A Systematic Review of M-learning in Formal Education

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In the recent years, mobile learning has changed the way humans live to learn. Development of M-learning has led to an era of new learning, namely mobile learning involving computers, tablets and mobile phones, which is the core mechanism of M-learning presentation. This study takes a systematic approach to assess the users' perspectives, perceptions and adoption to M-learning and M-learning in formal education. This study used comprehensive analysis and synthesis of 66 articles from the year 2010 until 2018 including full-text articles and peer review journal articles from Google Scholar and ERIC for better comparison between sources. Results of this study show that quantitative was the most used method in exploring the users' perspective and perception to M-learning and M-learning in formal education. This review explores the users' experience in any level of education using mobile tools in formal learning. In addition, it analyses the issues and constraints in implementing mobile learning in formal education, such as confidentiality, integrity and privacy of data. Overall, the results of this study show that 95% of users agreed that M-learning has a positive impact on formal education by increasing the quality of education and various mobile tools that can be used as the implementation of M-learning inside and outside the classroom.

Key words: *M-learning, Systematic Approach, Perspective, Implementation, Formal Education.*

Introduction

The development of our education system is highly influenced by current technology development. Technology development has been fast and has caused changes in aspects of human life, including how human beings learn (Henrie, Halverson, & Graham, 2015). Thus, the implementation of learning in the classroom needs to be adapted to the current needs of students so that their interest in learning can be increased. Technology-based learning at primary and secondary levels can be deemed to be a new learning method. The use of mobile equipment such as mobile phones, tablets, laptops and smartphones has changed the way

people learn. Students are able to reach notes, homework and tasks given by teachers by using mobile equipment, which result in continued extension of anywhere and anytime learning (Norhayati & Yusoff, 2015).

This method is known as Mobile learning (M-Learning). M-Learning is a new method of learning and results in the development of electronic based learning (Hockly, 2013). M-learning has the potential to perform in our education system because each individual is capable of owning a cell phone. (Nawi & Isa Hamzah, 2013). According to Twum (2017),wireless technology and mobile technology are equipped with multimedia features which allow the implementation of M-learning in and outside the classroom. M-learning is a learning concept that gives emphasis on the learning process without being bound by the physical location of learning (Traxler & Kukulska, 2016). In addition, this method provides a variety of alternatives that can be used to facilitate relationships involving distance. The role of mobile phones as a tool to send and receive e-mails, short message service (SMS), multimedia message service (MMS), browsing the web and other various computer applications has increased usability of this technology tool (Liu, Han, & Li, 2010). The goal of M-learning introduced in the field of education is to increase students' motivation in science and learn something in depth (Muslimin, Nordin, Mansor, & Awang, 2017).

Diversity learning applications that support portable learning encourage teachers and students to use it in the best way as possible. Teachers can use various free applications that are easily accessible, searchable and use them to support their teaching supplies (Naismith, Lonsdale, Vavoula, & Sharples, 2004). Implementation of M-learning in education has helped to accelerate and facilitate the learning and make the learning process effective. Students become active participants and voluntarily engage in learning with M-learning (Embi & Nordin, 2013). The implementation of this method can contribute to the teaching and learning environment that is more flexible (Uzunboylu & Ozdamli, 2011). This is due to the traditional version that has turned into the online version. This method is also treated as a tool that can be used to improve the quality of learning in the classroom. Teachers and educators believe that mobile learning would be useful for students because it will be able to create a flexible environment (Hamat, Embi, & Hassan, 2012).

Despite M-learning developing rapidly, there is a need to investigate the users' perspectives and perception towards M-learning in formal education and how M-learning in formal education is implemented during the learning and teaching process. Without considering users' perception and exploring users' readiness levels to use mobile learning, this can cause the ineffective use of M-learning. By understanding users' perceptions towards M-learning, it may help the success of the implementation of M-learning in formal education. Besides, it helps the decision makers to analyse the requirement that is needed to be fulfilled in implementing M-learning in formal education. There were several empirical research studies that had been done focusing on users' perceptions towards M-learning and also the implementation of M-learning in formal education in various levels of educational institutions. These researches attempted to

explore the perceptions of M-learning in education, when it is integrated in the classroom learning. However, there is an absence of systematic review studies on the users' perception towards M-learning and how M-learning is implemented in formal education. Therefore, the goal of this review is to synthesise the findings of studies related to users' perspectives, perceptions and adoption to M-learning and also M-learning in formal education. First, researchers defined M-learning as a teaching method involving mobile equipment such as mobile phones, laptops and PDAs (Grimus, Ebner, & Holzinger, 2012). The concept of M-learning is the implementation of the learning process without being bound by locality and the time factor (Alqahtani & Mohammad, 2015). For the determination of past research that is suitable to be used, researchers have outlined two research questions: a) What are the users' perspectives, perceptions and adoption to M-learning? and b) How can M-learning be implemented in formal education? Researchers will use both research questions as a guide in selecting the appropriate articles to review. After reviewing the studies, the researcher will synthesise the findings to answer both of the questions.

