

Students' Perceptions Towards the Integration of Knowledge Management Processes in M-learning Systems: A Preliminary Study*

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It is highly important for the higher educational institutions to understand the factors that affect the students' acceptance of Mobile Learning (M-learning) systems as a prior step to the implementation of such systems. From the M-learning perspective, the literature ignores some factors that could contribute to improve the knowledge acquisition, sharing, application, and protection, and how such factors could affect the M-learning acceptance. From the Knowledge Management (KM) perspective, research shows that KM processes have a positive impact on the acceptance and implementation of many Information Systems (IS). We observed that the existing literature overlooks the impact of KM processes on M-learning acceptance. Accordingly, the main objective of this study is to analyse the students' perceptions towards the integration of KM processes in M-learning systems. A mixed method (questionnaire and interviews) was used for data collection. An online survey has been sent to IT undergraduate students in two different universities in two different regions namely, Universiti Malaysia Pahang (UMP) in Malaysia and Al Buraimi University College (BUC) in Oman. 305 students responded to the survey. Results indicated that around 74% of students reported that it is interesting to incorporate KM processes in M-learning systems. Additionally, results pointed out that 93% of the students indicated that they would use the M-learning system in their studies if all KM processes will be taken into consideration. It is imperative that these results will assist the M-learning systems developers to take these factors into their consideration while designing and developing such systems. Furthermore, educators may need to elaborate their teaching strategies in a way that suits the use of these systems and meets the students' needs.

Keywords: M-learning; knowledge management processes; acceptance; perceptions

1. Introduction

During the last two decades, a lot of efforts have been made to integrate electronic gadgets into the educational environments aiming to assist the students in acquiring new knowledge [1]. Recently, there is a remarkable change in the educational environment that depends on mobility due to the technological developments and the low cost of mobile devices and services. This shift has led to a new wave of learning, that is called, Mobile Learning (M-learning) [2]. According to studies by [2–4], it is pointed out that due to the extensive coverage of M-learning features, it becomes an essential part of the institutions of higher education. M-learning assists learners in making their conversations, joining social media, facilitating their access to the course material, finding responses to their queries, enabling team collaboration, facilitating knowledge sharing, and thus, raising their learning outcomes [5–8].

The acceptance of M-learning is a prior step to the implementation of M-learning systems. It is crucial for the higher educational institutions to understand the factors that affect the students' acceptance of M-learning in order to sustain the usage of M-

learning systems and to keep improving their services to meet the education requirements. Many Information Systems (IS) theories/models were evolved for understanding the M-learning acceptance. Such theories may include “Technology Acceptance Model (TAM)” [9], “Innovation Diffusion Theory (IDT)” [10], and “The Unified Theory of Acceptance and Use of Technology (UTAUT)” [11]. Among all these theories/models, King and He [12] reported, that due to adaptability, simplicity, and soundness of TAM, it became one of the most commonly used models for measuring the IS acceptance so far. TAM has witnessed a lot of modifications and enhancements, which in turn contribute to the successful implementation of M-learning. Those modifications and enhancements were usually performed by extending the model either by external or contextual factors. Determining the factors that influence the acceptance of M-learning is still one of the ongoing and critical issues by many Information Systems (IS) scholars [2].

From the M-learning viewpoint, it's very important for enhancing the learners' abilities that Knowledge Management (KM) processes (Knowledge Acquisition, Knowledge Sharing, and Knowledge Application) should be incorporated in M-

