

M-Learning Preferences and Learning Preferences

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Abstract - The revolution in mobile devices and wireless networks have transferred E-learning to mobile learning (M-Learning). Delivering learning materials (podcasting) to mobile learners is a challenging task due to the variability of mobile learner contexts. This paper presents a novel method of considering mobile learners' preferences of podcast types in different contexts, utilizing learning preferences. The survey has been collected from 345 students from Australia and Saudi Arabia. Unlike previous studies, this paper deals with all podcast types. Two dimensions have been included in context namely: physical space and social space. This has been followed by determining learning preferences to determine how to personalize mobile learners' podcast usage preferences.

Keywords - Learning preference; m-learning context; m-learning preference; m-learning podcast; personalize m-learning.

I. INTRODUCTION

The rapid development of wireless networks and mobile devices have facilitated on-line access from everywhere and anywhere. Mobile devices like Smart Phones and tablets have changed the people way use connectivity. According to the International Telecommunication Union (ITU) the number of mobile subscribers is around 7 billion and mobile broadband subscribers is around 2.1 billion for 2013 [1]. This revolution has transferred E-Learning to M-Learning.

M-Learning is "e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone." [2]. M-learning has been classified as a new era of digital learning [3]. However, M-Learning can not be directly compared with traditional E-learning as M-Learning is extremely dynamic and should to target a user's current context and his/her learning requirements [4]. This feature empowers M-learning to overcome the limitations of learning spaces and time. Thus, learning materials (e.g. reading, podcasts) could be delivered anytime and anywhere for mobile learners.

Common learning materials which could be delivered to M-learning are text (e.g. E-books, PDF), audio, and video (podcasting). Podcasting supports the communication between

students and lecturers. The current tendency is [5] to define podcasts as "Podcasts are audio, video, text, and other media files that can be played on the computer or downloaded to MP3 player". So [6] characterizes podcast services in terms of usage, publishing and dissemination and conclude podcasts could be video, audio, and mime types which in most cases refer to text such word and pdf.

So far there is only one study which explicitly classified podcast's intervals [7]. The study has used podcast in blended learning at Minho University: they classified podcasts' intervals into short, moderate, and long. The short length is (1-5) minutes, moderate length (6-15) minutes, and long length (>15) minutes. A study has been done emphasize the advantages of having short podcasts [8]. Sutton-Brady et al consider that short formats of podcasting is a promising and successful model. They clarify that a short format of podcasting has a number of advantages such as less time to consume and to download as well. However, [7, 8] have highlighted that designing podcasts are time consuming.

Previous studies showed conflicts on students' preferences among podcasts types, notes, and traditional studies. A number of studies compared different types of podcasts, notes, and traditional studies [9-14]. These studies could be classified into three types which are: comparison studies among podcast types; comparison studies between podcast in general with notes; and comparison studies between traditional study and podcasting. A study where they have disseminated podcast lectures which have three different types (video, audio synced with PowerPoint slides, and audio) found students preferred unadulterated audio among the other type of podcasts [10]. [15] also have stated that although video has potential benefits for learners, audio is more common compared with video. Moreover, audio and video podcasts have been disseminated into four different classes [11] show that the number of downloaded audio podcasts is much higher compared with video podcasts. Copley [11] emphasize that in many

educational contexts, audio synced with PowerPoint slides is more important than a video podcast (e.g. recording a whole lecture). [12] have collected data from surveying students and have a positive vision on podcasting, however, a significant preference for notes compared with podcasts. On the other hand, [14] collected the students' ranking of podcasts compared to (note and textbook): the students' ranking shows that audio podcasts is more efficient, effective, and to which they were receptive compared with (notes and textbook). Based on the reviewed literature, we could not find a comparison study which investigates mobile learners for all podcast types (text, audio, video, and text synced with audio). This is important as inclusion of all possible type in a study would result in an unbiased investigation. Thus, our study will find, we believe, that the preference towards podcast types (text, audio, text synced with audio, and video) is based on context.

Most studies consider limited or one environment (e.g. field around a school [9], museum [16]) and this is understandable because of the study nature. However, our study stress that the main value of M-Learning is mobility [17, 18]. Therefore, our study considers two main concepts which are mobility in physical space and mobility in social space.

