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Designing Lifelong Language Learning Programs for Working Adults Through Mobile Learning

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ABSTRACT

Background. The increasing demand for continuous professional development among working adults has emphasized the need for flexible, accessible, and sustainable language learning opportunities. Traditional classroom-based instruction often fails to accommodate adult learners who face constraints related to time, location, and work schedules.

Purpose. This study aimed to design and evaluate a lifelong language learning program for working adults through mobile learning platforms. It specifically examined the pedagogical, technological, and motivational factors that support sustained learner engagement and long-term language retention.

Method. A mixed-method research design was employed involving 150 working professionals from various industries in Jakarta. Quantitative data were collected through pre- and post-tests and learner engagement analytics, while qualitative data were obtained from semi-structured interviews and learner diaries.

Results. The results demonstrated significant improvements in participants' vocabulary acquisition, communication confidence, and long-term language retention following the mobile learning intervention. Qualitative findings revealed that personalized content, task relevance to professional contexts, and mobile accessibility were key factors in sustaining learner engagement over time.

Conclusion. The study concludes that mobile-assisted lifelong language learning programs provide an effective and scalable approach to adult language education.

KEYWORDS

Adult Education, Language Learning, Lifelong Learning

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INTRODUCTION

Lifelong learning has become a central concept in modern education, reflecting the growing recognition that knowledge acquisition and skill development are continuous processes extending beyond formal schooling (Pelletier dkk., 2022). In the 21st century, rapid technological advancement, globalization, and shifting labor markets demand that adults continually update their competencies to remain relevant and competitive (Spatioti dkk., 2022). Language proficiency, particularly in international languages such as English, has emerged as a critical component of this lifelong learning paradigm, enabling professionals to access global networks, collaborate across borders and adapt to dynamic work



environments (Shemshack dkk., 2021).

Adult learners, however, face distinctive challenges in sustaining language learning over time. Professional responsibilities, family commitments, and limited access to structured educational opportunities often hinder their ability to engage in traditional classroom-based learning. Adult education theories, such as andragogy by (Kohnke, 2023), emphasize that adults are self-directed learners motivated by relevance and application rather than compulsion. This understanding underscores the importance of flexible, contextualized, and technology-supported approaches that align with adult learners' unique learning motivations and situational constraints (Xu dkk., 2020).

Mobile learning (m-learning) has emerged as a transformative model addressing these challenges by enabling flexible, on-demand access to educational resources. The portability, interactivity, and adaptability of mobile devices allow learners to engage with language materials during daily routines, converting idle moments into meaningful learning opportunities. Research by (Martin dkk., 2020) has shown that m-learning empowers learners to personalize their study pace, choose content relevant to their goals, and receive instant feedback all of which are vital for maintaining motivation and progress in adult education contexts.

The integration of mobile technology into language learning has also expanded the scope of instructional design. Mobile-assisted language learning (MALL) incorporates multimedia tools, social interaction platforms, and gamified learning environments to enhance engagement and retention. Studies by (Shemshack & Spector, 2020) and (Bernacki dkk., 2021) highlight that the use of mobile devices facilitates continuous exposure to the target language through authentic and contextualized interactions, leading to improved communicative competence. These findings position mobile learning as a key enabler of lifelong language education that transcends temporal and spatial limitations.

The concept of lifelong learning is further reinforced by international education policies such as UNESCO's Sustainable Development Goal 4, which advocates for inclusive and equitable access to quality education at all life stages. Mobile learning aligns with this vision by democratizing access to language education, especially for adults in developing countries who may lack institutional support (Al-Rahmi dkk., 2022). The ubiquity of mobile devices provides unprecedented opportunities for scalable, cost-effective, and inclusive language learning solutions, making it a practical pathway for realizing global education equity (Cui & Sachan, 2023).

Existing evidence suggests that mobile learning has the potential to reframe adult education into a more autonomous, learner-centered, and sustainable process. The combination of lifelong learning principles, adult motivation theories, and digital innovation provides a strong foundation for designing adaptive programs tailored to the needs of working adults (Gligorea dkk., 2023). However, the effective operationalization of these principles into practical program models that sustain engagement over time remains an ongoing challenge within educational design research (James & Thériault, 2020).

