

# Faculty Members' Perceptions of the Integration, Affordances, and Challenges of Mobile Learning

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VOL. 30, No. 2

## Abstract

In this qualitative study, faculty members' perceptions of the integration, affordances, and challenges of mobile learning (m-learning) were investigated through semi-structured interviews. The results showed that participants' integration of m-learning varies and tends to focus on select activities. At the same time, participants recognized m-learning as a valuable learning approach with potential to enrich the teaching and learning process and enhance flexibility. A lack of knowledge and skills, deficiencies in training and supports, problems with Internet connection, a digital divide among students, learning disruption, and a lack of awareness about the utility of m-learning were identified challenges that hinder current integration of m-learning.

## Résumé

Dans cette étude qualitative, les perceptions des membres du personnel enseignant sur l'intégration, les capacités de suggestion, et les défis de l'apprentissage électronique sans fil ont été étudiées à travers des entrevues semi-structurées. Les résultats ont montré que l'intégration des participants de l'apprentissage électronique sans fil varie et tend à se concentrer sur certaines activités. Parallèlement, les participants ont reconnu l'apprentissage électronique sans fil comme une approche d'apprentissage intéressante avec le potentiel d'enrichir le processus d'enseignement et d'apprentissage et d'améliorer la flexibilité. Un manque de connaissances et de compétences, des lacunes dans la formation et les soutiens, des problèmes de connexion Internet, d'un fossé numérique entre les étudiants, l'interruption de l'apprentissage, et un manque de prise de conscience de l'utilité de l'enseignement électronique sans fil ont été les défis identifiés qui entravent l'intégration actuelle de l'enseignement électronique sans fil.

## Introduction

The current trend of widespread access to mobile technologies has opened up additional pathways to advancing the quality of teaching and learning at all levels (United Nations Educational, Scientific and Cultural Organization/UNESCO, 2012). These technologies, including cell phones, computer tablets, and smart phones enable easy and rapid communication between teachers and students and access to information at any time and any place (Mockus et al., 2011). The use of such technologies could reduce computer costs and improve students' engagement, collaboration, motivation, and achievement through provision of dynamic, flexible, contextualized, convenient, and situated learning environments (Allen, 2011; Chen, Chang & Yan, 2012; Churchill, Kennedy,

Flint & Cotton, 2010; Hsieh, Jang, Hwang & Chen, 2011; Ishtaiwa, 2014; Kolb, 2011; Naismith, Lonsdale, Vavoula & Sharples, 2004; O'Bannon & Thomas, 2015; Oz, 2015, Pegrum, Howitt & Striepe, 2013).

This potential has encouraged policymakers and educational administrators worldwide to support initiatives that bring education into the m-learning age. A good example is the United Arab Emirates (UAE) Ministry of Higher Education's announcement of iPad-based teaching and learning project in April 2012. Through the project, faculty members and students at the three UAE federal universities were provided iPad tablets (Gitsaki, Robby, Priest, Hamdan & Ben-Chabane, 2013). As cited in Gitsaki et al. (2013), Cochran, Ben Halim, Khalil and Gilroy (2012) stated that the main goal of this project was to improve teaching and learning in higher education by focusing on individualized learning approaches that meet students' new needs, applying advanced teaching methods, stimulating students to learn, enhancing collaboration among faculty members, and taking advantage of the various applications of this new technology. Since these tasks require significant involvement by faculty members, there is a distinct need to learn about faculty members' perceptions about the use, affordances, and challenges of m-learning in order to ensure effective m-learning integration.

# Literature Review

## Definition of M-learning

The high ownership rate of mobile devices and the use of these devices as educational tools have shaped m-learning as an advanced learning approach. Building on the characteristics of mobile technologies which include spontaneity, informality, context, portability, ubiquity, pervasion, and personality, m-learning has been associated with the development of supportive learning communities in unique learning and teaching contexts (Garrison, 2011; Kukulska-Hulme, 2009; O'Bannon & Thomas, 2015; Pegrum et al., 2013). At the same time, although m-learning and its applications have been employed widely in education, researchers have not come to agreement on its definition. Instead, it has been defined in different ways (Peng, Su, Chou, & Tsai, 2009). For example, some learning experts define m-learning as the use of convenient and ubiquitous computing devices to learn about topic, anytime and anywhere (Peng, et al., 2009). Alternately, Park (2011) provided a definition of m-learning that focuses on the utilization of handheld, mobile, and continuously and immediately available devices to achieve educational purposes. While some researchers consider laptop devices to be mobile technologies, m-learning is generally limited to small handheld devices or tablet devices. Such devices are portable and 'always on' devices that allow learners to access information anywhere and anytime (Mockus et al., 2011; Shearer, 2010).

## M-learning Integration

For the purpose of this study, m-learning integration is defined as the effective and efficient use of handheld mobile devices and their applications as instructional tools to support learning in interesting and meaningful ways. Integrating m-learning has the power to benefit education in many ways (Chen et al., 2012; Kukulska-Hulme, 2009; O'Bannon & Thomas, 2015; Pegrum et al., 2013; Pollara, 2011; Song, 2007; Wang, Shen, Novak, Pan, 2009). Mobile devices can be utilized to promote learning behaviors and performance. For example, Wang et al. (2009) developed a learning system that depends on using students' mobile devices for receipt of live broadcasts of real-time classroom teaching activities. Through text messaging and instant polls, students were able to interact with the instructor in real time and receive immediate feedback. The data collected

from the formal implementation of this system in a large blended learning English class of 1000 college students revealed that m-learning activities contributed to changes in students' roles to be more active as well as more behaviorally, intellectually, and emotionally engaged in the learning process than they might be otherwise (Wang et al., 2009).

