Analysis of Application-Based Learning Media Use by Elementary School Teachers

Lizawati[1*], Abna Hidayati[1], Zelhendri Zen[1], Fetri Yeni[1]

[1] Faculty of Education, Universitas Negeri Padang, Padang, Indonesia.

Abstract: The transformation of education in the Society 5.0 era has accelerated the integration of digital technology into teaching and learning. This study examines the use of application-based learning media by elementary school teachers in Palembayan Subdistrict, Agam Regency, and explores the factors influencing teachers' digital competence and the challenges encountered in implementation. Using a mixed-methods approach, data were collected from 99 teachers through questionnaires addressing five core aspects, supported by interviews and field observations. Results show that application usage falls within a moderately favorable range, with most teachers using applications two to three times per week. Frequently used platforms include Canva and Wordwall, valued for their ease of use and support for interactive visual learning. Teachers' digital skills are influenced by variables such as teaching experience, educational background, device access, and internet stability. Key challenges include limited technological infrastructure, unstable connectivity, and difficulties adapting application features to curriculum content. Despite these barriers, many teachers demonstrate adaptability through independent learning and collaboration. The study highlights the need to strengthen digital competence through ongoing training, promote the development of user-friendly educational applications, and improve infrastructure to ensure inclusive and effective digital transformation in elementary education.

Keywords: Digital skills; Educational application media; Elementary school teachers; Mixed methods

Introduction

Advancements in information and communication technology have significantly transformed various aspects of life, including the field of education. The use of technology in education is no longer a matter of choice, but rather a pressing necessity to create more effective, engaging, and interactive learning experiences. A variety of digital learning tools, such as educational applications, videos, animations, and simulations, have enabled teachers to deliver instructional content in more contextual and innovative ways. This transformation has become increasingly relevant in the era of Society 5.0, which emphasizes the integration of digital technologies into all aspects of life,

including education (Prastiwi et al., 2023). In response to this development, the Indonesian government has introduced several policies, including Permendikbud of 2022 and Kepmendikbudristek No. 56 of 2022, which encourage the use of technology to support the implementation of the Kurikulum Merdeka.

Despite the considerable potential of educational technology, its practical use in many regions remains limited, especially regarding application-based learning media. Preliminary observations in Palembayan Subdistrict, Agam Regency, West Sumatra, show that internet access is already available in many elementary schools, and a relatively large number of teachers hold teaching certification. However, most teachers continue to rely predominantly on WhatsApp for instructional

activities. Other educational platforms such as Google Classroom, Quizizz, Canva, and similar applications have yet to be utilized effectively. This is primarily due to limited digital proficiency, particularly among senior teachers who are not yet accustomed to using technology in the classroom (Anyan et al., 2023; Wulandari et al., 2022). The problem is further compounded by administrative burdens, lack of sufficient training, and limited access to digital devices and internet data among students.

From a theoretical perspective, learning media serve as a bridge between teachers and students in the process of delivering educational content (Doyan et al., 2020; Yaumi, 2018). Digital learning tools, especially those based on applications, are designed to present content visually, auditorily, and interactively, thereby enhancing students' engagement in the learning process (Menrisal, 2022). An effective educational application should be able to capture students' attention, simplify complex material, facilitate two-way communication, and foster motivation and learner autonomy (Kusumadyanta et al., 2024). However, the effectiveness of such media depends on several key factors, including teachers' technological skills, the user-friendliness of the application (Duche-Pérez et al., 2024), alignment with learning objectives, the frequency and variation of its use, and its overall contribution to educational quality (Asta et al., 2024).

This research also draws on previous studies that emphasize the importance of teachers' technological competence in ensuring an optimal learning process (Kuramaeva et al., 2020; I. H. Utami et al., 2020). Nevertheless, much of the existing literature tends to focus on schools located in urban areas or regions with relatively advanced educational infrastructure. Few studies have specifically explored how teachers in rural areas such as Palembayan Subdistrict incorporate technology into their instructional practices, particularly with regard to application-based learning tools. This highlights a research gap concerning the implementation of educational technology in underserved or remote areas that possess great potential but face numerous obstacles.

