%)	23 years
2002	8 (3.7%)	22 years
2003	47 (21.7%)	21 years
2004	99 (45.8%)	20 years
2005	55 (25,%)	19 years old
2006	3 (1.4%)	18 years

This study was conducted from April to May 2024. Data were collected through an online questionnaire distributed using Google Forms. This questionnaire was designed to describe several aspects: student identity, availability of digital devices owned, learning style preferences, and specific needs related to digital microlearning teaching materials assisted by scaffolding. This questionnaire consists of several sections with closed questions filled in by respondents independently.

The obtained data were analyzed using the percentage method to describe the distribution of respondents' answers to each question in the questionnaire. The results of the study were then presented in the form of tables and figures to facilitate interpretation. The research procedure began by designing a questionnaire in the form of a Google Form. The researchers then sought permission from the coordinator of the PGMI study program to distribute the questionnaire to students of the 2022 and 2023 intakes. This approach might provide clearer insight into the need for digital microlearning teaching materials assisted by scaffolding for Generation Z pre-service elementary school teachers.

RESULTS AND DISCUSSION

In order to develop effective microlearning-based digital teaching materials for the Islamic Elementary Teacher Education Study Program (PGMI) students, a comprehensive needs analysis had been conducted to understand their learning characteristics and preferences. This study aims to identify students' specific needs in terms of the availability of technological devices, internet access, learning styles, and their preferences for the form and duration of teaching material content. These findings were expected to provide a strong foundation for developing teaching materials for academic needs and support the flexibility

and independence of learning desired by Generation Z students, who were accustomed to digital technology in their daily lives.

Availability of Digital Devices and Internet Access

The needs analysis results revealed that students of the Madrasah Ibtidaiyah Teacher Education Study Program (PGMI) at UIN Maulana Malik Ibrahim Malang had a high availability of digital devices for microlearning-based learning. Most students (90.3%) had laptops or computers, and almost all (99.5%) had smartphones, indicating their readiness to access digital teaching materials. Regarding experience, 38.9% of students had used gadgets for over 10 years, while 33.8% had used them for 5-10 years. Figure 1 shows the percentage of digital device ownership, indicating students' readiness for technology-based learning.

Furthermore, their internet access, which is a prerequisite for digital learning, was also quite adequate. Most students got very easy (56.5%) or easy (33.3%) internet access. Most students used Wi-Fi (58.8%) compared to personal mobile data (39.4%), as shown in Figures 2 and 3. Moreover, based on its usability, 77.8% of students felt that gadgets were very helpful in their lecture process, 20.4% of them mentioned that gadgets were useful, and only 1.4% feeling that gadgets were less helpful, as shown in Figure 4. This confirms that digital devices play an important role in supporting their learning.

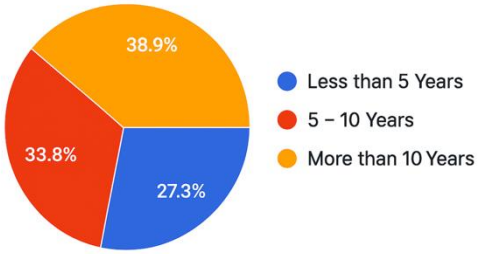

Figure 1. Percentage of Digital Device Usage

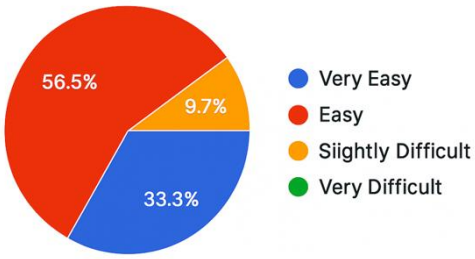

Figure 2. Ease of Internet Access

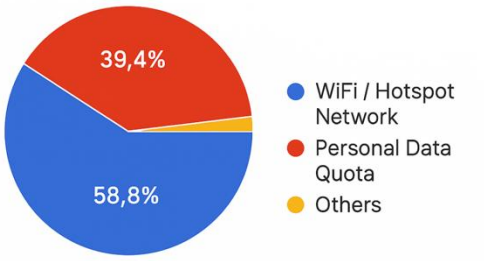

Figure 3. Internet Network Availability

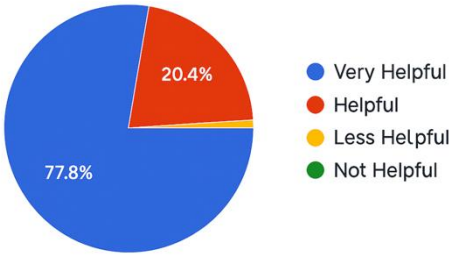

Figure 4. Use of Digital Devices in Lectures

Preference Student Learning Styles

Based on the analysis of PGMI students' learning styles, most students preferred using gadgets in learning. 34.7% of students were happy to learn with gadgets, 59.7% were pleased to know with these devices, while only 5.1% were less happy. This indicates that the majority of students welcome the use of technology-based learning. In terms of learning methods, most