In another study, Chen et al., (2012) used Personal Digital Assistant devices (PDAs) to investigate the impact of concurrent written text on the comprehension of spoken English as a second language. Eighty seven undergraduate students in Taiwan participated in the study. The study found that use of PDAs as a training tool helped learners with lower English levels to improve their performance and competence in immediate recall tasks by facilitating the attainment of information. However, this approach was less successful in facilitating the schematic construction of the comprehension skill. According to Chen et al. (2012), all traditional classrooms on university campuses can be converted to digital computer labs through available and cost effective mobile devices.

Another important pedagogical function of m-learning pertains to the delivery of course content. According to Song (2007), mobile devices provide accessible, convenient, and easy ways of exchanging information among students and teachers. They can also be used to conduct online quizzes and for posting information and presentations on educational websites and social media. In her study, Santos (2013) investigated the impact of five quizzes made available through mobile devices on student learning in an educational technology undergraduate course taught in UAE. The 19 female students were allowed to use their personal mobile devices to complete the quizzes. The study findings indicated that the mobile quizzes helped stimulate discussion inside and outside of the class and enhanced students' understanding of course content.

Song (2007) has stated that mobile devices can be used as collaborative learning tools given their capacity to support implementing a wide range of synchronous and asynchronous forms of communication. In asynchronous learning settings, teachers and students interact, provide feedback, and reflect on their personal learning outcomes at different times (Er, Özden, & Arifoglu, 2009; Harris et al., 2009). Mobile devices can be used to facilitate a variety of such application including short message service (SMS), emails, discussion boards, social networks, blogs, wikis, and podcasts. The other kind of interaction made possible through mobile devices is the synchronous interaction where teachers and students interact and share ideas in real time through telephone conferences, videoconferencing, and webcasts (Er et al., 2009; Harris et al., 2009). Mobile devices also give students the opportunity to perform various learning tasks in the classroom; these activities include podcasting, using virtual flashcards, accessing the Internet, reading online content, responding to a question, posting a comment, and using the device as a calculator or translator (Pollara, 2011).

In a study conducted by Pegrum et al., (2013), the researchers developed case studies of eight graduate students to identify how they utilize iPad2 to facilitate learning. Based on semi-structured interviews and non-participant observations, iPads were shown to improve students' understanding of content through the recording and recalling of information, combining and extending knowledge, and reflecting on learning. In addition, it was reported that iPads were helpful in developing knowledge and skills in the areas of engagement, facilitation of collaborative work, and selection of appropriate teaching materials. Participants reported that the iPads were valued tools for keeping them up to date with events and issues, and for being connected with others through actions such as sharing news, meanings, and information. Finally, the iPads were identified to be important organizational tools as well as storage tools for reading materials, lectures notes, and emails which can be accessed anytime and anywhere (Pegrum et al., 2013).

In a more recent study conducted to examine pre-service teachers' perceptions of mobile phones

as learning tools, O'Bannon and Thomas (2015) surveyed 245 undergraduate students in Kentucky and Tennessee in the United States. Almost half of participants supported the use of mobile phones for instructional purposes. They reported that using mobile phones for accessing the Internet, using them as clicker devices, utilizing educational applications, and reading online materials are the most valuable instructional functions of mobile phones. However, when mobile phones were compared to laptops as learning tools, a study included 1087 pre-service teachers revealed that participants perceived laptops to be the more powerful tools for supporting learning (Şad & Göktaş, 2014).

Overall, m-learning can create a better and motivating learning environment that supports the quality of teaching and learning and equips students with 21st century skills and critical thinking abilities. The promising results of the existing research literature related to m-learning have encouraged educational institutions to embrace m-learning initiatives as a way to improve teaching and learning. However, it is noteworthy to realize that achieving the benefits of new technological innovations demands identifying and addressing the issues which affect individuals' integration of particular innovation in the real situations (Alrasheedi, Capretz & Raza; 2015; Carter & Graham, 2012; Carter et al., 2014; Molnar, 2014; O'Bannon & Thomas, 2015; Pegrum et al., 2013). For example, research studies documented that individuals' perceived affordances of m-learning is a key factor influencing the effective adoption of this approach (Churchill, Fox & King, 2012; Ishtaiwa, 2014; Willemse & Bozalek, 2015).

### **Affordances of M-learning**

Affordances can be defined as “the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used” (Norman, 1988, p. 9). They have also been said to provide concrete indications of the operations of objects. Identifying the affordances of an object will allow users to know what to do without help or instruction (Norman, 1988). This definition of affordance includes both the actual and perceived properties of an object (Norman, 1990). For instance, the actual properties of mobile devices include small size, innovative user interface, and portability. These perceived properties of mobile devices lead to perceived ideas of how these devices should be used. According to Norman (1990), understanding and combining the actual and perceived properties of a tool develops an affordance.

Several research studies have discussed the affordances of m-learning. Naismith et al, (2004) conducted a literature review on m-learning. Contextualizing m-learning as a rich, collaborative, and conversational experience rather than an isolated learning activity, the researchers concluded that the educational affordances of m-learning include the following: (1) moving learning beyond the walls of the lecture room, (2) helping students to establish valuable connections with people and/or learning resources, (3) allowing students to easily publish their observations and reflections in digital formats, (4) empowering learners to capture and record events through context-aware applications for future use, and (5) increasing distributed collaboration and mobile team opportunities (Naismith et al., 2004).