Limited research has explored how lifelong language learning programs can be systematically designed for working adults through mobile platforms. While numerous studies have demonstrated the effectiveness of mobile learning for short-term language improvement, few have examined how it can be structured to support sustained, lifelong engagement (Ayeni dkk., 2024). The current literature tends to emphasize app-based learning outcomes rather than holistic program design integrating pedagogy, motivation, and career-oriented goals. This leaves a significant gap in understanding how mobile learning can facilitate continuous, self-directed language development among adult professionals (Miao & Holmes, 2021).

Empirical studies also lack a focus on the intersection between lifelong learning theory and mobile instructional design. Most m-learning applications are technology-driven rather than pedagogy-driven, prioritizing functionality over educational sustainability (Strielkowski dkk., 2025). The absence of frameworks that align m-learning environments with adult learning principles has led to inconsistent results in learner engagement and retention. As a result, many working adults abandon digital learning programs prematurely due to a lack of relevance, structure, or ongoing support mechanisms (Irielle, 2024).

There remains a paucity of research on the contextual adaptation of mobile learning for diverse professional sectors. Working adults represent heterogeneous groups with varying linguistic needs, digital competencies, and workplace demands. Studies often overlook how these contextual variables influence the design and effectiveness of lifelong learning initiatives. A deeper understanding of learner profiles and occupational contexts is necessary to ensure that mobile language learning programs are not only accessible but also meaningful and sustainable (Ubaedillah dkk., 2021).

The motivational dynamics of adult learners in mobile environments are also underexplored. While gamification and social learning have shown promise in improving engagement, little is known about how these elements contribute to long-term learning persistence. Without clear insight into how motivation can be maintained across extended periods, the vision of lifelong learning risks remaining theoretical rather than operational (Mir dkk., 2023). Bridging this gap requires research that integrates technological innovation with motivational psychology and adult learning theory to create enduring language learning ecosystems.

This study seeks to design and evaluate a lifelong language learning model for working adults based on mobile learning principles that emphasize flexibility, personalization, and continuous engagement. The rationale stems from the growing need to empower adult learners to sustain their linguistic development in the context of professional and personal demands (Li, 2021). By designing a program that integrates pedagogical structure, technological interactivity, and motivational scaffolding, the study aims to transform mobile learning into a sustainable medium for lifelong language growth (Latif dkk., 2023).

The research hypothesizes that mobile-assisted lifelong learning programs, when designed with adult learning principles and adaptive features, will enhance learner autonomy, persistence, and language proficiency more effectively than static, short-term approaches. The study adopts a design-based research (DBR) methodology to iteratively develop, implement, and refine program components based on empirical feedback. This approach ensures that the resulting framework is both theoretically grounded and practically applicable within the realities of adult education.

The ultimate goal of this research is to contribute to the development of an integrated framework for lifelong language education that supports adult learners beyond conventional classroom boundaries. The findings are expected to inform educators, policymakers, and corporate training institutions about best practices in designing mobile-based language programs that promote sustainable learning habits.

RESEARCH METHODOLOGY

The study employed a design-based research (DBR) approach to develop and evaluate a mobile-assisted lifelong language learning program tailored for working adults. The DBR framework was selected to iteratively design, implement, and refine the program through multiple testing cycles, ensuring both theoretical rigor and practical relevance (Susanty dkk., 2021). The approach integrated elements of instructional design, adult learning theory, and mobile learning

principles to address real-world challenges of sustained language learning. Quantitative data were collected to measure learning outcomes and engagement metrics, while qualitative data captured learners' experiences, perceptions, and motivational responses. This mixed-method integration provided a comprehensive understanding of how the program supports lifelong learning behaviors (Housel, 2020).

The research population consisted of working adults in Jakarta representing various professional sectors such as finance, education, and hospitality. Participants were selected based on two primary criteria: active employment and an interest in improving English language proficiency for professional development. The final sample comprised 150 participants aged 25–45, with diverse educational backgrounds and digital literacy levels. Stratified random sampling ensured proportional representation across occupational categories and language proficiency levels (beginner, intermediate, advanced). To gain additional pedagogical insights, 10 language instructors experienced in mobile-assisted learning were also included as expert reviewers. The participant diversity enabled a rich exploration of how mobile learning adapts to different professional and motivational contexts.

