Exploring Mobile Learning in UAE Universities: A Comparative Lens on Engineering and Other Academic Disciplines

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Abstract—The rapid integration of mobile learning technologies (MLTs) in higher education institutions (HEIs) has transformed pedagogical delivery, offering flexibility and accessibility. However, in culturally diverse contexts such as the United Arab Emirates (UAE), the perception of faculty members regarding the use of MLTs remain underexplored. While existing research highlights the technological and pedagogical benefits of MLTs, there is a critical gap in understanding how faculty members use these technologies in different disciplines within UAE universities. This study investigates the use of MLTs by faculty members in different disciplines in UAE HEIs, addressing key questions: (1) How do faculty members perceive the use of MLTs? (2) How do faculty members from different disciplines use MLTs? (3) MLT tools used by faculty members at UAE universities. A qualitative method is employed, a semi-structured questionnaire with an option of open-ended questions to further explore the perception of faculty members about the use of MLTs. The questionnaire was shared by email, and (n=100) participants took part in answering the questionnaire. Thematic analysis and descriptive statistics are used to interpret data, ensuring a robust understanding of the challenges and opportunities. Data was analysed using QDR Miner Lite. Findings reveal that the majority of faculty members consider using MLTs as a teaching tool. Faculty members at the Engineering school used MLTs more frequently than in other disciplines. The most used MLT tools were flipped classroom and video recording, in addition to gamification and collaborative learning. The study proposes further adoption of MLTs in various disciplines, advocating for policy adjustments and ethical guidelines tailored to the UAE context. By bridging the research gap, this study contributes to global discourse on the responsible use of MLTs in culturally distinct higher education settings.

Keywords— Mobile learning technologies; Student engagement; Learner's diversity

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I. INTRODUCTION

Advancements in technology are prevalent worldwide and the tendency of young people to use them in a well-known fact (Farouqa & Hysaj, 2022; Alenezi, Wardat & Akour, 2023). While educators in higher education may be skeptical about the benefits of using the mobile learning technology (MLT), students worldwide use these mostly free available sources for a variety of reasons that support their knowledge acquisition and knowledge formation (Criollo-C et al., 2021). The utilisation of MLTs has impacted the variety of ways that information is gathered and shared and how the instructions are delivered in higher education (Bernacki et al., 2020). Although the purposes of teaching and learning in higher education are somewhat the same as they have been prior to the advancements of MLTs, learning outcomes are required to consider the impact of the utilisation of these tools in higher education (Keengwe & Bhargava, 2014). Changes and adaptations in teaching and learning formats require the consideration of the pedagogical implications that occur due to the implementation of these tools (Hameed, Qayyum and Khan, 2024). For instance, new trends in mobile teaching technologies require exploration and understanding to ensure that their use has positive implications for students and educators. The same is valid when considering the efficacy of utilising these tools in facilitating teaching and learning in higher education (Akintayo et al., 2024).

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Exploring the efficacy of these tools in higher education requires an understanding of the ways that their use impacts the process of teaching and learning, the interaction between students and educators, levels of student engagement, and how they all relate to improved learning and teaching experience in higher education (Keengwe & Bhargava, 2014; Hysaj, Khan & Farouqa, 2025). The utilisation and exploration of these tools are in constant development, and new tools are regularly developed, adding value to the teaching and learning process (Bernacki, Greene, and Crompton, 2020). The active role of utilising these tools is connected with all aspects of teaching and learning, from the way the instructions are given, to the ways that students participate actively in the learning and teaching process, to the variety of forms which students are assessed. While the MLTs are mostly not directly connected with the learning outcomes in the majority of subjects, their effective utilisation may be used to improve students' levels of engagement, which can subsequently positively impact students' retention levels (Yadav, 2024).