learning systems. Such incorporation will enable the learners to acquire the knowledge that is transferred through mobile devices, share the acquired knowledge with others, and apply the acquired and shared knowledge in their learning processes for the reason of leveraging the learning effectiveness [13]. Besides, learners can generate new knowledge during the course through the interaction and collaboration with others [14]. KM efficiency highly depends on the diffusion of knowledge that is created through collaboration and communication [15]. M-learning systems facilitate the process of collaboration, communication, and interaction, in which, it makes it easy for knowledge to be managed. A study by [16] pointed out that KM is an essential component for developing M-learning systems that transforms the mobile-based learning into knowledge-based learning which in turn leverages the learning effectiveness. In terms of KM, M-learning is one of the KM initiatives that supports a reliable learning environment, in which knowledge has been easily gained and shared among users [17, 18]. Recently, KM has become one of the trendy IS research fields [19]. Accordingly, institutions and organizations have planned forwards to employ KM initiatives by various information systems in different contexts. As a result, this preliminary study aims to analyse the students' perceptions towards the integration of KM processes in M-learning systems as a prior step to the extension of TAM by these processes. Furthermore, this study intends to ensure the applicability of these factors as determinants to affect the M-learning acceptance.

The rest of this paper is organized as follows; section two shows the literature review. Section

three demonstrates the proposed contribution. Section four describes the research methodology. Section five shows the data analysis. Section six demonstrates the results and discussion. Conclusion and future work are demonstrated in section seven.

2. Literature review

Davis [9] pointed out that the primary indicator of any IS usage and success is the technology acceptance. TAM has been developed with the aim of predicting the users' behaviour towards a particular technology and examining their acceptance towards that technology [9]. TAM has witnessed a lot of modifications and enhancements in the context of M-learning aiming to examine the students' adoption of M-learning and to leverage their acceptance of the technology. According to the study [20], it is argued that the extension, revision, and modification of TAM is still an ongoing issue that is tackled by many IS scholars due to the rapid change in the technology development. In the context of M-learning, Table 1 shows that TAM has been extended by many factors for the purpose of examining M-learning acceptance. Some of those factors were adopted from the IS-related literature, while others were adopted from other disciplines.

It has been noticed that the literature ignores some factors that could contribute to improve the knowledge acquisition, sharing, application, and protection, and how such factors could affect the M-learning acceptance. Based on Table 2, research studies revealed that KM processes (Knowledge Acquisition, Knowledge Sharing, Knowledge

Table 1. Analysis of TAM research papers in terms of External and contextual factors in M-learning context

Source	Factors/Variables	Discipline	Methods	Country	Education Level	Research Purpose
[21]	("Performance expectancy", "effort expectancy", "social influence", "self-efficacy", and "anxiety").	Medical Education	Survey	Spain	Higher Education	Examining the students' acceptance of mobile technologies.
[22]	("Perceived long-term usefulness" and "personal innovativeness").	Language Learning		China		Investigating students' acceptance of mobile learning.
[23]	("Quality of service", "mobile devices", "mobile resources" and "visual attraction") along with an additional factor ("interest").	Education				Predicting the factors that affect students' acceptance of mobile learning.
[24]	("self-efficacy" and "compatibility").	Engineering		Taiwan		Investigating the students' acceptance of mobile-based vocabulary learning of English.
[25]	("Perceived innovativeness" and "Perceived ICT anxiety").	Computer Science + Information Technology		Saudi Arabia		Examining the students' usage of smartphones and tablets in the educational process.

Table 2. Analysis of studies related to the impact of KM processes on the implementation, adoption, and success of different IS

Source	KM Processes	Context	Methods	Country	TAM Usage
[26]	The impact of “knowledge acquisition”, “knowledge storage”, “knowledge dissemination”, and “knowledge protection” on E-business initiation, E-business implementation, and E-business assimilation.	E-Business System	Survey	Taiwan	No
[27]	The effect of “knowledge sharing” on performance.	E-Government utilization		Mongolia	
[28]	The influence of “knowledge sharing factors” on the attitude towards utilizing blogs.	Blog usage		Taiwan	Yes
[29]	The influence of “knowledge sharing intention” on task-technology fit (TTF), utilization, and performance impact.	Knowledge Management System	Interviews + Survey	Not Specified	No
[30]	The effect of “knowledge acquisition” and “knowledge integration” on the project quality of IT outsourcing success.	IS outsourcing success		China	

Application, and Knowledge Protection) have approved its effectiveness in predicting the adoption, implementation, and success of many ISs. Such Information Systems include E-business system [26], E-government system [27], blogs [28], knowledge management system [29], and IS outsourcing [30] among many others. We can observe that KM processes were applied to various ISs in different countries. In addition, surveys and interviews were the main methods used for data collection. Moreover, most of the studies didn't use TAM as an acceptance model while investigating the impact of KM processes on IS acceptance.

