



Investigating the Impact of Mobile Application on Learning Among Teachers Based on Technology Acceptance Model (TAM)

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Abstract: *Mobile learning and digital communication are known as the most advanced tool to get competitive edge over other in the current globalized world. The current research study tries to investigate the adaptation of mobile acceptance model among teachers in District Bannu. Researchers try to investigate the teachers' attitude, performance and learning capabilities with the usage of mobile technology. Target population of the study is 2000 newly recruited teachers, while sample size of 220 was drawn based on the approach of (Sekran, 2004) known population. Data was analyzed through SPSS statistical procedure. Results depict that all the variables having significant association. However, teacher performance shows 51% increase in their knowledge due to Mobile application to their studies. Based on the findings it is concluded that performance and mobile application to education can further enhance the capabilities of teachers.*

Key Words: Mobile Learning, Teachers, District Bannu, Teachers Attitude, Teachers Learning, Teachers Performance

Introduction

Mobile learning and digital communication are known as the most important weapons to conquer any nation (Camilleri, & Camilleri, 2019). However, It is not term as information technologies several decades ago, when all the information were stored in a big computer known as Mainframe Computers at that time, access to this computers were only possible through its preliminary terminal, however with the passage of time when the first personal computer was made and web browsers were designed then an evolution occur in the organizational environment and personal lives of the people. Some organizations have changed their working environment (higher education) with the technologies (Elkhateeb, Shehab, & El-bakry, 2019) immediately while some organizations need more money to purchase the required hardware and software (Olofsson & Lindberg, 2020). In the late 80s and early 90s information were exchange through floppy Disk among computers, but the problem with the floppy disc was that first one need to store/install the information in the computer hard drive, for which it was necessary to have the version of software on both the computers. As the volume of audio and video it was not possible to use the floppy disk easily (Codish et al, 2015; Wang et al., 2009). According to a group of researchers (Akbar, 2013; Berking et al. 2012; Blank et al.2012; Carlsson et al. 2006; Chen et al.2000; Gao et al. 2012) information technologies have a lot of implications and causes to change our lives, however all the new advancement in the technologies have caused the emergence of new tech concept for education. Now what are those factors which affect the user and which type of technology should be adopted is still controversial (Lai, 2020). Due to use of the IT users can benefit themselves through different opportunities, because it creates important ideas, through which mobile user can take advantage of that ideas and explorations (Bai,2019). The main challenge is to why will the end user will accept or reject the online learning resources (Lai, 2020). A researcher Demir (2006) is in the view that there is no scale through which it

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could be measured that why the end user will adopt the online way of learning. A group of researchers is of the view that most of the studies on the demand of the user of mobile several releases were made (Gao et al. 2008; 2011; 2012). In this context Gao (2008) has proposed a model for adoption of mobile services for learning purposes, for this purpose he investigates the existing framework of Mobile adoption (Saroia, & Gao, 2019; Nikolopoulou, 2018). Karimi, (2016) is in the view that a student can get information from his handset which he could not get in his classroom (Elkhateeb, et al., 2019; Olofsson & Lindberg, 2020). One can educate himself during office hours or out of office hours while using his mobile. Mobile learning is one of the most modern techniques of learning (Lai, 2020), in which people keep update themselves of each and everything whether on domestic level or international level (Nikolopoulou,2018;Dey 2012).

Significant advancement has been made in the field of information technologies (IT) in recent years. Advancement has been made in the field of IT through adopting new ways of learning such as e-learning and mobile learning (Lai, 2020; Nikolopoulou,2018; Dey 2012; Elkhateeb, et al., 2019; Olofsson & Lindberg, 2020) . A researcher (Hao et al., 2017) is in the view that due to this advancement equipment used in IT, such as internet and multimedia has been also developed to have ease of learning and have access to the required resources one is looking for (Khan, Al-Khanjari, & Sarrab, 2018; Suner, Yilmaz.& Piskin, 2019) .

