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Exposing tech skills shaping mobile learning in cross-disciplinary English learners

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ABSTRACT

This study delves into information and communication technology (ICT) competency and mobile learning (m-learning) acceptance among Indonesian university students enrolled in English for specific purposes (ESP) programs across various disciplines, such as mathematics, health, management, and counselling guidance. Utilizing survey methodology with closed-ended questions involving a broad sample of non-English major ESP students from these diverse fields revealed over 60% competency in using m-learning platforms. The results underscore the extensive use of digital technology across campus for diverse functions like communication, creation, distribution, storage, and management. These tools have proven crucial for collaboration and social interaction among students. However, pedagogical factors significantly challenge m-learning adoption. This study contributes to the literature by offering insights into ICT competencies' impact on m-learning acceptance among cross-disciplinary ESP learners. The findings carry practical implications for educators, suggesting that understanding ICT competencies can enhance student outcomes and engagement in m-learning platforms. Future research is recommended to incorporate perspectives from students and lecturers on the influence of ICT competencies on m-learning acceptance in cross-disciplinary ESP programs.

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1. INTRODUCTION

The rapid evolution of technology has significantly transformed the educational landscape, compelling educators and learners to adopt new methods for knowledge acquisition and delivery [1], [2]. Among these, mobile learning (m-learning) stands out due to its flexibility and accessibility, facilitated by the widespread use of smartphones, tablets, and laptops [3]–[5]. This evolution has reshaped education delivery and reception, supplementing or replacing traditional classroom learning with digital platforms enabling remote learning [6]. M-learning, in particular, offers the convenience of learning anytime and anywhere, breaking down the geographical barriers that once hindered education [7]. Despite these advancements, the phenomenon of m-learning adoption has been insufficiently examined by research communities, particularly in contexts outside higher education [8]–[10]. A critical gap exists in understanding how information and communication technology (ICT) skills influence m-learning acceptance among diverse student populations, including those from rural areas or non-English speaking backgrounds. This gap underscores the need for comprehensive research into the relationship between ICT competence and m-learning acceptance to provide valuable insights for educators in curriculum design and technology integration in various settings. This study intends to fill the gap in how ICT skills affect m-learning

adoption among varied student populations, including rural and non-English speakers. This study highlights the necessity for a thorough investigation into the correlation between ICT proficiency and the adoption of m-learning to offer educators significant insights into designing curricula and integrating technology in different environments. Prior research has typically regarded ICT skills as a unified concept without thoroughly examining how particular ICT skills or levels of proficiency impact learners' attitudes towards m-learning [11], [12]. In addition, there has been little research on specific demographics, such as rural Indonesian students, which requires a better understanding of how ICT skills affect m-learning acceptance to help students in areas with limited accessibility and facilities.

Therefore, while the benefits of m-learning, such as enhanced accessibility and learner autonomy, are well-documented, potential challenges related to technical issues or lack of technical skills among users cannot be overlooked [13], [14]. Recognizing these aspects will contribute significantly towards creating an inclusive digital learning environment where all learners can thrive regardless of their geographical location or technological expertise. As a blend of the convenience and portability of e-learning, m-learning has revolutionized the learning experience [15]. Addressing these challenges is essential for creating an inclusive digital learning environment where all learners can succeed, regardless of their geographical location or technological expertise. Moreover, the adoption of m-learning is influenced by the learner's ICT competence [16]. Previous research has explored this relationship broadly, yet a lack of detailed understanding of how different ICT abilities may affect m-learning adoption [17], [18]. It has been suggested that various ICT skill levels and types might differently impact the adoption of m-learning [19], indicating a need for a deeper exploration of ICT competence.

Furthermore, there is a noticeable scarcity of studies focusing on specific demographics, such as students in rural Indonesian communities. The context of Universitas Borneo Tarakan, situated in North Kalimantan, Indonesia, exemplifies students' unique challenges in areas with limited accessibility and facilities, including inconsistent internet connectivity and a general lack of English proficiency [20]. These factors add complexity to adopting m-learning, highlighting the importance of investigating how specific ICT skills affect m-learning acceptance among such groups.

