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WHY M-LEARNING MIGHT APPEAL TO ORGANISATIONS?

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Abstract

The vast majority of scientific publications connected with mobile learning relates primarily to its use in education. However, as some previous research suggest, it can bring benefits to organisations as well. The aim of this study is to develop a comprehensive model of m-learning determinants in organisation. In the course of the preliminary literature review of selected, recently published papers, we elicited advantages and disadvantages of m-learning utilisation in a business environment. Then we categorised them and identified five categories of benefits (Learning style, Technology, Communication, Knowledge, Organisation) and six categories of barriers (Organisation, Employees, Technology, Security, Content, and External). On the basis of the developed categorisation we elaborated the model of m-learning determinants in organisations. Then we formulated a number of implications for practitioners which allow them to improve performance and productivity and generate savings during m-learning implementation.

Keywords: mobile learning, mobile technologies, literature review, categorisation.

1 INTRODUCTION

The development of various technologies affects the functioning of both individuals and organisations. One of them is mobile technology that rapid growth can be observed in the last decade. Mobile devices which can be defined as a portable, wireless computing device that is small enough to be used while held in the hand (Caudill, 2007) are becoming ubiquitous in today's society. As shown by the studies, in the last decade the number of mobile devices (smartphones, tablets) exceeded the number of personal computers (Canalys, 2012). Today, billions of users have mobile devices that open up new possibilities in many areas providing access to information, processes, and communication at anytime and anywhere (Martin & Ertzberger, 2013).

This rapid development of mobile technology has not only led to changes in society, but also dramatically changed the way business is conducted. It is estimated that in the next few years, access to more than 50% of the company will be realised with the use of mobile devices (Gunnarsson, 2013). With the wireless connection, the employees have the ability to access corporate resources at anytime, anywhere, which leads to increasing their efficiencies from enhanced communication and connectivity.

The increasing number of up-to-date mobile devices with advanced capabilities that are used by individuals has become the driver for the use of that technology within the organisation. For using the capability of the devices and increasing mobility and flexibility, enterprises allow employees to use their own personal devices (specifically smartphones, tablets) in their workplace. The corporate policy of blending personal and business use of technology devices and applications (IT consumerization) and permitting employees to bring personally owned mobile devices (Bring Your Own Device - BYOD) to execute enterprise applications and access business data offers significant advantages, in particular virtually unlimited by time and place accessibility to corporate data, increased employee satisfaction, productivity, innovation, and flexibility, corporate cost savings, usage of up-to-date

devices, technology familiarity and less stress on IT, increases engagement in the workplace and after hours (Eslahi, 2014; Pillay et al. 2013). Thus, leveraging BYOD significantly affects the comfort and increases employee engagement.

Technological development plays a crucial role in the way of acquiring knowledge. In conventional, long-established approach, delivering information and facilitating conversation is provided by direct meetings run by experienced trainers utilising dedicated training materials. The development of Information and Communications Technology (ICT) and in particular the widespread access to the Internet, resulted in changes in the way of education paving the way for electronic education technology. E-learning facilitates educational content delivery via variety of digital and online media (Internet, Intranet, Extranet, CD, Broadcast TV, etc.) enabling learners to self-study by using Learning Management Systems (LMS) which in turn allows them to track the involvement and progress in science (Sangrà et al., 2012). It offers numerous advantages when compared to face-to-face approach. The main benefits a company can gain from implementing a training program based on LMS involve personalised learning/training, convenience and flexibility in quick and easy access to information, cost effectiveness, timely feedback, improved performance and productivity, and improved retention (Al-Qahtani & Higgins, 2013).

A rapid growth of mobile and wireless technology that can be observed in recent years contributed to the development of a new form of distance education in which learning content is delivered directly to the learners' mobile devices. It is called mobile learning (m-learning). M-learning changes the paradigm of learning and enhances e-learning with access to knowledge anytime and anywhere mobile signal is available.

The aim of this study is to develop a comprehensive model of m-learning determinants in organisations that will give a clear picture on how organisations might benefit from this learning method and what issues are vital for the successful learning outcome.

The paper is organised as follows: the next section describes briefly our research method. The subsequent section discusses the mobile learning concept in the context of various methods of perception. Then, based on the literature review of selected, recently published papers, we present our findings on advantages and disadvantages of m-learning utilisation in a business environment and their categorisation that we developed. Next, we present a comprehensive model of m-learning consideration in organisations. In the last section we offer some conclusions and future work guidance.

