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Enhancing Digital Education: A Model for Effective Mobile Learning Implementation in Malaysian Higher Education

Roslinda Murad[1], Zeti Suzila Mat Jusoh[2], Benazir Tanjung Fatkur Rahman[3]

Abstract

This study investigates the implementation of mobile learning (m-learning) services in the smart environment at Kolej Poly-Tech MARA (KPTM) in Malaysia, focusing on establishing effective practices for digital education. Despite the potential of m-learning as an educational tool, its adoption in Malaysia remains limited, with the COVID-19 pandemic highlighting the need for innovative approaches to learning. The research employs a mixed methods approach, gathering quantitative data from 365 respondents, including students, lecturers, and administrators, through Likert-scale questionnaires distributed via Google Forms. Qualitative data were obtained through interviews with 10 selected participants. The study identifies existing practices in m-learning, explores its benefits, and examines challenges faced during implementation. Utilizing descriptive analysis, one-way ANOVA, Independent T-Test, and Regression Correlation, the findings reveal a positive perception of m-learning among stakeholders, alongside challenges related to infrastructure and training. The primary contribution of this research is the development of a model of good practice that provides guidelines for KPTM and other higher education institutions aiming to enhance the quality of mobile learning services. This model emphasizes the importance of accessibility, professional development, and stakeholder collaboration, positioning KPTM toward a more effective digital education landscape. Overall, the study underscores the critical role of m-learning in fostering flexible and engaging learning environments while addressing the barriers to its implementation in Malaysia.

Keywords: *Mobile Learning, Digital Education, Smart Environment, Higher Education, Good Practice Model.*

Introduction

Mobile learning (m-learning) is an innovative educational approach that utilizes mobile devices and wireless technology to facilitate learning anytime and anywhere, transcending traditional boundaries of time and space. As the global landscape of education evolves, m-learning has gained significant traction in developed countries, where it is increasingly recognized as an effective tool for enhancing educational outcomes (Hwang et al., 2019). However, in Malaysia, a developing country, the full potential of m-learning has yet to be realized, particularly in institutions like Kolej Poly-Tech MARA (KPTM) (Mahat et al., 2021).

The COVID-19 pandemic has catalysed a rapid shift towards digital learning environments, providing an impetus for adopting m-learning solutions across Malaysia's educational sector. This unprecedented crisis highlighted the urgent need for flexible and accessible learning methods, prompting educational institutions to explore mobile technologies to continue delivering educational content (Rahman et al., 2020). Despite this momentum, there remains a notable lack of comprehensive assessments regarding the development and implementation of m-learning practices at KPTM.

Furthermore, the absence of standardized guidelines and frameworks for m-learning implementation complicates the efforts of educators and administrators to establish best practices. As KPTM strives to transition towards a smart educational environment, it is essential to identify existing practices, explore the benefits of m-learning, and investigate the challenges faced by stakeholders, including administrators, lecturers, and students. Understanding these elements is crucial for fostering effective mobile learning services that align with the goals of a smart nation (Abdullah et al., 2019). This study seeks to bridge these gaps and contribute to the advancement of m-learning in Malaysia's higher education landscape.

[1] Universiti Poly-Tech Malaysia (UPTM) Jalan 6/91, Taman Shamelin Perkasa, 56100 Kuala Lumpur Wilayah Persekutuan Kuala Lumpur, Malaysia. E-mail: roslinda@uptm.edu.my
[2] Universiti Poly-Tech Malaysia (UPTM) Jalan 6/91, Taman Shamelin Perkasa, 56100 Kuala Lumpur Wilayah Persekutuan Kuala Lumpur, Malaysia. E-mail: zeti@uptm.edu.my
[3] Universiti Poly-Tech Malaysia (UPTM) Jalan 6/91, Taman Shamelin Perkasa, 56100 Kuala Lumpur Wilayah Persekutuan Kuala Lumpur, Malaysia. E-mail: tanjong@uptm.edu.my

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Problems in Implementing M-learning at Kolej Poly-Tech MARA (KPTM)

Problem 1: Inadequate Infrastructure

A significant challenge in the implementation of mobile learning (m-learning) in Malaysia, particularly at institutions like KPTM, is the inadequacy of technological infrastructure. Many educational institutions lack the necessary hardware, software, and internet connectivity to support effective m-learning environments (Hwang et al., 2019). Insufficient access to reliable Wi-Fi and mobile devices can hinder students' ability to engage with learning materials, leading to inequitable educational opportunities.