students (73.6%) preferred a blended learning approach that combines online and offline learning, as presented in Figure 5. Students also tended to access learning materials independently, with 21.8% liking independent access anytime and anywhere, and 62.5% liking this method. Only 15.3% felt uncomfortable with this method. This is emphasized in Figure 6. This indicates that the majority of students need flexible access to learning materials.

Furthermore, flexibility in learning time was an important need for students, where 43.1% confessed that flexible learning time is necessary, and another 56.9% also stated that this is important. The need for flexibility was further emphasized by students' preference for microlearning, where 71.3% like learning that breaks down material into small parts, and another 25% really like this method. Meanwhile, only 3.7% of respondents expressed a dislike for the microlearning method, indicating that the majority of students were more comfortable with short and focused learning content. This analysis indicates that PGMI students prefer flexible, independent, and technology-based learning and a concise and easy-to-digest microlearning approach. Flexibility in learning time and student preferences for microlearning are presented in Figures 7 and 8.

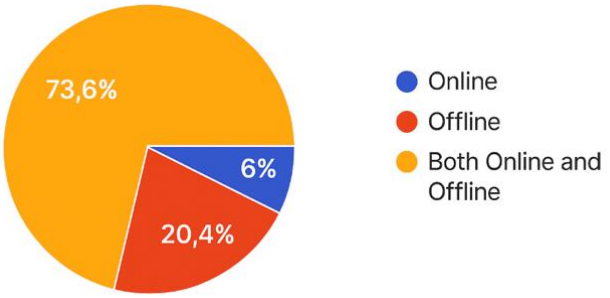

Figure 5. Learning Methods

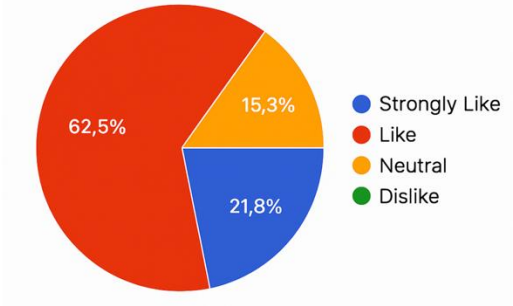

Figure 6. Ease of Access to Teaching Materials

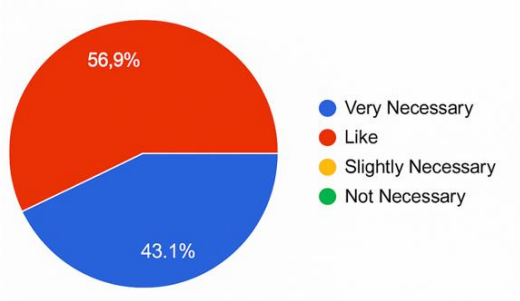

Figure 7. Need for Learning Flexibility

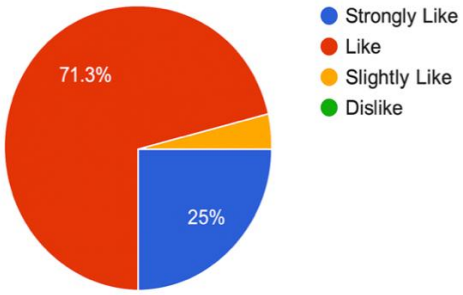

Figure 8. Preferences for Microlearning

Characteristics of Teaching Materials Required

Based on the results of the questionnaire analysis on the need for digital microlearning teaching materials for students of the Islamic Elementary Teacher Education (PGMI) Study Program, several important characteristics and preferences were found that need to be considered in developing teaching materials. The first point was related to applications that students frequently access; with most preferred visual content-based platforms. TikTok dominates, with 49.1% of students often accessing it, followed by Instagram (27.3%) and

YouTube (18.5%). Twitter (4.2%) and Facebook (0.2%) are less popular, as presented in Figure 9. This indicates that students prefer platforms that provide short and interesting video content, which is relevant to the concept of microlearning.

