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Mobile learning in Indonesian higher education: quantitative analysis of EFL integration, challenges, and impact

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ABSTRACT

This quantitative research investigated the integration of mobile learning in teaching English as a foreign language (EFL) within Indonesian higher education. This research adopts a two-phase data collection approach, using a structured questionnaire distributed to 134 lecturers from 86 universities and follow-up interviews with 11 selected lecturers. In analyzing this research, Statistical Package for Social Sciences (SPSS) version 26.0 used to provide comprehensive insights into lecturers' experiences, availability, effectiveness of mobile learning, and adequacy of facilities and content design. The results reveal a general positive attitude towards mobile learning integration (mean score 4.29 out of 5), with particular challenges identified, such as minimal classroom facilities and difficulties in content design. The implications show the importance of combining technology with teaching and support, while the conclusion points out readiness, benefits, and challenges in EFL instruction. At the same time, the conclusion highlights readiness, benefits, and challenges, serving as a guide for further exploration and development in EFL instruction. The importance of this research is intended in delivering and analyzing the development of technology used, readiness of lecturers and facilities challenging, and aligning technology with teaching practice. The study's limitations encompass potential over-reliance on self-reported data and limited geographical and institutional scope, with recommendations for future mixed-method research, expansion, collaboration, and continuous training and investment in classroom infrastructure.

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1. INTRODUCTION

The rise of the knowledge society and the pervasiveness of technology pose significant challenges and opportunities for the education sector globally, including the field of teaching English as a foreign language (EFL) [1]. With technology's integration, particularly in mobile learning, it has become vital in shaping modern education. In Indonesian higher education, mobile learning in EFL instruction is crucial because of the rising use of the internet and the potential for adapting this technology in classrooms. Mobile learning's ability to extend learning beyond the classroom and offer innovative teaching methods aligns it with contemporary societal needs [2]. The subject's importance is magnified by the context of globalization, where English communication skills become an essential asset for individuals and communities [3].

Development in the information and communication technology (ICT) sector has allowed various settings where university students can acquire knowledge, including mobile learning, an independent form of

e-learning handled by mobile devices [4], [5]. The characteristics of mobile learning, such as ubiquity, portability, blending, privacy, and interactivity, mark its distinct contribution to education [6]. The flexible tools provided by mobile learning supplement existing technology and make learning accessible in remote areas [7]. The integration of mobile devices for learning has been recognized and adopted widely in various language teachings [8]. Mobile learning's role as a tool to support education makes it a modern method of teaching and learning [9], [10].

Mobile learning has been identified as a new paradigm that is more suitable for integration into higher education [11]. Its function in higher education allows students to work on their tasks off-campus and submit their work through various media [12]. Mobile learning's flexibility complements existing technologies and broadens learning beyond conventional environments [13]. The growth of the knowledge society signifies both a challenge and an opportunity for education through technology, including mobile learning [14]. Teaching quality and development necessitate the competence and skills to incorporate ICT in teaching English, of which mobile learning is a part [15].

Numerous benefits are associated with integrating ICT in teaching English, such as enhanced interaction and communication, which fosters autonomous learning [16]. However, in Indonesia, a gap persists between the rapid growth of ICT and its actual use due to varying computer literacy levels [17]. English teachers acknowledge the continuous need for effective and enjoyable technology usage in classrooms [18]. Mobile learning significantly enhances student engagement by leveraging portable devices like tablets and smartphones, which offer diverse advantages such as collaboration and accessibility. These features not only facilitate interactive learning experiences but also empower students to participate actively in their education. Given its capacity to foster engagement and provide essential tools for effective learning, mobile learning emerges as a crucial component in teaching strategies for EFL, supporting both teachers and students in achieving their educational goals [19], [20]. Therefore, mobile learning stands as an essential component in teaching strategies for EFL [21]–[23].