Churchill et al. (2012) conducted a qualitative study to investigate how university faculty members use iPad devices in their teaching practices in Hong Kong. The results of the study indicated that faculty members used iPad as resources as well as a connections, collaboration, capture, analysis, representation and management device. Ishtaiwa (2014) carried out a mixed methodology study to examine undergraduate students' perceptions of the affordances of m-learning in the UAE. In this study, students indicated that m-learning has many educational affordances. The top five affordances of m-learning as reported by participants were promoting instructional interaction and sharing knowledge, flexible accessing of learning resources, supporting individual learning

needs, constructing knowledge through experimentation, and storing and retrieving information. In another study conducted to explore the affordances of integrating mobile devices in an undergraduate nursing program, Willemse and Bozalek (2015) concluded that mobile devices are valuable communication tools, particularly in relation to email, WhatsApp, and Facebook. While the three applications provide instructors and students with ability to asynchronously read, view, write, access, browse, link and share instructional content, WhatsApp and Facebook allow users also support synchronous discussion of issues and topics.

## **Challenges of M-learning**

Balancing the many benefits of m-learning previously described, the literature also documents several challenges of m-learning. For the purpose of the study, the researchers defined a challenge as any factor or issue that might hinder the effective and efficient integration of m-learning. A number of the challenges of m-learning are related to architectural features (small screen size, short battery life, and limited storage space), existing uses, cost, distraction, and parents' negative attitudes toward m-learning (Ishtaiwa, 2014; Pegrum et al., 2013; Veerasamy, 2010). Other challenges recognized by Tai and Ting (2011) included balancing the attractiveness of the device with student engagement with the curriculum, the requirement of a high level of technical proficiency, and technical difficulties. Gong and Wallace (2012) have reported perceptions of mobile devices as tools for entertainment rather than for learning as well as tools for increasing distraction from learning and encouraging plagiarism as the major challenges of integrating m-learning. Tamim (2013) reported other challenges including the following: the lack of a m-learning instructional philosophy to build research on, the shortage of empirical research on m-learning issues, a lack of teacher and student training, inadequate infrastructure and Internet connections, inadequate collaborative learning resources, and limited resources for supporting the effective use of mobile devices as tools to support teaching and learning. Finally, O'Bannon and Thomas (2015) found that cheating, distractions, cyber bullying, and accessing improper content are significant challenges to the use of mobile devices in education.

## **Purpose of the Study**

The literature on m-learning has documented its various benefits and challenges. It has also identified some inconsistencies and confusion (Isaacs, 2012; O'Bannon & Thomas, 2015; Tamim, 2013). As a result, various questions remain unanswered: Should educational institutions move towards integrating m-learning? At what educational level should m-learning be integrated? What are the beliefs of administrators, teachers, and students about m-learning? Given that m-learning research is particularly scant in the authors' world—the Arab learning world—the study reported in this paper explored three questions:

1. How do faculty members at Al Ain University of Science and Technology (AAU) integrate m-learning in their teaching?
2. What are the key affordances of integrating m-learning into teaching and learning as perceived by faculty members at AAU?
3. What are the key challenges of integrating m-learning into teaching and learning as perceived by faculty members at AAU?

# **Methodology**

## **Participants**

This study was conducted at Al Ain University of Science and Technology (AAU), which is a private university offering undergraduate and graduate degrees in various specializations. Participants included 13 full-time faculty members from the colleges of Business Administration, Education, Humanities and Social Science, Pharmacy, and Law. They were randomly selected through a lottery method. Selected faculty members were personally contacted by the first author to be part of this study. The author visited each selected member in his/her office to explain the background, purposes and data collection procedures of the study. Then, a written consent form including information about the study was given to each member to help him/her decide whether to be in the study or not (see Appendix A). Once the faculty member agreed to be interviewed, the time and place for the interview was set. Two faculty members among the selected members refused to participate for different reasons. The 13 participants represented a diverse group of faculty members in terms of specialization, academic rank, age (33–54 years), and teaching experience.

## **Instrument**

This qualitative case study relied on semi-structured individual interviews for data collection. It is a method that enables researchers to gain rich, thorough and detailed data and information through prompting and elaborating techniques (Hitchcock & Hughes, 1995). Semi-structured interviews also give respondents enough opportunity to freely and intensely convey their perspectives, thoughts, and emotions regarding the investigated phenomenon. The interview questions used in the study were designed by researchers based on the literature review and their experiences in the field. The questions of the interview focused on four aspects of m-learning: (a) Categories of mobile devices used for instructional purposes; (b) Perceptions of level of m-learning integration; (c) perceptions of m-learning affordances; and (d) Challenges of m-learning integration. After the preliminary interview questions were designed, nine educational reviewers validated them. The reviewers had between 5 and 18 years of working experience in the UAE and included five university educators (three associate professors and two full professors), a director of a university IT center, a director of an instructional development unit, and two m-learning researchers. All of the reviewers have experience in designing or using m-learning activities in higher education.

Based on the validity process, one question was deleted and four questions were rephrased. Then, the researchers interviewed two faculty members who were not a part of the actual study. This step also helped in the rephrasing of two questions and was valuable in establishing that the questions were inclusive, rich and clear enough to generate information relevant to the purposes of the study.