M-learning

Brown (2005) developed a model of learning related to the type of learning that can be executed to establish flexible learning. Based on that model, the E-learning is a subset of distance learning while online learning and M-learning is a subset to E-learning. The implementation of distance learning could be implemented in two different forms i.e. a) teaching and learning based on printed materials (Moore, Dickson, & Galyen, 2011) and b) distance learning based on electronic tools by using technology such as computers and mobile phones and supporting ease like internet, bluetooth and other devices. Therefore, in the context of M-learning, learning can occur in two different forms based on the implementation of distance learning. First is the distance learning-based printed materials such as correspondence (Moore et al., 2011). In ancient times, this learning process required a person to travel out to obtain new knowledge and experience. More recently, learning was more directed to the centralisation of the pupils. The teaching and learning process was also implemented formally but not based on where students were required to find a teacher from other places to obtain new knowledge. The knowledge gained would be shared with other members. Stanton et al. (2013) mentioned that the formation of knowledge happens when knowledge is shared and disseminated to others intended to improve the quality of life. If the first student receives the knowledge and learns something from the teacher, then it is known as information. In contrast, if the information is shared with other people, then that information will be knowledge. Learning situations like this actually is M-learning in the past. Dissemination of knowledge happens when someone disseminates the information collected to create new knowledge. As with E-learning, its function is to help disseminate extensive information, but within a short period of time. The second form of learning is distance learning-based electronic resources such as computers, laptops, smart phones etc. This learning involves the use of electronic resources to facilitate learning and social interaction between teachers and students. Situations and the implementation are similar to distance learning based on printed materials. The difference is
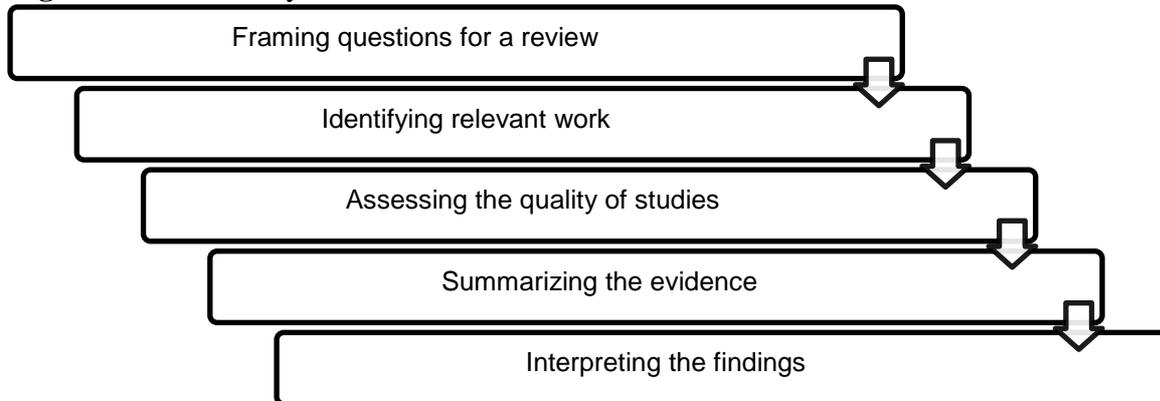
the use of electronic tools which expedites the process of sharing and dissemination of knowledge, regardless of differences in time and place of learning. Even though students and teachers are not present physically, the acquisition still can take place virtually. There are various applications that can be used such as Whatsapp, WeChat, Teamviewer and others which assist the process of face-to-face interaction between teacher and pupils (Stanton et al., 2013). Thus, social interaction among teachers is not limited in the classroom only. Teachers and students can interact anywhere, share their views, experiences and knowledge without limitation. With it, technology and pedagogy are applicable with the implementation of M-learning. Computers, internet, electronic, CD-ROM, smart phones, computers and so on, is an example of the technology involved in the development of M-learning. In pedagogy, M-learning is more purposeful than blended learning, online learning, face-to-face, computer aided instruction, interactive learning and web-based-learning (McCabe, Sharples, & Foster, 2012). Thus, the concept of M-learning can be summed up as follows: a) embodies network communication and cooperation. Students and teachers are able to interact virtually and learning and can be implemented without borders; b) a process that is quick and saves money. Students and teachers can share information, disseminate information and exchange ideas quicker. Pupils can also download the materials before learning; and c) cater to the needs of pupils who want a better learning experience. Pupils currently use computers, smart phones and tablets as technology based learning is seen as a process of fulfilling the will of pupils in acquiring knowledge.

Method

Information could be accessed through hard copy and electronic media when doing a literature review (Hart, 1998). This study is based on systematic analysis conducted on searched articles from databases which include Google Scholar and Eric. The process of literature search was done from July 2018 to November 2018. The purpose of the systematic literature review has been to provide guidelines as well as proper direction in the area of mobile learning, which is considered changing the learning attributes, learning institutional directions, technological enhancement and technical security measurements. Therefore, in this study, researchers used five phases proposed by Khan (2003). This method has contributed in original research and been able to help researchers to critically analyse, evaluate and synthesise complex ideas (Khan, Kunz, Kleijnen, & Antes, 2003).

Figure 1. shows the phases of Systematic Literature Review:

Figure 1 . Phase of Systematic Literature Review

Phase of Systematic Literature Review:
- Framing questions for a review
- Identifying relevant work
- Assessing the quality of studies
- Summarizing the evidence
- Interpreting the findings

Phase 1 : Framing questions for a view

Due to the development of technology, mobile devices have become a greater opportunity to expand learning to not only limited to the classroom but also virtual learning. So, this study aims to analyse the users' perspectives, perception, satisfaction and adoption to M-learning and also M-learning in formal education, published from 2010 to 2018. The research questions are: a) What are the users' perspectives, perception and adoption to M-learning? b) How is M-learning the implemented in formal education?

Phase 2 : Identifying relevant work

The second phase in a systematic review is identifying relevant work. There were two processes in this phase. Firstly, collecting all relevant articles in the initial researches. Secondly, choosing suitable articles based on inclusion and exclusion criteria. In this study, limitation may exist, referred to as publication bias, (Bernard, Borokhovski, & Tamim, 2014) as this study did not do a survey on the "grey literature" such as conference proceedings, technical reports, book chapters and dissertations. Therefore, the search was limited to full-text articles and peer review journal articles in order to better compare between sources (Baran, 2014). So, there were two databases used in this study, which were Google Scholar and Eric to ensure comprehensive data collection. Other than that, the articles must be published from 2010 to 2018. In the initial search, the combination and variation of the keywords used were "perspective and perception towards mobile learning" or "m-learning in formal education".