Four primary instruments were utilized in data collection. The mobile learning platform analytics provided quantitative data on usage patterns, task completion rates, and interaction frequency. The language proficiency tests, administered before and after the intervention, assessed vocabulary acquisition, grammatical accuracy, and communicative competence using standardized rubrics. The learner perception questionnaire employed a five-point Likert scale to measure motivation, satisfaction, and perceived relevance of the learning materials. The semi-structured interview guide explored participants' experiences with flexibility, feedback mechanisms, and long-term engagement strategies. All instruments were validated by experts in applied linguistics and instructional technology, achieving a Cronbach's alpha reliability score of 0.91, indicating high internal consistency across scales.

The research was implemented in four systematic stages: needs analysis, design, implementation, and evaluation. The needs analysis stage identified linguistic and technological requirements of working adults through surveys and focus groups, which informed the development of the mobile learning framework. The design stage involved creating interactive modules emphasizing microlearning, adaptive feedback, and real-life communication scenarios integrated into a dedicated mobile application.

The evaluation stage collected post-intervention data through tests, surveys, and interviews. Quantitative data were analyzed using descriptive statistics and paired-sample t-tests to evaluate proficiency improvement and engagement consistency. Qualitative data from interviews were coded thematically using NVivo to extract patterns related to motivation, learning autonomy, and perceived program effectiveness. The iterative nature of the DBR design allowed continuous refinement of content and interface features based on user feedback, ensuring the program evolved into a sustainable model of lifelong language learning for adult professionals (Housel, 2020).

RESULT AND DISCUSSION

Quantitative findings from the study demonstrated measurable improvements in language proficiency and learner engagement among working adults participating in the mobile-based lifelong learning program. Table 1 presents the descriptive statistics comparing pre-test and post-test results in three key domains: vocabulary acquisition, grammatical accuracy, and communicative competence.

Table 1. Descriptive statistics of learner performance

Variable	N	Pre-Test Mean	Post-Test Mean	SD (Pre)	SD (Post)	Interpretation
Vocabulary Acquisition	150	65.42	81.36	8.21	6.48	High improvement
Grammatical Accuracy	150	68.19	80.14	7.95	6.73	Significant gain
Communicative Competence	150	66.87	84.53	9.22	6.11	Very strong gain

The data reveal a consistent upward trend across all measured competencies. Learners exhibited the greatest improvement in communicative competence, suggesting that mobile learning environments support authentic language use and real-world application. The relatively lower standard deviation in post-test scores indicates that performance disparities among learners decreased as the program progressed, reflecting equitable learning outcomes.

Overall, descriptive statistics confirm that mobile learning effectively supports language skill development in professional adults. The self-paced and adaptive design features contributed to steady progress across participants of different proficiency levels. The data also suggest that working adults benefited from consistent exposure to interactive, real-life tasks integrated into mobile contexts, resulting in sustained learning engagement and skill retention.

The improvement patterns suggest that mobile-assisted lifelong learning encourages continuous reinforcement of linguistic skills through repeated practice and context-based interaction. The built-in feedback mechanisms provided instant correction and encouragement, helping learners self-regulate their progress. These features align with principles of adult learning that emphasize autonomy, relevance, and experiential engagement. The adaptive difficulty system of the platform enabled learners to engage with materials suitable for their proficiency, thereby minimizing frustration and disengagement.

Learners’ progress across the three domains also reflects the integration of multimodal resources text, audio, and video designed to accommodate various learning preferences. Participants frequently accessed microlearning modules during breaks or commuting hours, turning idle time into productive learning moments. The combination of accessibility and relevance resulted in deeper language retention and increased learner confidence, reinforcing the concept that lifelong learning thrives in flexible, mobile-mediated environments.

Learner engagement and motivational indicators were captured through post-program surveys assessing four constructs: task relevance, flexibility, feedback satisfaction, and persistence. Table 2 summarizes mean scores based on a 5-point Likert scale.

Table 2. Learner engagement and motivation indicators

Construct	Mean	SD	Interpretation
Task Relevance	4.52	0.41	Very High
Flexibility and Accessibility	4.47	0.44	Very High
Feedback Satisfaction	4.33	0.53	High
Persistence and Continuity	4.40	0.49	Very High

The consistently high means suggest strong learner satisfaction with the program’s design and delivery. Participants valued the relevance of language tasks to their professional and daily communication needs. The perceived flexibility of mobile access was cited as a major motivator sustaining engagement, especially for those balancing demanding work schedules.

Survey results affirm that adult learners’ motivation is driven by perceived autonomy and direct applicability of learning outcomes. The inclusion of personalized content and adaptive

feedback mechanisms enhanced a sense of control over progress. Participants reported that the program not only improved language skills but also cultivated lifelong learning habits that extended beyond the digital classroom.