## **Data Collection and Analysis**

During the second semester of 2014–2015, individual semi-structured interviews were conducted with 13 participants. The interviews lasted from 18 to 54 minutes based on the participants' knowledge, proficiency, and experience and level of m-learning integration. To ensure accuracy of all participants' words and statements, interviews were audio-taped (Hitchcock & Hughes, 1995). The researchers transcribed all interview recordings.

To analyze the collected data, the researchers employed the verbal analysis method (Chi, 1997). Verbal analysis is a method for quantifying qualitative coding of spoken and written utterances. This method is used to reduce the subjectivity of qualitative coding. Applying verbal analysis requires tabulating, counting, and drawing relationships between different kinds of utterances (Chi, 1997). In this study, initial coding of the whole content and then more comprehensive coding of selected subdivisions were performed. The aim of this step was to reduce the large amount of the collected data. This step was followed by segmenting the data to identify units of analysis.

Segmenting was done according to non-content features and semantic features. The non-content features included (a) language-related syntax, such as words and sentences, and (b) activity features. The semantic features included ideas, argument chains, and topics (Chi, 1997). Then, the researchers created a specific coding system. In this stage, the researchers created a set of codes which corresponded to a formalism that was utilized for representing the knowledge. Once the coded system was created, operationalizing evidence was determined by deciding which utterances in the data could be translated into specific codes. Afterwards, the data were analyzed to identify key themes. Lastly, the identified themes were interpreted according to the research questions (Ishtaiwa & Dukmak, 2013).

According to Merriam (1998), internal and external validity are important factors in qualitative research. To meet the requirement of internal validity, peer debriefing and member checking methods were employed to confirm the descriptions and explanations provided in the collected data. In order to secure external validity, representative quotations from the interviews were used as the basis of thick and extensive descriptions of different sides of the same topic. Two additional methods were used to ensure the rigour of the analysis process and to strengthen the validity of findings. The methods were examining negative cases and reflexivity (Kolb, 2012). A negative case is a piece of data that does not match the emergent themes. The researchers applied this method during the classification of themes which added valued insights and ideas (Taylor & Bogdan, 1998). Reflexivity provides another way for checking the accuracy of data analysis (Kolb, 2012). Bickman and Rog (2008) have stated that the researcher’s bias and reactivity present two threats to validity of qualitative research. To minimize the effects of these threats, the researchers were continuously aware of their need to reflect, investigate, and interact through all phases of the research process (Conrad, Neumann, Haworth & Scott, 1993).

## Results

### How do Faculty Members at AAU Integrate M-learning in their Teaching?

In order to gather information about the first research question regarding m-learning integration, participants were first asked to specify all mobile devices that they use for instructional purposes. As presented in Table 1, the participants use a selection of devices including smart-phones, tablet computers, basic cell phones, digital cameras, media players, and Personal Digital Assistants (PDAs).

**Table 1. Mobile Device Used for Instructional Purposes (N = 13)**

The Device	Number	Percent
Smart-phone	12	92.3%
Tablet	9	69.2%
Basic cell phone	7	53.8%

Digital camera	4	30.7%
Media player	3	23.1%
PDA	2	15.2%

To determine how faculty members actually integrate m-learning into their teaching, they were asked to elaborate on their use of m-learning in their teaching. Analysis of the participants' responses revealed that they implement a variety of m-learning activities. All participants indicated that they use mobile devices to enhance communication with students and colleagues through phone calls, text messages, instant messages, and emails. These different types of usage are described in the following responses:

- WhatsApp now is my favorite way of communication with my students. Since my students study in the UAE and live in Oman, WhatsApp provides me with fast, easy and cheap way of communicating with students. At the first day of each semester, I collect students' phone numbers and I create a WhatsApp group as a mean for communication. All news and announcements are sent via this application.
- To meet the accreditation standards, we have to coordinate with other instructors teaching the same courses at the second campus. All my coordination tasks have been done through my iPhone. I just make some phone calls to agree on the details of course syllabus, assignments, the midterm and final exams. Then I send my suggestions through my personal email. There is no need to travel to the second university campus in Abu Dhabi City which is 170 K.M. away from Al Ain City.
- The availability of VoIP applications on mobile devices opens additional avenues for communications with students or with experts in the field. For example, Skype, Viper, and IMO are affording a great way to get engaged in thoughtful dialogue with some students who don't find enough time during the class time to discuss or share their ideas and thoughts. Sometimes I continue my discussion with them while I'm driving to my home. Teaching and learning really becomes feasible anytime and anywhere.
- My mobile Facebook messenger allows me to respond to students' questions and comments from anywhere.
- In addition to my office hours, students have many other ways to reach me. They can do so by calling, texting or emailing me their requests or inquires.
- In our culture and as a female professor, I don't like to receive phone calls from male students especially out of my working hours. This also the case of female students when they want to contact their male professor. Mobile applications provide us with immediate methods of communications with less cultural restrictions.

