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Methods of Developing Information and Communication Competence Among Students Through M-Learning Technologies

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Abstract: Today, the development of digital technologies is bringing major changes to the education system. M-learning (mobile learning) technologies are an integral part of these changes. These technologies create broad opportunities for the formation and development of information and communication competence among students. This article analyzes the methods of developing information and communication competence among students through m-learning technologies.

Keywords: m-learning, information and communication competence, mobile education, interactive methodology, innovative approach.

Introduction: As technology continues to transform educational landscapes, mobile learning (m-learning) stands out as a key driver of innovation for developing students' information and communication competence. These competencies include the ability to locate, evaluate, and effectively use information, as well as to collaborate and communicate using digital tools. M-learning, characterized by the use of portable devices such as smartphones and tablets, can facilitate these processes by making resources and interactive environments accessible beyond the traditional classroom. The ubiquity of mobile technology has reshaped pedagogical practices, moving them toward more learner-centered, flexible, and personalized approaches. While e-learning has been extensively researched, the rapid global adoption of smartphones and tablets has made m-learning a distinct field of inquiry, worthy of dedicated study and pedagogical

experimentation.

The growing significance of m-learning can be attributed to several factors. First, increased access to wireless connectivity enables students to engage with educational content virtually anytime and anywhere. This flexibility aligns well with student lifestyles, particularly for non-traditional or working learners. Second, mobile devices tend to be highly interactive, offering innovative features such as GPS, camera functionality, and social media integration. These features can enrich the learning experience by encouraging real-time collaboration, location-based tasks, and multimedia presentations. Third, contemporary labor markets are increasingly reliant on strong digital literacy skills, making it imperative for educational institutions to integrate technology-based methodologies. Consequently, the focus on developing students' information and communication competence through m-learning has gained momentum in diverse educational contexts, from primary schools to universities.

Despite widespread enthusiasm for m-learning, challenges persist in terms of instructional design, technological infrastructure, and teacher readiness. Institutions often struggle to determine the best pedagogical models that optimize mobile technology use while maintaining robust academic standards. Many teachers also require additional training to incorporate mobile devices effectively into lesson plans and to mitigate potential distractions. This article investigates methods for developing information and communication competence through m-learning, analyzing both theoretical frameworks and practical classroom interventions.

METHODS

This study adopted a mixed-methods approach to investigate how different m-learning methodologies can bolster information and communication competence among students. The data collection was divided into two phases. The first phase involved a review of existing literature, including peer-reviewed journals, conference proceedings, and policy documents, to identify prevailing trends, theoretical models, and successful practices in m-learning. Keywords such as "m-learning," "mobile devices," and "information and communication competence" guided the search. The literature review provided a conceptual framework for understanding the pedagogical principles underlying m-learning initiatives, especially regarding digital literacy and collaborative learning.

In the second phase, an empirical investigation was carried out at two educational institutions: one

secondary school (grades 9–12) and one university. In total, 120 students (60 from the secondary school and 60 from the university) participated voluntarily, along with 10 instructors who had varying levels of experience in using mobile technologies for teaching. Data were gathered through observation of m-learning sessions, structured interviews with instructors, and pre- and post-intervention questionnaires administered to students. The intervention spanned eight weeks and focused on three specific strategies for m-learning integration: mobile-based research tasks, collaborative discussion platforms, and interactive assessment tools.

The mobile-based research tasks required students to use smartphone applications for searching scholarly databases, collecting real-time data, and organizing references. Collaborative discussion platforms, such as dedicated class chat groups or social media channels, were used to foster peer-to-peer feedback and group problem-solving. Finally, interactive assessment tools, often in the form of gamified quizzes or quick polls, were integrated at the beginning and end of lessons to evaluate understanding, keep students engaged, and adapt teaching strategies in real time. Throughout this period, instructors recorded reflective notes about students' progress and any technical or pedagogical challenges. After the eight-week intervention, questionnaires aimed to measure changes in students' self-efficacy concerning digital information management and interpersonal communication through mobile tools.