This study seeks to fill that gap. Although various educational applications are now widely available and offer significant opportunities to enhance instructional quality, there has been no focused investigation into the extent to which elementary school teachers in Palembayan Subdistrict are using these tools. Furthermore, little is known about the barriers that hinder their adoption or the opportunities that could be leveraged to optimize their use. In addition, a deeper understanding of the factors that influence teachers' digital skills and the readiness of supporting infrastructure is still lacking. Therefore, this study aims to contribute academically by providing a comprehensive analysis of how application-based learning media are being used by elementary school teachers in Palembayan Subdistrict.

The objectives of this study are threefold. First, it aims to analyze the extent to which elementary school teachers in Palembayan Subdistrict utilize application-based learning tools. Second, it seeks to identify the key factors that influence their digital competencies. Third, it explores the challenges faced in implementing these tools in classroom settings. The study also aims to develop concrete recommendations to optimize the use of educational applications. By employing a mixed-methods approach, this research presents a holistic picture that incorporates both quantitative data and qualitative insights from teachers, who play a central role in the ongoing transformation toward technology-integrated education.

Method

This study employed a descriptive method using a mixed-methods approach, combining both quantitative and qualitative techniques to obtain a more comprehensive understanding of the research problem (Creswell, 2015; Sugiyono, 2019). This approach was selected because it addresses the limitations inherent in each method when used independently, thereby producing more robust and holistic data. From a total population of 390 teachers, a sample of 98 participants (25%) was selected using purposive sampling, with consideration given to professional competence and teaching experience, particularly among certified teachers. Data were collected through questionnaires, interviews, and direct classroom observations.

The questionnaire instrument consisted of 50 items, developed based on five key aspects: teacher competency, application usability, alignment with learning objectives, frequency and variation of use, and the perceived impact on educational quality. All questionnaire items were subjected to validity and reliability testing, yielding correlation coefficients ($r\_calculated$) > (r_table), and a Cronbach's Alpha score of 0.994, indicating that the instrument was highly valid and reliable. Interviews were conducted with selected teachers and school principals to explore their experiences and perceptions, while classroom observations were carried out to directly examine the practical application of digital tools in instructional settings.

Data analysis was conducted using two approaches. Quantitative data were analyzed using descriptive statistics and classified based on Norm-Referenced Assessment (NRA), while qualitative data were examined using thematic analysis following the

method of Braun and Clarke. This analytical process led to findings that illustrate the implementation of educational applications, the challenges encountered by teachers, and the need for technical support and training to optimize the use of technology in elementary school instruction.

Result and Discussion

This study was conducted in several elementary schools in Palembayan Subdistrict, Agam Regency, using a mixed-methods approach that combined both quantitative and qualitative techniques. Quantitative data were obtained through a questionnaire consisting of 50 statements distributed to 98 respondents, and the results were presented in tabular form. Qualitative data were collected through interviews and observations and subsequently analyzed using descriptive methods. This approach was intended to provide both an objective and contextual understanding of the issues under investigation. The data were then analyzed based on predetermined factor groupings.

Teacher Competence and Skills

This section aims to assess teachers' proficiency and knowledge in using application-based learning media.

Table 1. Descriptive Statistics of Teacher Competence and Skills

Statistic	Value
N	98
Mean	41.2
St Deviasi	4.59
Max	50
Min	29

The data indicate that the average level of teacher competence and skills was 41.2 out of a maximum score of 50, suggesting a generally good level of proficiency among respondents. The standard deviation of 4.59 reflects a moderate level of variation across the sample. The highest score was 50, while the lowest was 29, indicating that some teachers still possess relatively low competency levels. With 98 respondents, the sample is considered sufficient to represent the overall teacher population involved in this study.

Table 2. Norm-Referenced Categorization of Teacher Competence and Skills

Interval	Frequency	Percentage	Category
X > 48.09	7	7.14%	Very High
43.50 < X ≤ 48.09	20	20.41%	High
38.91 < X ≤ 43.50	43	43.88%	Moderate
34.32 < X ≤ 38.91	22	22.45%	Low
X ≤ 34.32	6	6.12%	Very Low

As shown in Table 2, the majority of teachers (43.88%) fall within the moderate category regarding their competence and skills. Approximately one-quarter of the respondents demonstrated high to very high levels of proficiency. However, 28.57% were categorized as having low to very low competence, indicating the need for capacity-building initiatives. Overall, the findings suggest that ongoing professional development is essential to ensure more equitable levels of teacher competency.