In addition, two main approaches emerged almost equally regarding the desired learning method. As many as 34.7% of students chose the project-based learning method outside the classroom, and 34.3% preferred the flipped classroom method, which is studying the material outside the school and discussing it in the classroom. Meanwhile, the traditional method of lectures was only preferred by 21.3% of students, and presentations in class were only chosen by 9.7%. These preferences reflect students' desire to be actively involved in learning and prioritize participatory and collaborative learning methods.

Regarding the expected learning media, 39.4% of students stated that video is the most effective learning resource. Furthermore, interactive digital teaching materials were chosen by 23.6% of respondents, while presentation slides such as PowerPoint or Canva were selected by 21.8%. As audio-based learning media, podcasts were only preferred by 8.8% of students. This confirms that visual-based media are preferred compared to media that only present audio or text. Regarding the desired duration of video content, 43.5% of students preferred short videos (5-7 minutes), followed by 40.3% who preferred videos with a longer duration but still dense (10-15 minutes). Only 13% preferred videos with detailed explanations and long duration (15-30 minutes), as shown in Figure 10. This indicates a preference for learning videos that are concise, informative, and brief.

In terms of the content of the teaching materials, 63.9% of students wanted short and straight to the point, while 31% preferred content that covers all the material completely. Meanwhile, only 5.1% wanted content with very deep details, as presented in Figure 11. This preference shows the importance of efficient information delivery and focusing on the core of learning in microlearning.

Regarding learning methods, most students (75.5%) preferred a systematic learning approach, starting from the easiest to the most difficult materials. Meanwhile, 24.5% of students chose a random learning approach based on the topics they wanted to learn at a particular time, as presented in Figure 12. This showed that most students want a clear and orderly structure in compiling teaching materials. Overall, the results of this analysis provide clear guidance in designing digital microlearning teaching materials for PGMI students. Students strongly prefer visual media, short and focused content, and a systematic learning structure.

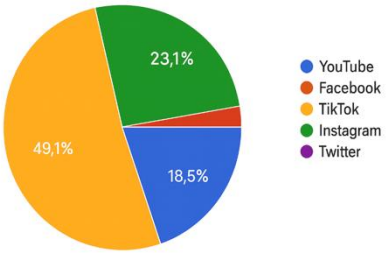

Figure 9. Most frequently accessed applications

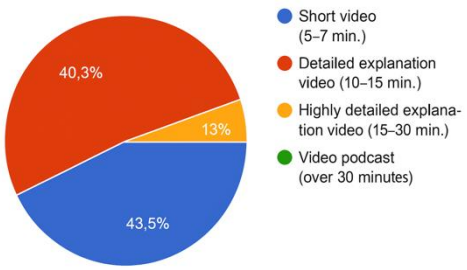

Figure 10. Video Duration that Facilitates Learning

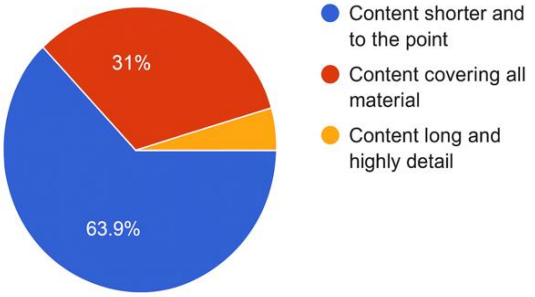

Figure 11. Material Characteristics

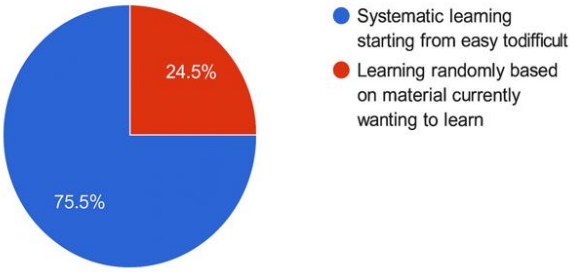

Figure 12. Material Systematics

The results of this study revealed that PGMI UIN Maulana Malik Ibrahim Malang students had a high readiness to utilize digital devices and internet access as part of microlearning-based learning. Previous research mentioned that technological readiness is an important factor in the success of technology implementation in higher education (Al-araibi et al., 2019; Mousa et al., 2020). Most students in this study had digital devices, such as laptops and smartphones, with adequate internet access. This finding is consistent with the report from Clarin & Baluyos (2022), which states that the availability and access to digital devices are basic requirements for implementing online learning. Moreover, the presence of easily accessible technological devices increases students' confidence in adopting new learning approaches (Sung et al., 2016).