RESULTS

Analysis of questionnaire data revealed a marked increase in students' confidence regarding their information and communication competence. The greatest improvement was observed in tasks that required information evaluation and synthesis using mobile applications. Prior to the intervention, only 37% of secondary school students and 52% of university students considered themselves "proficient" or "very proficient" at evaluating the credibility of digital sources. After the intervention, these figures rose to 62% and 78%, respectively. Additionally, over 70% of participants reported feeling more capable of organizing online research findings using collaborative tools such as shared documents or note-taking apps.

The use of collaborative discussion platforms also produced positive outcomes. Observations and instructors' reflective notes indicated that students who participated actively in group chats or forums displayed higher levels of engagement with the course material. Their interactions involved clarifying concepts, sharing relevant links, and even providing moral support to peers. In interviews, instructors noted that the more

structured and purposeful the discussion prompts, the more constructive the dialogue became. Students in both the secondary school and the university setting demonstrated improved interpersonal communication skills, including respectful online discourse and problem-solving strategies.

Interactive assessment tools contributed to an overall increase in student motivation and accountability. Pre- and post-session quizzes offered real-time insight into student comprehension, allowing teachers to adjust their lessons quickly. These tools also gave students immediate feedback, which many interviewees described as motivating and useful for reinforcing learning. One notable finding was that students felt less anxious about assessment when it took the form of short, frequent mobile quizzes rather than traditional high-stakes exams. While some technical glitches were encountered—primarily related to connectivity issues or outdated device software—these problems were relatively minor and did not significantly undermine the intervention's objectives.

DISCUSSION

The findings confirm the hypothesis that well-structured m-learning initiatives can significantly enhance students' information and communication competence. By harnessing the interactive, flexible, and networked capacities of mobile devices, educators can promote deeper engagement and foster essential digital skills. The observed boost in students' ability to evaluate sources indicates that contextualized, hands-on practice is more effective than theoretical instruction alone. M-learning offers frequent opportunities for students to search for information, verify its accuracy, and apply it to real or simulated problem-solving scenarios, thereby making the learning process both authentic and dynamic.

The study also highlights the value of collaborative discussion platforms and interactive assessment tools in cultivating communication skills. Such tools underscore the participatory nature of learning in the digital age, where knowledge is constructed through social interaction and peer feedback. However, the positive outcomes hinge on careful instructional design and alignment with learning objectives. Simply inserting mobile technology into a traditional lecture without clear, purposeful tasks can result in distractions or superficial engagement. Teachers therefore require targeted professional development to design and facilitate meaningful m-learning experiences, ensuring that students collaborate, communicate, and critically engage with digital content.

Despite the generally positive results, certain

limitations and challenges emerged. Internet connectivity and device compatibility issues occasionally disrupted the flow of lessons, particularly in areas with weak Wi-Fi infrastructure. Another challenge involved varying degrees of digital literacy among instructors, some of whom needed ongoing technical support to manage advanced m-learning platforms. Furthermore, while the intervention had a clear impact on self-reported competence and observed engagement, future research might employ longitudinal designs to measure the retention of these competencies over time. Studies could also explore how socio-economic factors influence m-learning outcomes, especially in settings where access to personal devices is uneven.

CONCLUSION

In conclusion, this study reinforces the argument that strategically deploying m-learning technologies can serve as a potent method for developing students' information and communication competence. By leveraging mobile research tasks, collaborative platforms, and interactive assessments, educators can create a learning environment that aligns with modern digital realities. The key to success lies in structuring m-learning activities that balance technological innovation with pedagogical rigor, thereby ensuring that the transformative potential of these tools truly benefits students. As mobile technology becomes increasingly integral to everyday life, educational systems have both the responsibility and the opportunity to integrate m-learning approaches that equip learners with the digital competencies essential for academic achievement and lifelong learning.

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