Inferential statistical analysis using a paired-sample t-test confirmed that the performance improvements between pre- and post-tests were statistically significant. Table 3 presents the results of the t-test for each language competency domain.

Table 3. Paired-sample t-test results

Variable	Mean Difference	t-value	p-value	Interpretation
Vocabulary Acquisition	15.94	13.82	0.000	Significant
Grammatical Accuracy	11.95	10.67	0.000	Significant
Communicative Competence	17.66	14.22	0.000	Highly Significant

The results show that all domains yielded significant differences between pre- and post-test means at $p < 0.05$, confirming that the mobile learning intervention had a substantial impact on learners' proficiency development. Communicative competence exhibited the strongest statistical gain, indicating that interactive and context-based features were particularly effective in promoting practical language use.

The inferential analysis provides robust evidence supporting the pedagogical effectiveness of mobile-assisted lifelong learning programs. The high t-values across all categories confirm consistent improvements across diverse learners. This reinforces the hypothesis that flexible, adaptive, and learner-centered mobile environments can significantly enhance long-term linguistic growth among working adults. Correlation analysis was conducted to explore relationships among learner motivation, engagement, and performance improvement. The results revealed strong positive correlations: motivation and post-test performance ($r = 0.81, p < 0.01$), engagement and motivation ($r = 0.76, p < 0.01$), and engagement and persistence ($r = 0.83, p < 0.01$). These findings suggest that intrinsic motivation and active engagement are key mediators in the success of mobile learning programs.

The relationship among variables illustrates that the more learners perceive the relevance and flexibility of the program, the higher their engagement and achievement levels. The interactive mobile environment appears to create a feedback loop between satisfaction and performance, whereby continuous feedback sustains motivation, and motivation in turn drives persistence and achievement. This pattern reinforces the theoretical alignment between mobile learning design and adult learning principles emphasizing autonomy and goal orientation.

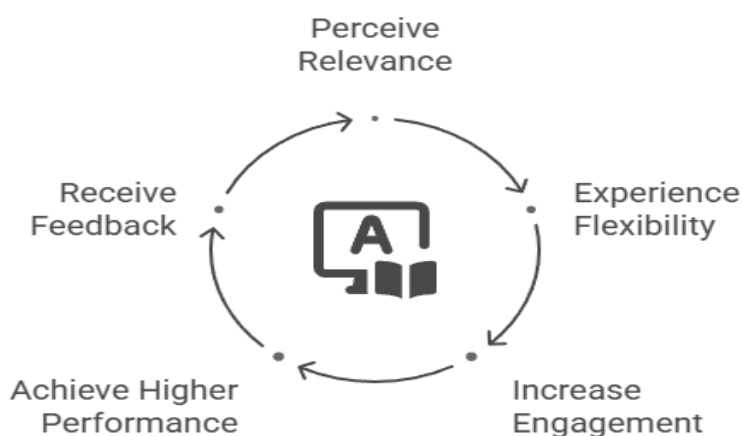


Figure 1. Cycle of learner engagement and achievement

A case study focusing on ten participants from different professional fields provided qualitative evidence of the program's impact. Participants reported that the mobile learning program allowed them to integrate language learning seamlessly into their daily routines. For instance, professionals in banking used the listening and speaking modules during commutes, while educators utilized vocabulary quizzes between teaching sessions. These patterns indicate that mobile learning successfully transformed sporadic time into structured learning experiences.

The case study also revealed that peer collaboration through discussion forums enhanced accountability and social motivation. Participants expressed that sharing reflections and completing group challenges fostered a sense of community, reducing the isolation commonly experienced in self-directed learning. The flexibility of asynchronous communication encouraged consistent participation regardless of work shifts or time constraints.

The qualitative insights validate the quantitative findings by emphasizing the role of contextual learning and social interaction in sustaining engagement. Participants consistently cited personalization, goal alignment, and continuous feedback as the most valued features of the program. The mobile platform's adaptability not only met learners' professional needs but also enhanced their digital literacy and confidence in using technology for self-directed education.

Educators who reviewed the program noted that its modular structure effectively balanced autonomy with guided learning. The integration of gamified progress tracking and personalized recommendations contributed to a sense of accomplishment and direction. The data confirm that mobile learning can be designed as a scalable framework that supports the long-term development of linguistic competence in adult learners.