Phase 3 : Assessing the quality of studies

To ensure the quality of this review, the selection of the studies must be based on the framework criteria, as a part of the systematic review process. The inclusion and exclusion criteria were defined to identify which article will be included or excluded from this study. Aside from the

definition of the studies, the two parts; inclusion and exclusion criteria were very important to access potential primary studies. Only those articles that meet the inclusion and exclusion criteria were selected in this study. Thus, Table 1 shows the inclusion criteria meanwhile Table 2 shows the exclusion criteria:

Table 1: Inclusion criteria

Inclusion criteria
Mobile learning must be implemented in the educational system
Uses research methodologies: quantitative, qualitative and mixed method
Sample or respondents from various levels of education
The studies access and evaluate M-learning
Show current mobile technology trends
M-learning in formal education
Teaching and learning using M-learning
Published between 2004 till 2018

Table 2 : Exclusion Criteria

Exclusion criteria
Mobile learning was not implemented in the educational system
The studies did not access and evaluate M-learning
M-learning not in the formal education
Teaching and learning which did not use M-learning
The articles were not published between 2004 and 2018
Other than journal articles

Both inclusion and exclusion criteria are important when designing high quality research protocols. There were 8 inclusion criteria which were defined as the key features of the relevant articles that the researchers will use to answer research questions. In contrast, there were 6 exclusion criteria were defined as features of the potential articles that meet the inclusion criteria, but presents with additional information that could interfere with the success of this review.

Phase 4 : Summarising the evidence

The first database used in this study was Google Scholar. The search using the keywords "perspective and perception towards M-learning" and "M-learning in formal education" in articles published from 2010 until 2018 resulted in 245 results. The results were filtered into non-journal resources (202 results remained) and non-English texts (146 results remained).

Then, researchers removed 35 results because they did not have access to the full text. The remaining articles were sorted into inclusion and exclusion criteria. 63 articles which did not meet with the inclusion and exclusion criteria were removed, leaving 48 articles to be included in this study.

The second database used in this study was Eric. The search using the keywords "perspective and perception towards M-learning" and "M-learning in formal education" in articles published from 2010 until 2018 resulted in 156 results. The results were filtered into non-journal resource (109 results remained) and non-English texts (70 results remained). Then, researchers removed 20 results because they did not have access to the full text as well. The remaining articles were sorted into inclusion and exclusion criteria. 15 articles did not meet the inclusion and exclusion criteria which were removed, leaving 35 articles to be included in this study. These were compared to the previous results from the first database search, and 69 duplicates were removed. Finally, there were only 66 articles used in this study after all the process. The searching process can be summarised into PRISMA flow chart as shown in Figure 2: PRISMA Flow Chart

Phase 5: Interpreting the findings

The fifth phase is interpreting the findings using content analysis to analyse the data. Content analysis can be performed using quantitative, qualitative and mixed method so that categorical data can be used to reveal trends. A total count of 401 articles on users' perspectives, perception, satisfaction and adoption to M-learning. M-learning in formal education in various settings, from year 2010 until 2018 were collected and only 66 were selected that fitted the inclusion criteria. Table 3 illustrates the analysis performed on the methodology used from the previous publications from 2010 until 2018. From the table, quantitative method was the most used method in previous studies, followed by the qualitative and mixed method.

Table 3: Numbers of Study Based on Methods

Methods:	Google Scholar	ERIC
Quantitative	31	23
Qualitative	2	6
Mixed method	0	4

Sample or respondents of all the studies were from any level of education. Most of the setting was from primary and secondary level meanwhile the rest was higher institutions.

Results

Users' Perspective, Perception and Adoption to M-learning

The majority of the researchers have presented the perspective and perception of mobile learning in the scope of technical Competence of Learners, User Friendly Design, Learner Community Development and Platform Accessibility (Alrasheedi, Capretz, & Raza, 2015). The discussion of each author is represented in the Table 4 and 5:

Table 4 : Perspective and Perception of Mobile Learning

No   Authors   Discussions

- 1   (Yang, 2013) Social influence is one of the undergraduate students ' intention to use M-learning
- 2   (Alrasheedi *et al.,* 2015)   The success of mobile learning depends on Platform Accessibility, User Friendly Design, Learner Community Development and also Technical Competence of Learners.
- 3   (Emran, Elsherif, & Shaalan, 2016) M-learning helps improve cooperation skills among pupils using the aid of the internet and technological developments.
- 4   (Uzunboylu & Ozdamli, 2011)   Teachers have shown medium level of perception towards M-learning.
- 5   (Aish & Love, 2013) There are several factors affecting behavioral intention to use M-learning such as personal innovativeness, performance expectancy, effort expectancy, quality of service, and influence of teachers.
- 6   (Ali, Rafie, & Arshad, 2016) From students' perspective, to be enjoyable is the main reason in implementing mobile learning in the classroom.
- 7   (Chaka & Govender, 2017) Students in Nigeria have positive perceptions towards the implementation of M-learning in formal education.
- 8   (Mtebe & Raisamo, 2014)   There are several factors contributing to the acceptance of the implementation M-learning which are social influence, effort expectancy, performance expectancy and facilitating conditions.
- 9   (Cavus, 2011) Students feel that M-learning is a new trend of learning environment that support educational institutions.
- 10   (Çuhadar, 2014)   IT pre-service teachers have positive perception to the tablets, PCs and their positive effects on the attitude and behavioural intention to use mobile tools in learning.
- 11   (Liaw & Huang, 2011)   There are a few factors like perceived usefulness, learners' autonomy, M-learning system's functions and M-learning interaction that affect the users' acceptance to M-learning.
- 12   (Shonola & Joy, 2014)   Integrity, privacy of the data and confidentiality are threats in implementing mobile technologies in the educational institutions.
- 13   (Ismail, Bokhare, Azizan, & Azman, 2013) Teachers have   low   level perception towards the implementation of M-learning in teaching and learning practice.
- 14   (Miglani & Awadhiya, 2017) Teachers have felt that M-learning has great potential to be engaged in the educational system.