Furthermore, in their treatment of all learners, these studies disregard the potential influence of unique socio-cultural and educational environments on adopting technology. This one-size-fits-all approach distorts the multifaceted challenges students face from various contexts. This oversight affects English for specific purposes (ESP) pupils in rural regions of Indonesia to an even greater degree. The present research has not extensively examined the unique intersection wherein these learners encounter technological limitations and language learning requirements. Hence, notwithstanding the copious amount of scholarly work dedicated to m-learning and ICT proficiency, a notable deficiency persists in comprehending these phenomena specifically a s they pertain to Indonesia's rural ESP student demographic. Emphasizing this observation emphasizes the necessity for further research in this underexplored domain to ensure academic rigour and, more significantly, devise efficacious pedagogical approaches customized to these learners' specific requirements and environments. Our study investigates the specific ICT competencies of Indonesian university ESP students and their correlation with m-learning acceptance to bridge this glaring divide and chart a new course. Our study is distinguished from most previous research, which tends to generalize across various learner populations by its specific focus.

The justification for this focused investigation is based on the recognition that the success of m-learning implementation is heavily influenced by users' technological proficiency and willingness to utilize these tools. Nonetheless, these crucial facets have received inadequate attention in the context of ESP pupils residing in rural Indonesia. We intend to change that. By emphasizing this particular demographic, we aim to contest the prevailing trend in the literature and offer educators valuable insights tailored to address these students' unique requirements. By incorporating these observations into developing more advanced curriculum design and technology integration strategies, our study can potentially achieve greater significance and influence. By doing so, we are not simply addressing a theoretical oversight but actively working towards enhancing educational achievements for these students within their distinct environments. The novelty stems from directing attention towards a distinct and relatively uncharted field, thereby substantially boosting students' academic accomplishments within their unique context.

2. METHOD

This study utilized a survey research method to explore students' perspectives on ICT competencies and m-learning acceptance, following the approach outlined by Creswell and Clark [21]. Data were collected through a written survey comprising mainly closed-ended questions designed for easy completion and straightforward analysis. This approach enabled the collection of detailed insights from a sample representing a broader student population. In subsequent sections, we will discuss participant selection, research procedures, and data analysis methods.

Participants were sourced from Universitas Borneo Tarakan, Indonesia, across four departments: math education, health, management, and counselling guidance, totalling 275 students based on their enrollment and

willingness to participate. A sufficient sample size of 275 was determined by considering various criteria in order to ascertain its suitability. Cohen *et al.* [22] state that in order to detect a moderate effect size (d=0.5), a statistical power of 0.8, and a significance threshold of 0.05, an approximate sample size of 64 per group is necessary. The sample size of 275 is sufficient for finding medium effect sizes in the entire sample. Generally, studies investigating ICT skills and acceptance of m-learning often employ sample sizes ranging from 200 to 300. For example, Djauhari *et al.* [23] employed a comparable approach to ascertain the appropriate sample size in their investigation of the technology acceptance model (TAM). This suggests that our sample size aligns with the acknowledged standards in the field.

The survey, our primary data collection tool, included demographic questions and 14 items assessing ICT competencies and m-learning acceptance. The survey was designed to promote candour by removing respondents' identities and assuring their secrecy. Two specialists in technology's educational impact reviewed the survey for readability, clarity, relevance, and validity, leading to minor adjustments [24]. The comprehensive methodology ensured the generation of valid and reliable insights. Preliminary examination assessed the dependability of variables about attitudes towards technology and the significance of m-learning. Table 1 presents cronbach alpha coefficients ranging from 0.70 to 0.90, which indicate satisfactory reliability.