Similarly researchers (Tang et al., 2017) says that the use of mobile technology for education purpose (Khan et al., 2018; Suner et al 2019; Saroia, & Gao, 2019; Nikolopoulou, 2018; Bai., 2019) or training purpose (Yusri, Goodwin, & Mooney, 2017; García-Martínez, Fernández-Batanero, Cobos Sanchiz, & Luque de La Rosa, 2019) gaining much consideration. All these advancement from education to changing the environment of training system is known as e-learning. The current advancement in the technologies provide an opportunity to users to avoid all the traditional ways of learning and rely on the new advanced ways of learning, users of the technologies can now learn and get a lot of information which they required at their homes, offices, and during traveling without bearing the difficulties of traditional learning (Yusri et al., 2017; García-Martínez et al.,2019; Khan et al., 2018; Suner et al 2019; Saroia, & Gao, 2019) . Researchers (Mitchell et al., 2015) argued that video is designed for some specific aim which the learner with one way or other. Despite all these advantages, modern technologies have create confusion between public and private sector. In order to understand the concepts all, the educational institutes upgrading their existing methodology of teaching, libraries, contents and performance. One of the most important features of e-learning has been realized with the wireless technology; actually mobile learning is that of learning which is implemented through mobile technologies such as Personal Digital Assistants (PDA), audio players and electronic books. In this regard several approaches and theories came to existence.

Learning is combination of series of process and experience, in-fact learning is visible or non-visible thing which could be understood from a person`s behavior (Koole et al. 2010; Lee et al 2013). Mou et al. (2014) Hamidi and Chavoshi, (2018) are in the view mobile services are one of the cheapest ways for distance learner.

Mobile application has been used mostly in Higher education setup to enhance the capabilities of student and teachers through their performance (Hamidi & Chavoshi, 2018; Olofsson, & Lindberg, 2020). At the same time in developed world the focus in primary and secondary education teacher`s capabilities advancement through learning and performance by applying advance mobile technology is also at peak (Bai, 2019; Suner et al.,2019; Khan et al.,2018). Most of the studies investigate the mobile application procedure based on technology acceptance model in education setup. Study of Altakhayneh, (2018) focus on attitude factor (Francis, Taylor, Sudirman, Trongtortam, & Symons,2017) of individuals that boost ones desire to use mobile application for learning process in mathematics. Nikolopoulou, (2020) focus on teacher perception toward using tablet and mobile technology to enhance the skills of students in classroom.

Recently Government of KPK primary and secondary education has initiated a revolutionarily concept to mould the course structure of government primary and secondary schools to the level of English medium schools. The transformation in early education system is based upon the slogan of equal education to all Pakistani. In this regard Government of KPK initiated a highly capable faculty for these challenging jobs through independent education testing agency i.e.(National Testing Service). As a

result, more the (120,000) faculty through competitive test are selected in last 5 years. Now the government of Khyber Pakhtunkhwa move one step forward and providing skill development through (standard Operation Procedure) of Induction Program Management system (IPMS) mobile based learning to the selected faculty among these (120,000) teachers. For this purpose, smart phones are provided and by using internet facility these teachers downloaded the already designed/developed videos (by International Educational Experts) through you tube and apply the knowledge in the class room. Interestingly the selected teacher for the mobile based learning activity has to appear for online test twice a month.

Problem Statement

Despite the fact that mobile is now a day's one of the most important tool for learning, entertainment and educational activities. Yet the mobile learning is not fully utilized in Pakistan primary education sector. And that is the reason why government school teachers/student attitude toward learning through practical knowledge is at the lowest level.

Research Objectives

- To investigate the attitude towards mobile using through IPMS of newly appointed NTS teachers in Primary schools.
- To find out the teacher learning through IPMS mobile technology among newly appointed NTS teachers in Primary schools.
- To investigate the performance of teachers using IPMS in primary Education sector of KPK. To recommend suggestion on the basis of current study findings.

Research Question

- Is newly appointed Primary school teachers have attitude toward mobile learning?
- Is newly appointed Primary school teachers have behavior intention to use mobile as a learning source.
- Is performance of teachers having any relationship with using IPMS mobile application in Primary Education sector of District BANNU?

