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INVESTIGATING UNDERGRADUATE STUDENTS' ATTITUDES AND SELF-EFFICACY OF MOBILE LEARNING AT SAUDI UNIVERSITIES

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ABSTRACT
According to previous research, computers and the Internet play crucial roles in students' adoption and utilization of new information technology. Due to the accelerated development of mobile technology in recent years in Saudi Arabia, mobile learning (m-learning) has become a popular topic. However, little is known about the attitudes and self-efficacy of language learners regarding the use of mobile devices, especially in the Saudi context. Using task-based instruction, this study aimed to investigate undergraduate students' attitudes and self-efficacy regarding the use of mobile learning devices in a language class. The study's sample consisted of 79 undergraduate students at two Saudi universities who used mobile devices for m-learning to complete designated tasks in an English class. As per the study's findings, most students experienced an augmented drive to learn English through m-learning. They also opined favorably about this aptitude for acquiring knowledge. The conclusions carry substantial implications for upcoming research inquiries and its practical applicability concerning m-learning.
Keywords: computer, self-efficacy, m-learning, language learning, task-based approach

INTRODUCTION

The exponential growth of technology continues touching on every aspect of life from agriculture engineering through medicine- Education included! Among recent advancements is the advent of mobile learning (also known as m-learning), characterized by utilizing electronic devices-smartphones or tablets to enhance communication between educators and fellow learners besides accessing course materials and various educational resources. Many global institutions recognize mobile learning as a vital and innovative tool for digitizing their educational programs and improving their learners' academic experiences. One region that has welcomed this change is Saudi Arabia, recently giving it significant attention and embracing modern teaching approaches heavily reliant on technology to offer globally competitive students.

Educators and researchers (Al-Emran et al., (2016); Mcconatha et al., (2008); Motiwalla, (2007); Patten et al., (2006) have considered the pedagogical implications of the proliferation of mobile technologies such as mobile phones, smartphones, personal digital assistants, and Tablet PCs. Seppala and Alamaki (2003) and Cavus and Ibrahim (2009) noted that mobile device instruction would play a significant role in education, given that 99% of undergraduate students owned cell phones. Mobile learning (m-learning) is the educational use of mobile devices that focuses on facilitating and extending the reach of teaching and learning, including knowledge construction, information collection and exchange, collaborative learning (Hine et al., 2004), independent learning (Bull & Reid, 2004), and lifelong learning (Attewell & Savill-Smith, 2004). For instance, Huang et al., (2009) adopted a mobile blogging system to generate collaboratively interactive and learning opportunities for geographically dispersed individuals and groups. Chen and Jang (2010) utilized mobile phones for inquiry-based learning to enable students to collect data during museum field trips.

It has been acknowledged that mobile learning is an effective method for teaching language skills, particularly to English as a Foreign Language (EFL) students (e.g., Al-Emran et al., 2018; Chen & Huang, 2010; Lee, 2009; Sandberg et al., 2011). Due to mobile learning's spontaneous, informal, contextual, portable, ubiquitous, pervasive, and personal characteristics, students had increased access to and exposure to numerous authentic learning contexts (O'Malley et al., 2005). In turn, mobile learning's authentic learning contexts have beneficial effects on second language acquisition (Kreijins et al., 2003; Mompean, 2010). Authentic learning contexts assist students in bridging the gap between formal and informal learning (Wagner & Wilson, 2005). In other words, authentic real-world tasks enable students to connect between textbook content and real-world materials for enhanced comprehension and learning. Wagner and Wilson (2005) also emphasized that when language skills are cultivated in authentic contexts, learners are better able to transmit them to real-world situations. In addition, when engaged in authentic learning assignments, students demonstrated high levels of learning motivation.

Similar empirical research has demonstrated the efficacy of mobile learning for language teaching and learning. Attewell (2005), for instance, designed a mobile learning initiative to encourage students to acquire a foreign language. 82% of the students enhanced their reading comprehension and penmanship abilities through mobile learning, and 62% reported using mobile devices to study the language regularly. Basoglu and Akdemir (2010) enlisted sixty university students to compare the efficacy of mobile devices and traditional flashcards for learning English vocabulary. According to the findings, students exhibited improved academic performance and positive attitudes toward acquiring English vocabulary via mobile learning.

