RESEARCH ARTICLE

# PERCEPTION OF PRIMARY EDUCATION TEACHERS OF ADOPTION MOBILE LEARNING IN SAUDI ARABIA.

**Alshammari bader farhan.**
University Science of Malaysia, School of Educational Studies.

| *Manuscript Info* | *Abstract* |
|---|---|
| | This study investigates the perception of adoption mobile learning in terms of readiness among primary education teachers in Saudi Arabia. In this study, adoption of mobile learning was the basis for the assessment of teachers' perception and comparison in both genders. The sample consisted of 50 male and 50 female teachers from Primary Education schools in Saudi Arabia. The results show the positive perception of these teachers in terms of readiness. The male teachers' readiness does not correlate with the overall perception. However, the female teachers' readiness was not correlated with overall perception. It can be concluded that, teachers' perception is not affected by the potential constraints and teacher in both genders have similar perception. |

## Introduction:-
M-learning is a new area of development in e-learning and distance learning. It defined as any learning which takes place using mobile wireless devices such as smart phones, PDAs, and tablet PCs as these devices are mobile with the learners, in order to allow learning anytime, anywhere (Naismith et al., 2006; Wang, Wu, & Wang, 2009). The rapid spread of mobile devices and wireless networks a conducive environment to integrate teachers-centered m-learning (Cheon et al., 2012). Mobile learning that utilizes ubiquitous devices will be a successful approach now and in the future. This is because these devices (PDA, tablet PC, smartphone) are more attractive to higher education teachers for several reasons; one of such reasons is that the mobile devices are more cost effective than normal PCs; also, they are satisfactory and economical tools (Mohamad et al., 2010). Similarly, (Nassuora , 2012) opined that Mobile devices have become more affordable, effective, and easy to use. These devices can increase the benefits of e-learning systems (Motiwalla, 2007) by creating an opportunity for university teachers to have access to course materials and ICT, and also to learn in a collaborative environment (Nassuora, 2012). It also helps to obtain formative evaluation and feedback from instructors (Crawford, 2007).

Peter (2007) emphasised the relationship between e-learning and m-learning is suggested by in the 'just enough, just in time, just for me' model of flexible learning. Figure 1 depicts the model which shows that e-learning and m-learning is both subsets of flexible learning. Apart from this subset, there is also an intersecting area between e-learning and m-learning, the latter is not fully a subset of the former as there is an m-learning area located beyond the boundary of e-learning. This means that e-learning does not always include all aspect of M-learning (Abu-Al-Aish & Love, 2013).

## Background:-
Over ten years ago, mobile learning (m-learning) has undergone rapid developments, and this has had a large effect on the higher education (HE) sector (Klassen, Eibrink-Lunzenauer & Gloggler, 2013). These developments have given rise to the need to re-imagine and reconceptualize the role of teachers in the learning process, and to understand the impact of using m-learning so as to enhance teachers teaching and learning. Ktoridou, Gregoriou, and

Eteokleous,(2007) noted that the recent literature on m-learning provides evidence that supports the effectiveness of mobile technology in learning and teaching. This success is grounded in extending learning and teaching beyond the traditional teacher-led classroom; expanding the accessibility of learning opportunities; providing flexible learning materials that can be used at any time and place; generating new methods of technology-enhanced learning; allowing new modes of teaching; and encouraging teachers' active participation in their learning (Guy, 2010, Picek & Grcic, 2013).

Moreover, m-learning enhances the implementations of teachers-centered pedagogies which enable access to learning materials at any time and place, and hence, to improve teachers teaching and learning outcomes (Hu & Webb, 2009). The growth of mobile learning has largely depended on the participation of teachers and their belief in the possibilities that this technology offers for enhancing learning (Tai, Ting, 2011).

Teo (2009) emphasised that with the active role of teachers in successfully integrating technology into education, it is important to understand the factors that encourage or discourage their participation. It should however be noted that, the presence and accessibility of mobile technologies do not guarantee that their potential will be realized in educational contexts (Liu et al., 2010). This is because; the positive achievement of mobile learning is based on human factors in the use of mobile devices (Kukulska-hulme, 2007). Thus, the need to understand factors that contribute towards teachers' intention to adopt mobile learning is critical for successful implementation in a given context.