Studies related to mobile learning in EFL have highlighted its use in improving student motivation and enhancing writing and grammar skills [24]. Mobile devices have become increasingly popular among language researchers and teachers [25], [26]. The usage of mobile devices in language learning requires adherence to quality criteria in application creation for educational purposes [27]. Continuous evaluation and improvement are essential for supporting language learning through mobile technology [28]. English learning strategies can emphasize the importance of strategy involving active participation from students and teachers [29].

Despite the substantial progress in the domain of mobile learning, several limitations and controversies exist. Key challenges include physical limitations, software and content issues, internet connection speed, and environmental conditions [30]. There is a crucial need for mobile applications that are both practical and well-suited to teaching methods, and interruptions in internet service can negatively impact mobile learning [31]. Furthermore, more empirical research is needed on the utilization of mobile learning in higher education, particularly in courses related to mobile devices using technology acceptance framework [32]. This study critically analyzes the integration of mobile learning in Indonesian higher education EFL teaching, aiming to bridge gaps between technological advancement and practical application. By evaluating current usage, challenges, and potential, it offers empirical insights to support more effective strategies, aligning Indonesian EFL education with global trends, especially in the rapidly expanding area of EFL teaching, and aligning with global educational trends and advancements [33].

2. METHOD

This study adopted a quantitative research design to investigate the integration of mobile learning in teaching EFL in Indonesian higher education, aiming to obtain numerical data describing lecturers' perceptions, experiences, and challenges. The study employed a two-phase data collection approach. In the first phase, a structured questionnaire was distributed to lecturers from 86 universities in Indonesia to examine mobile learning availability, its integration into EFL teaching, and perceived challenges. In the second phase, follow-up interviews were conducted with 11 selected lecturers to provide additional contextual understanding.

The primary research instrument was a structured questionnaire consisting of Likert-scale items. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistical analyses, including frequencies, percentages, means, and standard deviations, were employed to summarize lecturers' responses across the three measured variables: mobile learning availability, integration in EFL teaching, and challenges in practical implementation. A pilot study involving 30 participants was conducted to assess the reliability of the instrument. Reliability analysis using Cronbach's alpha yielded values of 0.910 for mobile learning availability (7 items), 0.942 for integration of mobile learning (10 items), and 0.825 for challenges in mobile learning (10 items), indicating high internal consistency. Content validity was ensured

through expert review by senior academics to confirm the relevance, clarity, and appropriateness of the questionnaire items.

3. RESULTS AND DISCUSSION

In this study, 134 lecturers from 86 universities in Indonesia from English departments were requested to participate in the survey. The Figure 1 demonstrate the participants' information in using mobile devices to teach English in Indonesian higher education. This study involved 134 English lecturers from 86 public and private universities across Indonesia, representing regions such as Java, Sumatra, Sulawesi, and Papua. Among the participants, 57% were female (n=81) and 43% male (n=53), with no significant gender-based differences in mobile learning usage. The average scores were 71 for females and 46 for males, indicating similar levels of engagement despite the higher female participation rate. Moreover, the researcher identified that 86 university lecturers had participated in answering the survey. Lecturers were in the age 30-39 with 63 (47%), aged 40-49 were 57 (42.5%), and 50 years above, is 14 (10.4%), for the percentage number can be seen in the Figure 2.

Meanwhile, from the total number (N=134), the researcher made a limitation of the minimum categorization for lecturers who participate in the research should have a minimum of two years of teaching experience at the university level as an English major. Mostly, they hold a degree minimum for a Master's degree. After the survey distribution, 36 (22%) participants hold a Doctorate or PhD level, and 98 (78%) have a Master's degree level. The percentage and number can be seen in the Figure 3.

Additionally, based on the answers from the survey, there are participants with teaching experience of around 13 years and above 33%, with several 44 participants. Also, there are 3-7 years of experience in teaching with 44 (34%) participants. Meanwhile, participants have 8-12 years 30 (22%) participants, and the researcher also identified 15 (11%) participants who had less than 3 years' experience, which means the participants have been teaching English courses for around 2-3 years. The percentage and number can be seen in the Figure 4.