Most students had experience using digital devices for quite a long time, with 38.9% having used gadgets for more than 10 years. This experience is important because students showed greater familiarity with digital technology, leading them to be more motivated to participate in technology-based learning (Pan, 2020). In line with this, research by Javorcik et al. (2023) shows that long-term exposure to technology improves students' ability to navigate digital platforms, making them more receptive to the microlearning approach. This finding is also supported by Inan et al. (2011), who found that students familiar with technology are more adaptive to internet-based learning methods.

The learning style preference that combines online and face-to-face learning/blended learning further strengthens the relevance of microlearning in PGMI students' learning. Previous studies have emphasized that blended learning increases flexibility in learning, allowing students to access materials independently and manage their study time (Huang, 2020). Blended learning can also increase student engagement by combining face-to-face and online interactions, which is proven to be effective in improving learning motivation (Amelia, 2021b, 2021a). This study found that most students chose the blended learning method, which is consistent with the findings of Bouilheres et al. (2020), who stated that this method increases students' desire to learn independently while still getting face-to-face support.

Nevertheless, most students chose video as the most effective learning medium, with a preference for short video durations (5-7 minutes). This finding aligns with studies showing that short video-based content can improve student attention and retention in online learning (Ichiuji et al., 2021; Kadhem, 2017). A study conducted by Lee et al. (2021) found that short, concise videos effectively convey complex information concisely, making them highly

relevant in the context of microlearning. Moreover, Mohammed et al. (2018) and Wang et al. (2020) stated that videos with a duration of between 5-10 minutes tend to be more effective in increasing information absorption because students can focus without feeling overwhelmed by excessive information.

Microlearning, a learning approach that breaks down content into small parts, is relevant to PGMI students' preferences for flexibility and easy access. Recent studies have shown that microlearning can accommodate the learning preferences of Generation Z, who prefer short, to-the-point content (Bhalla et al., 2021; Chicca & Shellenbarger, 2018). Furthermore, microlearning takes advantage of students' limited attention span by presenting information in small, focused modules (Gabrielli et al., 2017). This study confirms a previous study conducted by Shatte & Teague (2020), which states that microlearning can improve learning outcomes by providing relevant and direct content without burdening students with overly complex information.

Overall, the results of this study indicate that developing digital teaching materials based on microlearning that focuses on flexibility, technological affordability, and visual content preferences is highly relevant for PGMI students. These findings provide a strong foundation for developing learning methods that meet the unique needs of Generation Z students, who tend to be more responsive to technology-based learning methods (Alruthaya et al., 2021; Krasnova et al., 2023). To increase effectiveness, these teaching materials can be integrated with a scaffolding approach, which has been shown to support students in understanding complex material through gradual assistance (Gill et al., 2024). Thus, combining microlearning and scaffolding can provide optimal support for PGMI students in mastering learning materials.

This study contributes to the literature on developing microlearning-based teaching materials for student teachers, especially in the madrasah environment, which is rarely explored in previous studies (Alias & Abdul Razak, 2023; Sugiarto & Seli, 2023). In addition, the focus on integrating microlearning with a scaffolding approach presents a unique perspective to support a deep understanding of the material through technology-based learning (Gill et al., 2024). By understanding the specific needs of Generation Z students in Islamic higher education environments, this study provides valuable insights for developing more adaptive, flexible, and effective teaching materials in the digital era.

The limitation of this study lies in the scope of the sample, which is limited to one educational institution, namely UIN Maulana Malik Ibrahim Malang. Therefore, the findings may only partially represent the needs of pre-service teachers in general. In addition, the use of online questionnaires can affect the results because students' direct involvement in filling out the questionnaire may vary (Estelami, 2015). For further development, field studies and in-depth interviews can enrich the data and provide a more comprehensive understanding of students' preferences and needs for microlearning-based teaching materials.

CONCLUSION

To conclude, the students of the Islamic Elementary Teacher Education Study Program (PGMI) UIN Maulana Malik Ibrahim Malang are highly ready to utilize digital technology as a learning medium. Most students preferred blended learning methods, short video-based learning media, and microlearning approaches that allow flexible access and independent

learning. These findings strengthen the relevance of using digital teaching materials based on microlearning accompanied by scaffolding to support students' understanding of complex learning materials. The development of digital teaching materials with a micro-learning approach assisted by scaffolding is capable of meeting the needs of Generation Z in technology-based learning. A short learning structure, with attractive visual support, can increase student engagement and motivation in the learning process. This study also suggests developing more adaptive teaching materials according to student preferences and considering sustainable accessibility. Further study is recommended to conduct additional exploration involving a variety of institutions or a more in-depth qualitative approach to gain more comprehensive insights into the needs of teaching materials for pre-service teachers in various educational contexts.

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