Using cloud storage systems for accessing and sharing information was the second m-learning activity described by the faculty members. Twelve participants indicated that they use their mobile devices to access and share data and information stored in their clouds, including Dropbox, OneDrive, Google Drive, and Box. Seven participants who reported using their mobile devices for sharing information emphasized the importance of protecting students' privacy and confidential information. They noted that they regularly advise students to read the privacy policies for these



applications and to share only subject related materials. This idea was explained by the participants as follows:

- With my Google Drive on my iPad, there is no need to carry thumb drives or CDs. All my teaching materials are stored on the cloud and accessed anytime and anywhere.
- When my students send me a message or an email that I haven't sent them the PowerPoint presentation or any teaching materials, I quickly use my Galaxy Note 3 to drop the file in the class shared folder or send them a link to that file.
- Sometimes I used my iPhone 6 plus during the slight free time portions for modifying or updating stored materials before sending them to students. For instance, three days ago, I accessed one of my class presentations stored in my OneDrive, I updated, and then I sent it to students while I'm waiting for my doctor appointment.
- Since I have downloaded Dropbox on my Galaxy phone, I rarely use my laptop in my classes. All what I need is in my hand. It is lighter to carry and easier to access.
- I always encourage students to collaborate with each other using their mobile devices. However, I always remind them to protect their confidential data. I ask them to not share passwords, personal images or any private information.
- Mobile devices created many affordances, but also created many risks. In my classes, I make sure to warn students about illegal or unethical sharing of files or data.

The third m-learning activity reported by faculty members is searching for information. Nine participants reported that they utilize their mobile devices to search for information and educational materials:

- Frequently, I use my iPhone to conduct a quick and easy searching about specific information or a meaning for a new concept. Google Apps on my phone are my favorite and fast tool to meet this need.
- By the light weight iPad, I can easily search for educational materials. For example, some mobile apps provide me with excellent educational videos and tutorials that could be very helpful and beneficial for engineering students.
- As a professor in the College of Pharmacy, every day there is a new medicine, treatment, or a virus. Sometime when students ask me about these things, I have to use my mobile device immediately to search for information to help me answer their questions.

The use of mobile devices for searching was followed by using mobile devices for reading online content. Eight participants mentioned that they feel comfortable reading online content related to their teaching or field of specialization. This type of usage is illustrated by the responses below:

- With my iPhone which is always in my hand, I can find and read information anywhere and anytime.
- When I find any research article or any related materials, I store it in my Dropbox to be able to read it in my spare time from my smart-phone screen. Now, I can read in a restaurant, a café, or a park. I can invest every single minute in doing something that is useful.
- Reading from a small screen is onerous; however, this is now addressed by the bigger screen of the tablets. I really enjoy reading from the iPad screen.
- During my students' work in the lab, I utilize the time to read and assess their online submitted assignments or posted comments on the MOODLE asynchronous discussion board using my smart device.

Sharing information through Web 2.0 applications and social media was another identified m-learning activity. Five participants specified that they use their mobile devices to share related teaching materials via Web 2.0 applications and social media including Google Site, Blog,

Facebook, Google+, and Edmodo. One participant noted the following:

Because I'm a member of some professional teaching organizations, I always receive various types of materials. I make sure to post these materials on my educational blog as soon as I receive it. My mobile which is always on helps me to do so.

Another participant said:

Although many people have negative attitude of the Facebook and its impact on our kids' learning, I do believe that Facebook can improve our teaching and learning. Once I post some materials on my Facebook page, many students' comments and questions start to arise. This requires me to provide them with prompt answers and feedback. Mobile devices really make teaching and learning very dynamic.

Finally, only one participant indicated that he and his students use mobile devices to conduct classroom learning activities:

I teach a course that requires IT hands on activities. The class size is big and there is no adequate number of computers in the computer lab. So I allow my students to use their mobile devices to effectively participate in those activities. It is quite important to say that most of students prefer to use their devices rather than the University's ones.

What are the key affordances of integrating m-learning into teaching and learning as perceived by faculty members at AAU?

To answer the second research question concerning perceived affordances of m-learning, the data revealed that m-learning has many affordances that can lead to effective teaching and learning. The most commonly noted affordance is the capability of m-learning to enrich the teaching process by addressing several challenges and problems of traditional teaching. Eleven participants reported that m-learning applications could be used to enhance participation and engagement in group learning, improve the quality of communication with the instructor, provide students with immediate feedback, increase opportunities for knowledge sharing, and motivate students to collaborate with others. These educational benefits are presented in the following responses:

- Mobile devices allow students to ask me about things they didn't understand during the class. WhatsApp allows everyone to ask or get clarifications about new concepts and information presented in the class without being restricted with the time constraint.
- Once a student send a question on the class Facebook page, many comments and answers are instantly posted from other students. I strongly claim that the availability of mobile devices and its networks encourage students to share knowledge and help others.
- When I receive a question from a student, there is no need to wait until to open my laptop or desk computer. I send him an answer right away using my mobile phone. It is a perfect tool for providing students with prompt feedback.
- I have noticed that integrating mobile apps in my teaching motivated students to collaborate with peers and to create good answers and products.
- Generally speaking, m-learning has the ability to create a more interactive, interesting, attractive, and motivating learning environment. It is an example of student centered teaching approach that heavily depends on students' participation and involvement.

The second important affordance of m-learning identified by most of participants was enhanced flexibility of the teaching and learning process. Ten participants agreed that m-learning could

facilitate teaching and learning opportunities in all places and according to the convenience of all students. This m-learning affordance is clearly explained below:

- Now, there is no specific place and time to plan for my lectures or to respond to my students questions. I can do that anytime and anywhere. It is amazing change.
- M-learning is a way to teach virtually anytime, anywhere with ubiquitous resources and rich collaboration opportunities.
- In my opinion, good teacher in the age of technology who can get rid of traditional classroom thinking and design formal and informal learning opportunities that are easily accessible based on students' need. M-learning is a perfect description for effectively achieving this goal.
- Although my implementation of m-learning is modest, I conclude that m-learning provide us with several educational possibilities. The most significant one as I believe is teaching students what they the need to learn when they need to learn it.