3. Purpose of the study

Based on the analysed studies in the context of M-learning and the studies in KM processes, we can observe that the existing literature ignores other factors that could contribute to improve the knowledge acquisition, sharing, application, and protection and how such factors could affect the acceptance of M-learning. In order to assure the importance of the relationship between KM processes and M-learning acceptance, we have conducted this study to analyse the students' perceptions towards the integration of KM processes in M-learning systems. This study will provide two types of findings that will contribute to the existing literature for improving the M-learning acceptance. Quantitative findings will help in analysing the students' perceptions towards the integration of KM processes (Knowledge Acquisition, Knowledge Sharing, Knowledge Application, and Knowledge Protection) in M-learning systems. Qualitative findings will help the designers and developers of M-learning systems in taking the

appropriate actions for designing and developing M-learning systems.

4. Research methodology

4.1 Research instrument

In this study, a mixed method (questionnaire and interviews) of data collection was used in order to analyse the students' perceptions towards the integration of KM processes (Knowledge Acquisition, Knowledge Sharing, Knowledge Application, and Knowledge Protection) into M-learning systems. A study by [31] argued that the use of mixed methods can deeply grasp the participants' responses (with regard to interviews) and the statistical analyses methods can provide an elaborated assessment of responses patterns (with regard to questionnaires). Authors of the study [32] reported the importance of mixed methods in collecting data in which it increases trustworthiness in research investigations. This preliminary study attempts to investigate the students' perspectives towards M-learning systems services and to analyse their perceptions towards the integration of KM processes in M-learning systems.

The survey instrument in this study comprised of two parts. The first part involves the questionnaire, which was adapted from different studies with further adjustments in order to fit the study context. The questionnaire contains three sections. The first section involves collecting the students' personal information (e.g., gender, age, country, and year of study). Section two includes closed questions that were adapted from previous studies [4, 32, 33] in order to collect data about the students' usage of mobile devices and M-learning systems. Section three covers the KM processes along with their corresponding items that were adapted from pre-

Table 3. KM processes and their corresponding items and sources

KM Process	Items	Sources
Knowledge Acquisition	It would be interesting to use the m-learning system in my study if it: <ul style="list-style-type: none"> • Allows me to acquire the learning material and contents. • Allows me to receive guidance on learning activities from the course instructor. • Allows me to gain new knowledge based on the existing knowledge. 	[32], [34], [35]
Knowledge Sharing	It would be interesting to use the m-learning system in my study if it: <ul style="list-style-type: none"> • Allows me to share the course material and contents with my class colleagues. • Provides me with a discussion forum that allows me to discuss issues regarding the course materials and contents with my class instructor and colleagues. • Allows me to keep in touch with my class instructor and colleagues. 	[32], [36]
Knowledge Application	It would be interesting to use the m-learning system in my study if it: <ul style="list-style-type: none"> • Provides me with an immediate access to the course materials and contents. • Allows me to use and apply the learning materials and contents in problem solving. 	[34], [35], [37], [38]
Knowledge Protection	It would be interesting to use the m-learning system in my study if it: <ul style="list-style-type: none"> • Allows me to protect my learning materials and contents from inappropriate access and use. • Allows me to protect my communications and discussions with my class colleagues and instructor from inappropriate access. 	[26]

vious studies and tailored to the use of M-learning services for knowledge management as per Table 3 following the 5 point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1) for the purpose of analysing the students' perceptions towards the integration of KM processes in M-learning systems. The second part of the instrument involves the interview questions where some of them were adapted from a previous preliminary study by [32]. Overall, the survey instrument includes both questionnaire and interviews, was reviewed by different IT experts from the Faculty of Computer Systems and Software Engineering at UMP in Malaysia, and the IT department at BUC in Oman.