The overall results indicate that mobile learning serves as a powerful medium for designing lifelong language learning programs tailored to working adults. Quantitative evidence shows significant gains in proficiency and engagement, while qualitative findings highlight the motivational and social factors underpinning sustained learning. The convergence of these outcomes supports the notion that lifelong learning flourishes when educational design aligns with learners' autonomy, relevance, and flexibility needs.

The study's findings suggest that the fusion of mobile technology and adult learning principles represents a sustainable strategy for inclusive, ongoing education. The results affirm that lifelong language learning for professionals can thrive outside formal classrooms through personalized, adaptive, and technology-mediated environments. The evidence lays the groundwork for broader policy and institutional support for mobile-assisted lifelong learning as part of workforce development and global education initiatives.

The findings of this study demonstrate that the design of lifelong language learning programs through mobile learning effectively enhances adult learners' proficiency, motivation, and engagement. Quantitative data showed significant improvement in vocabulary, grammar, and communicative competence across all proficiency levels, confirming that mobile-based environments can sustain continuous learning even among time-constrained professionals. The consistent high scores in flexibility and task relevance highlight that mobile learning fulfills adult learners' need for autonomy and real-world applicability. This suggests that when mobile platforms are designed around adult learning principles, they become powerful enablers of long-term linguistic development.

Qualitative evidence further substantiated the quantitative results by revealing that learners appreciated the integration of adaptive features, microlearning modules, and authentic communication tasks. Participants perceived the mobile learning experience as an empowering

process that allowed them to transform idle moments into meaningful study opportunities. The combination of self-paced content, personalized feedback, and social collaboration nurtured motivation and accountability, both essential elements for sustaining lifelong learning habits. The overall data affirm that mobile-assisted learning can serve as a flexible bridge between professional commitments and continuous education.

The results are consistent with prior studies by (Akour dkk., 2021) and (Chen dkk., 2022), which found that mobile learning enhances engagement and autonomy among adult learners by offering convenience and personalization. This research extends those findings by demonstrating that long-term linguistic growth can be achieved when mobile learning is systematically designed within a lifelong learning framework. (Eschenbacher & Fleming, 2020), the present study highlights that adaptive and interactive mobile applications provide meaningful opportunities for authentic language use beyond formal classrooms. The strong improvements in communicative competence corroborate the argument that mobile technologies facilitate contextualized learning environments aligned with real-world communication needs.

The findings diverge from earlier critiques suggesting that mobile learning may lack depth due to fragmented attention spans or inconsistent participation (Salajan & Roumell, 2023). Evidence from this study indicates the opposite: structured, micro-modular content and adaptive sequencing encourage persistence rather than distraction. The integration of lifelong learning principles into mobile design mitigates superficial engagement by connecting learning tasks with professional and personal goals. This contrast underscores that the success of mobile learning depends less on the technology itself and more on its pedagogical design and contextual relevance.

The findings signify a paradigm shift in how language learning for adults is conceptualized and delivered. The high engagement levels and reduced skill disparities among participants indicate that mobile learning can democratize access to quality language education, particularly for working adults who have historically been marginalized from continuing education opportunities. The consistent learning outcomes across diverse professional backgrounds reflect that lifelong learning is achievable when learning environments are adaptive, inclusive, and embedded within everyday contexts. This transformation aligns with the notion of “learning as a lifestyle,” where technology dissolves boundaries between formal education and personal development.

The results also point to the evolving role of technology as not merely an instructional medium but as an ecosystem for sustained self-regulation and reflection. Adult learners no longer rely solely on institutional structures but actively curate their own learning journeys. The success of mobile-mediated learning programs illustrates that lifelong education must now be viewed as a participatory process where learners, educators, and technologies co-construct meaning and progress. This signifies a broader educational evolution toward autonomy, accessibility, and personalization core tenets of lifelong learning in the digital age.

The implications of these findings extend to curriculum design, institutional policy, and workforce development. For curriculum designers, the study provides empirical evidence that adult-oriented mobile learning frameworks must integrate microlearning, adaptive sequencing, and real-life tasks to sustain engagement. Institutions offering language training should adopt mobile platforms not as supplementary tools but as central delivery systems enabling flexible, just-in-time learning for professionals. The success of this model demonstrates the feasibility of lifelong learning systems that function beyond the limits of formal education structures.