Table 5 : Adoption of M-learning

No   Authors   Discussions

- 1   (Demirbilek, 2010) Individuality characteristic, connectivity of social interactivity, context sensitivity and portability are the basic elements of digital games and mobile games.

- 2   (Kinash, Brand, & Mathew, 2012)   There are various uses of mobile devices such as accessing university web pages, email, updating Facebook posts and utilization of Blackboard Mobile Learn.

- 3   (Norazah Mohd Suki, 2011) Students are not too dependent and keen with M-learning in accessing their learning materials such as in lectures and lab sessions.

- 4   (Selwyn & Gorard, 2016]   The function of Wikipedia in M-learning as an introduction and/or additional information. It gives explanation to the topic being studied.

- 5   (Almaiah, Jalil, & Man, 2016)   From instructors' perspectives, blended learning, technical competence and instructors' autonomy are the main elements that have contributed to M-learning adoption.

- 6   (Montrieux, Vanderlinde, Schellens, & De Marez, 2015)   The uses of mobile tools like tablet devices has a great impact on the teaching and learning process.

- 7   (Shorfuzzaman & Alhussein, 2016) The applications in M-learning will improve the productivity of students' studies by utilizing the time during commuting and travelling that was spent in unproductive way.

- 8   (Kim, Rueckert, Kim, & Seo, 2012) WhatsApp is an interesting application and educationally useful that supports M-learning.

- 9   (Sarrab, Al Shibli, & Badursha, 2016)   Factors like suitability, social, economic, usefulness and ease of use have influenced learners' adoption of M-learning.

- 10   (Emran, Mostafa, 2017)   Mobile technology has big impacts on education and it can become an effective tool for teachers and learners in gaining new knowledge.

- 11   (Mansour, Rajab, & Atiquil, 2007)   Perceived usefulness and perceived ease of use are factors that have contributed to the lecturers' readiness in adopting M-learning in higher education.

- 12   (Pegrum, Howitt, & Striepe, 2013)   There are various uses of iPads in pre-service teachers' learning which are developing understanding of content and pedagogy, staying organised and staying connected.

- 13   (Hunaiyyan, Alhajri, & Sharhan, 2018)   Video-based social media is the main application used in M-learning. Learners and instructors also have positive perceptions towards M-learning.

- 14   (Hamidi & Chavoshi, 2018) There are seven categories related to the adoption of M-learning: culture, behavioural intention, usefulness, context, characters and

personal qualities, trust and ease of use.

- 15   (Iqbal & Bhatti, 2015)   Perceived ease of use and perceived usefulness are constructs that have affected the behavioural intention in adopting M-learning.
- 16   (Shraim & Crompton, 2015) M-learning provides a new environment in teaching and learning practice which support anytime-anywhere learning opportunities and developing students interests in learning. Thus, it makes the learning experience accessible, enjoyable and meaningful.
- 17   (James, 2011) The media used and the effects of the delivery mechanism are examples of technological constraints in adopting M-learning in education system and have an impact on student's pedagogic engagement.
- 18   (Al-Said, 2015)   Edmodo is an example of application that supports M-learning and the majority of students have positive perceptions towards it. The application can increase and facilitate the effectiveness communication of learning.
- 19   (Şad & Göktaş, 2014)   Laptops are the main tool used in M-learning compared to mobile phones among teachers.

The implementation of M-learning in formal education

Almost all the selected studies have reported positive implementation of mobile learning in formal education. Previous studies showed M-learning has promoted the participants to use a wide range of different mobile tools, both inside and outside the classroom. Table 6 shows the discussion of each author on the implementation of M-learning:

Table 6 : Implementation of M-learning in Formal Education

	No	**Authors**	**Discussions**
•	1	(Li & Liu, 2017)	M-learning is difficult to be accessed among teachers and learners in the classroom.
•	2	(Mahande, Susanto, & Surjono, 2017)	M-learning can be accessed by searching relevant contents on the internet by teachers.
•	3	(Katz & Foster, 2013)	Mobile applications have promoted features like socio-cultural dimensions, psychological learning principles, pedagogical voice, creative self-efficacy and aesthetic understanding.
•	4	(Hu, 2013)	Portability, context sensitivity, individuality, connectivity and social interactivity are aspects that must be considered in the integration of vocabulary learning by using mobile devices.
•	5	(Bradley, Berbyuk, & Sofkova, 2017)	Pronunciation application (M-learning) in linguistic training is useful in developing spoken skills.
•	6	(Aamri & Suleiman, 2011)	Teachers have not encouraged students to use mobile phones because it can be a big distraction for teachers and students. Thus, the implementation of M-learning is still limited.
•	7	(Tran, 2016)	Quizzlet application is useful in developing vocabulary and grammar tasks in learning English outside the class.
•	8	(Hazaea & Alzubi, 2016)	The participants' code breaking practice and text participation practice improved by using online and offline dictionaries, WhatsApp, online resources, mobile camera and memos.
•	9	(Ruiz, García, Pérez, Sierra, & Menéndez, 2017)	The mobile tools will help children to work independently throughout the activity that they are doing.
•	10	(Charitonos, Morini, Arnab, Cervi, & Brick, 2016)	M-learning has promoted interaction in groups and it is an interactive activity instead of only reading books.
•	11	(Chang, Chiu, & Huang, 2018)	In M-learning, students were able to perform self-assessment on content learning and choose appropriate learning directions.
•	12	(Joan, 2013)	Academic performance and mobile learning have a high correlation in teaching and learning practice.
•			Learning paradigm can be increased by using mobile phones in formal education through inside and outside the classroom.
•	13	(Ahmed & Parsons, 2013)	Experimental groups have high learning performance compared to control groups after the implementation of M-learning in their learning practice. They have also shown positive attitude during the experiment.
•	14	(Yagci, 2015)	M-learning can provide feedback simultaneously by

taking an online quiz.