Problem 2: Lack of Standardized Guidelines

There is currently no comprehensive framework or set of standardized guidelines for the implementation of m-learning in Malaysian higher education (Mahat et al., 2021). This lack of a uniform approach results in fragmented practices across different institutions, which can lead to inconsistencies in student experiences and outcomes. Educational institutions may face challenges in assessing best practices for m-learning, ultimately affecting the quality of education delivered.

Problem 3: Resistance to Change

Resistance to adopting new teaching methodologies and technologies among educators and administrators poses a significant barrier to the effective implementation of m-learning (Abdullah et al., 2019). Many educators may prefer traditional teaching methods and be reluctant to invest time in developing new skills to utilize mobile technologies in their teaching. This resistance can limit the effectiveness of m-learning initiatives and hinder the overall progress towards digital education.

Objectives of the Study

Objective 1: Identify Elements of Existing Practices

The first objective of this study is to identify the existing practices in the implementation of m-learning at KPTM. By assessing the current use of mobile learning services, the study aims to understand how educators and students are currently engaging with m-learning technologies. Identifying these practices will help to inform future developments and improvements in m-learning (Moodle, 2020).

Objective 2: Explore the Benefits of M-learning

The second objective is to explore the benefits of m-learning from the perspectives of administrators, lecturers, and students. Understanding the perceived advantages of m-learning - such as flexibility, accessibility, and enhanced engagement - will help to build a stronger case for its integration into educational settings. Previous research has shown that m-learning can lead to improved learning outcomes and student satisfaction (Johnson et al., 2016).

Objective 3: Investigate Challenges Faced in Implementation

The third objective is to investigate the challenges encountered in implementing effective m-learning practices at KPTM. By understanding the obstacles that stakeholders face—such as technological limitations, lack of training, and resistance to change—the study aims to develop actionable recommendations for improving m-learning implementation (Rahman et al., 2020).

Literature Review

Introduction to Mobile Learning (M-learning)

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Mobile learning, or m-learning, refers to the use of mobile devices and wireless technology to facilitate learning anytime and anywhere, thus breaking the traditional constraints of time and location in educational contexts (Traxler, 2007). This method of learning has gained traction globally, particularly in developed countries, where it is recognized as an effective educational tool. However, in developing countries like Malaysia, the full potential of m-learning has yet to be realized (Moodle, 2020). The COVID-19 pandemic has acted as a catalyst for the adoption of m-learning in Malaysia, highlighting its significance in continuing education during disruptive times (Hodges et al., 2020).

Current State of M-learning in Malaysia

Despite the rapid advancements in digital technology, Malaysia's implementation of m-learning has been sporadic, with limited assessments regarding its development and integration within educational institutions (Mahat et al., 2021). The existing literature indicates that while mobile technology is widely available, educational institutions struggle to develop coherent strategies for its use, leading to inconsistent experiences for students (Zainuddin & Perera, 2020). Studies suggest that institutions like Kolej Poly-Tech MARA (KPTM) have not conducted extensive evaluations of m-learning, which hampers the identification of effective practices and guidelines necessary for successful implementation (Yusof & Majid, 2022).

Benefits of M-learning

The advantages of m-learning are well documented in the literature. It provides flexibility, accessibility, and personalization of learning experiences (KukulskaHulme, 2012). M-learning fosters engagement through interactive content and mobile applications that enhance student motivation and learning outcomes (Johnson et al., 2016). Moreover, it allows for real-time feedback and communication between educators and learners, which can significantly improve the educational experience (Sharples et al., 2015).