Table 1. Cronbach's alpha coefficients

Variable	Cronbach's alpha coefficient	Interpretation
ATT 1	0.85	Good
ATT 2	0.78	Acceptable
BIM 1	0.88	Good
BIM 2	0.92	Excellent

The dependability of our survey was shown by a cronbach's alpha coefficient of 0.987. In the context of this study, the abbreviation "ATT" likely stands for "attitude," referring to the participants' attitudes towards technology. In contrast, "BIM" could stand for "behavioral intention model" or similar related to behavioral intentions regarding technology or m-learning tools. These abbreviations indicate the specific focus of variables measured in the survey, which are crucial for understanding the dynamics around technology acceptance and the effective implementation of m-learning. We employed three criteria in reference [25] to further validate the data. These criteria included ensuring the indexing variables were below 0.80, factor loadings were above 0.7, and composite reliability and cronbach's alpha were above 0.70. The survey's dependability was confirmed through these methods, which bolstered our confidence in the data and its implications for comprehending attitudes towards technology and the significance of m-learning.

3. RESULTS AND DISCUSSION

The study assessed m-learning's impact on student engagement, productivity, and problem-solving abilities. Respondents were grouped by gender, age, department, and m-learning expertise. Additional information on m-learning usage time and challenges was gathered. This detailed profiling facilitated an understanding of participants' backgrounds and m-learning interactions. The survey also examined attitudes toward ICT skills, covering app use, ethical knowledge application, communication via media platforms, and online resource interaction for learning purposes.

3.1. Respondent profiles

This section asked respondents about their gender, age, and department affiliation. Based on their level of m-learning expertise, respondents were further classified into one of five groups: expert, proficient, competent, advanced beginner, and novice. Then, the respondents also estimated how much time they spent using m-learning. Lastly, the researcher used this questionnaire to uncover respondents' challenges while attempting to use m-learning. The respondents' profiles are shown in Table 2.

Table 2 presents a comprehensive overview of the survey respondents' demographic characteristics, specifically focusing on their gender, age, and departmental affiliations. The gender distribution exhibited a notable inclination towards women, with 68.7% (189 people) identifying as female, indicating a distinct division. Conversely, the male population accounted for 31.3% (86 persons), less than one-third, indicating a significant gender disparity. When considering the age range, we were focusing on, most applicants were young people. Specifically, persons between 18 and 20 accounted for a significant portion, 78.2% or 215 individuals, who were still living. The age cohort from 21 to 23 exhibited a comparable level of ambition, with 21.1% or 58 individuals. The number of individuals aged 24 and above was extremely low, only 1% or two.

Table 2. Respondent profiles

	Description	N	%
Gender	Female	189	68.7
	Male	86	31.3
Age	18-20	215	78.2
	21-23	58	21.1
	24-above	2	1
Departments	Mathematics	30	10.9
	Health	50	18.2
	Management	120	43.6
	Counselling guidance	75	27.3

Management emerged as the top department, accounting for 43.6% or 120 students, a significant number that should not be underestimated. Counselling guidance closely followed, with a percentage of 27.3% or 75, indicating a strong alignment. The field of health studies had an enrollment rate of 18.2% or 50, indicating that it is not under control. Mathematics exhibited the smallest fold, amounting to about 10% or 30 narratives. This study explores the knowledge, usage patterns, and issues associated with m-learning. Figures 1 to 3 effortlessly capture these features visually. Figure 1 evaluates proficiency levels, Figure 2 examines the ease of gadget usage, and Figure 3 provides a detailed analysis of the challenges encountered. The subsequent sections will thoroughly examine these, guaranteeing no detail is overlooked.