4.2 Pilot test

According to the study [32], it is reported that the pilot test is an essential phase before conducting the final instrument that ensures and finds out the initial indications about the content and face validity of the instrument. Furthermore, the pilot test refers to a feasibility study or a small-scale version that is conducted as a preparation for the final instrument. To that end, this study attempts to implement the pilot test in order to assess the content and face validity of the instrument as a prior step before conducting the final instrument. Authors of the study [39] pointed out that the minimum sample for conducting the pilot test is 30 respondents. Accordingly, the researcher selects 35 respondents to participate in the pilot test.

4.3 Participants

This preliminary study was conducted at two different universities in two different regions namely, UMP in Malaysia and BUC in Oman in May 2017.

An email containing the online survey has been sent to 871 IT undergraduate students at both universities. The researcher explains the aims of the study in the body of the email and requests the students to fill the survey. Follow-up emails were sent after few days from the initial email reminding those who don't fill the survey. Out of 871 distributed surveys, 305 students have filled the survey; giving a response rate of 35%. Incomplete responses were discarded; resulting in 297 valid responses as to be used for data analysis. Table 4 shows the personal information of the participants. 72.1% of the students were females while only 27.9% were males. Regarding the students' age, 75.4% of them were between the age 18-22, followed by 20.9% between the age 23-28 among the others. In terms of country, 68% of the students were from Oman, while only 32% of them were from Malaysia. Regarding their year of study, 37.7% of the students were in year 3, followed by 24.2% in year 2, 20.5% in year 4, and 17.5% in year 1, respectively.

4.4 Measurement

The survey instrument was validated with regard to reliability and validity. In terms of reliability, it measures the internal consistency of the items within the same construct. In this preliminary study, reliability was performed in order to measure the internal consistency of the data through the usage of the coefficient of Cronbach's Alpha. As per the study of [40], the Cronbach's Alpha (α) values should be above 0.7 in order to be accepted (i.e., if the Cronbach's Alpha (α) values are greater than 0.7, this indicates that the instrument is acceptable). Results showed that the Cronbach's Alpha (α) for knowledge acquisition items is (Alpha =

Table 4. Students' personal information

	Values	Frequency	Percentage
Gender	Male	83	27.9%
	Female	214	72.1%
Age	18 to 22	224	75.4%
	23 to 28	62	20.9%
	Above 28	11	3.7%
Country	Malaysia	95	32%
	Oman	202	68%
Year of study	Year 1	52	17.5%
	Year 2	72	24.2%
	Year 3	112	37.7%
	Year 4	61	20.5%

0.909), knowledge sharing is (Alpha = 0.909), knowledge application is (Alpha = 0.863), and knowledge protection is (Alpha = 0.9). This shows that the Cronbach's Alpha (α) values are greater than 0.7. Therefore, the internal consistency is accepted, and the instrument is extremely reliable.

With regard to validity, Hair and his colleagues [40] reported that validity measures how the instrument was developed, and what will be supposed to measure. There are two types of validity namely, face and content validities. The former refers to the degree to what the instrument claims to measure, and the latter refers to how well the instrument sufficiently measures the subject field. We have examined two types of validity during the pilot test stage. A copy of the survey was distributed to various IT experts and PhD students in Computer Science domain as reviewers to assess the survey and provide suggestions in order to improve the survey quality for the purpose of verifying the content and face validities. Accordingly, the survey instrument was modified based on the reviewers' suggestions. We followed the same procedures described by [34, 35, 41]. The pilot test ensures that the survey instrument questions are clear, appropriate, and provide soundness in terms of language and clarity to fulfil the study purpose.

5. Data analysis

In this preliminary study, the survey instrument was analyzed through the use of descriptive statistics method using Statistical Package for Social Sciences (SPSS) V.21 software.