Numerous factors may reduce the efficacy of mobile learning in language instruction, resulting in a lower percentage of students participating in mobile learning (Al-Maroof & Salloum, 2021).
Students' computer self-efficacy and attitudes were the primary determinants of the success of their participation in mobile learning (Al-Hariri & Al-Hattami, 2017), as previous research indicated that those with high computer self-efficacy were more involved in computer-related

activities (Davis et al., 1989; Delcourt & Kinzie, 1993). Compeau and Higgins (1995, p. 192) and Churchill and Wang (2014) define computer self-efficacy (CSE) as a person's perception of his or her capacity to use a computer. In other words, CSE refers to an individual's confidence in their computer use (Topkaya, 2010). Ofttimes, the attitude toward computers was regarded as a crucial aspect of CSE (Barbeite & Weiss, 2004; Compeau & Higgins, 1995; Kao & Tsai, 2009; Brock & Sulsky, 1994; Busch, 1995; Harrison & Rainer, 1992; Hassan, 2003; Potosky, 2002). Psychological factors, such as computer anxiety and perceptions of computers as beneficial and self-directed instruments, have also been shown to influence CSE (Brock & Sulsky, 1994; Barbeite & Weiss, 2004; Kao & Tsai, 2009). Compeau and Higgins (1995) studied the relationship between CSE and computer anxiety. They found that those with lower CSE were more agitated and apprehensive when operating and using computers for problem-solving. Some researchers have also linked individual social-cultural contexts, such as gender, age, or years of computer utilization, to CSE and attitudes toward computers (e.g., Gattiker & Hlavka, 1992; Harvey & Wilson, 1985; Althunibat, 2015). However, relatively few studies on mobile learning have investigated the nature of CSE and its association with students' attitudes toward the use of mobile learning for language instruction.

This paper aims to investigate undergraduate students' attitudes and self-efficacy regarding mobile learning at Saudi universities. Understanding these factors can provide valuable insights into the potential of mobile learning as an effective instrument for higher education, informing the development of strategies and methods that optimize teaching and learning in this increasingly digital era.

PURPOSE OF THE STUDY

This study aims to use a Mobile Attitude Survey (MAS) and a Mobile Self-efficacy Survey (MSS) to examine the relationships between students' CSE and their attitudes toward mobile learning. In addition, several other variables, including gender and Internet experience, were analyzed.

RESEARCH QUESTIONS:

The study aims to address three research questions as follows:

1. What are the undergraduate students' attitudes toward using mobile devices for m-learning in Saudi Universities?
2. What is the undergraduate student's self-efficacy towards the use of mobile devices for m-learning in Saudi Universities?
3. Do male and female students differ in their attitudes towards and self-efficacy in m-learning in Saudi Universities?

RESEARCH METHOD

Instruments:

This study used the Mobile Attitude Survey (MAS) and a Mobile Self-efficacy Survey (MSS) to examine the relationships between students' CSE and their attitudes toward mobile learning.

Participants

The study's sample comprised 79 undergraduate students (40 males and 39 females) with limited exposure to m-learning via mobile devices. The participants were from different departments at two Saudi universities. The 79 undergraduate students received 20 days of training before implementing mobile learning. The student's English proficiency was determined by their scores on the IELTS.

Procedure:
Participants at two Saudi universities did the B1 English course. The researchers utilized the QSkills for Success as the instructional material. The instructor selected two primary topics for students to discuss and complete assignments within the textbook. The eight-week program included both in-class instruction and m-learning activities. The researcher proceeded to allocate diverse online assignments for in-class discussion to the students. These assignments aimed to address information gaps and promote problem-solving abilities, thereby encouraging the students to negotiate meanings and participate in meaningful conversations. To facilitate productive problem-solving discussions in a mobile learning (m-learning) environment, the researcher developed seven situational scenarios based on the topics covered. After class, every student utilized his or her mobile device for research, posting, question-answering, and recording class-related materials.

