Research Article

Beyond the Classroom: Mobile-Assisted Learning for Medical Communication Competence in Indonesia

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Abstract: Effective communication is a key competency for medical professionals, but traditional classroom-based methods in Indonesia face challenges such as limited practice, geographical barriers, and insufficient exposure to diverse patient scenarios. Mobile-assisted learning (MAL) offers a promising solution to enhance medical communication training outside traditional settings. This study investigates the effectiveness of MAL interventions in developing communication skills among Indonesian medical students and healthcare professionals. A mixed-methods approach was used, involving a quasi-experimental design with pre- and post-assessments of communication competence among 180 participants from three Indonesian medical schools. The MAL intervention included a mobile app with video demonstrations, interactive case scenarios, peer feedback, and microlearning modules. Quantitative data showed a significant improvement in communication competence (mean increase of 23.4%, p<0.001), with notable gains in information gathering (28%), relationship building (26%), and patient education (21%). The mobile platform saw high engagement (average of 4.3 sessions/week) and 87% module completion. Qualitative data revealed increased confidence in consultations, improved cultural sensitivity, and better time management. Challenges included inconsistent internet access, varying digital literacy, and resistance from traditional educators. MAL shows potential for improving medical communication in Indonesia, offering flexible, accessible training. Successful implementation requires addressing infrastructure issues, integrating MAL into existing curricula, and training faculty. This study adds to the growing evidence supporting technology-enhanced medical education in resource-limited settings.

Keywords: Communication Competence; Digital Literacy; Medical Education; Mobile-Assisted Learning; Technology-Enhanced Learning

1. Introduction

Effective communication between healthcare providers and patients forms the cornerstone of quality medical care, influencing diagnostic accuracy, treatment adherence, patient satisfaction, and health outcomes. In Indonesia, the development of medical communication competence faces unique challenges stemming from cultural diversity, linguistic variations, geographical dispersion, and resource constraints within the medical education system. The archipelagic nature of Indonesia, spanning over 17,000 islands with more than 700 languages, creates particular challenges for standardizing communication training across medical schools.

Traditional classroom-based approaches to teaching medical communication skills, while foundational, present several limitations in the Indonesian context. These include limited opportunities for repeated practice, insufficient exposure to diverse patient populations and clinical scenarios, geographical barriers preventing access to specialized training centers,

large student-to-faculty ratios constraining individualized feedback, and minimal integration of culturally specific communication patterns. Additionally, the rapid evolution of healthcare delivery models and patient expectations necessitates continuous professional development that extends beyond initial medical training.

Mobile-assisted learning (MAL) has emerged as a transformative approach in medical education worldwide, leveraging the ubiquity of mobile devices to deliver flexible, accessible, and personalized learning experiences. Indonesia has witnessed remarkable growth in mobile phone penetration, reaching approximately 370 million cellular subscriptions in 2023, with smartphone adoption rates exceeding 68% among young adults. This digital infrastructure provides a foundation for implementing mobile-based educational interventions.

Mobile learning offers several theoretical advantages for developing communication competence. First, it enables microlearning approaches, allowing learners to engage with content in short, focused sessions that align with busy clinical schedules. Second, mobile platforms facilitate just-in-time learning, providing access to resources precisely when needed in clinical settings. Third, multimedia capabilities support multimodal learning through video demonstrations, audio examples, and interactive simulations. Fourth, social learning features enable peer collaboration and feedback exchange. Finally, analytics capabilities allow for personalized learning pathways and progress monitoring.

While international literature demonstrates promising outcomes for mobile learning in medical education, research specifically examining its application for communication skills training in Indonesia remains limited. Existing studies predominantly focus on knowledge acquisition rather than skill development, often exclude practicing healthcare professionals, and rarely address implementation challenges within resource-constrained settings. Furthermore, few studies examine how mobile learning can be contextualized to address Indonesia's unique cultural and linguistic diversity.

This study addresses these gaps by investigating a comprehensive mobile-assisted learning intervention designed specifically for the Indonesian context, examining both effectiveness and implementation feasibility. The research contributes to understanding how technology-enhanced learning can extend medical communication training beyond traditional classroom boundaries while respecting cultural contexts and addressing practical constraints.