6. Results and discussion

This section comprised of two subsections namely, quantitative and qualitative results. Quantitative results involve analysing the second and third part of the survey instrument, while qualitative results

involve analysing the fourth part of the instrument (i.e., open-ended questions).

6.1 Quantitative results

This section involves two types of analyses. The first one concerns analysing the second part of the survey instrument (i.e., closed-questions about the students' usage of mobile devices and M-learning systems). The second one concerns analysing the third part of the instrument (i.e., analysing the students' perceptions towards the integration of KM processes in M-learning systems).

Table 5 shows the results of students' usage of mobile devices and M-learning systems. The first question asked the students about the ownership of mobile devices. Results indicated that 76.4% of the students own smartphones, followed by 16.5% own both (smartphones and tablets) while only 3.4% of the students indicated that they don't have a mobile device. Overall, 96.6% of the students own mobile devices, and thus, this percentage is almost consistent with previous studies like [32] who indicated that 96.4% of the students have mobile devices and [4] who revealed that 99% of the students were doing so. This percentage shows that mobile devices availability is relatively high. In terms of years of experience in using mobile devices, results revealed that 40.1% of the students have more than 6 years of experience in using mobile devices, followed by those who have 4 to 6 years of experience with 38.7%, while only 7.1% of students reported that they have 0 to 1 year of experience. Collectively, around 79% of the students have a minimum of 4 years of experience in using mobile devices. This indicates that mobile devices are prevalent among the students.

In terms of accessing the internet using mobile devices, 97.6% of the students stated that they access the internet through their mobile devices, while only 2.4% didn't so. This reveals that students prefer to access the internet via mobile devices rather than other tools. With regard to the most commonly used activities through mobile devices, results indicated that 46.5% of the students reported that using the internet (web and email) via mobile devices is the most commonly used activity. This percentage is highly reasonable as it matches the results of the previous question. In terms of using the current M-learning system, 68% of the students reported that they used the M-learning system, while only 32% didn't so. Students were asked about their opinion of the existing M-learning system in the learning process, 54.2% of them stated that M-learning system is interesting. However, students would not like to use it in their studies because it doesn't fulfil their learning needs. This percentage indicates that students are highly motivated to use the system, but

Table 5. Results of students' usage of mobile devices and M-learning systems

Questions	Frequency	Percentage
B1. Which mobile device do you have?		
Smartphone	227	76.4%
Tablet (Ex. iPad)	11	3.7%
Both	49	16.5%
None	10	3.4%
B2. Years of experience in using mobile devices?		
0–1 year	21	7.1%
2–3 years	42	14.1%
4–6 years	115	38.7%
More than 6 years	119	40.1%
B3. Do you access the internet using your mobile device?		
Yes	290	97.6%
No	7	2.4%
B4. What is the most commonly used activity by mobile devices?		
SMS	73	24.6%
Education	40	13.5%
Internet (web/mail)	138	46.5%
Entertainment	46	15.5%
B5. Have you ever used the mobile learning (M-learning) system?		
Yes	202	68%
No	95	32%
B6. What is your opinion of M-Learning system in the learning process?		
Interesting, and I would like to use it because it fulfills my learning needs.	122	41.1%
Interesting, but I would not like to use it because it doesn't fulfill my learning needs.	161	54.2%
Not interesting, and I would not like to use it because it doesn't fulfill my learning needs.	14	4.7%

due to the lack of other features that may affect the M-learning system usage, students don't like to use it in their studies, which in turn, decreases the M-learning system acceptance among them. This result is consistent with a previous study by [32] who stated that 83% of the students don't like to use the M-learning system due to the lack of other factors that affect the system acceptance. In order to raise the M-learning system acceptance among the students, other factors need to be investigated. In this study, we attempt to understand the integration of KM processes as factors that may affect the acceptance of M-learning systems among students.