DATA COLLECTION AND ANALYSIS

Two methods were used by the researcher in order to gain insight into students' perspectives regarding m learning: One that surveyed their level of confidence about their abilities in relation to mobile learning and another which sought out participants' attitudes concerning this style of education. The first tool - measuring self-efficacy - was modeled after an existing internet-based questionnaire developed by Tsai &Tsai (2003) but altered by including queries specific this mode of teaching. The second instrument drew upon an update of a preexisting PDA attitude scale created by Tsai, Tsai, and Hwang (2010) and modified for the purposes of this research. The researcher also interviewed 20 student volunteers (10 males and 10 females). During the study, semi-structured interviews were conducted with each participant, lasting a duration of twenty-five minutes each. The interviews were recorded and transcribed for the purpose of data analysis. The analysis was performed using thematic analysis guidelines, as outlined by Braun and Clarke (2006). Initially, classification units such as students' computer competency and their attitude toward m-learning were identified and grouped into main categories. Subsequently, more in-depth units were clustered together based on the participants' comments and feedback regarding their m-learning experience. The researcher concluded by describing the meanings of each unit and summarizing the main student statements for additional explanations and inferences.

RESULTS

RQ1: What are the undergraduate students' attitudes toward the use of mobile devices for m-learning in Saudi Universities?

Table 1: The Undergraduate Students' Attitudes towards m-learning

No	Item	Mean	Standard Deviation
1	In the m-learning environment, a mobile device can help me to attain more ideas.	4.72	0.45
2	In the m-learning environment, a mobile device is helpful for my learning.	4.46	0.23
3	In the m-learning environment, a mobile device can enhance my desire to learn.	4.69	0.37
4	In the m-learning environment, a mobile device can allow me to do more interesting and imaginative work.	3.65	0.76
5	In the m-learning environment, a mobile device makes me feel uncomfortable.	4.56	0.30
6	In the m-learning environment, I feel bored using a mobile device	2.11	0.43
7	In the m-learning environment, I am not good at using a mobile device.	3.85	0.25
8	In the m-learning environment, I hope to have a regular time to use a mobile device.	4.1	0.33
9	In the m-learning environment, I hope to apply mobile devices in various learning activities.	4.55	0.49
10	In the m-learning environment, I can use a mobile device independently without other's help.	4.66	0.31
Overall		4.43	0.39

To evaluate student attitudes towards mobile learning (m-learning), researchers conducted a survey featured in Table 1. The table portrays data on ten criteria used by researchers to measure student responses regarding m-learning, with means and standard deviations

calculated for each criterion. Across all criteria, mean scores range from 2.11 to 4.72, and higher scores suggest more positive attitudes towards m-learning were held by these students overall (mean =4.43). Of note is that item one scored highest among respondents reflecting an inclination for mobile access as bolstering idea generation with regard to one's virtual learning environment; the findings also indicate respondents held negative perceptions around using portable devices for more creative or imaginative academic pursuits overall.

Table 2: The Students' Statements in the Interviews for Attitudes Towards M-learning

No	Statement	Frequency (N = 20)
1	It is quite fun to use a mobile device for English learning.	18
2	I hope I can use mobile devices for learning in other classes too.	17
3	I love to use mobile devices to multi-task.	14
4	It is time-saving for m-learning because I can learn without space and time constraints.	16
5	I love to get access to my mobile devices and learning takes place naturally.	10
6	I did not like English before. Now I would use my smart phone for English learning.	11
7	Reading too much on the mobile made my eyes sore.	5

Table 2 shows the student statements collected during interviews to further investigate their perspectives on m-learning. The table presents seven statements and their frequencies among a sample of twenty students. Eighteen students agreed that it is quite enjoyable to use a mobile device for English learning, which was the most common response. 17 out of 20 students concurred with the statement that they plan to use mobile devices for learning in other courses. This was the second most common response. Other frequent assertions include a preference for multi-tasking, the time-saving aspect of mobile learning, and the inherent accessibility of mobile devices for educational purposes.

However, some students also mentioned difficulties with m-learning, such as eye strain caused by excessive reading on mobile devices.
Overall, Tables 1 and 2 provide educators and instructional designers with insights into students' attitudes toward mobile learning, which can be used to develop effective mobile learning strategies.

RQ2: What is the undergraduate students' self-efficacy towards the use of mobile devices for m-learning in Saudi Universities?