- 15   (Miyazoe & Anderson, 2010)   M-learning through forum and wiki has improved learners' skills in difference English writing styles.
- 16   (Avci, 2017)   Communication skills and vocabulary knowledge can be improved by adopting M-learning in the classroom.
- 17   (Ozdemir & Erdemci, 2017) Mobile portfolio is being used to increase students' academic achievement and support mastery learning.
- 18   (Mosalanejad, Najafipour, & Dastpak, 2013)   Mobile-based learning has a significant effect on increasing faculty members' knowledge.
- 19   (Hanbidge, Sanderson, & Tin, 2015) Mobile   learners   will   enhance mobility and flexibility during M-learning process. It will enable learners to become contextual, ubiquitous and pervasive.
- 20   (Suwantarathip & Orawiwatnakul, 2015)   Mobile applications have significant effects on the vocabulary of the learners. It can act as learning tools and increase learners' motivation.
- 21   (Zou, Xie, & Wang, 2015)   The use of mobile dictionaries have been used to facilitate vocabulary learning and the result shows that it increases learners' ability in vocabulary learning.
- 22   (SariTanriverdi, LutfiyeBasal, & Yilmaz, 2016)   Teachers can teach idioms by using mobile applications and the usage can create an appropriate environment to teach them.
- 23   (Othman, Azraai, & Norishah, 2014) OCRA has been used as a tool in learning organic reaction mechanism and it has provided convenience and flexibility.
- 24   (Fernández, Fórtiz, Almendros, & Segura, 2013)   Picaa is a mobile application that helps to develop learning skills especially for those who have special educational needs. The results show that it has improved basic skills like language and maths.
- 25   (Rahimi, Hashemifardnia, Namaziandost, & Professor, 2018)   An ICT tool and WhatsApp have influenced learners' vocabulary knowledge.
- 26   (P. Ardi & P., 2017)   Schoology of the M-learning platform has helped the students to exercise autonomy in EAP learning.
- 27   (Kuswanto, 2018)   Mobile tools can be utilized inside and outside the classroom during learning activities and it can improve problem-solving skills and creative -thinking.
- 28   (Twum, 2017)   Smart phones are being used in M-learning to help learners and lecturers access information easily and they can read it anywhere and everywhere.
- 29   (Rakowski, 2017)   Mobile flashcards used in the classroom have obtained positive feedbacks from the participants.

- 30   (Amer, 2014) Online quizzes have a correlation with the average score of students in the learning activities.
- 31   (Chen & Xiao, 2013) Tablets, computers, smart phones are examples tools that can create ubiquitous, interactive and collaborative environment for language learning.
- 32   (Burgess & Murray, 2014)   Students used the flashcards application less frequently than the traditional flashcards.
- 33   (Chan, Brown, Chung, Lu, & Luk, 2013)   Effectiveness of the SRS implementation has correlated with the integration of SRS with lecture content and seamless administration, perceived benefits in enhancing course material understanding, students' efficacy in logging into and operating the SRS and perceived classroom engagement through SRS activities.

Discussions

Previous studies have highlighted discussion on users' perspectives and perception of mobile learning and also implementation of mobile learning in formal education. The results of this study show that 95% of users have positive perspectives and perception to mobile learning (Al-Said, 2015; Cavus, 2011; Chaka & Govender, 2017; Çuhadar, 2014). This method supported wireless learning without certain physical infrastructure facilities to access information. Mobile equipment such as mobile phones, computers and PDAs (personal digital assistants) enables information to be reached anywhere and anytime (Al-Emran & Mostafa, 2017). The process of M-learning has helped students to share ideas, learn and collaborate with their friends with the aid of technology and internet development (Al-Emran et al., 2016; Ali et al., 2016; Chang et al., 2018; Kim et al., 2012; Liaw & Huang, 2011). Besides, most users agreed that the application of a learning system with mobile devices will be brought to another paradigm of teaching and learning because it's ease of use, usefulness, enjoyment, suitability and social and economical factors (Hamidi & Chavoshi, 2018; Iqbal & Bhatti, 2015; Mansour et al., 2007; Sarrab et al., 2016).

There were few studies showing medium and low perception towards M-learning (Ismail et al., 2013; James, 2011; Uzunboylu & Ozdamli, 2011). At the same time, this study also highlighted issues on implementing M-learning based on users' perception like the use of mobile technology for learning possesses a threat to confidentiality, integrity and privacy of the data involved in learning delivery for both learners and lecturers.(Shonola & Joy, 2014) Also there are crucial technological constraints in implementing M-learning which are the media used and the effects of the delivery mechanism (James, 2011). For the implementation of M-learning in formal education, the results revealed that the use of a mobile device has given a positive impact to learning such as collaboration among students being promoted (Chang et al., 2018), skills are developed (Avci, 2017; Bradley et al., 2017; Hazaea & Alzubi, 2016; Katz-Buonincontro & Foster, 2013; Miyazoe & Anderson, 2010), self-assessment is able to performed (Chang et al., 2018; Tran, 2016; Yagci, 2015; Zou et al., 2015), students' performance and achievement have increased (Ahmed & Parsons, 2013; Joan, 2013; Suwantarathip & Orawiwatnakul, 2015) and they are able to create an interactive environment in teaching and learning situations (Charitonos et al., 2016; Chen & Kessler, 2013; SariTanriverdi et al., 2016). There are several factors that contributed to the success of M-learning in formal education such as M-learning is more objective and rational (Li & Liu, 2017), enhances mobility and flexibility (Hanbidge et al., 2015) and mobile tools can be used in and outside the classroom (Kuswanto, 2018). Besides, this study has also revealed some issues during implementation of M-learning, like the use of mobile phones in the classroom which is still limited (Aamri & Suleiman, 2011) and teachers have not encouraged students to use mobile tools because the digital device will be a big distraction for both teachers and students (Aamri & Suleiman, 2011).