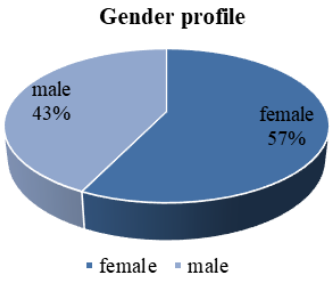

Figure 1. Gender profile

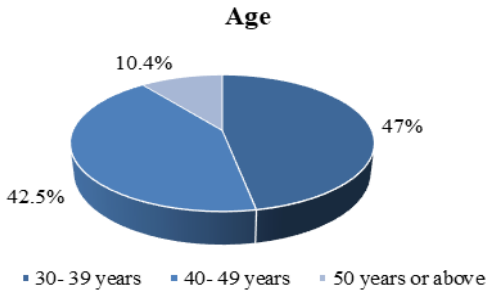

Figure 2. Age profile

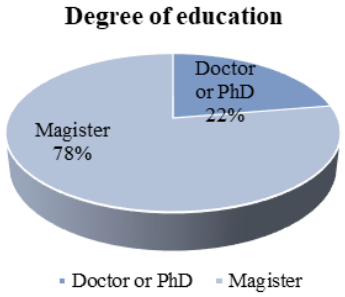

Figure 3. Degree of education profile

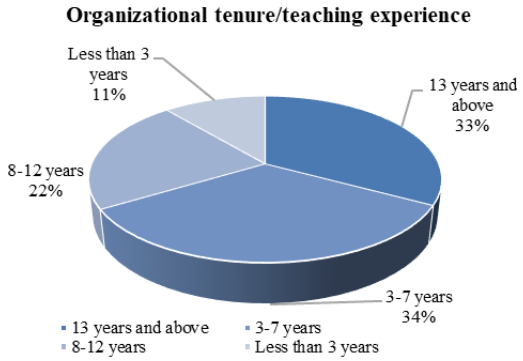

Figure 4. Organizational tenure/teaching experience

3.1. Availability to access mobile learning

The findings indicate a high level of mobile learning availability among English lecturers in Indonesian higher education, with an overall mean score of 4.39. As summarized in Table 1, the majority of lecturers reported using smart devices in teaching (91.8%), acknowledging mobile learning's flexibility to

support learning anytime and anywhere (92%), and recognizing its value for communication between lecturers and students (91.1%). A considerable proportion also viewed mobile learning as complementary to traditional classroom teaching (87.4%) and noted that device accessibility facilitates its use (88.8%). Moreover, most lecturers expressed strong interest (85.8%) and a high level of commitment (92%) to developing mobile-based teaching strategies. These results demonstrate not only the wide availability of mobile devices but also lecturers' pedagogical readiness and motivation to integrate mobile learning into English language teaching. Nevertheless, despite the promising availability and positive attitudes, successful implementation still depends on continued institutional support, professional training, and adequate technical infrastructure.

Table 1. Descriptive statistics of lecturers' perceptions on the availability of mobile learning

No	Statement	Mean	SD	Percentage (%)
1	Use of smart devices in teaching	4.53	0.811	91.8
2	Helps students learn anytime and anywhere	4.49	0.753	92
3	Supports communication with students	4.46	0.801	91.1
4	Supports traditional learning	4.31	0.789	87.4
5	Device availability facilitates mobile learning	4.34	0.775	88.8
6	Interest in mobile learning	4.25	0.879	85.8
7	Willingness to develop mobile learning strategies	4.38	0.908	92

Figure 5 depicts a generally strong positive perception across all surveyed aspects which suggests that the respondents actively engage with mobile devices for teaching, recognize their benefits for flexible learning and communication, and maintain a high interest and commitment to developing mobile learning strategies.