Mobility in physical space and social space are one of the fundamentals results of unpacking mobile from mobile learning [19]. Mobility in physical space means that a mobile learner is moving from one place to another and crams learning in the gaps of daily life, while mobility in social space means a mobile learner encounters social events such as being with family members and/or friends. Furthermore, Mobility in physical and social space are overlapping, for example, a mobile learner can be in a busy environment such as a café with a friend. However, to the best of the authors' knowledge, no studies have consider the effect of mobility in physical and social space on mobile learner preferences.

Mobility in social space has a different set of attributes values (CompanionType) based on the study purpose. For example, [20] have included (alone, friend, girlfriend/boyfriend, family, coworkers, and others) as attribute values of companion to assist the recommendation process for watching a movie as an example. Another example, [21] have set companion attribute values as (family member, colleague, boss, and unknown) as social relations between caller and receiver to assist telephony on context aware systems. In this study companion type will be classified as (alone, family, friend, and classmate). On the other hand, the attribute values of mobility in physical space (EnvironmentType) are quiet, busy, and moving environments. As mentioned above, these environments (quiet, busy, and moving) are overlapping with the notion of mobility in social space. Therefore, this paper investigates the effect of companion type and environment type on mobile learner preferences in two different cultures (Australian and Saudi).

Moreover, this paper investigates the degree to which we could personalize mobile learner preference utilizing VARK, which stands for Visual, Aural, Read/Write, and Kinesthetic. VARK is a reliable and validated questionnaire for learning preferences which was developed by Fleming and Mills [22].

The result of VARK surveys categorize students as Visual, Aural, Read/Write, Kinesthetic, and multimodal learners which can be subdivided into 23 possible combinations [23]. More details of the main VARK categorization are clarified in Table I.

VARK preferences have been included in smartphone studies. For example, a Dunn and Dunn learning style model has been proposed by [24, 25] as a proper model for M-Learning. Also, a mobile learning model has been designed for different learning preferences which is built on the Myers-Briggs category indicator. Another study has been done by [26], and investigates preferences and opinions of business schools students to design an application for mobile marketing education.

The aim of our work in this paper is to find out if a relationship exists between mobile learners' preferences in different contexts and learning preferences utilizing VARK.

TABLE I. VARK LEARNING PREFERENCES, SOURCE: ADAPTED FROM [23].

Learning Preference	Description
Visual	This preference includes the depiction of information in maps, spider diagrams, charts, graphs, flow charts, labelled diagrams, and all the symbolic arrows, circles, hierarchies and other devices that people use to represent what could have been presented in words.
Aural	This perceptual mode describes a preference for information that is "heard or spoken."
Read/Write	This preference is for information displayed as words
Kinesthetic	This modality refers to the "perceptual preference related to the use of experience and practice (simulated or real)."

TABLE II. THE RESULTS OF ENVIRONMENT AND COMPANION OVERLAPPING, WHERE MOBILE LEARNERS HAVE BEEN ASKED FOR EACH COMBINATION CONTEXT ON THEIR PREFERENCE OF PODCAST TYPES.

Context	Companion Attributes			
	Alone	Family	Friend	Classmate
Quiet	Quiet and alone	N/A	N/A	N/A
Busy (e.g. Café)	Being alone in busy context	Being with family in busy context	Being with friend in busy context	Being with classmate in busy context
Moving case 1 (e.g. Walking)	Being alone in walking context	Being with family in walking context	Being with friend in walking context	Being with classmate in walking context
Moving case 2(e.g. Vehicle)	N/A	Being with family on car context	Being with friend on car context	Being with classmate on car context

II. METHOD

A Subjects

The subjects for this part of the research are university students from Australia and Saudi Arabia. A total of 345 participants (126 Australian, and 219 Saudis).

B M-Learning preferences questionnaire

The students' preferences questionnaire has Arabic and English versions as data will be collected from Australian students and Saudi students. The translated Arabic version have been done by the first author, then it has been edited and validated with linguistic specialist. The questionnaire evaluates the students' preferences of using mobile devices for formal education. Preferences of podcast type (text, audio, video, and PPT synced with audio) and podcast length (1-5, 6-15, >15 minutes) have been structured based on environments (busy context, quiet context, and moving context), and companion (alone, friend, classmate, family member). Please refer to table II.