2 RESEARCH METHOD

In the course of research reviewed the recent papers concerning utilising m-learning in organisations, the main reasons why organisations should pay attention to this learning method were taken into consideration. To make a full picture we extracted also barriers to applying m-learning in organisations. Then we labelled the extracted benefits and barriers and arrived at the benefit and barrier categorisation.

On the basis of the developed categorisation we elaborated a comprehensive model of m-learning determinants in organisations. We compared this model with the general model of mobile learning proposed by Koole (2009) (see section 3).

3 M-LEARNING CONCEPT

There is a variety of definitions which deals with m-learning, a form of distance education, in which mobile technology is used. Differences may result largely from relatively new method of providing knowledge and different perception of "mobility" which can have two implications: (1) mobility of learner and (2) mobility of device (mobile device). With respect to the former meaning, Woodill (2010) defines mobile learning as "a means in keeping people in touch with each other and with information sources, no matter where either is located". According to this approach, immediate knowledge is provided to help individuals in the moment of learning. Similarly, O'Malley et al. (2003) emphasises the importance of learner specifying mobile learning as "any sort of learning that happens when the learner is not at a fixed, predetermined location". By contrast, O'Malley et al. (2003) points

out at the significance of mobile technology in the process of providing knowledge by defining m-learning as “learning that happens when the learner takes advantage of learning opportunities offered by mobile technologies”. Further, El-Hussein & Cronje (2010) highlight the strong implications of portability and mobility for clarification the term of mobile learning. Specifically, they put forward to use the mobile device as a signifier in relation to the mobility and divide the concepts of mobility into three significant areas: mobility of technology, mobility of learner and mobility of learning.

The transition from theoretical considerations to practical use of mobile technology in knowledge acquisition requires the development of conceptual models, which in turn will be useful for deployment of mobile solutions in educational institutions or organizations. For successful implementation and evaluation of mobile learning initiatives, Cornforth (2012) emphasises the importance of six broad theory-based categories of activity: (1) Behaviourist - for promoting learning as a change in learners' observable actions, (2) Constructivist - for supporting learners in actively construct new ideas or concepts based on both their previous and current knowledge, (3) Situated - for promoting learning within an authentic context and culture, (4) Collaborative - for promoting learning through social interaction, (5) Informal and lifelong - for supporting learning outside a dedicated learning environment and formal curriculum, and (6) Learning and teaching support - for assisting in the coordination of learners and resources for learning activities. In her book, Laurillard (2013) advances a conversational framework for the effective use of learning technologies in which, in relation to the categories in question (Behaviourist, Constructivist, Situated, Collaborative and/or Informal), mobile technology plays a pivotal role in providing an environment to enable conversation and enabling learners to build models in order to solve problems.

In his holistic and comprehensive framework FRAME (The Framework for the Rational Analysis of Mobile Education), Koole (2009), in turn, describes mobile learning as a process resulting from the convergence of mobile technologies, human learning capacities, and social interaction. It takes into consideration both the technical characteristics of mobile devices as well as social and personal aspects of learning. By showing (on the Venn diagram) the inter-relationship between the technology, the learner and their social connection, mobile learning, being a central point of the graph, can be defined depending on the context of its use (Figure 1).

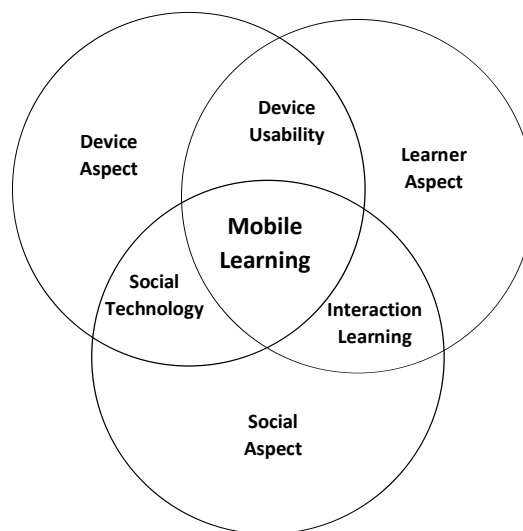


Figure 1. *The Framework for the Rational Analysis of Mobile Education (FRAME).*

Source: Own elaboration on the basis of (Koole, 2009, p.27).

The ideal model reflects the relationships between all aspects that affect equally to m-learning. The assessment of their actual extent of use allows us to utilise the model to improve the usage efficiency of mobile learning in practice.