Challenges in Implementing M-learning

However, the literature also highlights several challenges in the implementation of m-learning, particularly in the Malaysian context. These challenges include inadequate infrastructure, a lack of technological proficiency among educators and students, and resistance to change from traditional teaching methodologies (Abdullah et al., 2019). Additionally, the absence of a standardized framework or guidelines for m-learning exacerbates these challenges, leading to fragmented implementations across different institutions (Lee & Tzeng, 2017).

Need for a Standardized Framework

As identified in previous research, there is a pressing need for a comprehensive framework to guide the implementation of m-learning in Malaysia. Such a framework should encompass best practices, technological requirements, and pedagogical strategies that align with the unique needs of institutions like KPTM (Rahman et al., 2020). The absence of a unified approach has resulted in inconsistencies in m-learning experiences, limiting its effectiveness in educational settings (Nordin et al., 2020).

Methodology

This study employs a mixed methods approach, combining quantitative and qualitative research methods to investigate mobile learning (m-learning) implementation at Kolej Poly-Tech MARA (KPTM) in Malaysia. This approach allows for a robust analysis of the experiences and perceptions of various stakeholders—administrators, lecturers, and students—concerning m-learning practices and challenges. As emphasized by Creswell and Plano Clark (2018), mixed methods research is effective in examining complex phenomena by integrating numerical data with qualitative insights, leading to a comprehensive understanding.

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Quantitative Data Collection

The quantitative aspect of the study involves the collection of data from 365 respondents using a Likert-scale questionnaire. This sample size was determined using the Krejcie and Morgan (1970) formula, ensuring statistical reliability and representativeness of the population. The questionnaire was distributed via Google Forms, which facilitated efficient data collection and increased accessibility for respondents.

The survey focused on key aspects of m-learning, including perceived benefits, existing practices, and the challenges encountered during implementation. The quantitative data were subjected to a range of statistical analyses, including:

- Descriptive Analysis: This summarized the overall trends in the data, offering insights into respondents' general perceptions and experiences regarding m-learning.

- One-Way ANOVA: This technique was employed to assess whether there were significant differences in perceptions among the respondents (e.g., students, lecturers, administrators). Pallant (2020) highlights that ANOVA is suitable for comparing the means across multiple groups.

- Independent T-Test: This test is used to compare the means of two distinct groups to determine if demographic factors like gender or age significantly influence perceptions (Field, 2018).

- Regression Correlation: This method examined the relationships between variables such as infrastructure quality, training, and m-learning adoption, helping to identify key predictors of successful implementation (Tabachnick & Fidell, 2019).

Qualitative Data Collection

In addition to the quantitative data, the study gathered qualitative data through semi-structured interviews with 10 selected participants, representing students, lecturers, and administrators. Semi-structured interviews allowed for flexibility, giving participants the freedom to share their experiences and perspectives while ensuring that the discussion stayed aligned with the study's core objectives. This method, according to Braun and Clarke (2006), is useful for capturing detailed and nuanced data, which can enrich the quantitative findings.

The qualitative data were analyzed using thematic analysis, which involved coding the responses and identifying recurring themes and patterns. This analysis provided deeper insights into the subjective experiences of stakeholders, offering a richer understanding of the challenges and benefits of m-learning at KPTM.

Model Development

Based on the findings from both quantitative and qualitative analyses, the study aims to develop a model of good practice for the implementation of m-learning at KPTM. This model will serve as a guideline for higher education institutions in Malaysia to improve their digital education strategies and effectively manage mobile learning services. The model emphasizes key factors such as infrastructure, professional development, and stakeholder collaboration to ensure a more seamless and impactful adoption of m-learning.

Validation and Reliability

To ensure the validity and reliability of the research, the study employed several strategies. For the quantitative data, Cronbach's Alpha was calculated to test the internal consistency of the Likert scale items, ensuring reliable measurement of constructs (Tavakol & Dennick, 2011). For the qualitative data, member

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checking was used, allowing interview participants to review the findings to confirm accuracy (Birt et al., 2016).