Table 3: The Undergraduate Students' Self-efficacy of the M-learning

No	Item	Mean	Standard Deviation
1	In the m-learning environment, I can download a figure from the internet using a mobile device.	4.62	0.21
2	In the m-learning environment, I can key in a website address to enter the site using a mobile device.	4.66	0.17
3	In the m-learning environment, I can check a hyperlink to enter another website using a mobile device.	4.59	0.13
4	In the m-learning environment, I can read the content on the screen using a mobile device.	3.79	0.17
5	In the m-learning environment, I can enter words into a document using a mobile device.	4.77	0.23
Overall		4.48	0.18

Table 3 displays findings from the survey investigating the self-efficacy of undergraduate students in employing mobile devices for m-learning tasks. Five items were used to evaluate the extent of their confidence across various activities associated with m-learning, along with respective means and standard deviations (SD). The mean score ranged between 3.79 and 4.77, demonstrating high levels of efficacy when utilizing mobile devices for m-learning applications- with the highest scores reported under item number five referring to word document entry on a mobile device. The overall mean score was found at approximately high levels through this review at a rate of roughly around (4 .48), whereby provisional figures suggested that there is substantial potential in using mobile phones as an aid: however, there are areas underpinning unsureness primarily noted relating to not feeling confident enough whilst operating reading content via this multimedia platform- reflecting notably under item number four.

Such data consolidates insights towards undergraduate students' self-efficacy when using mobile devices factor in utilizing mobile devices promoting education, thereby allowing instructors to structure more effective mobile learning instructional models.

Table 4: The students' statements in the interviews for self-efficacy of m-learning

No	Statement	Frequency (N = 20)
1	I could use the mobile device to discuss with my peers about the reading materials.	19
2	I could log into the discussion forums via the mobile device.	17
3	I know how to post questions about the reading via the mobile device.	15
4	I know how to respond to peers' questions via the mobile device, which made the learning more interactive.	10
5	I can take pictures with my phone to show the related information about the assigned tasks.	10
6	When it comes to typing, it's rather difficult. There is no keyboard to type with and the screen is too small. It was inconvenient to write messages to answer peers' questions on mobile devices.	9
7	I could use the mobile device to film some clips and share with my peers about what we have learned in class.	7

By interviewing students about m-learning and using mobile devices for studying purposes, we collected some insightful data regarding self-efficacy levels among them. Table 4 presents a list containing seven statements made by participants describing their abilities or difficulties related to using these gadgets for educational activities, together with a frequency count taken from an overall sample size comprised of twenty students.

The majority (19/20) felt confident when communicating with peers over reading material via these tools, while logging into discussion forums was seen as similarly straightforward by a significant margin (17/20). Posting questions related to coursework through mobile phones was considered feasible by almost three-quarters of our sample group, too (15/20).

However, ten respondents thought answering questions issued by classmates on such platforms was not quite as easy as those stakes ranked far lower on our list overall, along with taking pictures designed to support completed tasks after either browsing secondary sources or using online software while mobile devices do help.
Comparatively, nine of the twenty students did not feel completely comfortable typing on phones or tablets.

The table indicates that despite challenges, there's still considerable hope when it comes to these tools' effectiveness in supporting educational processes; however, tailoring these materials in a way that fits individual tastes & needs is crucial. Education professionals and

device experts should consider providing detailed guidance if they are willing to help learners who face potential roadblocks navigate their way through the technology too.

RQ3: Do male and female students differ in their attitudes towards and self-efficacy in m-learning in Saudi Universities?

Table 5 Gender Comparisons on mobile learning attitudes and mobile self-efficacy

Mobile Attitude Survey (MAS)	Male (n=10) 4.26 (0.4)	Female (n=10) 4.18 (0.45)	1-tailed *t-test* *0.184*
Mobile Self-efficacy Survey (MSS)	4.72 (0.21)	4.51 (0.15)	0.003

P<0.01

Table 5 sheds light on the disparities between genders regarding the attitude towards mobile learning (MAS) and self-efficacy for using mobile devices effectively while participating in m-learning surveys (MSS).
The recorded results entail essential comparisons displaying males exceeding females slightly in mean scores at MAS, where male rates were evaluated at M=4.26 alongside SD=.40 vis à vis females who attained an average of M=4.18 alongside SD=.45.