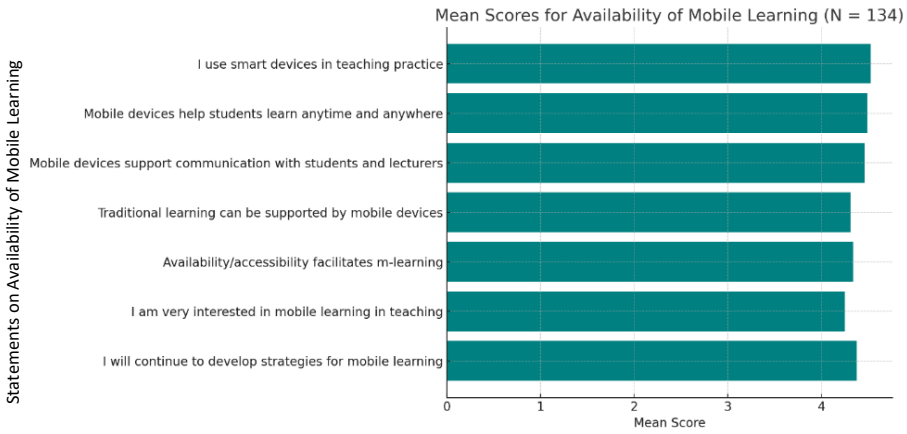

Figure 5. Mean scores for availability of mobile learning

3.2. Integration of mobile learning in teaching and learning of EFL classroom

The extent to which mobile learning is integrated into the teaching and learning of EFL classrooms in Indonesian higher education was evaluated through ten questionnaire items. These items assessed various pedagogical and technological dimensions, including lecturer facilitation, technological infrastructure, and alignment with 21st-century learning needs. The total mean score obtained was 4.29 (SD=0.637), indicating a high level of integration of mobile learning in EFL instruction.

As shown in Table 2, the highest mean score (M=4.43; SD=0.698) was recorded for the statement that mobile learning serves as a reference for 21st-century education, reflecting institutional awareness of its transformative potential. Items related to the development of ICT-based teaching models (M=4.40; SD=0.777) and supporting student activeness (M=4.40; SD=0.683) also scored high, underscoring lecturers' proactive stance toward modern pedagogical practices. The availability of mobile phones and English learning applications both achieved a mean of 4.35 (SD=0.807), showing that lecturers recognize mobile technology as both accessible and effective in enriching language learning. Other items, such as organizing classroom activities (M=4.25; SD=0.808) and improving teaching strategies through mobile learning (M=4.22; SD=0.762), further indicate a strong trend toward learner-centered, mobile-assisted instruction.

Table 2. Descriptive statistics of lecturers' responses on the integration of mobile learning in teaching and learning of EFL classroom

No	Statement (summary)	Mean	SD
1	Encouraged student use of mobile devices	4.16	0.883
2	ICT effectively supports language teaching	4.28	0.855
3	English apps support EFL learning	4.35	0.807
4	Mobile phones helpful for EFL learning	4.35	0.807
5	Organized student activities using mobile	4.25	0.808
6	ICT-based teaching should be developed	4.40	0.777
7	Mobile learning supports participation	4.40	0.683
8	Relevant for 21st-century education	4.43	0.698
9	Helps develop teaching strategies	4.22	0.762
10	Classroom condition is adequate	4.08	0.756

Figure 6 reveals a generally strong agreement among respondents across all ten measured aspects. This high positive perception suggests that the participants view mobile learning as an effective, essential, and well-supported educational instrument. However, the data also hints at minor difficulties, particularly concerning the necessary physical infrastructure and the complexities involved in creating specific integration strategies. This meant the consistently high scores underscore the widespread recognition of mobile learning's value in modern education, indicating a readiness for its adoption. The slightly lower scores for the 'classroom condition is adequate' and 'encouraged student use of mobile devices' are significant as they highlight practical barriers that institutions should prioritize addressing to ensure successful, large-scale implementation.