The necessity for improved and increased mobile learning is due to many factors of economic, political, or social nature (Thaanyane & Jita, 2024). While these factors are maybe different in countries worldwide, the utilisation of mobile learning technologies is undoubtedly one of the important values and relates to the plethora of circumstantial instances when these educational platforms or applications are used to facilitate actively the process of teaching and learning in higher education (Hysaj, Freeman and Hamam, 2024). The efficiency in utilising these tools not only positively impacts students' learning process but also adds value to the teaching process and allows educators to sharpen their technological skills and keep up to date with the newest trends in teaching and learning (Keengwe & Bhargava, 2014; Farouqa & Hysaj, 2022). Listening, reading, and sharing are all much-needed sets of skills in education, and they are all possible due to the mobile devices that provide an extensive number of applications that can support teaching and learning of these fundamental skills (Criollo-C et al., 2021). Although there are many initiatives of using MLTs in higher education, exploring the efficacy of each of them is required to be incorporated in the teaching process to ensure that the use of these tools not only facilitates teaching and learning but also has a positive impact on the empowerment of students with skills needed in the work environment. Therefore, it is important that these tools are explored to also understand the impact that they have on the development of cognitive, analytical, and reflective skills of students (Hakimi, Katebzadah, and Fazil, 2024). Such exploration can also improve awareness about the implications that these tools have for future improvements in the education system (Bernacki, Greene, and Crompton, 2020; Criollo-C et al., 2021).

II. LITERATURE REVIEW

MLTs definition and benefits

There are many definitions of Mobile learning technologies (MLT), which can be defined as the usage of mobile and smart devices for providing convenient methods of teaching and learning process (Valencia-Arias et al., 2024). MLT enables students to access different resources at their convenience with no limitation for time or/and location (Kucuk et al., 2020). Also, it facilitates personalized learning, peer collaboration, and fosters a dynamic student engagement environment (Imlawi et al., 2023). Generally, the pedagogical framework of mobile learning, often termed m-learning, is characterized not just by the use of portable devices like smartphones, tablets, and laptops, but by its reliance on internet connectivity to facilitate education (Oyelere et al., 2017; Pramana, 2018). Fundamentally, its objective is to enable a flexible and location-independent didactic exchange. This approach empowers learners to interact with educational material and receive real-time assessments of their development, free from the constraints of a fixed classroom or schedule (Parsons et al., 2023; Suartama et al., 2019).

Faculty views about using MLTs

The COVID-19 pandemic intensified the demand for m-learning, with instructors worldwide transitioning to synchronous and asynchronous modes under emergency conditions. While some thrived, others, particularly those with little online teaching experience, struggled with disengagement, often "teaching to black boxes" when students left cameras off (Kalogeras et al., 2022). This highlighted both the opportunities and risks of digital learning environments. At the same time, students' immersion in technology-rich cultures has shaped their expectations. By the time they enter university, many have already used technology to support personal learning preferences (Zhang & Ma, 2023). Raja and Nagasubramani (2018) argue that education must continually adapt to meet the demands of the technological age, while Statti and Torres (2020) emphasise that students require technological competencies to meet evolving workforce needs. Mobile devices motivate learners through autonomy, flexibility, and collaboration. Studies show that students perceive mobile apps as satisfying and intrinsically motivating, yielding greater well-being and achievement than traditional tools (Jeno et al., 2019). Other research reinforces the benefits of m-learning, including constructivist learning, collaborative knowledge building, informal and self-directed opportunities, portability, affordability, and motivational appeal (Criollo-C et al., 2021; Krull & Duart, 2017). These outcomes align with social constructivist approaches that emphasise dialogue and communication (Greenwood, 2020). Yet despite these advantages, instructors continue to face challenges in sustaining engagement, making the thoughtful integration of digital tools into lesson design critical (Kalogeras et al., 2022).

The issue of readiness and acceptance is also central. The concept of "mobile learning acceptance" highlights the role of attitudes and intentions in shaping adoption (Mittal et al., 2017; Abas et al., 2009). Research consistently shows that faculty experiences influence acceptance, with Ball and Levy (2009) identifying prior experience as crucial. Chun's (2019) qualitative study adds depth, identifying five themes shaping acceptance: teachers' perceptions, motivations, standards of conduct, challenges, and benefits. Other determinants include ease of use, enjoyment, and self-efficacy (Gan & Balakrishnan, 2014). Thomas et al. (2014) similarly noted that access to the