Literature Review

Distance Learning

[Mallat et al. 2009](#) are in the view that distance learning is process of learning, in which a learner is far away from the existing place of the tutor or teacher, all the learning process is accomplished through electronic way. Without proper advancement in the technology and communication process distance learning is not possible. Researcher [Shah et al. 2014](#) are also in the view that for distance learning program it is mandatory to have a instructor on one side and a learner on another side. Computer has changed the way of learning, while in past one's could only share the information/knowledge from a book or his own experience.

Mobile learning is one of the most important elements for higher education, because through this technology student can get, share, and collaborate ideas and information with use internet services. Now the question which arises over here is that whether people are willingly participate in this type of learning or will reject this type of learning.

Electronic learning or e-learning since from its evolution and developmental time, it is beneficial for distance learners and all others who are interested in learning something ([Irby et al. 2015](#); [Koe et al, 2016](#)). The main aim of e-learning is to utilize technology for all the official correspondents, learning, shopping, business promotions etc, to minimize the cost, save the time, and avoid traffic issues etc.

Learning is a combination of series of process and experience, in-fact learning is visible or non-visible thing which could be understood from a person's behavior ([Koole et al, 2010](#)). [Mou et al, 2014](#) are in the view mobile services are one of the cheapest ways for distance learners.

Electronic Learning

The beginning of electronic learning started when information communication technologies occupied place in teaching in learning process successfully. Irby, et al, (2015) presented the idea of electronic learning or e-learning also described the same idea that electronic learning is useful in distance learning. In the same way Julien et al, (2006) highlighted the importance of electronic learning in distance learning as well. The importance of electronic learning may not be neglected why because it is an easy way of learning though apart from the hesitation of distance as well as time because when you have free time then one can get utilize time in teaching learning process ([Jayatilleke et al., 2018](#)). The same is example of distance learning in which there is not teaching learning process like real classroom environment (Koc et al, 2016). Different type of electronic instruments used in electronic learning such as computers, internet, multimedia CD, e-mail and newsletter publication and so on, with the aim of reducing the amount of traffic, saving time, money as well as promoting better, faster, easier learning (Koole, et al., 2010). Learning when take place in distance then various sources are used for this purpose which make the learning process easy and possible for learners like electronic learning (Lee, et al., 2013). But in transformative sense learning is an activity which can take place due to this reason to prepare one to deal with the environment and situations. It is a change in the behavior of an individual through experiences and practices the in distance learning the importance of electronic learning may not be neglected (Legris, et al., 2003). In these various type of leaning sources mobile is also used successfully for learning because it is also used for learning purposes like distance learning (Mou et al., 2014). It clear light of previous research studies like Isil [Boy and Gary Motteram, \(2013\)](#) indicated that mobile devices role in learning process is prominent because it provides multiple prospects of learning for learners. One of the most important aspects of mobile learning apart from traditional classroom environment is that a learner may get help from mobile phone in learning activities even at home, field trips, museum visits, by reviewing teaching materials on mobile devices and may collect and analyze information while using cell phone([Liak \(201\)](#)).