During mobile learning implementation (mobile application deployment), numerous limitations need to be also taken into consideration. Prasad et al. (2012) emphasises high cost of devices and network, low network transmission rate, and limited educational resources. To solve these limitations, he puts

forward to utilise cloud computing providing learners with much richer services in terms of data (information) size, faster processing speed, and longer battery life.

4 M-LEARNING CONSIDERATION IN A BUSINESS ENVIRONMENT

4.1 Business drivers for mobile learning

Companies will not apply m-learning just for the simple reason that such trend started to emerged as a learning paradigm. They need to see clear business reasons for doing this. The main business drivers of mobile learning can be summarized as follows (Woodill, Udell, 2014):

- the need for speedier and more frequent training that is driven by quick technology changes,
- reduced time for trainings in organisations,
- compliance with the main organisation's goals of increasing performance and delivering information that is really needed,
- ready infrastructure for mobile learning,
- workers mobility (on the move) that make it difficult to organise traditional trainings,
- mobile devices facilities providing solutions for reaching all workers in the area of globalisation.

It should be noted that the mobile technologies unlocked new paths of learning that might be greatly beneficial for companies (Pimmer and Pachler, 2014):

- creation and sharing of content –recording of performed tasks that might be useful for other workers and sharing records with other employees (peer-to-peer learning on the basis of real/practical cases); besides, this type of activity enhances self-recognition and self-acceptance and helps to built worker's social identity,
- learning at work (just in-time learning) – the possibility of a quick access to the web or intranet resources when they are actually needed, this can led to increased self-confidence of workers,
- social learning – the possibility of immediate access to the knowledge/experience of more experienced colleagues that could help in solving problems,
- formal and informal learning integration – the possibility of delivering practical tasks to be perform at workplace (that follow the previous theoretical course) in a form of text messages or the possibility of providing quick feedback – straight from the workplace to the instructors; the possibility of documenting work experience and discussing it in a classroom.

However, in order to m-learning to be applied in enterprises the following conditions need to be fulfilled (Kok, 2013):

- acceptance by learners that might be quite easy achieve in case of younger employees, however in might be more difficult to achieve in case of older employees,
- good learning results – at least the same as with the usage of traditional methods of learning, e.g. seminars,
- acceptable costs that in total should be no higher than in case of traditional learning.

The next sections summarised benefits and barriers for m-learning in enterprises.

4.2 Advantages of mobile learning

In his empirical research, Kok (2013) categorised the chances for m-learning in enterprises into the three main groups: (1) usability and aims – the usage of company's online resources, attracting younger employees and money saving, (2) organisation – improvement in course training organisation by the quick delivery of up-to date course materials and information straight to the hands of employees, the possibility of being continuously in touch with employees, the possibility of learners' preparations for seminars or replacing seminars, and the possibility of learning home, and (3) learning – the emphasis of m-learning as especially useful for learning about company's products, learning languages and the delivery of individual learning content, the possibility of giving instant feedback by learners.

Category*	Drivers or Advantages \ Research	(Kok, 2013)	(Parsons, 2014)	(TM, 2014)	(Woodill, Udell, 2014)	(Feser, 2014b)	(Yueh et al, 2016)
Learning style	location independence	✓				✓	
	time independence	✓					
	flexibility / adaptability	✓				✓	
	delivering learning materials when they are actually needed (time)				✓**		
	access support at the point of need (place)			✓			
	contextual learning / the possibility of learning in a specific context		✓			✓	
	learning convenience					✓	
Technology	the possibility of using augmented reality tools (e.g. Google Goggles, Wikidute, Layar) and virtual information to learn about real-life objects and locations		✓				
	ready for instant usage a learning toolkit: the possibility of using advanced technical functionalities of mobile devices for learning, e.g. camera, sound recorder as well as applications that can convert the mobile into useful toolkit, e.g. measuring distance toolkit, a compass, a speedometer		✓				
	ready to use global infrastructure				✓	✓	
	the possibility of the usage by learners their own mobile devices			✓			
Communication	communication improvement between learners and tutors			✓			
	communication improvement between employees			✓			
Knowledge	quick information obtaining	✓				✓	
	the possibility of learning only relevant content	✓			✓**	✓	
	the possibility of personalisation of learning process connected with the ownership of a learning toolkit	✓	✓		✓**		
	quick information and knowledge sharing: the possibility of making rapid contribution to the shared learning resources and benefit from collaborative learning	✓	✓				
	the possibility of quick new data capture					✓	
Organisation	the possibility of the usage of idle time for learning	✓					
	positive influence on the perception by employees of improvement of work performance						✓
	performance and productivity improvements					✓	
	reusable materials					✓	

	reduced time for trainings				✓		
	improved access to support			✓			
	attracting younger employees	✓		✓			
	increased employee engagement			✓			
	lower costs of learning	✓				✓	
	paper saving	✓					
	reduce cost of IT support			✓			

*- categories developed by the authors.