**Problem Statement:-**
In Saudi Arabia, the use of mobile learning devices have been a recent area of educational development, as the government feels it could enhance effective and efficient learning in education. However, studies on Teachers' adoption of m-learning in Saudi Arabia are yet to be fully explored and still very limited (Al-Fahad, 2009; Nassuora, 2012, Alfarani, 2014). This is because a little is known about the factors that influence teachers' adoption of m-learning particularly in primary education, the current studies on m-learning are mainly small scale trials and pilot studies that focus on students and educators adoption in higher education. According to Cherry (2014) and Coffman, (2015) study, examining the adoption in primary education can provide a unique perspective within mobile learning research. Given the fact that the Saudi government plans to introduce mobile learning at all levels of education, it is therefore, necessary to conduct studies in Primary schools to identify the effect on teachers' adoption of m-learning.

**Research Objectives:-**
The purpose of this study is to:
1.  Investigate perception of male teachers on adoption of mobile learning in terms of readiness?
2.  Investigate perception of female teachers on adoption of mobile learning in terms of readiness?
3.  Investigate the relationship between the perception of male and female teachers on adoption of mobile learning in terms of readiness?

**Research Questions:-**
The research questions being considered in this study are:
1.  What is the perception of male teachers on adoption of mobile learning in terms of readiness?
2.  What is the perception of female teachers on adoption of mobile learning in terms of readiness?
3.  Is there a relationship between the perception of male and female teachers on adoption of mobile learning in terms of readiness?

**Significance of the Study:-**
Mobile learning in education is still in the beginning stages of implementation, and the concepts and instructional issues surrounding mobile learning are evolving and require further research (Kukulska-Hulme, 2007). Understanding teacher's acceptance and use of mobile is essential to the successful for teaching and learning before investing limited funds in developing mobile services and content, it is important that an institution be able to anticipate and account for the factors that influence teachers' technology acceptance. If teachers fail to accept the mobile technology offered to them in the education setting, they will also fail to use the technology to support students' learning, thereby wasting the government funds.

This study will also benefit education ministry. The information will gleaned from the results of this study will provide policy makers and school administrators with knowledge of determinants of teachers' behaviour intention to use mobile devices to access content in a education setting.

## Literature Review:-
The primary adoption theory applied to education is the Technology Acceptance Model (TAM). However, the Universal Technology Adoption and Use Theory (UTAUT) have more recently been used in research on mobile learning acceptance, effectiveness, and use in the delivery of information and resources (Tibenderana & Ogao, 2008; Williams, 2009). Both TAM and UTAUT seek to answer questions about technology adoption. The theory adopted in this research to study primary school teachers' adoption of mobile learning is the Universal Technology Adoption and Use Theory (UTAUT). This chapter discusses TAM and UTAUT and why UTAUT was chosen for the theoretical basis of this study.

### M-Learning in Education:-
M-learning is the use of mobile and handheld IT devices, such as personal digital assistants (PDAs), mobile telephones, laptops, and tablet PC technologies, in teaching and learning (Alsaadat, 2009). Given that computers and the Internet have become essential tools for education, technology has become more mobile, affordable, effective, and easy to use. Thus, participation and access to ICT, particularly the Internet (InfoDev, 2010), can be widened. Mobile devices such as phones and PDAs are much more affordable than desktop computers and are therefore less expensive alternatives in accessing the Internet (even if the connection cost may be higher) (InfoDev, 2010). The introduction of the tablet PC has enabled users to access mobile Internet with more functionality than desktop computers. According to a report by Quality Improvement Agency (2010), the report emphasised that most mobile devices are useful in the field of education.

### M-Learning in Saudi Arabia:-
Mobile learning is in an early phase of its implementation in the Kingdom of Saudi Arabia (Al-Fahad, 2009), and the decision to formally adopt mobile learning in Saudi universities still very new. A useful definition of mobile learning is provided by the e-Learning Guild, which defines it as an activity that allows individuals to be more productive when consuming, interacting, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis and has reliable connectivity and fits in a pocket or purse. In Saudi Arabia, the number of students that use mobile devices as educational resources continue to rise sharply in Saudi Arabia (Al-Fahad, 2009; Nassuora, 2012), and yet the readiness of Saudi teachers to use mobile learning to support students' learning has yet to be explored.