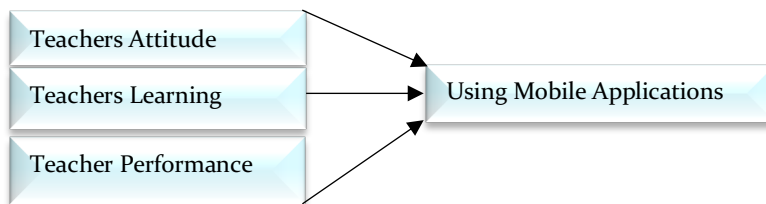
Mobile Learning

In the past there was no concept of mobile learning, because mobile phone were used only for calling and texting purposes, but in this modern era its used expanded to internet access, retrieval of different information from different sources, access to different learning websites, software developers have developed different learning software, it is not limited to those features of calling and texting only (Hashemi et al, 2011; Shin et al, 2015, Koole et al, 2010; Tughba et al, 2016). Perhaps the most relevant definition of mobile learning may be that it is the process of getting knowledge anywhere and anytime, and as result a change occur in one`s behavior (Khan et al., 2018; Suner et al 2019; Saroia, & Gao, 2019; Nikolopoulou, 2018; Bai., 2019). A survey was carried by researchers Park et al, in 2011, the research were made in Singapore, the introduced information feedback system. In this survey learning content were displayed on a mobile device and learner behavioral response from a loop of sense and respond. Researchers Thornton et al., in (2005) design a mobile a learning environment, for the purpose that with the help of mobile learning environment knowledge transferring and getting feedback from the recipient is more effective than the conventional system of learning (Hamidi& Chavoshi, 2018; Nikolopoulou, 2018; García-Martínez et al., 2019). In this method of learning a smart classroom was designed where along with computer systems a gap for conventional was also took into consideration. In this method of learning a suggestion system was introduced so that teacher could change his or her methodology of teaching accordingly. Student found this method of learning very interactive and interesting, that`s why experts believe that this type of learning is very suitable for learning point of view, Wei et al., (2009) is in the that consolidated learning methods should also take into consideration.

In addition, the researchers believe that mobile learning is commenced with the aim to enhance students learning experience, and not to be used for as primary method to provide the entire course. Now the main difference can be seen between mobile learning and e-learning, through mobile learning one can easily educate him/herself at any time (Yusri et al., 2017; García-Martínez et al.,2019; Khan et al., 2018; Suner et al 2019; Saroia, & Gao, 2019) and any place whereas in e-learning one must have a computer or laptop, the drawback of e-learning is that it needs privacy as well as separate place and may

there is chance that PCs and laptop are not allowed somewhere, then it became difficult for the user to retrieve the required information at that time (Wang et al., 2009).

Mobile application has been used mostly in Higher education setup to enhance the capabilities of student and teachers through their performance (Hamidi & Chavoshi, 2018; Olofsson, & Lindberg, 2020). At the same time in developed world the focus in primary and secondary education teacher's capabilities advancement through learning and performance by applying advanced mobile technology is also at peak (Bai, 2019; Suner et al., 2019; Khan et al., 2018). Most of the studies investigate the mobile application procedure based on technology acceptance model in education setup. Study of Altakhynah, (2018) focus on attitude factor (Francis, Taylor, Sudirman, Trongtortam, & Symons, 2017) of individuals that boost one's desire to use mobile application for learning process in mathematics. Nikolopoulou, (2020) focuses on teacher perception toward using tablet and mobile technology to enhance the skills of students in classroom. Result from previous studies stress that mobile application is mostly applied to enhance the performance of students (Klimova, 2019; Karabatzaki, et al., 2018; Apostol, 2020; Farrah, & Abu-Dawood, 2018; Makoe, & Shandu, 2018; Jayatillekeet al., 2018; Camilleri, & Camilleri, 2019) however there is limited work that investigate the association between primary school teacher performance and mobile application to their studies. Most of the studies investigate the performance of university teachers performance (Hamidi, & Chavoshi, 2018; Lai, 2020;



Methodology

As the study try to get response from teachers about the uses of mobile and its impact on their behavior hence it is descriptive nature of study. The response was collected during their working hours in school duty hence it is non-contrived in nature. The response was obtained through designed construct hence it is survey-based approach. The study gets the response through adopted construct from Gao et al (2008) to measure mobile application attribute of the study. While three other dimensions namely teacher attitude, Teachers learning and teacher's performance was designed by the researchers of the current study. Before its application to the study the items were validated through reliability and validity issue. In first stage 5 items were designed that were assessed through 30 different field (Education, computer science and management sciences) experts. And after removing the grammatical errors as well as other issues finally 4 items to each factor were again analyzed through CFA and EFA process as recommended by (Saif and Khan., 2020; Saiph,,Khan., Adnan.,2018) . Results from AMOS for CFA depict that all the items loaded on their respective factors and their loading values were greater than (.60). At the same time 3 factor CFA fit indices depict that model is fitted well and it can be used for further analysis. The sample items for teacher's attitude toward using mobile application are "I would like to use mobile as a tool to enhance my knowledge". "I get updated information's about my field of expertise through mobile internet technology". Sample items for teacher's learning toward using mobile application are "Learning through mobile internet technology is always interesting and fun for me". "Learning through mobile internet technology enhanced my practical knowledge". "Learning through mobile internet technology infuses motivation to apply new ways for transferring knowledge". Teacher performance was measured by the level of their novel way to deliver and transfer knowledge to the target audience. "Through mobile internet technology I am applying new way of teachings to transfer knowledge". "Because of using mobile internet technology, I am trying to convert study into fun for students." The items for the said concept were than pilot testing and results are presented in table (3.1).