internet and digital tools such as calculators and calendars encouraged adoption, though concerns over cheating, cyberbullying, and misuse remain. Studies across contexts show uneven levels of acceptance. Pre-service teachers in Turkey reported moderate readiness and acceptance (Ilci, 2014), while Bere and Rambe (2019) found that those in developing contexts primarily used devices for communication and planning. Faculty in Kentucky and Tennessee highlighted both opportunities and obstacles (Thomas et al., 2014). Positive faculty perspectives are also evident: Brown (2018) found mobile learning to be useful for professional development, communication, and overcoming time constraints, yet challenges persist. For instance, teachers in Tanzania expressed concerns about phones negatively affecting student behaviour (Kafyulilo, 2012), while Korean teachers' attitudes were generally low, with female instructors expressing more positive attitude towards the use of mobile learning than male instructors (Baek et al., 2017). At institutional levels, infrastructure often dictates outcomes. While Karimi et al. (2014) found Iranian universities possessed hardware capacity, they lacked content development and professional expertise to sustain m-learning. In African contexts, Kaliisa and Picard (2017) documented similar barriers, including weak infrastructure and policy gaps, though they also found strong potential for collaborative and authentic learning. These findings underline the importance of contextual conditions for implementation.

Another aspect of mobile learning relates to shifts in learning styles. Hayles (2008) contrasts deep attention, characterised by sustained focus, with hyper attention, which involves frequent switching between tasks. The latter style is prevalent among millennial and post-millennial learners, challenging traditional education models. Multimodal learning frameworks provide solutions, emphasising the use of multiple semiotic resources in meaning-making (Mayer, 2009). Kalogeras (2013a, 2013b) similarly stresses the importance of designing content with multicultural and multimodal media to suit diverse learners.

One response has been microlearning, which presents content in short, digestible units. According to Kalogeras et al. (2022), microlearning resonates with students' social media habits, enhancing retention and engagement. It is especially suited to learners accustomed to shorter content forms. However, Samala et al. (2023) warn that microlearning must extend beyond "edutainment" to offer substantive value.

Mobile learning is part of a broader paradigm shift in higher education. According to Cavanaugh et al. (2012), this shift as moving from content transmission to content transaction, where instructors become partners in learning rather than sole authorities. Sharples (2006) notes that m-learning allows students to construct knowledge outside of temporal and spatial constraints, while Naismith et al. (2004) emphasise its distinct qualities of ownership, informality, and mobility. Nevertheless, there are risks that accompany these changes. Some of the concerns raised by researchers and educators are related to academic integrity, inappropriate internet use, and disruption persist (Thomas et al., 2014). For example, Corbeil and Valdes-Corbeil (2007) point out social and organisational barriers, while Balash et al. (2011) cited reluctance on the part of Iranian lecturers. Even where there is university-level adoption of mobile applications, the latter are characteristically restricted to non-educational uses such as calendars or maps (Park, 2011;

Park et al., 2009). These trends reflect the early stage of adoption with little integration into core pedagogic practice. Uneven uptake apart, the literature documents the transformative potential of the paradigm of mobile learning. It offers active participation, reflective practice, and collaboration were designed pedagogically appropriate (Criollo-C et al., 2021; Kaliisa & Picard, 2017). However, there is a need for additional studies to examine teaching instructors' roles within the development and reaction to such transformations. As confirmed by Kukulska-Hulme (2007), higher education m-learning is still exceedingly underdeveloped, and the education outcomes are still not apparent.

Use of MLTs in Higher Education

Academic studies highlight that mobile learning significantly contributes to learners' performance outcomes while also positively influencing their emotional engagement, including their perspectives, curiosity, and levels of motivation (El-Sofany & El-Haggar, 2020; Kang, 2024; Li & Li, 2024). The capacity of this approach to engage students through dynamic visual and auditory elements can make educational content more compelling and stimulate a greater desire to learn (Ibrahim, 2024; Yin et al., 2019). The devices that enable this pedagogy have transcended their primary role as communication tools to become ubiquitous instruments integrated into daily routines (Lin et al., 2023; Zhang, 2022). Consequently, this methodology empowers both educators and learners by creating sustained opportunities for education beyond the physical classroom (Parsons et al., 2023). For instructors, it facilitates digital interaction with students, enables the distribution and evaluation of tasks, and supports active use of dedicated learning applications. The fundamental objective is for learners to assimilate subject-specific knowledge and address queries by interacting with structured educational materials and tasks within a tailored mobile learning environment (El-Sofany & El-Haggar, 2020).