M-Learning is not a new word for academics in Saudi Arabia, though it is still in the initial phase of implementation. As explained by Altameem (2011) many universities in Saudi Arabia use technology for distance learning. Several universities have already adopted the short message service for teaching and learning.

To encourage the implementation of distance and mobile learning, the Saudi government has established several leading projects, and these are:
- ❖ The National Centre for E-Learning and Distance Education
- ❖ JUSUR (a Learning Management System)
- ❖ Saudi Digital Library
- ❖ Saudi Electronic University

Nassuora (2012) emphasized that University administrators should carefully consider the high budget in M-Learning. Also, the factors that influence using M-Learning should also be considered when deciding to invest or not in M-Learning.

## Methodology:-
### Research Design:-
This study is a cross-sectional study of teachers' perceptions on adoption of mobile learning. The research design applies a comparative study of Primary Education teachers' in Saudi Arabia. A comparison is made between males and females in terms of readiness.

**Population:-**
A population consists of all the subjects you want to study. (Banerjee & Chaudhury, 2010) population is "any inferences from a sample refer only to the defined population from which the sample has been properly selected". Polit and Hungler (1999) refer to the population as an aggregate or it is as the totality of the objects, subjects or members that conform to a set specification. There is no stated minimum number of subjects required for a non-experimental descriptive study. The recommended minimum number of participants is 30 in order to reduce the chance of mistaken identification of relationships between variables (McMillan, 2004).
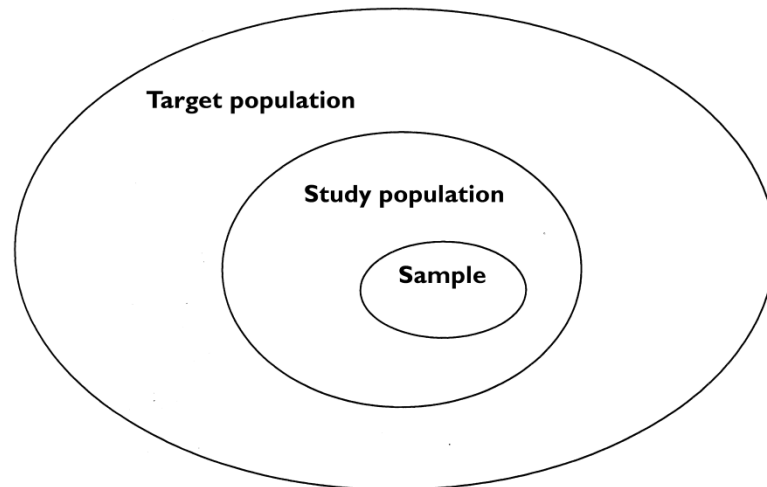


**Figure 3.2:-** shows the relation between target population, study population and sample.

In this study the researcher will select the target population then the study population before selecting the sample. Thus, the population is teachers in Primary School in Saudi Arabia. The study population is teachers in Primary School in Hail state which consists of 3147 teachers. This is according to the statistical information department in ministry of education in 2015/2016.

**Sampling:-**
Sampling is the process of selecting a group of subjects for a study in such a way that the individuals represent the larger group from which they were selected. This representative portion of a population is called a sample. (Smith, 2010) insisted accidental, or convenience sampling can be used to obtain a representative population sample depending on the phenomenon measured. According to Brink (1996) a sample is a subset of a population selected to participate in the study, it is a fraction of the whole, selected to participate in the research project. The sample selected was 50 males & 50 females who are teaching in primary education schools in Saudi Arabia.