C VARK questionnaire

VARK consist of 16 questions, each question has four options where participants are allowed to leave it blank, and choose one or more options. In order to have a valid entry, 12 out of 16 questions have to be completed. The maximum score is 16 for each set (visual, aural, read/write, and kinesthetic). Permission to use version 7.8 was granted by VARK Learn Limited, Christchurch, New Zealand.

D Statistical analysis

SPSS version 23 has been used to analyze data. A Spearman's rank-order correlation was run to assess the relationship between preference length of podcast type and the score on visual, aural, read/write, and kinesthetic (VARK) preferences.

III. RESULTS

A Spearman's correlation has been conducted to determine the correlation between m-learning preferences in different contexts and VARK preferences for two different cultures. Please refer to table III for Australian students, and table IV for Saudi students.

TABLE III. CORRELATION IN DIFFERENT CONTEXTS FOR M-LEARNING PREFERENCES AND VARK FOR AUSTRALIAN CONTEXT.

Context/VARK	VARK Subclasses			
	Visual	Aural	Rd/W	Kinesthetic
Quiet & Alone	Video+			
Busy & Alone		Audio+ PPT+	Text+	
Busy with family				
Busy & Friend			Audio-	
Busy with Classmate		Audio++ PPT+ Video+		
Walking alone				
Walking with family				
Walking & Friend			PPT- Video-	Text-
Walking & Classmate				Text-

Vehicle with family				
Vehicle with friend				
Vehicle with classmate				

TABLE IV. CORRELATION IN DIFFERENT CONTEXTS FOR M-LEARNING PREFERENCES AND VARK FOR SAUDI CONTEXT

Context/VARK	VARK Subclasses			
	Visual	Aural	Rd/W	Kinesthetic
Quiet & Alone	Video++		Text+	Video++
Busy & Alone	Text-	Text+		Audio-
Busy with family				
Busy & Friend				
Busy with Classmate				
Walking alone		Video+		
Walking with family			Video-	
Walking & Friend				
Walking & Classmate				
Vehicle with family				Video++
Vehicle with friend				
Vehicle with classmate				

IV. DISCUSSION

Our expectation is that Visual learners will prefer videos, Aural will like audio and PPT, Read/Write will like text, and Kinesthetic will like videos (but less than Visual learners). We also expect that Visual and Aural learners will not like text, Read/Write will not like audio and videos, and Kinesthetic will not like audio.

Most of the results for "Quiet and alone" and "Busy and alone" meet our expectations, except for Saudi Aural learners who liked text. This is possibly due to the busyness natural in Saudi Arabia compared to Australia where (e.g. cafes) are so busy so mobile learner turn to have learning materials with no auditory such as text-based learning material.

For "quiet and alone", both Australian and Saudis with visual preference prefer to have video as learning material. While Saudi with Read/Write preference prefer text-based learning material and kinesthetic learners prefer video, Australian with Read/Write and Kinesthetic show neutral preference towards podcast types.

For "busy and alone" Australian with aural preference liked audio and PPT learning materials, however, Saudis as mentioned earlier liked text-based learning material. Moreover, Australian with read/write preference preferred text, while Saudis with read/write preference have neutral correlation towards text. Kinesthetic Saudi learners as expected don't like to have audio as learning material, while Australian show neutral correlation towards audio.

Each Australian and Saudis cultures will be discussed in details in the next sections.