In addition, Studies have established mobile learning as a viable pedagogical strategy for the effective integration of digital tools into structured educational settings (Elfeky & Masadeh, 2016; Kang, 2024). A key strength of this approach lies in its capacity to facilitate immediate information retrieval, thereby ensuring vital academic resources are readily accessible to learners (Huang et al., 2020). Furthermore, this method promotes greater student autonomy, empowering individuals to take an active and self-directed role in their educational journey (Kang, 2024). Within such an environment, students gain the flexibility to interact with instructional materials and build their comprehension of various subjects at a self-determined pace. This approach also allows educators to tailor curricular materials to meet diverse student needs, thereby fostering improved academic outcomes and cultivating a more engaging and motivating learning experience (Badawood & AlBadri, 2021).

A study conducted by Goundar and Kumar (2022) tested various mobile learning applications in undergraduate and graduate classrooms. Through thematic analysis, the applications were categorized into five types: learning management systems, vodcasts/podcasts, game-based learning, collaborative tools, and language learning apps. Learning management applications function primarily as centralized

digital repositories for educational materials. Research in this domain has involved trialing and assessing platforms like Moodle. For instance, one project engineered a mobile application to facilitate the storage and access of instructional videos on phones via the Hadoop Distributed File System (HDFS) (Parsola et al., 2019). In a separate study, a Moodle-based LMS was created to address the disconnect between educators and learners while aligning with evolving trends in tertiary education (Castillo et al., 2013).

Vodcasts and podcasts serve as instructional tools for disseminating academic content to learners. These platforms allow students to access and review recorded lectures after they have been delivered live. This category is defined by functionalities that encompass video-based lessons (vodcasts), the distribution of materials through social networks, and audio-only educational content (podcasts) (Goundar & Kumar, 2022). Research by Evans (2008) exemplifies this use, where a university course employed podcasting to educate its undergraduates by having them download sequences of audio and video files onto portable media devices.

Game-based learning utilizes interactive mobile games as a primary instructional mechanism. This pedagogical approach leverages the engaging nature of gameplay to foster the acquisition and refinement of academic competencies. For instance, Troussas et al. (2020) developed and deployed "Quiz Time," an application designed to autonomously evaluate and progressively build a student's proficiency in the C# programming language through game mechanics. Separately, Fotouhi-Ghazvini et al. (2009) created a pair of educational mobile games intended to function as a comprehensive self-directed learning tool. These games provided instructional content, tasks, and practical exercises tailored for three distinct groups of Farsi language learners: school pupils, university students, and public sector personnel.

Collaborative learning applications employ specific strategies to improve educational outcomes by enabling group-based work among students. This pedagogical method is often realized through digital tools like instant messaging platforms and blogs that promote interactive engagement. For instance, Davies (2014) explored the use of iPads to strengthen interaction and group dynamics during tutorial sessions involving undergraduate nursing students. In separate research, Ng et al. (2020) investigated the educational application of "WeChat," a mobile social networking platform. Their study found that WeChat effectively facilitated collaborative learning and was uniquely positioned as the predominant mobile social application utilized by a significant majority of Chinese student populations.

Digital tools designed for linguistic acquisition enable learners to study non-native languages. Illustrating this approach, Liu et al. (2015) created a context-aware ubiquitous language learning (CAULL) framework. This system facilitated an educational experience around Cheng Kung Lake by integrating handheld personal digital assistants with wireless connectivity, RFID tags, and corresponding readers. Their research involved a cohort of 47 graduate students possessing intermediate language proficiency. The investigation's results indicated that engagement with the CAULL system supported the development of learners' comprehension abilities and was met with a favorable reception from participants.

In another review, Criollo-C et al. (2021) identified further significant benefits of adopting mobile learning technologies (MLTs). They found that MLTs support a constructivist approach by enabling learners to actively build knowledge through customizable experiences. This, in turn, positively transforms student behavior by increasing motivation and promoting self-directed engagement. Another supporting empirical study by Anuyahong and Pucharoen (2023) found that a mobile learning platform significantly enhanced student engagement and improved learning outcomes in higher education. Using a comparative design, the research demonstrated that the intervention group, which used the platform, showed superior results in usage metrics, perceived usefulness, satisfaction, and academic performance compared to the control group. The findings confirm the platform's positive impact on education.