The third affordance of m-learning as identified by eight participants is supporting students' individual learning needs. These participants emphasized the significance of m-learning in helping them to meet and address their students' different needs. The eight participants concluded that taking students' individual differences into account is one the great benefits of m-learning. The following are some instances of participants' responses:

- It is difficult sometime to take all students' individual differences into account in a 90 minutes lecture. Usually, I have a lot of things to cover.

This means that no enough time for questions especially from those students who need more explanation. To solve this problem, I encourage them to call me or send me a message if they need help. This procedure makes me hear all voices and help all of them.

- The best thing of m-learning is allowing everyone to learn whenever and wherever he needs. I make sure to design m-learning activities that are always accessible and suitable for their situation or context.
- English is the language of instruction at AAU, and students have different levels of English proficiency. I allowed students to use their mobile devices during the class to record the lecture or to look at the meaning of words or concepts.
- By integrating mobile devices into education, differentiation of instructional strategies becomes easy and attainable. M-learning supports self-learning, collaborative learning, learning by doing, simulating, and other strategies that can meet students' learning styles, needs and objectives.
- Mobile devices provide students with quick and convenient access to wide verity of learning apps that help them to achieve their tasks and projects.

Eliminating certain cultural restrictions is the fourth perceived affordance of m-learning. Seven participants indicated that some cultural restrictions could be reduced through m-learning. More explicitly, students within Muslim-Arab culture are restricted by traditions from talking to the opposite sex. Such action is considered to be breaking a cultural rule and, thus, unacceptable behavior. Given this situation, many universities in the region segregate students by opening separate classes for male and female students or segregating them by partitions in the same classrooms. AAU applies the second approach where students from both sexes study in joint classes with partitions separating male students from female ones. In such an environment, female students are not willing to interact and collaborate with male students. In addition, female students' shyness may prevent them from talking in front of the whole class, or may reduce their participation or lead to subdued participation. In some cases, female students prefer to write their

questions or answers down rather than present them verbally. This culture also puts more restrictions on women's 'hanging out' or staying out late. This difference does not mean that families do not care about their sons. Rather, they put more emphasis on their daughters, what they are doing and with whom they socialize. M-learning holds potential for reducing such cultural restrictions by providing additional channels for student interaction and collaboration. The following passages provide evidence of this affordance:

- I noticed that female students used the WhatsApp group to ask a lot of questions. I think that shyness or not being willing to talk in front of male students limited their participation in the actual joint classroom.
- Since the culture of many families doesn't accept the interaction between students from different sex, m-learning applications provide students with ample opportunities for interaction with classmates. It is a good way to engage all students from both sexes in thoughtful and deep intellectual discussion. Giving students numbers or nick names is a nice strategy.
- One of the problems of group work assignments is difficulty of facilitating face to face meeting between students outside the class time. To be more definite, Arab Culture is very restricted regarding the girls' getting out from the house. There is a specific time for getting out and coming back. Mobile devices can help in facilitating virtual meeting between members of learning groups when actual meetings are difficult to be arranged.
- My students tend to feel more comfortable to participate in discussions using mobile apps than what I used to have in regular classes.

Lastly, four participants indicated that m-learning has potential to promote students' ability to construct knowledge through authentic investigation. As evidence, one participant stated:

M-learning offers students different possibilities including quick information retrieval and data collection that lead to construct new knowledge. As an example, when I explain the symptoms of a certain disease, students start to collect data by their mobile devices to find treatment approaches for it.

Another participant explained this occurrence by saying:

Because I believe in learning by doing, I devote some part of my teaching classes for practice sessions. I allow pre-service teachers in my classes to use their devices to create authentic teaching materials such as lesson plans, presentations, handouts, and exams.

What are the key challenges of integrating m-learning as perceived by faculty members at AAU?

The purpose of the third research question was to identify the challenges of m-learning integration. Several challenges were reported by the participants. The most significant challenge is lack of knowledge and skills. All participants complained that they do not possess adequate knowledge and skills to effectively integrate m-learning. This issue is clarified in the following statements:

- M-learning requires skillful mobile technology users. It is more than using phones to facilitate quick communication between the instructor and his students. It includes a wide range of complicated applications and activities. Thus a continuous and proper training should be provided for both parties.
- How to use mobile devices to design and conduct assignments, engage students in collaborative works, collect data and keep records of these data, and employ problem based

and simulation applications. Actually, there are many things that I don't know in this field. I want too much help.

- I use the Moodle to create various online activities to support my teaching in regular classrooms. My major concern now is to be able to access and update these activities from my mobile device. Integrating mobile devices with the Moodle is an example of support that I need to increase my m-learning integration.