This study aims to evaluate the effectiveness of mobile-assisted learning in improving medical communication competence among Indonesian medical students and residents. It also seeks to assess user engagement patterns and learning experiences with the mobile platform, as well as identify implementation challenges and facilitators within the Indonesian medical education context. Additionally, the study explores participants' perceptions of mobile learning's role in developing culturally appropriate communication skills.

2. Research Method
Study Design and Setting

This study employed a convergent parallel mixed-methods design, combining quantitative measurement of communication competence with qualitative exploration of learning experiences and implementation factors. The research was conducted from January 2024 to December 2024 across three medical schools in Indonesia: one in urban Java (Jakarta), one in semi-urban Sulawesi (Makassar), and one in a more remote location in Kalimantan (Banjarmasin). This geographical diversity was intentionally selected to capture varying infrastructure capabilities and cultural contexts.

Participants

A total of 180 participants were recruited through purposive sampling, comprising 120 clinical-year medical students (years 4-6) and 60 medical residents from various specialties. Inclusion criteria required ownership of a smartphone with internet capability, basic digital literacy, and willingness to engage with mobile learning for six months. Exclusion criteria included previous participation in intensive communication skills workshops (>20 hours) within the past year. Demographic diversity was achieved across gender (58% female), age (22-35 years), and prior clinical experience.

Mobile-Assisted Learning Intervention
Platform Development

A custom mobile application was developed in collaboration with medical education experts, communication skills specialists, and Indonesian healthcare professionals. The platform was designed following Universal Design for Learning (UDL) principles and optimized

for low-bandwidth environments. Content was available in both Indonesian and English, with culturally adapted scenarios reflecting Indonesia's diverse patient populations.

Intervention Components

The MAL intervention comprised five integrated components:

a. Video Demonstrations: 60 professionally produced videos (5-8 minutes each) demonstrating effective communication techniques across various clinical scenarios, including history-taking, breaking bad news, obtaining informed consent, and managing difficult conversations

b. Interactive Case Scenarios: 40 branching scenarios allowing learners to make communication choices and receive immediate feedback, with culturally contextualized patient presentations

c. Microlearning Modules: 90 bite-sized learning units covering specific communication skills (e.g., active listening, empathy expression, clear explanation) accessible in 3-5 minute sessions

d. Peer Learning Features: Video recording and sharing functionality enabling participants to practice and receive peer feedback on their communication attempts

e. Assessment Tools: Self-assessment checklists and guided reflection prompts aligned with established communication frameworks

Participants were encouraged to engage with the platform at least three times weekly over six months, with recommended completion of all core modules and at least 10 interactive scenarios. Faculty facilitators provided asynchronous support through the platform's messaging system.

Data Collection

Quantitative Measures

Communication competence was assessed using two validated instruments at baseline and six-month follow-up:

a. SEGUE Framework Assessment: Standardized patient encounters were conducted and video-recorded, with trained raters evaluating performance across five domains (Set the stage, Elicit information, Give information, Understand the patient's perspective, End the encounter)

b. Calgary-Cambridge Guide: Clinical communication skills were evaluated through OSCE stations focusing on initiating consultation, gathering information, building relationship, explanation and planning, and closing consultation

Usage analytics were automatically collected through the mobile platform, including session frequency, duration, module completion rates, and feature utilization patterns.

Qualitative Data

Qualitative data were collected through:

a. Twelve focus group discussions (6-8 participants each) conducted at mid-point and conclusion of the intervention

b. Twenty-four semi-structured interviews with diverse participants representing different locations, experience levels, and engagement patterns

c. Reflective journals maintained by participants documenting learning experiences and application in clinical settings

All qualitative data collection was conducted in Indonesian, with bilingual researchers ensuring accurate translation and cultural interpretation.

Data Analysis

Quantitative data were analyzed using SPSS version 27. Paired t-tests compared pre-post communication competence scores, with effect sizes calculated using Cohen's d. Subgroup analyses examined differences by location, experience level, and engagement intensity. Usage analytics were analyzed descriptively to identify engagement patterns.

Qualitative data underwent thematic analysis following Braun and Clarke's six-phase approach. Indonesian transcripts were analyzed in the original language by bilingual researchers to preserve meaning and cultural nuances. NVivo 12 software facilitated coding and theme development. Triangulation across data sources enhanced credibility.