**Research Procedure:-**
The procedure was used to collect data for the study is questionnaire. The Figure below shows the procedure that researcher follows to collect the data.
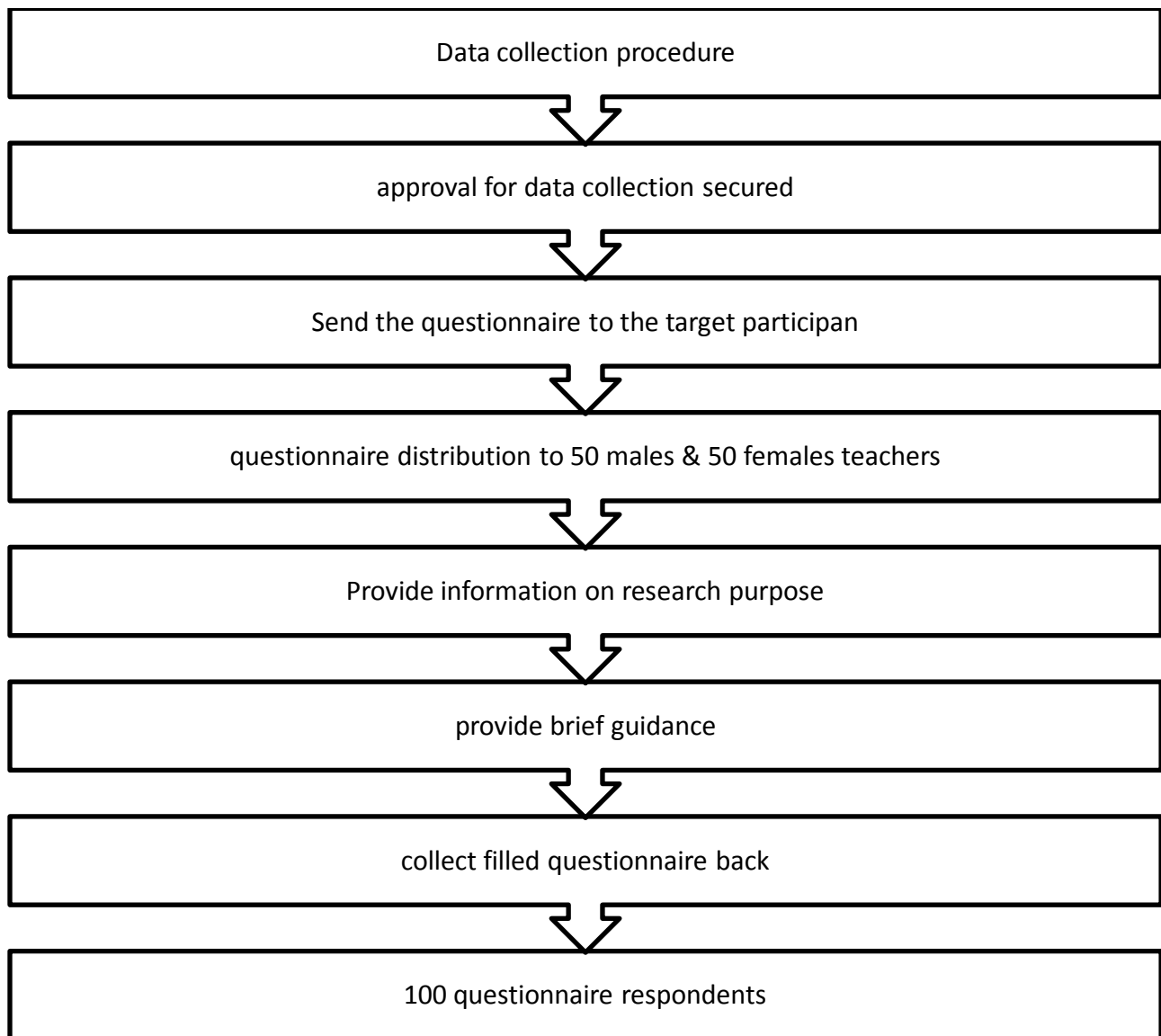
```
┌─────────────────────────────────────────────────────────────────┐
│                    Data collection procedure                      │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│                 approval for data collection secured              │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│             Send the questionnaire to the target participan       │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│          questionnaire distribution to 50 males & 50 females teachers │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│                Provide information on research purpose             │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│                       provide brief guidance                      │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│                  collect filled questionnaire back               │
└─────────────────────────────────────────────────────────────────┘
                                │
                                ▼
┌─────────────────────────────────────────────────────────────────┐
│                  100 questionnaire respondents                    │
└─────────────────────────────────────────────────────────────────┘
```

**Figure 3.1:-** Research Procedure.

**Research Instruments:-**

The Research Instruments is a questionnaire designed to gather information in line with the research objective. The instrument, titled questionnaire on the adoption of mobile learning was developed by (Edwards, 2013). No information that identifies (e.g. name) will collect. Information will collect including age registration on and were mostly for the direct purposes of this study.