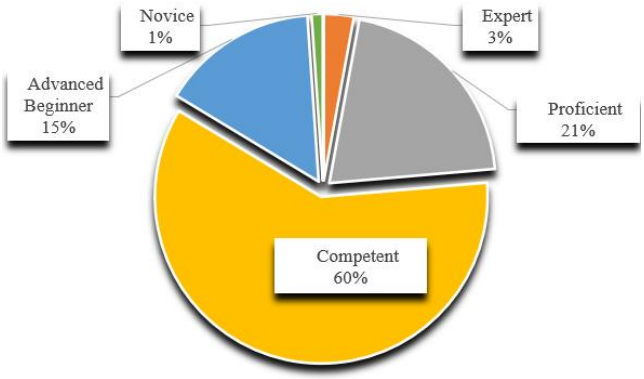

Figure 1. Students' level skills

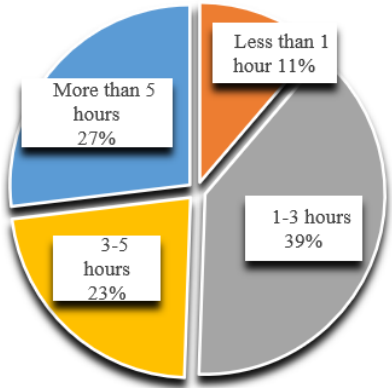

Figure 2. Estimate using gadget

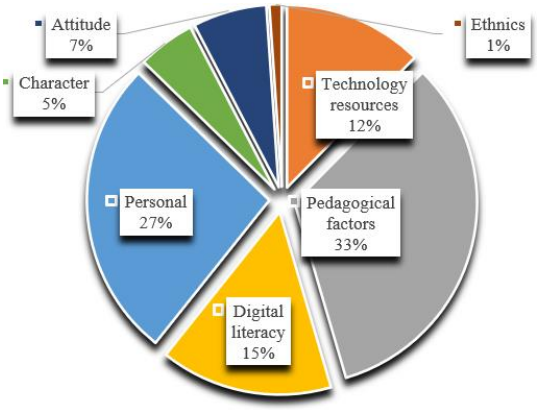

Figure 3. Challenges

The presented data in Figure 1 depicts the self-reported proficiency levels in m-learning as reported by the study participants. A significant proportion, comprising 60% (165 individuals), self-identify competent proficiency, signifying an effective application and comprehension of m-learning methodologies and tools. Following this, a subsequent proportion of 21% (57 individuals) define themselves as proficient in m-learning

technologies, indicating an elevated level of expertise and familiarity. Individuals who self-identify as advanced beginners comprise 15% (42 individuals), who recognize that while they have a fundamental comprehension, they still require additional knowledge and experience. The analysis reveals that experts and novices are nominally represented at 3% (8 individuals) and 1% (3 individuals), respectively. It indicates that most participants have attained intermediate proficiency in m-learning, while the prevalence is minimal at the extremes of expertise.

The analysis of the daily time allocated to m-learning through devices, as reported by the study participants, is presented in Figure 2. The largest proportion, comprising 39% (108 individuals), devotes one to three hours per day to m-learning endeavours, suggesting a moderate inclination towards utilizing technology for educational intentions. The subsequent noteworthy group, consisting of 27% (74 individuals), commits to m-learning for a duration exceeding 5 hours per day. It demonstrates a profound dedication to utilizing technology to enhance their educational journey. An additional 23% (62 students) indicate that they employ their devices for m-learning for 3 to 5 hours daily, indicating a significant level of involvement with digital learning resources. 11% (31 participants) of the least represented group utilizes electronic devices for m-learning for less than an hour daily, suggesting a negligible dependence on technology for educational endeavours. As mentioned earlier, the distribution highlights that the participants' daily engagement with m-learning technologies is diverse but predominately moderate to high.