MLTs' common software/platforms

Technology has become deeply embedded in modern societies, and education is no exception. Information and communication technologies (ICTs) are increasingly central to teaching and learning, reshaping pedagogical approaches across all levels of education (Matimbwa & Anney, 2016). Academic institutions, much like learning organisations, dedicate resources to adopting advanced technologies in their operations, particularly in teaching and learning (Grabe, 2008, as cited in Balash et al., 2011). Among the most prominent innovations is mobile learning (m-learning), a growing trend that provides both educators and learners with diverse opportunities (Ilci, 2014). The expansion of mobile technologies has transformed higher education, offering possibilities for effective teaching and learning by supporting knowledge sharing, critical thinking, problem solving, and the development of lifelong communication skills (Sanga et al., 2016; Abidin & Tho, 2018). Although widely adopted, the concept of m-learning is still evolving. Traxler (2007) describes it as personal, spontaneous, situated, private, and portable, while Lan and Sie (2010) define it as a model enabling learners to access materials anytime and anywhere through mobile and internet technologies. The essential feature distinguishing it from other forms of e-learning is its mobility (Liaw et al., 2010). Mobile devices, usually inexpensive, portable, and flexible, appeal strongly to learners. They host a wide range of applications, including productivity software such as Word, Excel, and PowerPoint (Mtega et al., 2012) and subject-specific tools such as language learning apps and mathematical problem-solving software (Alzaza & Yaakub, 2011). While m-learning cannot fully replace traditional instruction, it is increasingly valued for complementing and enriching classroom practices (Liaw et al., 2010).

At the heart of mobile learning is its grounding in learner-centred and constructivist pedagogy, emphasising interaction, collaboration, and the active construction of knowledge (Matzavela & Alepis, 2021). However, the integration of mobile devices in higher education presents challenges. Effective implementation requires instructors to acquire both technical skills and pedagogical knowledge to design meaningful mobile-based content (Ertmer & Newby, 1993; Viberg & Grönlund, 2017). Familiarity with technology does not equate to expertise in applying it pedagogically; they are

distinct competencies (Alanazy & Alrusaiyes, 2021; Dinçer, 2018; Instefjord & Munthe, 2017). Instructors must demonstrate competence in applying applications and devices to curriculum design, assessment, and classroom engagement (Ifinedo et al., 2020; Waters & Troy, 2015). Yet traditional assessments do not always align with mobile learning methods, further complicating adoption (Crompton & Burke, 2018). Moreover, many of the devices being used were designed for corporate rather than educational purposes, creating a tension between their potential and their pedagogical suitability (EdMonger, 2021). Poorly designed methodologies may even increase distraction (Alhumaid, 2019), making careful pedagogical planning essential.

III. METHODOLOGY

This qualitative research study investigates the use of MLTs among different disciplines at universities in the United Arab Emirates and the possible effects of this use on academic achievement and student engagement. The qualitative method was chosen to gain an in-depth understanding of the faculty experiences, perceptions, and challenges in using MLTs in different disciplines at UAE universities. Data was collected using a semi-structured online questionnaire. This questionnaire was designed to explore insights into the ways MLTs are used by faculty members, their perceptions, and possible challenges they may experience. A total of 100 faculty members from different universities in the UAE participated in the questionnaire. The participants were selected using a purposeful sampling strategy to maximize diversity in disciplines, cultural backgrounds, and levels of academic experience. The questionnaire was sent to the participants via email, and data was analysed using QDR minor Lite for qualitative and mixed method data analysis.

IV. RESULTS

The first objective of the study was to better understand the readiness of faculty members to use MLTs in their teaching practice. Results and number of participants are displayed in Figures 1 and 2. The second objective of the study was to compare the use of MLTs among different disciplines at UAE universities, as shown in Figure 3. The MLT tools that are used by faculty and their frequencies are displayed in Table 1.
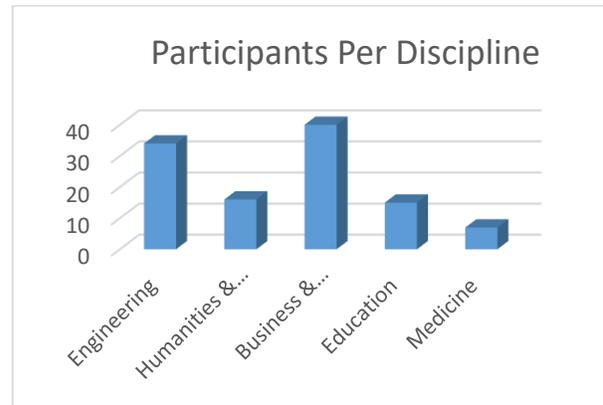