The instrument is a 2-part instrument. Part A is devoted to collect demographic data and other personal information about the respondents especially in relation to the study. For example, the data on registration and adoption of mobile learning will provide information on the teachers' perception in terms of readiness of adoption of mobile learning as a function of current use of the tool by the teachers. The survey made use of Likert type scales. Response options include Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A) and Strongly Agree (SA). Table 3.1 shows the sections of the instrument and brief details of the items covered.

**Table 3.3:-** results of Reliability analysis.

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | Number of items |
| 0.843 | 40 |

**Data Analysis:-**
Data analysis will involve the use of both descriptive and inferential statistics. It will be focused on providing answers to the research questions and establishing the relationship between the dependent and independent variables involved in the research. Statistical Packages for the Social Sciences (SPSS) version 20 used for data analysis.

Data from the questionnaire and from the structured is presented in frequency tables. The instrument is design such that items design to measure constructs in relation to a particular variable are grouped together for easy reference. For perception measures, inferential statistics is employed. Frequency tables, charts used to present the data from samples. The comparative analysis of data from male and female teachers involves the Chi-square test. Table 3.4 presents a summary of the data analysis methods employed in the study.

**Table 3.4:-** the data analysis methods employed in the study.

| Research question | instrument | Data analysis method |
|---|---|---|
| What is the perception of male teachers on adoption of mobile learning in terms of readiness? | Questionnaire | Descriptive Statistics (Mean, Standard deviation), inferential statistics (Pearson Chi-square) |
| What is the perception of female teachers on adoption of mobile learning in terms of readiness? | Questionnaire | Descriptive Statistics (Mean, Standard deviation), inferential statistics (Pearson Chi-square) |
| What is the relationship between the perception of male and female teachers on adoption of mobile learning in terms of readiness? | Questionnaire | inferential statistics (Pearson Chi-square) |

## Findings:-

**perceptions of male teachers on adoption mobile learning:-**
Male teachers were found to have a positive perception of adoption mobile learning in terms of the variable examined in this study. They consider adoption of mobile learning in relation to digital learning.

No correlation was found between teachers' readiness and mean perception, this observation is due to the concerns of teachers on the availability of required infrastructure for adoption of mobile learning a possible learning as expressed in their responses to the open-ended questions. Some of the issues raised include high cost of internet connectivity and affordability of ICT tools like computer systems, laptops and tablets; unstable power supply and the possibility that social networking will remove the teacher-student ethical gap and cause disrespect as well as the potential of social networking activities to distract students from academic work.

**perceptions of female teachers of adoption mobile learning:-**
Correlation of teachers' mean perception with perception in terms of readiness shows no correlation for the variable of female teachers. In essence, the general positive perception found from the descriptive data differs from the perception based on the individual variable. They reported this as major constraints that constitute real hindrance to the educational utility of adoption of mobile learning and in line with other findings of Bakia (2000), cost as a major factor in internet usage in higher institutions, in relation to campus use of technology. It's also in line with findings of (Ehrmann & Milam, 1999) reported that, using technology in the higher education typically represents additional costs, rather than cost reductions.

**Table 4.1:-** the Chi-square statistics for male and female

| Pearson Chi-square | | |
|---|---|---|
| | Readiness | Significance |
| Male | 0.118 | N.S |
| Female | 0.197 | N.S |

S= Significant    NS=Not Significant

**Relationship between the perception of male and female teachers on adoption of mobile learning:-**
There is a significant relationship between the perception of male and female teachers adoption of mobile learning in terms of readiness.

However, in spite of the higher number of respondents expressing concern over the adoption of mobile learning, the responses to the questionnaire show teachers have a general positive perception of adoption mobile learning in terms of readiness. The potential challenges identified obviously do not seem strong enough for adoption mobile learning to be discarded as an important tool.