Findings from in-depth interviews and classroom observations support the quantitative results. Most teachers possess basic competencies in using educational applications; however, they continue to face challenges such as device compatibility, limited internet connectivity, and initial technical understanding. The amount of time required to master these applications varies depending on their level of complexity, as also noted by Wang et al. (2023). It was further observed that younger teachers tend to be more adaptive, while more experienced teachers exhibit a strong enthusiasm for learning. Generally, teachers acquire digital skills independently or through online communities such as social media platforms. This reflects a positive initiative toward improving digital competence, although such efforts remain unevenly distributed.

Moreover, all informants agreed that additional training is essential to enhance digital skills in response to the continuous advancement of technology. This awareness aligns with the findings of Anasta et al. (2021), who emphasized the importance of regular training as a way to adapt to technological changes. In addition, institutional support from schools, including the provision of adequate facilities and the allocation of dedicated time for professional learning, is regarded as a critical factor in promoting teacher development (Fitri et al., 2025). Integrated and ongoing training programs have been demonstrated to be effective in enhancing teachers' digital competencies (Nugroho et al., 2024; Wati et al., 2024). Consequently, policy interventions aimed at ensuring equitable access to training and improving digital infrastructure should be prioritized in order to adequately prepare all teachers to meet the instructional demands of a technology-driven educational environment.

Ease of Application Use

This section aims to assess how easily teachers can use educational applications in their daily teaching practices. The data indicate that educational applications are generally perceived as fairly easy to use, with an average score of 40.54 out of 50 and relatively consistent responses across participants. Although a small number of teachers still reported difficulties, the majority had positive experiences, highlighting the need for ongoing

evaluation and refinement to ensure broader user satisfaction.

Table 3. Descriptive Statistics on Ease of Application Use

Statistic	Value
N	98
Mean	40.54
St Deviasi	4.46
Max	50
Min	30

As shown in Table 4, the majority of respondents (48%) rated the ease of use of educational applications as moderate, while approximately 28% rated them high to very high. However, 22% of respondents still encountered difficulties, indicating the need for improvements in user interface design, navigation features, and technical support to ensure a more universally accessible user experience.

Table 4. Norm-Referenced Categorization: Ease of Application Use

Interval	Frequency	Percentage	Category
X > 47.23	4	4%	Very High
42.77 < X ≤ 47.23	24	24%	High
38.31 < X ≤ 42.77	48	48%	Moderate
33.85 < X ≤ 38.31	10	10%	Low
X ≤ 33.85	12	12%	Very Low

Findings from in-depth interviews revealed that the primary challenges in using these applications include unstable internet connectivity, limited access to devices, the cost of premium features, and difficulties in aligning application functionalities with instructional content. Although most teachers stated that the built-in instructions and tutorials were helpful, many preferred visual learning resources such as YouTube, which they considered more practical and easier to understand. This is consistent with the findings of Wicaksono et al. (2022), who emphasized the importance of a design approach focused on the user, in which applications are tailored to users' preferences and skill levels.

Several teachers recommended that beginners start with tools that are simple and practical, such as Canva. They also highlighted the importance of collaboration and the sharing of effective practices among teachers to accelerate the adaptation process. Field observations confirmed that teachers tend to choose applications that are familiar, easy to access, and efficient in terms of time, particularly within dynamic teaching environments. These findings are supported by Alqahtani (2024), who noted that time limitations and task-related pressures influence teachers to opt for applications they already know well.

In this context, the perceived ease of use of applications depends significantly on users' backgrounds and situational contexts. Astuti et al. (2021) emphasized that features such as clear navigation, an appealing user interface, and simple interaction are key aspects that influence perceptions of usability. Nevertheless, additional technical assistance, formal training programs, and efforts to improve digital literacy are essential to support teachers who are not yet accustomed to using technology.

The development of applications that are straightforward, efficient, and responsive to user needs, as suggested by Sarıgoz (2023), represents an important step in enhancing teachers' confidence and skills in integrating technology sustainably within the classroom. In addition, the active participation of both teachers and students in selecting appropriate applications, as highlighted by school principals during interviews, can foster a greater sense of ownership and improve the overall effectiveness of technology use in the educational process.

Alignment of Application Media with Learning Objectives

This section aims to evaluate the extent to which application media support the achievement of predetermined educational goals.