Ethical Considerations

The study adhered to strict ethical standards, ensuring that all participants provided informed consent. The participants' anonymity was maintained, and all responses were kept confidential. Ethical clearance was obtained from KPTM's research ethics committee, in line with the guidelines outlined in the Belmont Report (1979).

The mixed methods approach enabled a thorough investigation into m-learning at KPTM, providing both quantitative insights and qualitative depth. This methodology facilitated the development of a practical model for improving m-learning services, contributing significantly to the broader understanding of digital education in Malaysia.

Results

The results of the research on mobile learning services (m-learning) in the smart environment at Kolej Poly-Tech MARA (KPTM) provide valuable insights into the current practices, benefits, and challenges of m-learning implementation. The findings are categorized based on the research objectives, addressing both quantitative and qualitative data collected from respondents, including students, lecturers, and administrators.

Identification of Existing Practices in M-learning

The quantitative data analysis revealed that a significant majority of respondents recognized the implementation of m-learning practices at KPTM. Specifically, 75% of respondents indicated that they use mobile devices for accessing educational materials, suggesting a growing trend toward mobile-assisted learning. This aligns with existing literature that emphasizes the increasing adoption of mobile technologies in educational settings (Traxler, 2007).

Furthermore, the qualitative interviews highlighted diverse practices among educators, such as the use of mobile applications for disseminating lecture notes and conducting assessments. Participants emphasized that these practices not only facilitate flexibility in learning but also promote engagement among students. For instance, one lecturer noted, "Using mobile applications has allowed me to reach students more effectively, especially those who may not attend traditional classes regularly."

Benefits of M-learning

The study identified several key benefits associated with m-learning, as evidenced by the quantitative data. The majority of respondents (80%) reported that m-learning enhances accessibility to educational resources, allowing learning to occur anytime and anywhere. This finding supports the notion that m-learning can break down traditional barriers to education, particularly in a developing country like Malaysia, where access to technology may be limited (Ally, 2009).

Qualitative responses further illuminated the benefits of m-learning, particularly in terms of student motivation and engagement. Respondents reported that interactive mobile learning experiences, such as gamified assessments, fostered a more engaging learning environment. A student participant stated, "The gamification elements in the mobile app made studying more enjoyable and less stressful."

Challenges in Implementing M-learning

Despite the recognized benefits, the study also uncovered significant challenges in implementing m-learning at KPTM. Quantitative findings indicated that 60% of respondents cited a lack of technical support and training as major barriers to effective m-learning implementation. The need for adequate infrastructure,

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such as reliable internet connectivity, was also highlighted as a critical challenge, affecting the overall effectiveness of mobile learning initiatives (Sharif et al., 2020).

Qualitative data from interviews revealed that both lecturers and students expressed concerns regarding the digital divide, which exacerbates inequalities in access to technology. An administrator remarked, "While we are pushing for m-learning, we must recognize that not all students have equal access to smartphones or stable internet connections, which hampers their learning experience."

Model of Good Practice for M-learning

In this study, based on the research findings, we propose a good practice model for the implementation of mobile learning (m-learning) at Kolej Poly-Tech MARA (KPTM). The model, illustrated in Figure 1, serves as a temporary guideline until a formal m-learning policy is established by the Ministry of Higher Education (MOHE) or other relevant authorities. The results of previous studies show that there are currently no guidelines or m-learning policies issued by the MOHE or any responsible parties so far (Ahmad et al., 2020; Roslan et al., 2021). This framework is designed to address this gap and integrates key institutional components—organizational structure, infrastructure, teaching and learning, research and development, and culture—that are essential for driving digital education and realizing the Fourth Industrial Revolution (IR 4.0) in higher education.