Another major challenge perceived by participants is the lack of efficient m-learning training programs. Almost all participants stated that they had not received any training program for m-learning integration. Furthermore, they commented on the type of training that they had received for general technology integration. Participants concluded that the one size fits all model of training would not adequately equip them with the needed skills. Participants' comments included the following:

- As I know, the University didn't organize any workshop for m-learning use. The few m-learning activities which I implement in my teaching are self-learning based. YouTube enhanced my knowledge of using my iPhone for teaching purposes.
- To succeed in using mobile devices as a teaching and learning tool, various and continuous types of training are critically required. Both Instructors and students need practical training workshops, an immediate one to one assistance, and seminars.
- One or couple of short training workshops wouldn't make me a good technology user. Successful m-learning integration requires ongoing training and support. I think that observation of successful practice of m-learning integration is a recommended form of training.
- I'm not motivated to attend technology training programs because most of those sessions are presented in a useless lecture format. We want hands-on experience on m-learning use rather than lectures about it.

The inadequacy of the Internet connection on the university campus was the third challenge. The majority of participants agreed that the availability of reliable Wi-Fi Internet connections in all teaching halls is a necessary element to support their efforts. One participant commented: "The first thing we should do is having strong Internet connection everywhere on the campus. It is not enough to have Internet only in the computer labs and some other few places like the University Library." Another statement clarified the problem: "While most of students own new mobile devices, few of them have 3G or 4G Internet connection on those devices. Therefore, if we want to use mobile devices into classroom, we have to provide them with free Wi-Fi connection."

Nine participants focused on the digital divide among students as an additional challenge of m-learning. They reported that students own different types of devices with different features, and they have different levels of proficiency using their devices. This issue is described below:

- Even you provide all students with Internet service; there is a big problem still there. How can do the same learning activity using different devices with different platforms and features? We need to think about this issue.
- I teach a university general requirement course. Registered students in it are from different colleges with different technology skills. Based on my actual experience, integrating m-learning with this diverse group of students is complicated and not an easy task.

Learning disruption presents a further challenge. Eight participants specified that allowing students to use their own devices during class causes many interruptions to the teaching and learning process:

- Without mobile devices, I find difficulty in having students' attention during class lectures. What do you think when you allow them to play with these things?
- Chatting, playing, posting, and browsing are some examples of distractions that can be taken place as a result of using mobile devices in actual classes.
- Could you tell me, how could you prevent students from getting access to their Facebook, WhatsApp, Instagram accounts and many other distractors?!!!
- Giving students opportunity to use their mobile phones in the class like giving each one of them his favorite toy.

Lack of awareness of m-learning utility was also apparent in participants' perceived challenges. Seven participants declared that a significant part of Muslim-Arab society is unaware of the benefits of m-learning:

- One of the problems that I faced during m-learning integration is some students' views about mobile devices. They think that mobile devices are entertainment tools. They want just to have fun with these tools. Unfortunately, students didn't take m-learning activities seriously.
- The problem is not with using mobile devices in my teaching. The problem is convincing people that I'm teaching with these tools. I think if the Dean of the college stops by my class and sees students are engaging with their mobile device, he will think that I'm wasting the class time. Maybe he will question me about it.
- Although students and I believe in the useful role of m-learning, parents don't have the same feeling. Parents don't believe that their kids can study with mobile phones or iPad tablets. In fact, some parents think that the use of mobile devices can open big door for committing wrong behaviors and actions.
- Any female student's father or brother won't accept that his daughter or sister talks, chat or send a message to other male students even for educational purposes. It is a part of the culture that you can't change it. In such situation, there is very limited opportunity to utilize mobile devices to enhance collaboration among students.
- My colleagues don't motivate me to implement such new innovation. They don't integrate m-learning and don't want anyone to use it. They think that I'm wasting my time using ineffective and unbeneficial tools.

Finally, three participants indicated that their efforts towards m-learning integration are slowed down by the lack of time for planning and designing m-learning activities. As evidence, one participant said: "I'm teaching four classes with more than 45 students in each, I'm a member of many department and college committees. I have too many duties. Thus I don't have much time for m-learning."

## Discussion

The aim of this study was to qualitatively explore faculty members' integration of m-learning strategies in their teaching as well as their perceived affordances and challenges with m-learning. The results indicate that the scope of participating faculty's integration of m-learning is modest and focuses on a few activities. However, participants agreed that m-learning is a valuable approach for the improvement of teaching and learning. The results also identified a number of challenges that prevent effective m-learning integration. These results will be discussed in the following section.

The participating faculty members used their mobile devices to conduct diverse learning activities.

Mobile devices were used to enhance communication and to access, share, search, and read online content and information. This type of m-learning integration could be beneficial in changing certain features of teaching and learning in higher education. For example, it could enhance student-instructor interaction and provide an easy way to exchange information and knowledge. At the same time, in the case of this study, only one participant reported that he conducts authentic m-learning activities in his classes. Primarily, the use of m-learning by faculty members is influenced by the ease of implementation of m-learning activities. Faculty members tend to implement activities that are easy and quick to implement. Ease of implementation is also associated with another factor, namely, perceived utility. Based on the research literature, the utility of a particular application is a significant factor influencing its future use (Alrasheedi et al., 2015; O'Bannon & Thomas, 2015; Churchill, Fox & King, 2012; Ishtaiwa, 2014; Pullen, Swabey, Abadoo & Sing, 2015). This means that faculty members will integrate useful and convenient m-learning activities so long as the activities do not require much time and effort. Adding to this idea are the varied perspectives about the central functionality of mobile devices. For instance, someone might argue that mobile devices are primarily designed for communication and browsing purposes rather than for conducting activities or completing assignments. Having particular skills for conducting certain m-learning activities is another factor that affects m-learning integration. Faculty members tend to implement the activities they know how to implement. This idea is augmented by another result of the current study. Participants reported that lack of knowledge and skills was a major problem and limited their adoption of the new approach.