Table 1. Table of Variables and Items and Reliability During Pilot Testing

S. No	Variable Title	No of Items	Adopted from	Reliability
1	Mobile Application	06	Gao et al (2008)	.711
2	Teachers Attitude	04	Saif (2020)	.802
3	Teachers Learning	04	Saif (2020)	.822
4	Teacher Performance	04	Saif (2020)	.766

As data was obtained from teachers in public sector primary educations sector, hence individuals (teachers) became the unit of analysis. Data was obtained only once; hence horizontal time horizon approach is applied. The current study tries to correlate the different concept with each other hence deductive approach is applied to it. Population of the study consists of all the primary sector teachers in district Bannu. However due to financial and time constraints only 200 respondents were selected to get response. According to Sekran., (2004) in questionnaire-based research sample size of 200 is enough to get appropriate response. Information's indicate that the response from 120 (80%) male and 30 (20%) female having age group between 21-25 Years comprises (81.33%) followed by 28 (19.76%) having age group higher than 25 years. Interestingly 15 (10%) respondent s are higher qualified having research degree, while (86.66%) have master qualifications. About computer certification respondents indicate that (81.66) % male and (70%) female having IT related certifications. Response from the respondents was collected through 5-point Likert scale and it was then entered into SPSS. After removing missing data from the data set, correlation and regression analysis was performed to assess the linear regression model application

Result and Discussion

Table (4.1) shows the information's about the mean and standard deviation values about the different variables. The values of inter correlation among the independent and dependent variables are in the acceptable range. From table it is clearly indicated that teacher performance and mobile application model is highly correlated ($r=.502$; $p<0.05$) followed by teachers learning correlation ($r=.411$; $p<0.05$) and teachers attitude correlation ($r=.311$; $p<0.05$).

Table 2. Correlation Among the Variables

Variables	Mean	S. D	MAM	TA	TL	TP
MAM	3.88	2.24	(.711)	.381**	.411**	.502**
TA	3.76	2.11		(.802)	.211*	.201
TL	3.56	2.07			(.823)	.167
TP	2.77	1.55				(.733)

Table 3. Regression Analysis for MAM and Teachers Attitude

R	R-Square	Adjusted R Square	Standard error of estimation		
.622	.419	.402	.31226		
Model	Sum of Square	Df	M.S	F	Sig
Regression	27.330	1	10.223	68.451	.000
Residual	16.782	118	0.142		
Total	44.112	119			
Model	Unstandardized Coefficient		B	T	Sig
	Beta	SE			
Constant	1.432	0.365		5.114	.000

TA	0.367	0.044	.381	4.043	.000
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Predictor. Mobile Application Model. Dependent variable, TA= Teachers Attitude

Table 4. Regression Analysis for MAM and Teachers Learning

R	R-Square	Adjusted R Square	Standard Error of Estimation		
.701	.444	.412	.30117		
Model	Sum of Square	Df	M.S	F	Sig
Regression	29.330	1	11.113	77.401	.000
Residual	19.7809	118	0.155		
Total	49.112	119			
Model	Unstandardized Coefficient		B	T	Sig
	Beta	SE			
Constant	1.322	0.512		5.003	.000
TL	0.377	0.024	.411	4.343	.000