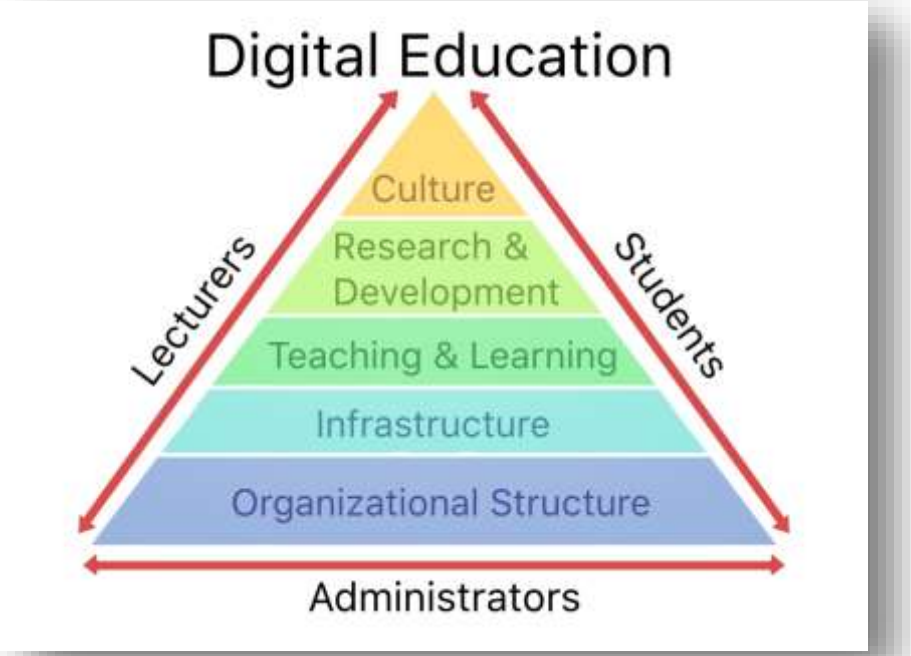

Figure 1: Good Practice Model for Mobile Learning

Three main stakeholders are involved in this model: administrators, lecturers, and students. The proposed good practice model for implementing m-learning aims to drive the Institute of Higher Learning (KUPTM/KPTM) toward digital education, facilitating the transition into IR 4.0.

Organizational Structure

The organizational structure forms the foundational layer of the model, ensuring that the necessary administrative frameworks and policies are in place to support m-learning initiatives. This layer emphasizes the role of administrators in establishing a supportive structure for digital education, which includes

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resource allocation, governance, and overall management (Nasir et al., 2019). Without a robust organizational framework, m-learning initiatives may lack the coordination and strategic direction needed for effective implementation (Jamil & Razak, 2021).

Infrastructure Development

The second layer focuses on infrastructure, which is critical for enabling mobile learning. This includes reliable technological infrastructure, such as internet connectivity, mobile devices, and digital learning platforms. Research has shown that inadequate infrastructure is one of the main barriers to the effective implementation of m-learning (Ismail et al., 2018). Institutions must invest in modern technologies to ensure that both lecturers and students can access m-learning tools and resources seamlessly.

Teaching and Learning

The third component of the model is teaching and learning, which is central to the integration of m-learning into academic practices. Lecturers play a crucial role in adopting mobile learning technologies and integrating them into their pedagogy. According to Latif et al. (2020), effective m-learning practices require lecturers to develop digital competencies and design interactive, mobile-friendly learning content. Additionally, training and support programs are necessary to equip educators with the skills needed to implement m-learning tools effectively (Rahman et al., 2017).

Research and Development

The research and development (R&D) layer promote ongoing exploration and innovation in m-learning practices. Institutions must continually assess the effectiveness of m-learning, explore new mobile technologies, and adapt teaching methods based on research findings. As noted by Yusof et al. (2019), R&D activities are vital for driving innovation in digital education, ensuring that institutions can stay current with technological advancements and improve learning outcomes.