** - “just in time, just enough, and just for me” (Woodill and Udell, 2014, p.9)

Table 1. The advantages of m-learning in a business environment mentioned in the previous literature.

On the basis of the literature review we, in turn, propose the following categorisation of the main advantages of m-learning in organisations (see Table 1):

- Learning style – advantages concerning time and location independence and instant access to the learning materials when they are actually needed and at a real-life place where they are needed,
- Technology – benefits connected with ready global infrastructure and possibilities of using up-to date tools for learning, e.g. augmented reality and advanced mobile applications that can convert a mobile into a variety of tools,
- Communication – gains from improved communications between employees and tutors, and among employees,
- Knowledge – the whole range of benefits concerning relevant knowledge acquisition, ease of new knowledge generation, and sharing,
- Organisation – the benefits from the point of an enterprise organisation connected with training organisation enhancement, a company’s performance improvement, and increased employees’ engagement resulted from using tools that they use in everyday life, and lower costs of trainings.

The categorisation presented in the first column in Table 1 was developed on the basis of the list of m-learning advantages presented in the second column that was extracted from the previous works listed in the last six columns of the table.

4.3 Barriers to Mobile Learning

The summary of barriers mentioned in the previous literature is presented in Table 2. The barriers have been grouped according to the following issues:

- Organisation – barriers that appear at the level of enterprise organisation connected mainly with high cost of the development and maintenance of m-learning materials and infrastructure, lack of support from top management, and organisation culture,
- Employees – barriers related to employees negative attitude or lack of sufficient skills,
- Technology – barriers connected with insufficient ICT infrastructure and problems with introducing m-learning when employees are not provided with company’ mobiles,
- Security – the issues connected with user and data safety,
- Content – the barriers connected with lack of ready to use m-learning materials,
- External – legal issues and lack of well established leaders in m-learning.

Category*	Barriers or disadvantages \ Research	(ASTD, 2012)	(Kok, 2013)	(TM, 2014)	(Feser, 2014a)
Organisation	budget constraints (cost of m-learning materials development and devices, cost of adjustment of existing learning programs to new technology or integration of new technology with legacy systems, cost of set-up and maintenance)	✓	✓	✓	
	difficulty in integration with legacy learning systems	✓			
	lack of support/understanding from leadership	✓			
	resistance from IT to implement	✓			
	general fear of losing control of the “corporate infrastructure”			✓	
	organisation culture and restrictions on the use of mobile devices in the workplace			✓	
	lack of internal skills to m-learning content development	✓			
Employees	lack of acceptance by some of employees		✓		
	lack of interest from learners in using these technologies	✓			
	problem for employees with low technology skills		✓		
	the possibility of learners distractions by using handy devices		✓		
	self-discipline requirement		✓		
	employee requirement to learn in his/her free time		✓		
	lack of social contact		✓		
Technology	lack of or unreliable ICT infrastructure supporting m-learning	✓		✓	
	difficulty with technical support			✓	
	wide variation in learners own personal technologies (it might be mitigated by providing employees with mobile devices)			✓	
	wide variety of formats that look differently on mobile devices				✓
Security	ICT security issues (loss of data, ...)	✓		✓	
	issues of user safety, identity or trust			✓	
Content	shortage of (ready to use) materials designed especially for m-learning		✓		
	the necessity of elaboration of new learning concepts		✓		
External	legal or policy concerns	✓			
	lack of trusted brands	✓			

*- categories developed by the authors.

Table 2. The barriers to m-learning in a business environment mentioned in the previous research.

Similarly to Table 1, the barrier categories in Table 2 were developed on the basis of the list of barriers and disadvantages mentioned in the works listed in the last four columns.

5 DISCUSSION

In the course of current research we identified five categories of benefits and six categories of barriers for m-learning in enterprises. Advantages of m-learning are mainly connected with new learning style and the possibility of the usage of up-to date technologies that might bring the whole range of benefits concerning enhancement knowledge acquisition, generation and sharing, and allows for better communication between all participants of learning process. As a result, an organisation may experience performance and productivity improvements and savings.