These figures lacked statistical significance between genders, judging by the one-tailed t-test yield of p=.184. In contrast. MSS portrayed considerably contradictory outcomes therein.

In that regard. Males achieved much higher self-efficacy ratings than their female counterparts, more specifically. They garnered an average of M=4.72 with SD=.21 compared to females who scored an average of M=4.51 with SD=.15; these outcomes delivered a p-value less than .01, reflecting significant variance correlated with gender outlines.

Overall, these findings elucidate valuable understanding crucial for educators and instructional designers responsible for creating and implementing tailored systems to enhance mobile learning experiences unbiased towards one gender or the other.

Table 6: The male and female students' statements in the interviews for mobile learning attitudes and self-efficacy

Statement	**Frequency (Males = 10)**
The mobile phone is like a toy to me. I love to use it for our tasks.	8
I would attend to the new message on my mobile every hour	7

It is very cool to use mobile phones for English learning. I shared some learning materials with my family members too.	5
Statement	**Frequency (Females = 10)**
I did not like to do the assignments on the mobile phones.	6
My phone is not as fancy as others so I did not find it easy to do the tasks.	5
Mobile devices are only for entertainment. I do not think it is ideal for English learning.	5

The information displayed in Table 6 unveils students' views towards mobile learning regarding their attitudes surrounding it alongside self-efficacy levels. The table comprises different statements for ten female students and ten male students, which describe their outlook regarding usage habit patterns.

Male students overwhelmingly conveyed a positive outlook on mobile learning - eight out of ten referred to it as an exciting toy-like experience. Furthermore, seven out of ten took regular breaks to intercept any messages arriving on their cell phones on a frequent basis throughout the day, only returning to work after attending to them quickly. Some males were also inspired by sharing English language resources from their mobile devices with family members (5/10).

Conversely, six out of ten females disliked doing homework via m-learning. Despite technology advancements, some females purported device inadequacies compared with others leading them into trouble completing tasks efficiently (5/10). Meanwhile - some participants believed that m-learning was solely tailored toward entertainment purposes rather than academic productivity.

These comprehensive statements listed provide novel information into the thoughts and self-efficacy measures taken by both female and male learners towards m-learning. This data set is ideal when creating effective strategies to personalize learners' experiences as teachers/instructional designers take individual genders' different requirements/preferences into account more so than generic content delivery strategies would permit.

DISCUSSION

Regarding the findings of the first research question, the findings suggest that undergraduate students in Saudi universities generally hold positive attitudes towards the use of mobile devices for m-learning. The mean scores for all ten criteria were above 3.0, indicating that students have an overall favorable perception of m-learning. The highest mean score was for item one, which suggests that students believe that using mobile devices in the virtual learning

environment can help them generate more ideas. This finding aligns with the idea that mobile devices can enhance creativity and improve learning outcomes in certain contexts.

However, there were some negative perceptions of using mobile devices for academic purposes, indicating that students felt less comfortable using mobile devices for more imaginative or creative work. This may be because mobile devices are often associated with more passive activities, such as scrolling through social media, rather than active and creative learning activities. Additionally, some students reported eye strain caused by excessive reading on mobile devices, which may be a concern for educators and instructional designers.

The results from the interviews conducted with twenty students further support the general positive attitude towards m-learning. The majority of students found using mobile devices for learning to be enjoyable and time-saving, and many expressed a desire to use mobile devices for learning in other courses. These findings highlight the potential benefits of m-learning, such as increased accessibility and flexibility, which can help students engage with course content more effectively.

Educators and instructional designers can use these findings to design effective m-learning strategies that align with students' attitudes and preferences. For example, they can focus on incorporating more interactive and creative activities into the m-learning design to help students overcome negative perceptions of using mobile devices for academic purposes. Additionally, they can provide guidelines and resources to help students reduce eye strain and other potential negative effects of using mobile devices for extended periods. Overall, this study provides valuable insights into undergraduate students' attitudes towards m-learning in Saudi universities and can inform the development of effective mobile learning strategies.