Conclusion

M-learning is a learning concept that gives emphasis to the learning process without being bound by the physical location of learning. In addition, this method provides a variety of alternatives that can be used to improve teaching and learning methods in the classroom. Thus, the concept of M-learning is a form of learning using mobile devices such as mobile phones, smart phones, laptops, PDAS etc (Gu, 2016; Pimmer, Linxen, Gröhbiel, Jha, & Burg, 2013). M-learning also is a form of an ordinary learning environment such as other learning, but is different in the aspects of the use of mobile devices as a material support in the learning process. Countries like North Korea, United States, Japan, Taiwan, Singapore, European Union and Australia have begun to promote the use of this method in education. In addition, previous studies show that M-learning has a positive impact on the learning in the classroom (S. Ardi, Syed, Kamal, Madya, & Tasir, 2008). The implementation of M-learning is able to improve social interaction, cooperation (Garcia, Marcos, & Lopez, 2015), active participation and creates an atmosphere of creative and productive discussion among students. In conclusion, the integration of M-learning in teaching is able to help improve the quality of education. The approach also focuses on a few other things such as collaboration, active learning, project-based learning, problem solving and students will be able to be involved directly with the real world. M-learning is also a form of activity that allows a person to be productive during the process of interaction while getting information from a mobile device that is used (Corral et al, 2012). The functions of mobile devices such as being a generator for information and as a source of additional information help individuals to improve their existing knowledge. So, teachers are expected to be capable of maximising the use of technology, whether in or outside the classroom so that learning can happen outside the school boundaries (Kim et al., 2013).

REFERENCES

Aamri, A., & Suleiman, K. (2011). The Use of Mobile Phones in Learning English Language by Sultan Qaboos University Students : Practices , Attitudes and challenges. Canadian Journal on Scientific & Industrial Research.

Abu-Al-Aish, A., & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. International Review of Research in Open and Distance Learning.

Ahmed, S., & Parsons, D. (2013). Abductive science inquiry using mobile devices in the classroom. Computers and Education.

Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. Computers in Human Behavior.

Al-Emran, Mostafa, K. S. (2017). Academics' Awareness Towards Mobile Learning in Oman. International Journal of Computing and Digital Systems.

Al-Hunaiyyan, A., Alhajri, R. A., & Al-Sharhan, S. (2018). Perceptions and challenges of mobile learning in Kuwait. Journal of King Saud University - Computer and Information Sciences.

Ali, R. A., Rafie, M., & Arshad, M. (2016). Perspectives of Students' Behavior Towards Mobile Learning (M-learning) in Egypt: an Extension of the UTAUT Model. Engineering, Technology & Applied Science Research.

Almaiah, M. A., Jalil, M. @. M. A., & Man, M. (2016). Empirical investigation to explore factors that achieve high quality of mobile learning system based on students' perspectives. Engineering Science and Technology, an International Journal.

Alqahtani, M., & Mohammad, H. (2015). Mobile applications' impact on student performance and satisfaction. Turkish Online Journal of Educational Technology.

Alrasheedi, M., Capretz, L. F., & Raza, A. (2015). Instructor Perspectives of Mobile Learning Platform: An Empirical Study. International Journal of Computer Science and Information Technology.

Al-Said, K. M. (2015). Students' perceptions of edmodo and mobile learning and their real barriers towards them. Turkish Online Journal of Educational Technology.

Amer, M. (2014). A Study of Learners' Usage of a Mobile Learning Application for Learning Idioms and Collocations. CALICO Journal.

Ardi, P., & P., A. (2017). Promoting learner autonomy through schoology m-learning platform in an EAP class at an Indonesian university. Teaching English with Technology.

Ardi, S., Syed, B., Kamal, Y., Madya, P., & Tasir, Z. (2008). Future learning - mobile learning (m-learning) in malaysia. Postgraduate Education Research Seminar 2008.

Avci, H. (2017). A Case Study on Mobile-Blended Collaborative Learning in an English as a Foreign Language (EFL) Context. International Review of Research in Open and Distributed Learning.

Baran, E. (2014). A review of research on mobile learning in teacher education. Educational Technology and Society.

Bernard, R. M., Borokhovski, E., & Tamim, R. M. (2014). Detecting bias in meta-analyses of distance education research: big pictures we can rely on. Distance Education.

Bradley, L., Berbyuk Lindström, N., & Sofkova Hashemi, S. (2017). Integration and Language Learning of Newly Arrived Migrants Using Mobile Technology. Journal of Interactive Media in Education.

Brown, T. (2005). Towards a model for m-learning in Africa. International Journal on E-Learning.

Burgess, S. R., & Murray, A. B. (2014). Use of traditional and smartphone app flashcards in an introductory psychology class. Jounral of Instructional Pedagogies.

Cavus, N. (2011). Investigating mobile devices and LMS integration in higher education: Student perspectives. In Procedia Computer Science.

Chaka, J. G., & Govender, I. (2017). Students' perceptions and readiness towards mobile learning in colleges of education: a Nigerian perspective. South African Journal of Education.

Chan, K., Brown, I., Chung, I. C. B., Lu, H.-J., & Luk, G. W.-T. (2013). Using Students Response System via Mobile Devices in Large Introductory Psychology Classes. Proceedings of the 8th International Conference on E-Learning.

Chang, J. H., Chiu, P. S., & Huang, Y. M. (2018). A sharing mind map-oriented approach to enhance collaborative mobile learning With digital archiving systems. International Review of Research in Open and Distance Learning.