Fig. 1. No of Participants Per Discipline

One hundred participants took part in this study. More than 70 % of participants teach at business and Engineering schools, and 30% teach at schools of Humanities and social studies, Education, and Medicine. Only 5% of participants did not consider using MLTs in class. While 95% noted that they consider using MLTs in teaching and learning as shown in Figure 2.
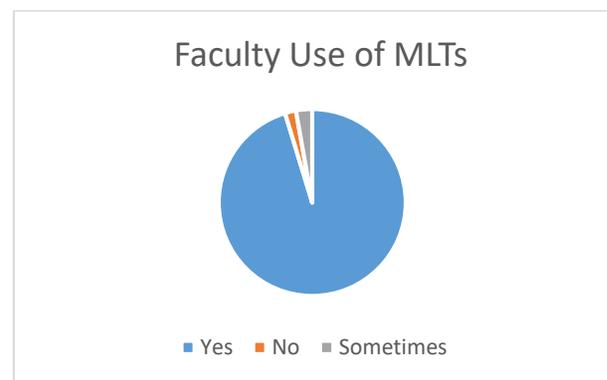

Fig. 2. Participants readiness to Use MLTs

More in detail, half of respondents of the schools of engineering noted that they use MLTs in teaching. Other 35% of respondents from business school indicated the same. Similarly, one third of faculty at the school of Education and the school of humanities and social sciences used MLTs while 28% of participants at the school of medicine included MLTs as a teaching tool. Results are shown in Figure 3.
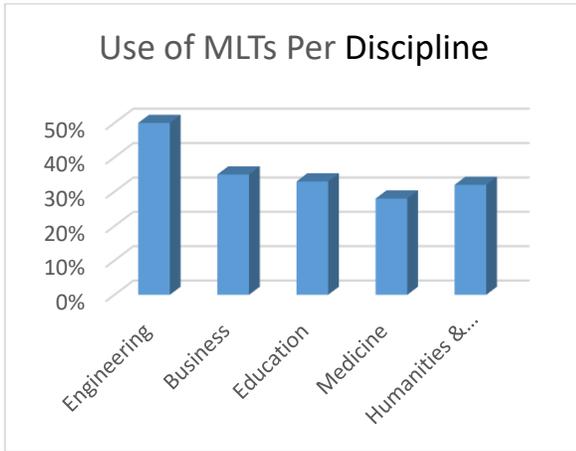
Fig. 3. The use of MLTs in Different Disciplines

The questionnaire aimed to further explore the MLT tools used by faculty members in different disciplines. The findings indicate that the flipped classroom and video recording were used frequently by faculty members. Similarly, some faculty members used Gamification and online collaboration. Few used other technologies like surveys and social media to enhance student engagement. Results are shown in Table I.

TABLE I
FREQUENT TOOLS USED BY PARTICIPANTS

MLT Use	Frequency
Flipped Classroom	15
Video Recording	14
Gamification	13
Online Collaboration	12
Surveys & Polls	7
Social media	4

CONCLUSION AND RECOMMENDATION

This study underscores that exploring faculty perceptions is crucial when considering the utilization of mobile learning technologies in higher education. Undoubtedly, faculty plays a pivotal role in determining the effective and sustainable adoption of mobile learning initiatives in higher education. While a number of educators recognize the benefits of mobile learning as a powerful tool for promoting collaboration, flexibility and most importantly learner autonomy, their enthusiasm is often tempered by concerns about assessment integrity, instructional quality, and more often than not, technological inequities. Faculty readiness, institutional support, and pedagogical alignment emerge as key determinants of successful implementation. Therefore, professional development programs that emphasize both the pedagogical and technical dimensions of mobile learning are essential and should be part of effective and sustainable mobile learning adaptation in higher education. Future research should

continue to explore disciplinary differences in the use of mobile learning, long-term impacts on teaching and learning practice, as well as strategies for cultivating increased positive faculty attitudes toward mobile learning. By addressing these factors, higher education institutions can create a more supportive environment for faculty engagement and ensure that mobile learning fulfills its promise as an inclusive and transformative educational approach.

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APPENDIX

Appendixes, if needed, appear before the acknowledgment.

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Use the singular heading even if you have many acknowledgments.