Figure 3 presents an analysis of the many problems encountered by participants throughout their interactions with m-learning platforms. The primary obstacle identified by around 33% (91 participants) is educational issues. These problems pertain to the complexities associated with successfully integrating technology in educational settings, intending to attain desirable educational outcomes. 27% (73 participants) expressed personal issues, such as time management and self-discipline, which were significant obstacles to the successful adoption of m-learning. 15% (42 participants) reported digital literacy issues, indicating a requirement for improved proficiency in accessing and utilizing online platforms and resolving technological difficulties. Approximately 12% (34 participants) had difficulties with technological resources, including reliable internet connections and suitable equipment. 7% (18 participants) indicated attitudinal hurdles, indicating a reluctance to adopt new technology for educational purposes. A total of 14 individuals, accounting for 5% of the sample, emphasized character traits such as resilience when confronted with technical hurdles. Only 1% (3 participants) expressed worries regarding ethical considerations, showing that ethical difficulties associated with ICT use are quite insignificant among these respondents. This investigation highlights the complex and diverse nature of obstacles to m-learning, with pedagogical and personal aspects emerging as the most prominent, suggesting potential areas for focused assistance that could improve the m-learning experience.

3.2. Results of the ICT competencies

A survey was undertaken to investigate attitudes towards m-learning, utilizing a line graph including 14 questions. Regarding the statement, "You utilize information technology and networks through m-learning," 121 participants expressed high agreement, while 119 participants agreed, suggesting a proficient understanding of its application. In contrast, 23 individuals expressed disagreement, while 12 strongly disagreed, believing they were less proficient in m-learning. The aforementioned disparity is seen in Figure 4.

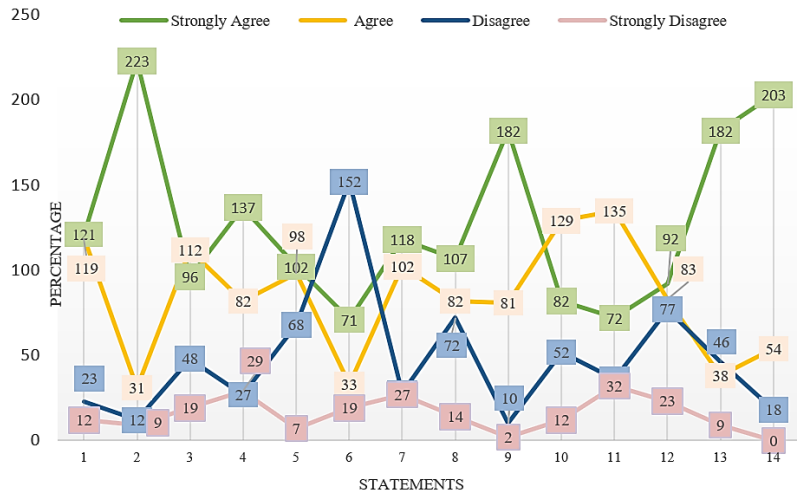

Figure 4. M-learning attitudes

The study on attitudes towards m-learning yielded extensive insights into how respondents employ m-learning across different domains. A considerable proportion, including 223 participants, conveyed a favourable disposition towards effectively utilizing applications, underscoring a positive perception of m-learning aids. Regarding acquiring information, 96 participants demonstrated proficiency in getting data from many sources. Among them, 112 individuals depended on several references for information gathering, while 67 participants primarily relied on Google as their primary source. It indicates that the respondents have a diverse strategy for retrieving information. The study also examined the ethical utilization of knowledge, with 137 participants identifying it as an ethical concern and 82 individuals conforming to guidelines for making judgments regarding intellectual conduct.

Nevertheless, 56 participants expressed difficulties navigating the ethical aspects of knowledge utilization and evaluation, highlighting the necessity for enhanced ethical guidance within m-learning settings. The study found that 200 respondents reported positive communication efficacy through media and platforms, while 75 respondents thought their communication was poor. It suggests a disparity in perceived communication abilities within m-learning contexts. Seventy-one respondents preferred simulations and models as tools for investigating difficult subjects. In comparison, 152 respondents had a different opinion, indicating a difference in the perceived efficacy of these educational aids. Most participants strongly support utilizing diverse online resources for engagement and communication, highlighting the significant importance attributed to the wide range of learning resources offered through m-learning.