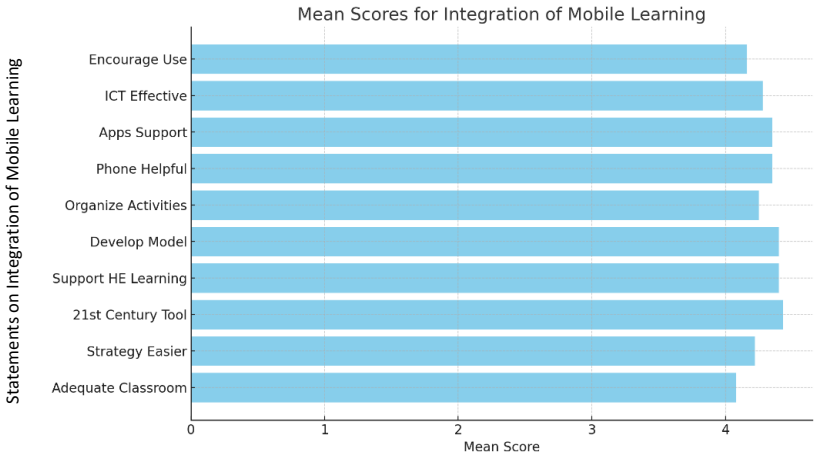

Figure 6. Mean scores of lecturers' perceptions on the integration of mobile learning in EFL teaching and learning

Despite the positive perceptions, the mean score for classroom condition (M=4.08; SD=0.756) signals a concern about physical infrastructure, including internet connectivity and access to compatible devices. While lecturers showed strong support for mobile learning's role in enhancing interactivity and educational access, successful implementation requires institutional investment in infrastructure and continuous professional development to bridge the gap between technological availability and its effective classroom use. These findings align with previous studies that emphasize the dual necessity of technological readiness and pedagogical competence to fully realize the potential of mobile learning in higher education.

3.3. Challenge of mobile learning in practical knowledge

The integration of mobile learning into EFL teaching has become increasingly significant in the higher education landscape in Indonesia. This section explores the practical challenges perceived by lecturers through ten questionnaire items encompassing infrastructure, content design, student engagement, pedagogical skills, and institutional support. Responses from 134 lecturers were collected using a five-point Likert scale, with the analysis focusing on the mean scores and standard deviations for each item. The results reveal both enthusiasm for mobile learning and a set of persistent challenges that hinder its full implementation.

Lecturers acknowledged the inadequacy of classroom facilities for implementing mobile learning (M=3.46; SD=1.031), reflecting infrastructure constraints that limit effective integration. Moreover, institutional efforts in organizing guest lectures and training programs were reported at a moderate level (M=3.25; SD=1.086), suggesting the need for stronger institutional support. The limited scope of mobile learning content (M=3.16; SD=1.042) also indicates that lecturers require more diverse and relevant digital learning resources.

As shown in Table 3, the most significant challenges faced by lecturers include inadequate classroom facilities (M=3.46), limited institutional support (M=3.25), and the narrow scope of mobile learning (M=3.16). These findings suggest that while lecturers show a strong willingness to integrate mobile learning, they continue to face structural and pedagogical barriers. Figure 7 further illustrates that challenges related to facilities, content design, and English language integration are the most critical, while motivation and pedagogical alignment remain moderate concerns. Overall, these results emphasize that mobile learning adoption is not limited by lack of interest but rather by contextual constraints such as infrastructure, training, and institutional readiness.

Table 3. Mean and standard deviation of mobile learning challenges

No	Statement	Mean	Std. Dev
1	Minimum facility in the classroom for mobile learning in EFL teaching	3.46	1.031
2	Institutions organize guest lectures for students	3.25	1.086
3	The scope of mobile learning is narrow, limited to specific institutions	3.16	1.042
4	Encouraging students' motivation and interest in diverse characteristics is a challenge	3.75	0.913
5	Difficulties in designing and connecting EFL content with lab content	3.59	0.967
6	Difficulty in developing mobile learning and SCL models in English classrooms	3.09	1.029
7	Teaching strategies using mobile learning are less appropriate for school integration	2.54	1.101
8	Integrating mobile learning values into practical teaching models is hard to understand	2.67	1.067
9	Lack of understanding in developing a mobile learning model in EFL classrooms	2.43	1.127
10	Preference for teaching models other than mobile learning in EFL classrooms	2.74	1.137