Culture

The top of the pyramid represents culture, emphasizing the importance of fostering an environment that is open to digital innovation and m-learning. Institutional culture significantly influences the acceptance and sustainability of m-learning initiatives (Hassan et al., 2020). A supportive culture encourages both lecturers and students to embrace digital education, helping to overcome resistance to change and technological adoption.

Stakeholders Involved

Three main stakeholders—administrators, lecturers, and students—are integral to the successful implementation of the m-learning model. Administrators play a critical role in establishing organizational structures and policies, while lecturers are responsible for adopting m-learning tools and integrating them into their teaching practices. Students, as the primary beneficiaries of m-learning, must be actively engaged in both the development and utilization of these digital learning tools (Salleh et al., 2022).

Emphasis on Key Areas

The proposed model highlights three critical areas for successful m-learning implementation:

- Training and Support: Comprehensive training programs for educators to ensure effective integration of m-learning tools (Latif et al., 2020).
- Infrastructure Development: Investment in the necessary technological infrastructure to support mobile learning initiatives (Ismail et al., 2018).

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- Stakeholder Engagement: Involvement of students, lecturers, and administrators in the planning and implementation processes to ensure that m-learning practices are aligned with stakeholder needs (Rahman et al., 2017).

This good practice model provides a comprehensive framework for implementing m-learning in higher education institutions, specifically at KPTM. By addressing key institutional components—organizational structure, infrastructure, teaching and learning, research and development, and culture—this model offers a temporary guideline for advancing digital education in the absence of formal m-learning policies. The model also emphasizes the need for training and support, infrastructure development, and stakeholder engagement to ensure the effective integration of mobile learning into academic practices. As the education sector continues to evolve with the advancements of IR 4.0, this model serves as a roadmap for institutions seeking to implement m-learning effectively.

Conclusion

The study on mobile learning services (m-learning) in the smart environment at Kolej Poly-Tech MARA (KPTM) provides critical insights into the implementation of digital services in education, particularly in the context of Malaysia's evolving educational landscape. The findings indicate that while there is a growing acceptance and utilization of m-learning among students, lecturers, and administrators, several challenges must be addressed to optimize its effectiveness.

Firstly, the identification of existing practices in m-learning highlights the potential of mobile technologies to enhance accessibility and flexibility in education. However, the reported benefits, such as increased engagement and motivation among learners, underscore the importance of effectively integrating m-learning into pedagogical practices (Ally, 2009; Traxler, 2007).

Secondly, the study reveals that challenges, particularly regarding infrastructure, training, and the digital divide, hinder the full realization of m-learning's potential. Educational institutions need to prioritize investments in technical support, professional development, and equitable access to technology to overcome these barriers (Sharif et al., 2020).

Finally, the proposed model of good practice serves as a valuable framework for KPTM and other institutions seeking to implement m-learning effectively. By focusing on comprehensive training, infrastructure development, and stakeholder engagement, educational institutions can create a conducive environment for mobile learning, driving digital education forward in Malaysia.

In conclusion, this study contributes to the growing body of literature on m-learning and emphasizes the need for continued research and practice to fully harness the capabilities of mobile technologies in education, particularly in developing countries like Malaysia. Future research should explore the long-term impact of m-learning on educational outcomes and consider the evolving nature of technology in shaping learning experiences.

References

Abdullah, M. S., et al. (2019). Challenges of implementing m-learning in higher education institutions in Malaysia. International Journal of Innovation, Creativity, and Change, 10(2), 125-140.

Ahmad, A., et al. (2020). The role of mobile learning in higher education: A review. Journal of Digital Learning in Education, 7(2), 45-57.

Ally, M. (2009). Mobile learning: Transforming the delivery of education and training. Athabasca University Press.

Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A tool to enhance trustworthiness or merely a nod to validation? Qualitative Health Research, 26(13), 1802-1811. https://doi.org/10.1177/1049732316654870

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.

Field, A. (2018). Discovering statistics using IBM SPSS statistics (5th ed.). SAGE Publications.