As for the second research question, In terms of this study's findings regarding undergraduate students within Saudi Arabian universities and their use of mobile devices for m-learning purposes, overall self-efficacy levels among respondents were quite high. Mean scores for all five assessed areas exceeded the 4-point mark, indicating a strong sense of confidence amongst participants in undertaking various technological tasks through the use of smartphone or tablet devices, further emphasizing the enthusiasm expressed by respondents surrounding tasks requiring extended textual input via these platforms.

However, it became apparent amidst the results collected that some areas may pose challenges when it comes to expressing confidence levels among student populations concerning m-learning approaches enabled through mobile devices, specifically where reading content on smaller screens is concerned with scores presenting lower levels of confidence concerning factors pertaining potentially to difficulties posed due to reduced screen size and its impact on prolonged exposure towards interactive material.

Further responses revealed complications concerning typing processes facilitated through equipment usage, causing inconvenience when attempting endeavors such as answering questions posed by peers and submitting messages into discussion forums. Facilitating an

excellent m learning experience and fostering better learning outcomes necessitate the provision of adequate support mechanisms for students. This may include access to relevant resources as well as personalized guidance to help resolve challenges they may face.

As related to the findings of the third research question, the Saudi Arabian undergraduate student population exhibits certain gender differences concerning attitudes toward mobile learning. As evident by the data presented in Table 5. The one-tailed t-test results indicate that there is no significant difference between male and female students' attitude preferences for mobile learning.

However, a noteworthy difference was found concerning their respective self-efficacy perceptions: Males rated themselves higher than females on this metric. Moreover, Table 6 provides deeper insights into male vs. female approaches toward m-learning platforms within Saudi universities. Notably, males exhibited a positive view of mobile education. Using descriptors like "exciting" and "playful." Such learners also appeared to multi-task effortlessly between attending to their study materials on these devices alongside receiving phone notifications regularly. In opposition, females exhibited comparatively negative views regarding the same medium- citing device inadequacies causing difficulty completing tasks efficiently; many considered this format merely an entertaining format unsuitable for serious study matters. In light of these findings highlighting gender differences amongst undergraduate m learning preferences in Saudi Arabia's university scenario, it becomes imperative to consider these disparities when designing effective digital pedagogy solutions catering to both genders effectively. Tailored support protocols will facilitate breaking traditional encumbrances faced by female learners ensuring better self-efficacy levels in the long run, thereby resulting in overall student success.

Limitations:

Acknowledging several constraints associated with this study when interpreting its conclusions is important. Firstly, its sample size was relatively small; therefore, an increase in this figure could raise external validity. Secondly, since it only focused on undergraduate students within Saudi universities specifically then, its generalizability must be approached with caution when applied beyond that context or educational level constraint.

A third limitation is due to reliance on self-reported measurements where social desirability bias could threaten quality data collection accuracy. Also noteworthy is that no investigation was made into whether reported positive attitudes or improved efficacy directly correlated with actual academic performance within the discipline.

Lastly, the exclusion of prior experience with technology literacy limits the researchers' ability to understand other potential influences contributing to both participants' attitudes and self-efficacy surrounding mobile technology within education (m-Learning). As future studies plan investigations into similar topics, such ancillary factors must also be taken into account.

Conclusion:

In this study, the researchers aimed to investigate the attitudes and self-efficacy of undergraduate students in Saudi universities when it comes to m-learning using mobile devices. Based on our findings, one can conclude that students generally have a positive attitude toward using mobile devices for m learning and are confident in their ability to perform various tasks. However, gender differences with male students exhibiting higher levels of self-efficacy were also found than their female counterparts. The study offers valuable insights into the attitudes and self-efficacy of undergraduate students in Saudi universities toward m-learning.

Educators and instructional designers can use this information to create effective m learning strategies tailored to meet the specific needs and preferences of each student. In doing so, they can improve the overall student experience with m learning and enhance learning outcomes.

That said, it is important to acknowledge some limitations of the study, such as a small sample size, reliance on self-reported measures, and the focus solely on undergraduate students at Saudi universities. As such, any generalizations must be made carefully. Future studies should take into account these restrictions while scrutinizing other factors that might affect attitudes towards and self-efficacy with m learning, like age or technological literacy.

In summary, this study provides a groundwork for future research in m-learning by stressing the importance of incorporating students' attitudes and self-efficacy levels when designing effective strategies that facilitate learning experiences for all learners regardless of gender or skill level.

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