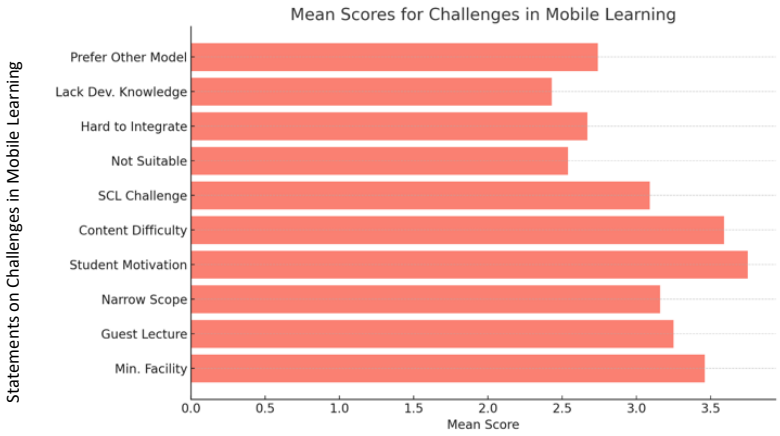

Figure 7. Mean scores for challenges in mobile learning

Despite lecturers' strong enthusiasm for mobile learning, they face significant gaps in practical understanding, model development, and curriculum integration indicating a lack of pedagogical and conceptual readiness. Key barriers include the limited scope of implementation, challenges in content design, and persistent preference for traditional teaching methods. These findings underscore the need for pedagogical training, institutional collaboration, and infrastructure development to bridge the gap between technological optimism and teaching realities. The study highlights that institutional readiness, user competence, and targeted strategies are essential for the effective integration of mobile learning in Indonesian higher education EFL classrooms. The investigation follows a lineage of prior studies on the vital role of ICT in universal access to education, quality teaching and learning, and the growing flexibility and potential for mobile technology integration in higher education [34], [35].

The main results of the study reveal a predominantly positive response towards mobile learning from lecturers in Indonesian universities' English departments. The availability of mobile learning stood at a medium level, with robust responses regarding the integration of mobile devices into teaching, the ability to aid learning at any time, and interest in mobile learning in education. Furthermore, the overall integration score suggests that

lecturers have generally incorporated mobile learning into their teaching practice. At the same time, challenges were highlighted in aspects such as minimum facility, institutional support, and difficulties in content design.

Comparing the findings of this study with previous research, the results corroborate the notion that ICT plays a significant role in education, enhancing interaction, communication, and autonomous learning [36], [37]. However, the observed challenges, such as lack of competency and difficulties in understanding mobile learning integration, align with earlier findings of challenges faced by both Indonesian learners and lecturers. This synthesis helps bridge the gap between the potential benefits and real-world challenges of mobile learning in the Indonesian context.

The findings' positive inclination may be attributed to the global trend of integrating mobile technology in education, coupled with the increase in internet usage in Indonesia [38]. However, the existence of significant challenges reflects an underlying complexity. The minimum facilities and difficulties in understanding how to develop mobile learning in EFL classrooms signal that technology acceptance is more than just about availability but requires a deeper understanding and structural support [39]. The challenges also hint at the need for both pedagogical and technical training to enable effective integration of mobile learning into EFL teaching. Furthermore, a closer collaboration between educational institutions and technology providers could foster an environment conducive to embracing mobile learning, aligning it with the specific needs and contexts of Indonesian higher education [40].

The contrast between positive perceptions and practical challenges in mobile learning reflects a complex interplay of technological, pedagogical, and institutional factors, highlighting a readiness gap that requires a comprehensive and context-sensitive approach. While no significant differences were found in gender or educational background, variations by age and experience suggest deeper dynamics possibly shaped by cultural shifts toward digitalization. These findings call for continued research and tailored strategies to support effective mobile learning adoption across diverse educator profiles.