Ethical Considerations

Ethical approval was obtained from the institutional review boards of all participating institutions. Participants provided written informed consent, with explicit permission for video recording and data analysis. Confidentiality was maintained through de-identification, and participants could withdraw at any time without consequence. The study was registered with the Indonesian Clinical Trial Registry.

4. Results and Discussion
Results
Participant Characteristics and Retention
Of the 180 enrolled participants, 168 completed the six-month intervention (93.3% retention rate). Attrition was primarily due to clinical rotation changes (n=7) and technical difficulties (n=5). Completers did not differ significantly from non-completers in demographic or baseline characteristics. The sample included 98 females (58.3%) and 70 males (41.7%), with a mean age of 25.8 years (SD=3.2). Geographical distribution was relatively balanced: Jakarta (n=62), Makassar (n=58), and Banjarmasin (n=48).

Communication Competence Outcomes
Participants demonstrated statistically significant improvements in overall communication competence from baseline to post-intervention across both assessment instruments.

Table 1. Pre-post Changes in SEGUE Framework Assessment Scores (n=168)

SEGUE Domain	Pre-test Mean (SD)	Post-test Mean (SD)	p-value
Set the stage	3.2 (0.8)	4.1 (0.6)	<0.001
Elicit information	3.4 (0.9)	4.5 (0.7)	<0.001
Give information	3.1 (0.7)	3.8 (0.6)	<0.001
Understand patient	2.9 (0.8)	3.7 (0.7)	<0.001
End the encounter	3.3 (0.6)	4.0 (0.5)	<0.001
Overall Score	**15.9 (3.1)**	**20.1 (2.4)**	**<0.001**

The mean overall SEGUE score increased from 15.9 (SD=3.1) to 20.1 (SD=2.4), representing a 26.4% improvement (p<0.001, Cohen's d=1.52). The largest improvements were observed in the 'Elicit information' domain (32.4% increase) and 'Understand patient' domain (27.6% increase). Effect sizes for all domains exceeded 0.8, indicating large practical significance.

Calgary-Cambridge Guide assessments similarly demonstrated significant improvements across all skill categories, with mean total scores increasing from 52.3 (SD=8.7) to 68.9 (SD=6.2), a 31.7% improvement (p<0.001, Cohen's d=2.14). Particularly notable gains were observed in 'Building Relationship' (35% improvement) and 'Gathering Information' (29% improvement) skills.

Platform Engagement and Usage Patterns
Analytics data revealed high engagement with the mobile platform throughout the intervention period. Participants averaged 4.3 learning sessions per week (SD=1.8), with mean session duration of 18.7 minutes (SD=6.4). Module completion rates were substantial: 87% completed all core video demonstrations, 82% finished at least 30 interactive scenarios, and 76% engaged with peer learning features.

Usage patterns varied by participant characteristics. Medical students demonstrated higher engagement frequency (4.8 vs. 3.5 sessions/week) but shorter session duration (16.2 vs. 23.4 minutes) compared to residents. Participants from Banjarmasin (the most remote location) showed comparable engagement rates but experienced more interrupted sessions due to connectivity issues.

The most frequently accessed content included breaking bad news scenarios (accessed by 94% of participants), patient-centered interviewing techniques (91%), and cultural communication considerations (88%). Peer feedback features were utilized by 73% of participants, with an average of 5.2 video submissions per user and 12.3 feedback comments provided throughout the study period.

Correlation analysis revealed a significant positive relationship between engagement intensity (measured by total platform usage time) and improvement in communication competence scores (r=0.52, p<0.001), suggesting a dose-response relationship.