Predictor. Mobile Application Model. Dependent variable, TL= Teachers Learning

Table 5. Regression Analysis for MAM and Teachers Performance

R	R-Square	Adjusted R Square	Standard Error of Estimation		
.811	.502	.481	.41021		
Model	Sum of Square	Df	M.S	F	Sig
Regression	41.220	1	22.430	71.331	.000
Residual	20.121	118	.133		
Total	61.341	119			
Model	Unstandardized Coefficient		B	T	Sig
	Beta	SE			
Constant	1.411	0.512		5.132	.000
TP	0.476	0.047	.502	7.122	.000

Predictor. Mobile Application Model. Dependent variable, TP= Teachers Performance

Table (3) provide detail regression information's about Teachers attitude and use of mobile application Model in education sector of Bannu. From table to calculated value at 95% confidence interval is (1.96). Hence it is evident from table that t value for teachers Attitude is (4.043) with beta value (.381) and significance level is (<.005). Hence it conforms that one-unit increase in MAM application create 38 % change in Teachers Attitude (TA).

Table (4) provide detail regression information's about Teachers learning and use of mobile application Model in education sector of Bannu. From table t calculated value at 95% confidence interval is (1.96). Hence it is evident from table that t value for teachers Performance is (4.343) with beta value (.411) and significance level is (<.005). Hence it conforms that one-unit increase in MAM application create 41 % change in Teachers Learning's (TL).

Table (5) provides detail regression information's about Teachers performance and use of mobile application Model in education sector of Bannu. From table t calculated value at 95% confidence interval is (1.96). Hence it is evident from table that t value for teachers Performance is (4.343) with beta value (.502) and significance level is (<.005). Hence it conforms that one-unit increase in MAM application create 52 % change in Teachers Performance (TP).

Conclusion and Recommendations

Conclusion

Based on the findings of the results it is concluded that Mobile Acceptance Model in primary education has fruitful results and it create an opportunity for the newly selected primary education teachers to enhance their capabilities for the better learning of their service as well as to effectively transfer the knowledge to the coming generation. Similar results were evident by (Boy & Motteram, 2013; Liak., 2011). Technology added multiple advantages to the life (Social, Economic and Religious) activities. The newly elected KP government initiate the process to select the candidate for primary education through competitive exams via (NTS) and it is resulting that mostly teachers are well educated are in opposition to adopt the newly technological methods.

Technology is an important tool to revolutionize the overall setup of human life set-up. Advance countries are focusing on adopting the newly technological advanced techniques in primary and secondary as well as higher education setup. Humans of 21st century are facing rapid competition in educational set up not only from technological advanced countries in the form of applying computer and mobile based learning in educational set up. But even now a day's robotics through artificial intelligence are also playing their role in educating communities. Keeping in view the above challenges Pakistan government and particularly KP government initiate the process to provide mobile based learning to the teachers in government primary schools. As the institutional setup and social structure of the Pakistan is far behind the global structure. However, it is producing good results in the form of getting new information through video aid lectures become an advantage to the newly appointed teachers.

Limitations

However, following are the some of the issues that are still hurdle in applying mobile acceptance model to KP primary education set up.

Teachers are facing problems related to

- Lack of awareness among the teachers to convey the message in the same spectrum
- Lack of motivation among the teachers
- There are social and cultural barrier about using smart phones in far flung areas as community perceive it as a tool for recreation only.
- People perceive that mobile is mostly used for searching (unethical activities), face book activities etc.
- However, there are some technical issues also related to the usage of mobile based learning
- Teachers living in remote areas have problem of appropriate and with to access the relevant videos.
- Some of the faculty is not in a position to use the mobile based learning because of their lower level knowledge of smart phones.

Schools located in the remote area teachers also claim that they higher digital distance as compare to schools located in city areas. And these also affect their outcomes in the monthly test held at main center in district Bannu.

Recommendations

Based on the findings of the current study following are the recommendation for future studies.

Government should provide digital equipment to education set up that the videos shared with teachers may also be display to the students.

Government should initiate the online evaluation process to evaluate the performance of the new and old teaching faculty.

Government should enhance the interest of the teachers in mobile learning and for this purpose, competition across different regions may be initiated.

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