As we stated previously, the aim of this preliminary study is to analyse the students' perceptions towards the integration of KM processes (Knowledge Acquisition, Knowledge Sharing, Knowledge Application, and Knowledge Protection) in M-learning systems. The third section of the survey instrument, which contains the KM processes along with their items, was dedicated to accomplishing the aim of this study. Table 6 shows the results of students' perceptions towards the integration of KM processes in M-learning systems. In terms of knowledge acquisition, results indicated that around 74% of students reported that it would be interesting to use the M-learning system if it allows them to acquire the learning material and content, receive guidance from their course instructor regarding their course material, and gain new

knowledge based on their existing knowledge. With regard to knowledge sharing, results revealed that around 74% of students stated that it would be interesting to use the M-learning system if it allows them to share the course material and content with their class colleagues, provides them with a discussion forum that allows them to discuss issues regarding the course material with their instructor and colleagues, and allows them to keep in touch with their class instructor and colleagues. In terms of knowledge application, results pointed out that around 73% of students stated that it would be interesting to use the M-learning system if it provides them with an immediate access to the course material and content and allows them to use and apply the learning materials in problem-solving. With regard to knowledge protection, results showed that around 74% of students indicated that it would be interesting to use the M-learning system if it allows them to protect their course materials and contents from inappropriate access and allows them to protect their communications and discussions with their class instructor and colleagues from inappropriate access and use. More interesting, 93% of the students indicated that they would use the M-learning system in their studies if all KM processes will be taken into consideration in the design and development of these systems. These results give a strong indicator that KM processes are important factors that affect

Table 6. Results of students' perceptions towards the integration of KM processes in M-learning systems

KM Process	Mean	Percentage
Knowledge Acquisition	3.69	73.8%
It would be interesting to use the m-learning system in my study if it:		
KA1. Allows me to acquire the learning material and contents.	3.69	73.8%
KA2. Allows me to receive guidance on learning activities from the course instructor.	3.71	74.2%
KA3. Allows me to gain new knowledge based on the existing knowledge.	3.67	73.4%
Knowledge Sharing	3.69	73.8%
It would be interesting to use the m-learning system in my study if it:		
KS1. Allows me to share the course material and contents with my class colleagues.	3.72	74.4%
KS2. Provides me with a discussion forum that allows me to discuss issues regarding the course materials and contents with my class instructor and colleagues.	3.67	73.4%
KS3. Allows me to keep in touch with my class instructor and colleagues.	3.69	73.8%
Knowledge Application	3.67	73.4%
It would be interesting to use the m-learning system in my study if it:		
KAP1. Provides me with an immediate access to the course materials and contents.	3.59	71.8%
KAP2. Allows me to use and apply the learning materials and contents in problem solving.	3.74	74.8%
Knowledge Protection	3.69	73.8%
It would be interesting to use the m-learning system in my study if it:		
KP1. Allows me to protect my learning materials and contents from inappropriate access and use.	3.69	73.8%
KP2. Allows me to protect my communications and discussions with my class colleagues and instructor from inappropriate access.	3.69	73.8%

the acceptance of M-learning systems among students.

6.2 Qualitative results

The last section of the survey instrument contains two open-ended questions. The first question intends to determine the problems that faced the students while using the M-learning system. The second question asks the students about their suggestions and recommendations for improving the M-learning system. Table 7 summarizes the main responses given to each question in the interview section. With regard to the first question, the majority of students reported that the main problems that faced them while using the M-learning system are as follows:

1. Lack of accessing and downloading the course material (lectures and assignments). Our results are consistent with [32] who indicated that the availability of course material is the primary factor in affecting the student's acceptance of M-learning system. The result of this question provides a strong indicator that knowledge acquisition (in terms of acquiring the learning material) and knowledge application (in terms of accessing the learning material) are important factors that could affect the M-learning acceptance.
2. Lack of communication between the students and their course colleagues and instructor. This result is consistent with [32] who stated that mobile technologies are effective tools for communication and the M-learning system should facilitate the way of such communication. The

result of this question provides a strong indicator that knowledge sharing (in terms of keeping in touch with course instructor and colleagues) is a critical factor that could affect the M-learning acceptance.