Table 5. Descriptive Statistics on the Alignment of Application Media with Learning Objectives

Statistic	Value
N	98
Mean	41.8
St Deviasi	3.98
Max	50
Min	30

The data indicate that the factor assessing the alignment of application media with learning objectives received an average score of 41.8 out of 50, reflecting a generally positive and consistent perception among respondents. While the highest score reached 50, some responses were as low as 30, signaling the need to improve the quality and relevance of content to better support diverse learning needs.

Table 6. Norm-Referenced Categorization of the Alignment of Application Media with Learning Objectives Factor

Interval	Frequency	Percentage	Category
X > 47.77	5	5%	Very High
43.79 < X ≤ 47.77	20	20%	High
39.81 < X ≤ 43.79	42	42%	Moderate
35.83 < X ≤ 39.81	24	24%	Low
X ≤ 35.83	9	9%	Very Low

As shown in Table 6, the majority of respondents (42%) rated the alignment of application media with learning objectives as moderate, while approximately 25% assessed it as high to very high. Notably, about one-third of respondents rated it as low, indicating that not all teachers perceive optimal alignment. Thus, further enhancement of content quality and better alignment of application features with instructional needs remain necessary.

Findings from in-depth interviews revealed that teachers are motivated to use educational applications with the intention of creating engaging learning experiences, enhancing student participation, and developing their own digital competencies. Applications such as Canva, Flipbook, Wordwall, and Articulate Storyline are widely used because they support both visual and interactive learning. Teachers noted that these applications offer considerable flexibility in adapting content to match students' characteristics and instructional materials. According to teacher reports, student responses were also positive, with learners displaying greater enthusiasm, increased engagement, and perceiving the learning process as more enjoyable.

These findings were corroborated by classroom observations, which indicated that applications were utilized as an integral part of the instructional process rather than as supplementary tools. Applications were employed for content delivery, interactive practice, and digital assessment. This aligns with the work of Pahmi et al. (2022), who asserted that the appropriate use of educational media can enhance learning effectiveness, foster creativity, and stimulate student interest. Teachers actively adapted these digital tools to the specific instructional context, consistent with Rifai et al. (2022), who highlighted the importance of aligning media with both student characteristics and educational objectives.

Teachers' motivation to use such applications also reflects a broader shift in their role toward that of facilitators of active and contextualized learning, as discussed by Nursakinah et al. (2025). This approach reinforces the findings of Maskuro (2022), who noted that the quality of learning outcomes improves when instructional media align closely with student needs and educational goals.

Overall, these findings indicate that while teachers generally perceive educational applications as suitable for classroom use, there remains a need to improve content quality, better align features with pedagogical needs, and enhance professional training. Such efforts are essential to ensure that educational media effectively support the comprehensive and equitable achievement of learning objectives across diverse instructional settings.

Frequency and Variety of Application Usage

This section aims to assess how frequently teachers utilize applications in their instructional activities and to identify the types of applications employed by teachers.

Table 7. Descriptive Statistics on Frequency and Variety of Application Usage

Statistic	Value
N	98
Mean	40.5
St Deviasi	4.66
Max	50
Min	25

The data indicate that the factor of frequency and variety of application usage has an average score of 40.5 out of a maximum of 50, suggesting a relatively high level of application use among respondents. With a standard deviation of 4.66, there is moderate variability in usage levels; some teachers are highly active users, while others remain limited in their use.

Table 8. Norm-Referenced Categorization of Frequency and Variety of Application Usage

Interval	Frequency	Percentage	Category
X > 47.49	3	3%	Very High
42.83 < X ≤ 47.49	30	30%	High
38.17 < X ≤ 42.83	46	46%	Moderate
33.51 < X ≤ 38.17	15	15%	Low
X ≤ 33.51	6	6%	Very Low

As shown in Table 8, the majority of teachers (46%) fall into the "moderate" category regarding the frequency and variety of application usage, while 30% are classified as "high," and only 3% as "very high." Conversely, approximately 21% remain in the low and very low categories, indicating uneven utilization of learning applications.