**Table 4.2:-** perception of male & female teachers.

| Pearson Chi-square | |
| --- | --- |
| Readiness | |
| Male | .118 |
| Female | .197 |
| Overall perception | .001 |

## Discussion:-
This study examined students' perception of adoption mobile learning. The perception of male and female teachers were examined and compared. The findings of this study shows that the challenges of infrastructure in Saudi Arabia have no effect on the perception of teachers on a mobile learning the results shows that in spite of the lack infrastructure, teachers perceive the use of adoption mobile learning positively in term of their readiness of the tool.

Furthermore, the findings show that internet access; the cost of ICT tools does not affect the perception of teachers. The constraints experienced due to the nature of the tools teachers use for adoption mobile learning do not affect their perception. Male are mostly restricted to the use of hand phone for mobile learning due to the cost of larger and more convenient gadgets; these places limitation on how much of the materials they can access and consequently, how useful the platform can be for learning. Female have access mostly and from their responses to the open-ended questions do not foresee any challenges with mobile learning. However, in spite of this difference, the perception of both groups is the same.

## Conclusion:-
This study shows that students' overall perception of adoption mobile learning is positive in spite of the possible challenges identified by the teachers. Issues including internet access, the cost of ICT tools are very important considerations while the place of culture/tradition is also emphasized by teachers.

## Recommendations:-
Future research should focus on areas not covered by this study, including the effect of differences in culture and traditions. This research involves only an perception study other aspects for example, implementation, development, etc can be explored in future research. These are other important issues in relation to the use of a learning tool; that could bring to focus a critical issue that require attention and could constitute potential challenges for practical applications. Future studies can also focus on the perception of school management, parents, etc.

## References:-

1. Aafaqi, B., & Ramayah, T. (2004). Role of self-efficacy in e-library usage among students of a public university in Malaysia Malaysian Journal of Library & Information Science, 9(1), 39-57.
2. Abu-Al-Aish, A., & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. The International Review of Research in Open and Distributed Learning, 14(5).
3. Agarwal, R., & Prasad, J. (1999). Are Individual Differences Germane to the Acceptance of New Information Technologies Decision Sciences, 30, 361-391.
4. Akbar, F. (2013). What affects students' acceptance and use of technology?
5. Al-Fahad, F. N. (2009). Students' Attitudes and Perceptions towards the Effectiveness of Mobile Learning in King Saud University, Saudi Arabia. Online Submission, 8(2).
6. Alfarani, L. A. (2014). Influences on the adoption of mobile learning in saudi women teachers in higher education. In Interactive Mobile Communication Technologies and Learning (IMCL), 2014 International Conference on (pp. 30-34). IEEE.
7. AlKhozim, K, M, N. (2012) the effectiveness of the use of Blackboard mobile education program in the mobile interaction and academic achievement of students in the development of decision methods of teaching mathematics at the Teachers College at King Saud University, a PhD Imam Muhammad University: Saudi Arabia.
8. Alsaadat, K. (2009). Mobile learning and university teaching. Paper presented at the International Conference on Education and New Learning Technologies (EDULEARN09), Barcelona, Spain.
9. Altameem, T. (2011). Contextual mobile learning system for Saudi Arabian oniversities. International Journal of Computer Applications, 21(4), 21=26.
10. Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.
11. Birch, D., & Burnett, B. (2009). Advancing e-learning policy and practice: influences on academics' adoption, integration and development of multimodal e-learning courses.
12. Beckers, J. J., Wicherts, J. M., & Schmidt, H. G. (2007). Computer anxiety:"trait" or "state"?. Computers in Human Behavior, 23(6), 2851-2862.
13. Cavus, N., & Ibrahim, D. (2009). m-Learning: An experiment in using SMS to support learning new English language words. British journal of educational technology, 40(1), 78-91.
14. Cherry, J. E. (2014). Technology Integration in Education: An Examination of Technology Adoption in Teaching and Learning by Secondary Teachers in Minnesota (Doctoral dissertation, UNIVERSITY OF MINNESOTA).
15. Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. Computers & Education, 59(3), 1054-1064.
16. Coffman, A. C. (2015). Teacher Acceptance of Web-Based E-learning Technology (Doctoral dissertation).
17. Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning?. Educause Quarterly, 30(2), 51.
18. Crawford, V. M. (2007). Creating a Powerful Learning Environment with Networked Mobile Learning Devices. Educational Technology, 47(3), 47-50.
19. Davis, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems:Theory and results. Unpublished Doctoral dissertation, Massachusetts Institute of Technology.
20. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.
21. Donaldson, R. L. (2011). Student acceptance of mobile learning. THE FLORIDA STATE UNIVERSITY. Chicago
22. El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining Mobile Learning in the Higher Education Landscape. Educational Technology & Society, 13(3), 12-21.
23. Etor, C. R., Mbon, U. F., & Ekanem, E. E. (2013). Primary Education as a Foundation for Qualitative Higher Education in Nigeria. Journal of Education and Learning, 2(2), 155.
24. Fernandez, V., Simo, P., & Sallan, J. M. (2009). Podcasting: A new technological tool to facilitate good practice in higher education. Computers & Education, 53(2), 385-392.
25. Gay, L.R. and Diehl, P.L. (1992). Research Methods for Business and Management. In Hill, R. (1998). "What Sample Size is 'Enough' in Internet Survey Research"? Interpersonal Computing and Technology: An electronic Journal for the 21st Century
26. Gibbs, C. (2009). Explaining effective teaching: self-efficacy and thought control of action. The Journal of Educational Enquiry, 4(2).