For policymakers and employers, the findings emphasize the need to embed mobile-based language education within professional development programs. By investing in scalable mobile platforms, organizations can cultivate employees’ linguistic competence and global communication

skills, ultimately enhancing workplace productivity and competitiveness. The study also supports UNESCO's SDG 4 by showing how digital inclusivity and continuous learning can be achieved simultaneously. These implications position mobile-assisted lifelong learning as both an educational innovation and a socio-economic strategy for workforce empowerment.

The positive outcomes can be explained by the convergence of andragogical principles and technological affordances. According to Knowles' theory of andragogy, adults learn best when content is relevant, self-directed, and problem-centered. The mobile program's flexible structure met these needs by allowing learners to control their pacing, select modules aligned with their goals, and apply new skills in real-world contexts. This relevance-driven design enhanced intrinsic motivation, leading to sustained engagement and measurable progress. The adaptivity of the platform ensured that learners operated within optimal challenge zones, reinforcing both confidence and competence.

The findings can also be interpreted through Self-Determination Theory (Morris & Rohs, 2023), which identifies autonomy, competence, and relatedness as key motivational drivers. The mobile learning program supported all three: autonomy through self-paced modules, competence through feedback loops, and relatedness through peer collaboration features. This synergy created a psychologically supportive learning environment that sustained long-term motivation. The technological design thus did not merely facilitate convenience; it operationalized core motivational constructs that sustain lifelong engagement in adult learners.

The results underscore the need for ongoing development of pedagogically sound, context-sensitive mobile learning programs. Future research should focus on longitudinal studies to examine retention and transfer effects over extended periods, determining how mobile-mediated learning influences career advancement and lifelong skill acquisition. Investigations into AI integration, such as personalized progress tracking and adaptive content generation, could further enhance the precision and sustainability of lifelong learning programs. These advancements would refine the balance between human pedagogy and technological intelligence in adult education.

Institutions and educators should collaborate to develop open-access mobile learning ecosystems that promote inclusive and equitable participation across socio-economic backgrounds. Partnerships between academia, industry, and technology developers can expand the scope of lifelong language programs to address specific workforce needs and global communication demands. The next step involves institutionalizing lifelong learning culture, where mobile learning becomes not an alternative, but an integral, recognized mode of continuous education for adults. By prioritizing adaptability, inclusivity, and learner agency, education systems can realize the full potential of lifelong language learning in an increasingly mobile and interconnected world.

CONCLUSION

The most important finding of this study is the empirical evidence that mobile learning can serve as an effective foundation for designing lifelong language learning programs tailored to the needs of working adults. Unlike conventional models of adult education that rely on periodic, institution-based instruction, this study demonstrates that continuous, flexible, and self-directed learning can be sustained through mobile technology when grounded in principles of andragogy and digital pedagogy. The unique contribution lies in showing that lifelong language learning is achievable through microlearning, adaptive sequencing, and contextualized tasks that integrate seamlessly into adults' daily routines. The observed improvements in communicative competence and engagement confirm that mobile-mediated learning not only supports linguistic development but also nurtures lifelong learning habits and autonomy among professional learners.

The added value of this research lies in its dual contribution conceptually and methodologically. Conceptually, it introduces an integrated framework that connects lifelong learning theory, mobile learning design, and adult motivation models into a coherent structure for language education. This framework redefines language learning as a continuous and self-regulated process rather than a finite course, emphasizing personalization, flexibility, and relevance as central pillars. Methodologically, the study adopts a design-based research (DBR) approach, which allows for iterative development, empirical testing, and refinement of the learning model in authentic professional contexts. The combination of quantitative and qualitative analyses provides a comprehensive understanding of how mobile platforms can be optimized to sustain engagement, equity, and scalability in adult language education.

The study acknowledges several limitations that pave the way for future exploration. The research was conducted primarily within an urban professional context in Jakarta, which may limit the generalizability of findings to rural or cross-cultural settings where access to technology and digital literacy levels differ. The study also focused on short- to medium-term outcomes, leaving the long-term impact of mobile-assisted lifelong learning on retention, career mobility, and identity transformation unexamined. Future research should employ longitudinal designs to investigate the durability of learning effects and integrate artificial intelligence to enhance adaptive personalization. Expanding the framework to include multilingual contexts, diverse industries, and global collaborations would further validate the model's applicability and advance the discourse on sustainable, technology-enhanced lifelong education for adults in the digital era.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

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