It should be noted that the categories Organisation and Technology are also present in barriers' categorisation. However, different issues are raised in connection to barriers. At an organisation level

the most important barrier, mentioned by three out of four cited works, was concerning with a budget allocation for m-learning content development and integration of m-learning with legacy learning systems. From the point of technology issues the lack of standard technology solution for mobile devices and adequate ICT infrastructure was raised. The barrier categorisation contains also the Employees category that is to some extent connected with Organisation, however it focused on issues directly connected with workers' attitude and a lack of skills. The difference in perceptions of Technology (once as benefit once as a barrier) might be connected with workers age: for younger employees the usage of mobile devices for learning might be a part of their everyday life – they are used to mobile devices whereas the older employees might be distracted and put off by the use of mobile devices for learning. This issue calls for further investigation.

The barrier categorisation contains also Security category that would probably emerged during the analysis of any activity connected with the usage of mobile devices. Next, Content category points that m-learning calls for the development of new learning concepts and materials; they can not be simply prepared by adjusting traditional learning or e-learning materials to smaller screens. The summary of m-learning determinants in the context of organisation is presented in Figure 2.

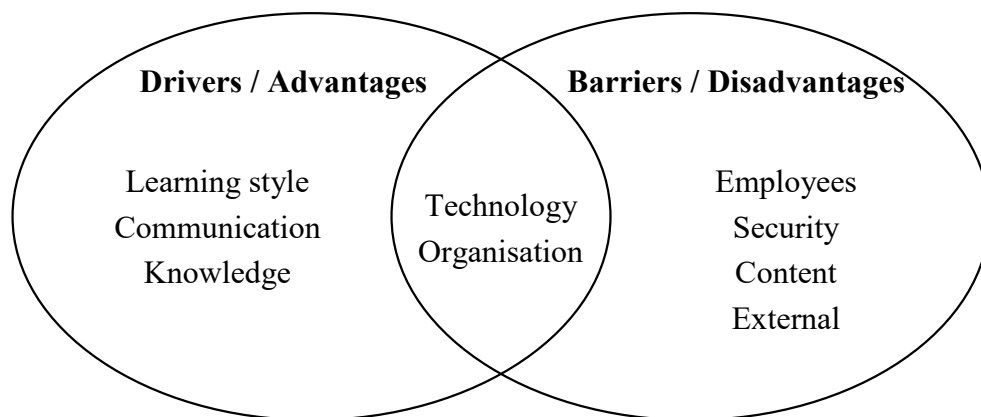


Figure 2 The determinants of m-learning in the context of an organisation.

To some extent the model presented in Figure 2 is similar to the general model of m-learning FRAME presented in Figure 1. Both models raise the aspects of devices/technology, learners that in the organisational context are represented by employees, and learning style. Further social aspect of learning that appears in FRAME might be represented by Organisation that facilitates an environment for learning. Uniquely, our model emphasises benefits related to knowledge acquisition, generation and sharing, and the possibility of enhanced communication.

On the basis on current research the following implications for practitioners might be drawn:

- m-learning strategy need to be carefully elaborated with the special attention to the comprehensive budget calculation that takes into account not only the cost of infrastructure but also the cost of new m-learning materials development that will meet the needs of employees,
- special attention should be paid to actual personalisation of learning methods; it might be the case that for some workers traditional methods might be more appealing and might bring better learning results,
- issues related to the use of appropriate technologies, and in particular the development, adoption and use of materials that allow their correct presentation on mobile devices should be taken into special consideration.

6 CONCLUSION AND FUTURE WORK

In the paper the concept of m-learning was thoroughly analysed with the special attention to its applications in enterprises. On the basis of literature review of the recent related publication, we categorised the benefits and barriers for m-learning in enterprises. In doing so, we developed five

benefit categories: Learning style, Technology, Communication, Knowledge, Organisation, and six barrier categories: Organisation, Employees, Technology, Security, Content, and External. The benefit and barrier categories were combined into the general model of m-learning determinants in organisations and compared with the general model of m-learning FRAME developed by (Koole, 2009). Our model uniquely acknowledges issues connected with knowledge acquisition, generation, and sharing. It might help the practitioners to understand the key factors influencing m-learning in organisations and hopefully encourage them to apply this learning method in their organisations.

The main limitation of this study is a narrowing our literature review to a recent publications concerning applications of m-learning in organizations. In future research we would like to conduct a comprehensive and systematic literature review concerning this subject and design an empirical research to verify the theory with practice. Investigation of the issue of m-learning in enterprises within the context of employees' age might be also an interesting path for future research.

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