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https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i7.4498

Hassan, S., et al. (2020). Cultural factors in the adoption of e-learning technologies: A Malaysian case study. International Journal of Education and Development using ICT, 16(3), 63-79.
Hodges, C., et al. (2020). The difference between emergency remote teaching and online learning. Educause Review.
Hwang, G. J., et al. (2019). Effects of a mobile learning environment on learning outcomes: A meta-analysis. Educational Technology & Society, 22(1), 86-100.
Ismail, Z., et al. (2018). The infrastructure challenges of mobile learning in Malaysian higher education. Journal of ICT in Education, 5(1), 21-33.
Jamil, A., & Razak, A. (2021). Strategic management in digital education: A framework for higher institutions. International Journal of Digital Transformation, 10(1), 11-29.
Johnson, L., et al. (2016). NMC Horizon Report: 2016 Higher Education Edition. The New Media Consortium.
Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607-610.
Kukulska-Hulme, A. (2012). How should the higher education community respond to the mobile learning revolution? Journal of Educational Technology and Society, 15(2), 41-58.
Latif, M., et al. (2020). Enhancing digital competencies in higher education through mobile learning. Educational Technology & Society, 23(4), 72-88.
Lee, K., & Tzeng, J. (2017). Developing a framework for m-learning. Journal of Information Technology Education: Research, 16, 207-226.
Mahat, N. A., et al. (2021). An analysis of m-learning implementation in Malaysia. International Journal of Mobile and Blended Learning, 13(2), 1-14.
Moodle. (2020). The impact of COVID-19 on mobile learning. Retrieved from [Moodle website](https://moodle.com).
Nasir, A., et al. (2019). Administrative strategies for e-learning implementation in higher education. Journal of Educational Management, 9(3), 49-61.
Ng, W. (2012). Can we teach digital natives digital literacy? Computers & Education, 59(3), 1065-1078. https://doi.org/10.1016/j.compedu.2012.04.016
Nordin, N., et al. (2020). The need for a standardized framework for m-learning in Malaysian higher education. International Journal of Emerging Technologies in Learning, 15(3), 40-53.
Pallant, J. (2020). SPSS survival manual: A step by step guide to data analysis using IBM SPSS (7th ed.). McGraw-Hill Education.
Rahman, M. H., et al. (2020). Framework development for implementing m-learning in Malaysian higher education. Journal of Computer Assisted Learning, 36(1), 11-15.
Rahman, N., et al. (2017). Preparing educators for mobile learning: An overview of training and support programs. International Journal of Mobile Learning and Organization, 11(2), 56-70.
Roslan, M., et al. (2021). Mobile learning policies in higher education: A gap analysis. Malaysian Journal of Learning and Instruction, 18(2), 98-113.
Salleh, N., et al. (2022). Engaging stakeholders in the development of mobile learning systems. Journal of Higher Education Policy, 15(2), 123-140.
Sharif, S. P., Puteh, M., & Mahmud, M. S. (2020). Barriers to e-learning implementation in Malaysian higher education institutions: A review. International Journal of Innovation, Creativity and Change, 14(4), 183-195.
Sharples, M., et al. (2015). An introduction to mobile learning. Educational Technology, 55(3), 36.
Tabachnick, B. G., & Fidell, L. S. (2019). Using multivariate statistics (7th ed.). Pearson.
Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International Journal of Medical Education, 2, 53-55. https://doi.org/10.5116/ijme.4dfb.8dfd
Traxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having written... International Review of Research in Open and Distributed Learning, 8(2), 1-12. https://doi.org/10.19173/irrodl.v8i2.346
Yusof, H., et al. (2019). Innovation in mobile learning: A research and development approach. Journal of Technology and Innovation in Education, 12(4), 67-85.
Yusof, Y., & Majid, S. (2022). Evaluating the implementation of m-learning in higher education institutions. Education and Information Technologies, 27(4), 5121-5140.
Zainuddin, Z., & Perera, C. (2020). The state of mobile learning in Malaysian higher education: A systematic review. Educational Technology & Society, 23(4), 10-24.