27. Guy, R. (Ed.). (2010). Mobile learning: Pilot projects and initiatives. Informing Science.
28. Handy, J. H., Whiddett, R., & Hunter, I. (2001). A technology acceptance model for inter-organisational electronic medical records systems. AJIS, 9(1).
29. Hasan, B., & Ahmed, M. U. (2012). A path analysis of the impact of application-specific perceptions of computer self-efficacy and anxiety on technology acceptance. End-User Computing, Development, and Software Engineering: New Challenges: New Challenges, 354.
30. Hill, R. (1998). What sample size is "enough" in internet survey research. Interpersonal Computing and Technology: An electronic journal for the 21st century, 6(3-4), 1-12.
31. Huang, R. T., Jang, S. J., Machtmes, K., and Deggs, D. (2012). Investigating the roles of perceived playfulness, resistance to change and selfĞmanagement of learning in mobile English learning outcome. British Journal of Educational Technology, 43(6), 1004–1015
32. Hu, L., and Webb, M. (2009). Integrating ICT to higher education in China: From the perspective of Activity Theory. Education and Information Technologies, 14(2), 143-161.
33. Imhof, M., Vollmeyer, R., & Beierlein, C. (2007). Computer use and the gender gap: The issue of access, use, motivation, and performance. Computers in human behavior, 23(6), 2823-2837.
34. InfoDev. (2010). ICT in school education (primary and secondary). Retrieved Jan, 10, 2012, from p://www.infodev.org/en/Document.1016.pdf
35. Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. Journal of Mixed Method Research, 1(2), 112-133.
36. Klassen, A., Eibrink-Lunzenauer, M., & Gloggler, T. (2013). Requirements for mobile learning applications in higher education. InMultimedia (ISM), 2013 IEEE International Symposium on (pp.492-497). IEEE.
37. Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educ psychol meas.
38. Ktoridou, D., Gregoriou, G., & Eteokleous, N. (2007). Viability of mobile devices integration in higher education: faculty perceptions and perspective. The 2007 International Conference on(pp. 57-62).IEEE.
39. Kukulska-Hulme, A. (2007). Mobile usability in educational contexts: what have we learnt?. The International Review of Research in Open and Distributed Learning, 8(2).
40. Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The Technology Acceptance Model: Past, present, and the future. Communications of the Association of Information Systems(12), 752-780.
41. Liu, Y., Li, H., & Carlsson, C. (2010). Factors driving the adoption of m-learning: An empirical study. Computers & Education, 55(3), 1211-1219.
42. Mac Callum, K., Jeffrey, L., & Kinshuk, K. (2014). Factors impacting teachers' adoption of mobile learning. Journal of Information Technology Education: Research, 13, 141-162.