Charitonos, K., Morini, L., Arnab, S., Cervi-Wilson, T., & Brick, B. (2016). Urban Explorations for Language Learning: A Gamified Approach to Teaching Italian in a University Context. Research-Publishing.Net.

Chen, Xiao-Bin., Kessler, G. (2013). Tablets for Informal Language Learning: Student Usage and Attitudes. Language Learning & Technology.

Corral, L., Sillitti, A., & Succi, G. (2012). Mobile multiplatform development: An experiment for performance analysis. In Procedia Computer Science.

Çuhadar, C. (2014). Information technologies pre-service teachers' acceptance of tablet PCs as an innovative learning tool. Kuram ve Uygulamada Egitim Bilimleri.

Demirbilek, M. (2010). Investigating Attitudes of Adult Educators towards Educational Mobile Media and Games in Eight European Countries. Journal of Information Technology Education.

Embi, M. A., & Nordin, N. M. (2013). Mobile Learning : Malaysian Initiatives & Research Findings. Mobile Learning: Malaysian Initiatives & Research Findings.

Fernández-López, Á., Rodríguez-Fórtiz, M. J., Rodríguez-Almendros, M. L., & Martínez-Segura, M. J. (2013). Mobile learning technology based on iOS devices to support students with special education needs. Computers and Education.

Garcia-Cabot, A., De-Marcos, L., & Garcia-Lopez, E. (2015). An empirical study on m-learning adaptation: Learning performance and learning contexts. Computers and Education.

Grimus, M., Ebner, M., & Holzinger, A. (2012). Mobile learning as a chance to enhance education in developing countries - On the example of Ghana. In CEUR Workshop Proceedings.

Gu, J. (2016). Understanding self-directed learning in the context of mobile Web 2.0 ??? case study with workplace learners. Interactive Learning Environments.

Hamat, A., Embi, M. A., & Hassan, H. A. (2012). Mobile Learning Readiness Among UKM Lecturers. Procedia - Social and Behavioral Sciences.

Hamidi, H., & Chavoshi, A. (2018). Analysis of the essential factors for the adoption of mobile learning in higher education: A case study of students of the University of Technology. Telematics and Informatics.

Hanbidge, A. S., Sanderson, N., & Tin, T. (2015). Using Mobile Technology to Enhance Undergraduate Student Digital Information Literacy Skills: A Canadian Case Study. IAFOR Journal of Education.

Hazaea, A. N., & Alzubi, A. A. (2016). The Effectiveness of Using Mobile on EFL Learners' Reading Practices in Najran University. English Language Teaching.

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. Computers and Education.

Hockly, N. (2013). Mobile learning. ELT Journal.

Hu, Z. (2013). Emerging vocabulary learning: From a perspective of activities facilitated by mobile devices. English Language Teaching.

Iqbal, S., & Bhatti, Z. A. (2015). An investigation of university student readiness towards M-learning using technology acceptance model. International Review of Research in Open and Distance Learning.

Ismail, I., Bokhare, S., Azizan, S. N., & Azman, N. (2013). Teaching via Mobile Phone: a Case Study on Malaysian Teachers' Technology Acceptance and Readiness. The Journal of Educators Online.

James, P. T. (2011). Mobile-Learning - Thai HE Student Perceptions and Potential Technology Impacts. International Education Studies.

Joan, R. (2013). A Study On Mobile Learning As A Learning Style In Modern Research Practice. I-Manager's Journal on School Educational Technology.

Kaplan-Rakowski, R. (2017). Students' views on the helpfulness of multimedia components of digital flashcards in mobile-assisted vocabulary learning. EUROCALL 2017.

Katz-Buonincontro, J., & Foster, A. (2013). Integrating the Visual Arts Back into the Classroom with Mobile Applications. Journal of Digital Learning in Teacher Education.

Khan, K. S., Kunz, R., Kleijnen, J., & Antes, G. (2003). Five steps to conducting a systematic review. Journal of the Royal Society of Medicine.

Kim, D., Rueckert, D., Kim, D.-J., & Seo, D. (2012). Students' Perceptions and Experiences of Mobile Learning. Language Learning & Technology.

Kinash, S., Brand, J., & Mathew, T. (2012). Challenging mobile learning discourse through research: Student perceptions of Blackboard Mobile Learn and ipads. Australasian Journal of Educational Technology.

Kuswanto, H. (2018). Android-Assisted Mobile Physics Learning Through Indonesian Batik Culture: Improving Students' Creative Thinking and Problem Solving. International Journal of Instruction.

Li, Y., & Liu, X. (2017). Integration of IPad-based M-learning into a creative engineering module in a secondary school in England. Turkish Online Journal of Educational Technology.

Liaw, S., & Huang, H. (2011). Exploring learners' acceptance toward mobile learning. In Technology Acceptance in Education.

Liu, Y., Han, S., & Li, H. (2010). Understanding the factors driving m-learning adoption: A literature review. Campus-Wide Information Systems.

Mahande, R. D., Susanto, A., & Surjono, H. D. (2017). The dynamics of mobile learning utilization in vocational education: Frame model perspective review. Turkish Online Journal of Educational Technology.

Mansour, N., Rajab, M. A., & Atiquil, A. Y. . (2007). Assessing Mobile Learning Readiness in Saudi Arabia Higher Education: An Empirical Study. The Malaysian Online Journal of Educational Technology.

McCabe, S., Sharples, M., & Foster, C. (2012). Stakeholder engagement in the design of scenarios of technology-enhanced tourism services. Tourism Management Perspectives.

Miglani, A., & Awadhiya, A. K. (2017). Mobile learning: readiness and perceptions of teachers of Open Universities of Commonwealth Asia. Journal of Learning for Development - JL4D.