Qualitative Findings
Thematic analysis of qualitative data yielded five major themes characterizing participants' experiences with mobile-assisted learning.

a. Theme 1: Flexibility and Accessibility

Participants consistently emphasized how mobile learning provided unprecedented flexibility in timing and location. One medical student explained: "I could practice communication skills during transit between hospital rotations, something impossible with traditional classroom sessions." The ability to access learning materials during brief breaks between clinical duties was particularly valued. Several residents noted that the mobile platform enabled continued professional development despite demanding work schedules that precluded attending in-person workshops.

b.   Theme 2: Enhanced Confidence Through Repetition

The opportunity for repeated practice emerged as a crucial factor in building communication confidence. Participants appreciated the ability to review video demonstrations multiple times and attempt interactive scenarios until mastery. A resident stated: "Being able to practice difficult conversations like discussing DNR orders repeatedly, without fear of judgment, built my confidence before facing real patients." The low-stakes practice environment allowed learners to experiment with different communication approaches and learn from mistakes.

c.   Theme 3: Cultural Relevance and Contextualization

Participants strongly valued the culturally adapted content reflecting Indonesian patient populations and healthcare contexts. The inclusion of scenarios addressing language barriers, family-centered decision-making, and traditional healing beliefs resonated deeply. One participant noted: "Finally, communication training that recognizes how Indonesian families want to be involved in medical decisions, not just Western individual autonomy models." The representation of diverse regional accents and communication styles was also appreciated.

d.   Theme 4: Peer Learning and Community Building

The peer feedback features fostered a supportive learning community that extended beyond individual institutions. Participants valued receiving diverse perspectives on their communication approaches and observing peers' techniques. A student remarked: "Seeing how colleagues in different cities handle similar situations enriched my understanding of effective communication." However, some participants initially felt hesitant to share videos due to concerns about privacy and judgment, which decreased over time as trust developed.

e.   Theme 5: Implementation Challenges

Several implementation challenges were identified. Internet connectivity issues were particularly problematic in Banjarmasin, with participants reporting frequent disruptions during video streaming. One participant stated: "I had to download content when WiFi was available at the hospital to watch later during power outages at home." Some participants struggled with initial technical navigation, requiring peer support. Additionally, several educators expressed concerns about mobile learning potentially reducing direct faculty-student interaction, though this concern diminished as they observed learning outcomes.

Data triangulation between usage analytics and qualitative accounts confirmed that technical difficulties primarily affected participants in remote locations, while motivational barriers (time constraints, competing priorities) were distributed across all sites.

Discussion

Principal Findings

This study demonstrates that mobile-assisted learning can effectively enhance medical communication competence among Indonesian medical students and residents. The significant improvements observed across multiple validated assessment instruments, coupled with high engagement rates and positive learner experiences, support the potential of mobile learning to extend communication skills training beyond traditional classroom boundaries. The convergence of quantitative outcomes and qualitative insights provides robust evidence for both efficacy and acceptability of this approach within the Indonesian healthcare education context.

Interpretation in Context of Existing Literature

Our findings align with and extend previous research on mobile learning in medical education. The magnitude of improvement (26-32% across assessment tools) exceeds that reported in several earlier studies examining mobile interventions for communication skills, which typically showed modest effect sizes. This enhanced effectiveness may reflect several design features: comprehensive integration of multiple learning modalities (video, interactive scenarios, peer learning), cultural contextualization of content, and sustained engagement period allowing for skill consolidation.

The dose-response relationship between platform engagement and learning outcomes supports adult learning theory's emphasis on active, repeated practice for skill acquisition. Our findings reinforce that mobile learning's value lies not merely in content delivery but in enabling frequent, distributed practice that traditional classroom formats cannot accommodate. The microlearning approach appears particularly suited to communication skills development, allowing learners to focus on specific techniques in manageable segments.

The strong emphasis participants placed on cultural relevance validates critiques of westernized medical education models in Asian contexts. Communication skills training must acknowledge cultural variations in patient-provider relationships, family involvement in healthcare decisions, and communication norms. Our culturally adapted content appeared to enhance learner engagement and perceived applicability, suggesting that context-specific design is essential rather than optional for mobile learning interventions in diverse settings.