3. Shortage of network connection and difficulty in use. This result comes in line with the results of [32] who reported that network accessibility and difficulty in use, is one of the challenges that impede the usage of M-learning system.

With regard to the second question in the interview section, students provide some suggestions and recommendations for improving the M-learning system. Students suggested that the M-learning system should be simple, user-friendly, and easy to use. Students also recommended that there should be a discussion forum or a chatting room for discussing the course content between the students themselves and their course instructor. Moreover, students pointed out that the course material (ppt slides, e-books, and assignments) should be easily accessed and available for downloading. Besides, students put forward that the M-learning system should have a feature that enables the students to share their course material along with further explanations. Furthermore, students were highly recommended that network connection should be improved. The results of this question provide an indicator that knowledge acquisition (in terms of downloading the course material and gaining new knowledge), knowledge sharing (in terms of providing a discussion forum or chatting room that allows that students to share and discuss the course material together and with their instructor), and knowl-

Table 7. Interview questions results

Interview questions	Results
What are the problems that you have faced while using the mobile learning system?	<p>The majority of students reported that the main problems that encounter them while using the M-learning system are:</p> <ul style="list-style-type: none"> • Lack of accessing and downloading the course material (lectures and assignments). • Lack of communication between the students and their course colleagues and instructor. • Shortage of network connection. • Difficulty in use.
What are your thoughts and suggestions for improving the overall mobile learning system?	<p>Students provide some suggestions and recommendations for improving the M-learning system. These suggestions and recommendations include:</p> <ul style="list-style-type: none"> • The M-learning system should be simple, user-friendly, and easy to use. • There should be a discussion forum or chatting room for discussing the course content between the students themselves and their course instructor. • The course material (ppt slides, e-books, and assignments) should be easily accessed and available for downloading. • The M-learning system should have a feature that enables the students to share their course material along with further explanations. • Improve the network connection.

edge application (in terms of accessing the course material) are essential factors that may affect the M-learning acceptance. Furthermore, designers and developers should take into their consideration that simplicity, user-friendliness, and ease to use, are the main features that a robust M-learning system should be. Moreover, higher education institutions should work on improving the internet network in their campuses as the lack of the network accessibility may hinder the use and acceptance of M-learning systems.

7. Conclusion

According to the analysed studies in the context of M-learning and the studies in KM processes, we have noticed that the existing literature has overlooked some factors that could contribute to improve the knowledge acquisition, sharing, application, and protection and how such factors could affect the acceptance of M-learning. The main objective of this preliminary study is to analyse the students' perceptions towards the integration of KM processes (Knowledge Acquisition, Knowledge Sharing, Knowledge Application, and Knowledge Protection) in M-learning systems. A mixed method was used for data collection. An online survey has been sent to IT undergraduate students in two different universities in two different regions namely, UMP in Malaysia and BUC in Oman. 305 students responded to the survey.

From the theoretical perspective, results revealed that KM processes are highly perceived by students and considered as important factors in studying the acceptance of M-learning systems. From the practical perspective, designers and developers should take these results into their consideration while designing and developing the M-learning systems as these factors play a key role in leveraging the

students' acceptance of these systems. From the pedagogical perspective, the present study expanded our understanding of how educators in different disciplines such as: computer science, engineering, medical education, and language learning may need to elaborate their teaching strategies in a way that suits the use of M-learning applications based on KM processes and meets the students' needs.

Although this research study yields substantial implications for expanding our insights into the importance of integrating KM processes in M-learning systems, it also has the following limitations. Further research should focus on integrating these processes into the development of a real M-learning application. Moreover, researchers should further investigate the impact of these processes on M-learning acceptance through the usage of one of the well-known information systems acceptance models. In view of these limitations, we are currently working to address them in our next publications.

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