Findings from interviews revealed variations in teachers' readiness to use educational applications. Teachers such as Mrs. Dewi and Mrs. Resi consistently utilized Canva and Wordwall due to their ease of use and relevance to student characteristics, whereas teachers like Mrs. Anfelya made limited use of these tools. This variation reflects differing levels of understanding and preparedness among teachers in integrating technology into instruction. This aligns with the findings of Toure et al. (2024), who stated that using applications two to three times per week is considered ideal when aligned with the learning material; however, guidance is necessary to ensure that technology use does not detract from instructional focus and effectiveness.

Teachers employed applications not only for content delivery in the classroom but also to facilitate independent assignments and implement diverse

instructional methods such as discussions, lectures, demonstrations, and project-based learning. The visual and interactive features offered by these applications promote cognitive and affective engagement among students, fostering a more active and creative learning experience. Observations supported these findings, indicating that applications have become an integral component of daily instructional strategies.

Nonetheless, challenges such as limited access to devices and unstable internet connectivity continue to hinder the optimal use of applications. Effective technology integration depends not only on frequency of use but also on selecting appropriate media that supports competency achievement. As noted by Utami et al. (2024), technology integration must be proportional and adaptive to be meaningful within the learning process. Therefore, ongoing professional development and infrastructural support are essential to enable teachers to utilize applications optimally and in ways that address learners' needs.

Impact on Educational Quality

This section aims to assess the impact of using learning media in the form of applications on the quality of education.

Table 9. Descriptive Statistics on the Impact on Educational Quality

Statistic	Value
N	98
Mean	42
St Deviasi	4.87
Max	50
Min	30

The data indicate an average score of 42 out of a maximum of 50, suggesting that the use of applications is perceived to have a fairly significant positive impact. With a standard deviation of 4.87, there is moderate variation in respondents' perceptions, ranging from those who feel a very substantial impact to others who have not experienced it as markedly.

Table 10. Norm-Referenced Categorization of the Impact on Educational Quality

Interval	Frequency	Percentage	Category
X > 49.31	7	7%	Very High
44.44 < X ≤ 49.31	38	38%	High
39.56 < X ≤ 44.44	35	35%	Moderate
34.69 < X ≤ 39.56	12	12%	Low
X ≤ 34.69	8	8%	Very Low

Table 10 shows that most respondents rate the impact of application use on educational quality as high (38%) or moderate (35%), while a smaller portion evaluates it as very high (7%), low (12%), or very low (8%). This reflects a generally positive perception, although improvements are still needed to achieve more equitable impact.

Interviews with teachers revealed that educational applications significantly enhance student engagement. Students became more active, enthusiastic, and even requested to learn using the applications. Beyond increasing participation, the applications facilitated material comprehension through hands-on activities such as poster creation, which was reflected in improvements in both pretest and posttest scores. The visual displays and interactive features of the applications stimulated learning interest as well as conceptual understanding, consistent with the findings of Pak et al. (2023) and supported by observational data indicating a livelier classroom atmosphere and more meaningful learning experiences. These findings also align with Raudah et al. (2024), who reported that interactive media effectively increase student activity and motivation.

Overall, learning applications contribute to enhancing students' motivation, conceptual understanding, and academic achievement. However, the predominance of moderate ratings indicates the need to improve effectiveness through the development of adaptive content, ongoing teacher training, and infrastructural support. Challenges such as limited device availability and digital literacy remain significant barriers, as highlighted by Asta et al. (2024). At the elementary schools in the Palembayan district, applications have demonstrated great potential as modern instructional media. To optimize this role, collaboration between government authorities and schools is essential to foster a sustainable, adaptive, and meaningful digital education transformation, in accordance with the recommendations of Budianto et al. (2024).

Conclusion

Based on the findings of this mixed-methods study, it can be concluded that elementary school teachers in the Palembayan District have utilized educational applications such as Canva and Wordwall with moderate consistency, averaging two to three times per week. However, their use remains uneven and is often limited to specific features within the applications. Teachers' digital competencies are influenced by factors such as age, educational background, and the availability of supporting infrastructure, including devices and internet connectivity. Younger teachers tend to adapt more readily to technological tools. The primary challenges identified include technical difficulties, inadequate infrastructure, and the

complexity of integrating applications into instructional content. To address these issues and optimize the use of applications in enhancing learning quality, there is a need for ongoing professional development, the design of more user-friendly application interfaces, and active collaboration among teachers, schools, and government stakeholders.

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