Although the level of m-learning integration by faculty members is modest, they did perceive m-learning to be a powerful approach with various affordances to improve teaching and learning in the environment of higher education. More particularly, faculty members reported that m-learning can enrich the teaching process, enhance flexibility, support individual differences, eliminate certain cultural restrictions, and promote knowledge construction. The ubiquitous access of the hand-held and 'always on' devices creates big opportunities for enhancing students' participation and engagement, improves the quality of communication with instructors, provides students with immediate feedback, increases opportunities for knowledge sharing, and motivates students to collaborate with others. In the m-learning environment, neither teacher nor students are limited by class time. Discussion can be taken place anytime-anywhere through new technologies. In other words, m-learning has potential to make anytime-anywhere teaching and learning a real and practical model. Furthermore, in the m-learning context, there is an opportunity for everyone to learn, participate and express ideas based on personal abilities and preferred pace. One more reason for these positive views about m-learning is the possibility to teach, communicate and share knowledge in different ways. Likewise, obstacles to participation, such as inadequate time or shyness can be eliminated by the use of new technologies. Communication between the instructor and students or among students from the opposite sex (male and female) – which is restricted within the Muslim – Arab culture – is now more accessible and possible through mobile apps. These perceived affordances have been documented in previous research studies (Churchill et al., 2012; Ishtaiwa, 2014; Naismith et al., 2004).

At the same time, participating faculty members reported that their efforts at integrating m-learning into their practices are hindered by many challenges. These challenges include lack of knowledge and skills in relation to m-learning integration, inadequate training and support, Internet problems, the digital divide among students, learning disruption, and a lack of awareness of the full potential and utility of m-learning. M-learning is a new teaching and learning approach that requires adequate preparation for effective implementation. The preparation plan should include ways for equipping faculty members with appropriate skills for the integration process. It is also important to provide faculty members different types of training programs. Ideally, training

sessions include formal (courses and workshops) and informal (mentoring, observation, training networks) opportunities. Successful m-learning integration also involves equipping universities with suitable technological infrastructure including reliable Internet connections. It is well known that technology integration does not produce fruitful results if it is hindered by lack of infrastructure or integration skills (Alrasheedi et al., 2015, Ishtaiwa, 2014; Pullen et al., 2015).

The digital divide among students presents an important challenge to m-learning integration. As reported by faculty members, students come to classes with different types of devices and different levels of skills. This challenge requires both administrators and faculty members to find ways to address this complicated situation (Ishtaiwa, 2014). Recommendations include providing students with training programs and implementing m-learning activities that work on all devices and platforms. Learning disruption was also highlighted as a major challenge of m-learning. Students' inability to balance the use of mobile devices for entertainment and for learning purposes poses problems. Mobile devices are still being perceived by students as tools for fun and entertainment, not as tools for learning (Gong & Wallace, 2012; Tai & Ting, 2011). This situation may contribute, in some way, to the final challenge of m-learning as perceived by the faculty members who participated in the study. They reported that a significant sector in Muslim-Arab society, including some administrators, faculty members, students, and parents, is not aware of the benefits and advantages of m-strategies for learning and teaching. The view of mobile devices as toys or tools for undertaking unsafe or inappropriate behaviors still strongly exists within Muslim-Arab culture. Many people may raise concerns about their sons and daughters using mobile devices for cheating, cultivating relationships with the opposite sex, and/or accessing forbidden sexual content (Ishtaiwa, 2014, UNESCO, 2012). Thus, enhancing people's awareness of m-learning is needed in order to generate a positive outlook about the benefits of m-learning. Such knowledge may encourage and advance the integration of m-learning in education.

### **Limitations of the Study**

Although the study has revealed some valuable findings regarding m-learning integration, a number of limitations are associated with its design. The main limitation is the use of a self-reporting interview as a data collection method. The study was built on participants' perceptions of m-learning integration. There is no guarantee that those perceptions reflect actual practices. This circumstance leads to another limitation which is absence of observational data on the actual integration of m-learning. The absence of students' perceptions about m-learning is a third limitation of the study. Students' perceptions of m-learning could have provided important insights into the experience of integrating m-learning in higher education.

## **Conclusion and Recommendations**

This study revealed that participating faculty members used their mobile devices to conduct different learning activities. The participants' views about m-learning were mainly positive. Participants concluded that m-learning has potential for supporting teaching and learning in different ways. Nevertheless, there are several challenges that prevent faculty members from fully integrating m-learning into their teaching practices. To enhance m-learning integration, the following are offered as important recommendations:

- Motivate faculty members and students to integrate m-learning as a new approach to teaching and learning in higher education institutions. Providing faculty members release time for planning and integrating m-learning activities is an important factor for motivating



faculty members to integrate m-learning in their instruction.

- Provide faculty members and students with diverse formal and informal training programs to equip them with the skills they require for effective m-learning integration.
  - Equip university campuses with sufficient technology infrastructure and reliable Internet connectivity. Provide faculty members and students with ongoing and immediate technical support.
  - Conduct seminars, lectures, and conferences about m-learning and invite people from diverse sectors to enhance individuals' awareness of m-learning, including its usefulness and advantages.
  - Conduct further quantitative and qualitative studies involving faculty members and students from different institutions to discover more insights about m-learning.
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