The implications of the findings underscore the importance of aligning technological innovation with pedagogical practice and institutional support in the context of higher education in Indonesia. While there is a clear tendency towards acceptance of mobile learning, the identified challenges demand a concerted effort to ensure that technological advancement translates into effective educational practice. Strategies must be formulated to address the current gaps, including enhanced support for faculty, well-equipped classrooms, and continuous evaluation and improvement for language learning through mobile technology [30], [41]. Only through a holistic approach that synchronizes technological readiness with pedagogical innovation and institutional support can the full benefits of mobile learning in teaching EFL be realized. In a summary, we found that the positive perception of mobile learning correlates with the identified challenges in practical knowledge which discovered a relationship between how positively educators view mobile learning and the difficulties they face in implementing it effectively. In other words, while educators generally have a favorable attitude towards using mobile technology in their teaching, they also encounter significant obstacles when trying to put this technology into practice.

The proposed learning method in this study tended to have an inordinately higher proportion of readiness to embrace mobile technology as compared to the difficulties in effectively integrating it into EFL classrooms. This study's suggested approach for incorporating mobile learning showed that educators were more inclined to accept and use mobile technology than they were prepared to handle the challenges associated with integrating it into EFL classrooms. Essentially, there was a greater enthusiasm for mobile learning than there was practical readiness or capability to address the hurdles involved in its effective application. In summary, the research highlighted that while there is a strong willingness among educators to adopt mobile learning, this enthusiasm is not yet matched by their ability to overcome the practical challenges that come with integrating this technology into their teaching practices.

4. CONCLUSION

Recent observations suggest that the integration of mobile learning in Indonesian higher education for teaching EFL is met with a generally positive attitude among lecturers. Our findings provide conclusive evidence that this proposed learning method is associated with an increase in engagement and potential benefits in EFL instruction, not due to elevated numbers of facilities or content design but rather due to the lecturers' positive perceptions and willingness to adopt new technology despite existing challenges.

The primary objective of this quantitative study was to rigorously assess the current state of mobile learning in teaching EFL in Indonesian higher education, including a comprehensive evaluation of lecturers' experiences and challenges, the effectiveness and availability of mobile learning, student motivation and engagement, and the adequacy of content design and facilities. The research findings indicate a generally positive attitude towards mobile learning among EFL lecturers in Indonesia, with an overall mean score for integration at 4.29 out of 5 showed in total number mean of integration of mobile learning in teaching and

learning of EFL classroom, profiling the gender, age, educational background, and teaching experience of 134 participants and revealing no significant gender difference in mobile learning usage. There were strong positive responses regarding the potential of mobile learning. However, challenges were also identified, including minimal classroom facilities, the narrow scope of mobile learning in practice, and difficulties in content design and understanding the methodology. These results have significant implications for aligning technological innovation with pedagogical practice within Indonesian higher education, emphasizing the necessity of a holistic approach that harmonizes technological readiness with innovative pedagogy and solid institutional support. Limitations of the study include possible over-reliance on self-reported data, limited scope in terms of geography and academic institutions involved, potential response bias, and cut-off text in some parts of the data that might have influenced the overall interpretation. Future research recommendations include a mixed-method approach, expansion to different regions and types of institutions, and collaborative efforts among educators, policymakers, and technologists to develop tailored solutions that address the unique challenges identified, with emphasis on continuous training for lecturers and investment in classroom infrastructure. In summary, the study offers valuable insights into the evolving landscape of mobile learning in Indonesian higher education for teaching EFL, highlighting potential benefits and readiness among lecturers while also uncovering critical challenges that must be addressed, serving as a blueprint for leveraging technological advancements in EFL instruction and suggesting directions for further exploration and development within the field.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
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So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest

INFORMED CONSENT

We have obtained informed consent from all individuals included in this study. All participants were informed about the purpose of the research and assured that their data would remain confidential and used solely for academic purposes.

ETHICAL APPROVAL

The study involved human participants (teachers/students) and was conducted in accordance with ethical research standards. Formal approval from an institutional ethics committee was not required.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [AF], upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

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