Miyazoe, T., & Anderson, T. (2010). Learning outcomes and students' perceptions of online writing: Simultaneous implementation of a forum, blog, and wiki in an EFL blended learning setting. System.

Montrieux, H., Vanderlinde, R., Schellens, T., & De Marez, L. (2015). Teaching and learning with mobile technology: A qualitative explorative study about the introduction of tablet devices in secondary education. PLoS ONE.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). E-Learning, online learning, and distance learning environments: Are they the same? Internet and Higher Education.

Mosalanejad, L., Najafipour, S., & Dastpak, M. (2013). Is the mobile based learning can be effective in academic learning? A study to check if mobile-based learning is desirable in presenting educational workshops. Turkish Online Journal of Distance Education.

Mtebe, J. S., & Raisamo, R. (2014). Investigating students' behavioural intention to adopt and use mobile learning in higher education in East Africa. International Journal of Education and Development Using Information and Communication Technology.

Muslimin, M. S., Nordin, N. M., Mansor, A. Z., & Awang, P. (2017). Reka Bentuk Dan Pembangunan Aplikasi Pembelajaran Mudah Alih Bagi Keperluan Modul Mikroekonomi. Seminar Pendidikan Transdisiplin.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). Literature review in mobile technologies and learning. Report 11. A Report for NESTA Futurelab.

Nawi, A., & Isa Hamzah, M. (2013). The Acceptance Level of Mobile Phones as M-Learning in Islamic Education. Journal of Islamic and Arabic Education.

Norazah Mohd Suki, N. M. S. (2011). Using Mobile Device for Learning: From Students' Perspective. 1st International Conference on Mobil Learning, Applications, and Services (Mobilcase2012).

Norhayati Yusoff dan Md Yusoff Daud. (2015). Level of Readiness of Postgraduate Students in the Use of M-Learning. National Research Seminar 2015 "Strengthening Scholarships Through Research" 592.

Othman, T., Azraai, O., & Tengku Putri Norishah, T. S. (2014). OCRA - Authentic mobile application for enhancing the value of mobile learning in organic chemistry. In European Conference on e-Learning. Academic Conferences Limited.

Ozdemir, O., & Erdemci, H. (2017). The Effect of Mobile Portfolio (M-Portfolio) Supported Mastery Learning Model on Students' Achievement and Their Attitudes towards Using Internet. Journal of Education and Training Studies.

Paule-Ruiz, Mp., Álvarez-García, V., Pérez-Pérez, J. R., Álvarez-Sierra, M., & Trespalacios-Menéndez, F. (2017). Music learning in preschool with mobile devices. Behaviour and Information Technology.

Pegrum, M., Howitt, C., & Striepe, M. (2013). Learning to take the tablet: How pre-service teachers use iPads to facilitate their learning. Australasian Journal of Educational Technology.

Pimmer, C., Linxen, S., Gröhbiel, U., Jha, A. K., & Burg, G. (2013). Mobile learning in resource-constrained environments: A case study of medical education. Medical Teacher.

Rahimi Esfahani, F., Hashemifardnia, A., Namaziandost, E., & Professor, A. (2018). The Effect of Using WhatsApp on Iranian EFL Learners' Vocabulary Learning. Journal of Applied Linguistics and Language Research.

Şad, S. N., & Göktaş, Ö. (2014). Preservice teachers' perceptions about using mobile phones and laptops in education as mobile learning tools. British Journal of Educational Technology.

SariTanriverdi, A., , LutfiyeBasal, A., & Yilmaz, S. (2016). Effectiveness of mobile applications in vocabulary teaching. Contemporary Educational Technology.

Sarrab, M., Al Shibli, I., & Badursha, N. (2016). An empirical study of factors driving the adoption of mobile learning in Omani higher education. International Review of Research in Open and Distance Learning.

Selwyn, N., & Gorard, S. (2016). Students' use of Wikipedia as an academic resource - Patterns of use and perceptions of usefulness. Internet and Higher Education.

Shonola, S. A., & Joy, M. (2014). Mobile learning security issues from lecturers' perspectives . EDULEARN14 Proceedings.

Shorfuzzaman, M., & Alhussein, M. (2016). Modeling Learners' Readiness to Adopt Mobile Learning: A Perspective from a GCC Higher Education Institution. Mobile Information Systems.

Shraim, K., & Crompton, H. (2015). Perceptions of Using Smart Mobile Devices in Higher Education Teaching : A Case Study from Palestine. Contemporary Educational Technology.

Stanton, G., Ophoff, J., Town, C., & Africa, S. (2013). Towards a Method for Mobile Learning Design. Issues in Informing Science and Information Technology.

Suwantarathip, O., & Orawiwatnakul, W. (2015). Using mobile-assisted exercises to support students' vocabulary skill development. Turkish Online Journal of Educational Technology.

Tran, P. (2016). Training learners to use Quizlet vocabulary activities on mobile phones in Vietnam with Facebook. JALT CALL Journal.

Traxler, J., & Kukulska-Hulme, A. (2016). Mobile learning: The next generation. Mobile Learning: The Next Generation.

Twum, R. (2017). Utilization of Smartphones in Science Teaching and Learning in Selected Universities in Ghana. Journal of Education and Practice.

Uzunboylu, H., & Ozdamli, F. (2011). Teacher perception for m-learning: Scale development and teachers' perceptions. Journal of Computer Assisted Learning.

Yagci, T. (2015). Blended Learning via Mobile Social Media & Implementation of "EDMODO" in Reading Classes. Australian International Academic Centre, Australia.

Yang, S. (2013). Understanding Undergraduate Students' Adoption of Mobile Learning Model: A Perspective of the Extended UTAUT2. Journal of Convergence Information Technology.

Zou, D., Xie, H., & Wang, F. L. (2015). The use of monolingual mobile dictionaries in the context of reading by intermediate Cantonese EFL learners in Hong Kong. Thouësny.