Practical Implications

Several practical implications emerge for medical educators and institutions considering mobile-assisted learning implementation:

a. Integration with Formal Curriculum: Mobile learning should complement rather than replace face-to-face instruction. Optimal integration might involve using mobile platforms for pre-class preparation, skill practice, and post-workshop reinforcement, while preserving in-person sessions for high-stakes assessments, complex case discussions, and personalized faculty feedback.

b. Infrastructure Considerations: Successful implementation in resource-constrained settings requires attention to connectivity challenges. Platform design should incorporate offline functionality, progressive content loading, and optimized media files. Institutions might provide dedicated WiFi access points or mobile data subsidies to ensure equitable access.

c. Faculty Development: Educators need training not only in platform use but in pedagogical approaches for mobile learning. This includes designing effective microlearning content, facilitating online discussions, and providing asynchronous feedback. Addressing faculty concerns about technology replacing traditional teaching relationships is crucial for institutional buy-in.

d. Cultural Adaptation Process: Developing culturally appropriate content requires collaboration between content experts, local healthcare professionals, and cultural consultants. This investment in contextualization appears essential for learner engagement and skill transfer to clinical practice.

e. Sustainable Implementation: Long-term sustainability requires institutional commitment, including technical support, content updates, and integration with assessment systems. Peer learning features can help distribute support responsibilities and foster learning communities that persist beyond formal intervention periods.

Limitations

Several limitations warrant consideration. The absence of a control group limits causal inference, as improvements might partially reflect maturation or concurrent clinical experiences. However, the magnitude of change and the correlation with platform engagement suggest a substantial intervention effect. The use of standardized patient encounters for assessment, while validated, may not fully capture real-world communication performance. Future research should include workplace-based assessments and patient-reported outcomes.

Selection bias may have occurred, as participants were volunteers who owned smartphones and had baseline digital literacy. This potentially limits generalizability to less digitally engaged populations. The six-month intervention period, while substantial, does not address long-term skill retention or the need for ongoing professional development. Follow-up studies should examine sustained effects and optimal refresher strategies.

The study was conducted at three sites, all affiliated with medical schools supporting research participation. Implementation in different institutional contexts or with different learner populations might yield varying results. Additionally, the custom-developed platform required significant resources that might not be available to all institutions, though the findings can inform development of more accessible solutions.

5. Conclusion

This study demonstrates that mobile-assisted learning represents a viable and effective approach to developing medical communication competence in Indonesia. By extending learning opportunities beyond traditional classroom boundaries, mobile platforms can address persistent challenges in medical education including limited practice opportunities, geographical barriers, and insufficient attention to cultural diversity. The intervention achieved significant improvements in communication skills while maintaining high learner engagement and satisfaction.

Successful implementation requires thoughtful attention to cultural contextualization, infrastructure constraints, and integration with existing curricula. The challenges identified, particularly regarding connectivity and faculty adoption, are not insurmountable but require proactive planning and institutional support. The strong relationship between engagement intensity and learning outcomes underscores the importance of designing compelling, relevant content that motivates sustained participation.

As Indonesia continues expanding medical education to meet growing healthcare demands, innovative approaches that leverage technology while respecting cultural contexts will be essential. Mobile-assisted learning offers a scalable solution that can democratize access to quality communication skills training across diverse geographical and institutional settings. However, technology should be viewed as an enabler rather than a replacement for meaningful human connection in teaching and learning.

The findings contribute to the growing evidence base supporting technology-enhanced medical education in resource-constrained settings. They suggest that with appropriate design, implementation support, and cultural adaptation, mobile learning can help bridge gaps between educational ideals and practical realities, ultimately enhancing the communication competence of healthcare professionals who serve diverse Indonesian communities.

Several promising avenues for future research emerge from this study. Randomized controlled trials with longer follow-up periods could establish causal relationships and examine skill retention. Comparative effectiveness research could determine optimal combinations of mobile learning with other educational modalities. Investigation of mobile learning's impact on actual patient outcomes and satisfaction would provide crucial evidence of clinical relevance.

Artificial intelligence integration presents exciting possibilities for personalized learning pathways, automated feedback on communication attempts, and adaptive scenario difficulty. However, such innovations must be evaluated rigorously for educational effectiveness and cultural appropriateness. Research examining implementation across diverse healthcare settings, including primary care clinics and specialty hospitals, would inform scalability.

Finally, exploring mobile learning's potential for interprofessional communication training and team-based communication skills could extend its impact beyond physician education to the broader healthcare workforce.

Conflict of Interest: The authors declare no conflicts of interest related to this research. The mobile learning platform was developed specifically for this study with no commercial intent or external industry involvement.

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