Additional data indicated a notable propensity for engaging in collaborative efforts and resolving problems, as evidenced by 108 participants who expressed significant agreement on their involvement in groups focused on generating innovative works or solutions. One hundred eighty-two respondents recognized the significance of utilizing appropriate tools and digital resources to overcome challenges. Additionally, 211 respondents supported utilizing m-learning to plan and organize project activities. It highlights the crucial role of m-learning in facilitating project management and collaborative endeavours. Nevertheless, the issue of responsible utilization of ICT arose, as 77 participants acknowledged their failure to employ ICT rationally, legally, and accountable. It underscores the potential for plagiarism and the necessity for heightened consciousness and instruction regarding copyright regulations.

Nevertheless, 182 respondents acknowledged the extensive utilization of ICT on campus for diverse objectives, such as communication and learning, underscoring the revolutionary impact of digital technologies in education. 203 respondents significantly agreed on the significance of digital technologies in improving collaboration and interpersonal connection, highlighting the crucial function of digital tools in promoting collaborative and interactive learning environments. The survey emphasizes the importance of m-learning and digital technologies in contemporary education, emphasizing their advantages in improving educational achievements, student involvement, and scholastic success. Furthermore, it highlights the difficulties and obligations of utilizing m-learning tools, specifically in guaranteeing ethical procedures and efficient communication.

The present study examines the efficacy and influence of m-learning on student engagement, productivity, and problem-solving abilities. The study constructs an elaborate respondent profile and collects data on m-learning utilisation and the associated difficulties. Most participants expressed a sense of aptitude for m-learning tools, suggesting their comprehension and proficient use of these resources, consistent with the results reported in reference [26]. Nevertheless, our research establishes a correlation between this competency and a robust dedication to technology-driven learning, a connection that had not been previously proven. The pedagogical obstacles we have identified align with the findings of previous studies [27]–[29], which also identified comparable issues in m-learning research. The obstacles stem from the complexities associated with efficiently employing technology and seamlessly incorporating it into daily activities. It is suggested that the observed high level of proficiency may be attributed more to individuals' familiarity with mobile devices rather than their specific training in m-learning. This concept has been briefly mentioned in references [30], [31] but has not been extensively investigated. The technique employed in this study, which relies on self-reported data, admits the presence of potential biases, aligning with the psychological perspective put forward by [32]. The present study aims to streamline and elucidate the phenomenon of student involvement with m-learning by drawing comparisons to prior studies and presenting alternate hypotheses. Further research is required to overcome its limits and investigate other elements to enhance our comprehension of m-learning.

4. CONCLUSION

The primary objective of this study was to investigate the impact of m-learning on students' engagement, productivity, and problem-solving skills. The study aimed to assess students' skills in m-learning, their level of engagement with m-learning technologies, and the difficulties they encounter. The survey revealed that most students possess a strong sense of proficiency in m-learning, devoting a substantial amount of time each day to these tools, indicating a profound involvement with technology-based learning.

However, notwithstanding their proficiency and commitment, educational difficulties continue to pose substantial barriers to fully harnessing technology for educational purposes.

These insights provide a comprehensive perspective on students' engagement with m-learning, encompassing their proficiency level, usage patterns, and challenges encountered. This study delineates the demographics of m-learning tool users, their usage patterns, and the obstacles they face, providing significant insights into areas where assistance could improve the efficacy of m-learning. Although the findings provide insight into the present m-learning practices among students, future research is required to address the study's shortcomings and identify other aspects that may impact the success of m-learning. Subsequent investigations may explore the potential of institutional assistance or curriculum design in mitigating the educational challenges discovered. Furthermore, an additional avenue for research could involve investigating if the elevated levels of reported competency can be attributed to a broad understanding of mobile devices rather than specific training or experience in m-learning.

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