A The Australian context

Students with a strong visual preference are more likely to use video learning materials while they are in a quiet context. On the other hand, mobile learners with aural preference are likely to use audio materials and PowerPoint synced with audio materials while they are alone in a busy context. They also

show a preference for using audio, PowerPoint plus audio, and video, which is understandable as being with classmates may require richer podcast types, such as PowerPoint plus audio and video, as such a context create a rich study environment of (e.g. sharing iPad or smartphone screen) and dialogs. Students with a read/write preference are more likely to use text-based learning materials than other VARK cohorts while they are alone in a busy context, such as a café. On the other hand, they show a negative correlation for using audio, video, and PowerPoint synced with audio while with a friend or friends in a busy and walking context. In contrast, students with a kinaesthetic preference show only a negative correlation with podcast types in two contexts: walking with a friend and walking with a classmate. In these contexts, those with a kinesthetic preference find text podcasts to be undesirable. Although these contexts would be unwanted for studying purposes, they show that the kinesthetic group is more unwelcoming of text-based podcasts than other VARK groups.

TABLE V. DEFINING CONTEXTS CORRELATED WITH VARK IN AUSTRALIAN CONTEXT.

Context/VARK	VARK Subclasses			
	Visual	Aural	Read/Write	Kinesthetic
Quiet & Alone	Positive correlation with video			
Busy & Alone		Positive correlation with audio and PPT	Positive correlation with text	
Busy & Friend			Negative correlation with audio	
Busy & Classmate		Positive correlation with Audio, PPT, and Video	Natural	
Walking & Friend			Negative correlation with PPT and Video	Negative correlation with text
Walking & Classmate				Negative correlation with text

B The Saudi Arabian context

The Saudi Arabian context also shows that students with visual preferences tend to use video materials for learning in quiet contexts and show a negative correlation of using text-based materials while they are alone in busy contexts. Aurally-inclined students, on the other hand, prefer to use text-based learning materials in the same context, and prefer video-based learning materials while walking alone. Students with a read/write preference prefer to use text-based materials while they are in quiet contexts, and they find it undesirable to use video-based materials while walking with family. Likewise students with a visual, and kinaesthetic preference prefer the

use of video while they are in quiet contexts and while in a vehicle with family. Audio podcasts are not preferable to be delivered to students with kinaesthetic preference while they are alone in busy contexts, as shown in Table VI.

C Are there any commonalities or differences between the two cultures?

Mobile learners in both cultures with visual and read/write learning preference show some similarities while being alone. In more details, both Australian and Saudis mobile learners with visual preference prefer video as learning material while being alone in quiet context. In addition, mobile learners with read/write preference prioritize text-based learning material while being alone in quiet and busy context. As soon as they (visual and read/write learning preference) engage with community, different preferences arise due to cultural differences. Although cultural differences effect on m-learning preference and learning preference (VARK), there is no contradiction for all VARK subclasses between the cultures (e.g. having Aural Australians with positive correlation with video in busy a specific context while Saudis have negative correlation with video in the same context). Moreover, there is no contradiction with each VARK subclass (e.g. students with aural preference have negative correlation with audio as learning material). Accordingly, the relation between VARK subclasses and m-learning preference are affected by cultural differences especially when mobile learner engaged with community, in other word, being in company with family, a friend, or classmate.

TABLE VI. DEFINING CONTEXTS CORRELATED WITH VARK IN SAUDI CONTEXT.

Context/VARK	VARK subclasses			
	Visual	Aural	Read/Write	Kinesthetic
Quiet & Alone	Positive correlation with video		Positive correlation with text	Positive correlation with video
Busy & Alone	Negative correlation with text	Positive correlation with text		Negative correlation with audio
Walking & Alone		Positive correlation with video		
Walking & Family			Negative correlation with video	
Vehicle & Family				Positive correlation with video

V. CONCLUSION

This research has investigated m-learning preferences in different contexts and cultures and personalize m-learning

preferences utilizing VARK. The study has shown that an association between learning preference and m-learning preference exists, especially for students with aural and read/write preferences. Consequently, the prediction to deliver a proper learning type for mobile learners with aural and read/write preference while they are alone in quiet and busy context possible. However, a number of limitations need to be considered. For instance, VARK preferences are not strongly related to the designed survey. In more details, asking mobile learner to select audio, text, or video does not match students with kinesthetic preference as such a learner preference require more details in the podcast content; please refer to Table I for kinesthetic definition. More research is needed to better understand m-learning preferences by expanding the designed context, utilizing different learning style, and conducting lab or field studies. For example, investigating the different requirements of kinesthetic learners for detailed podcast content, where podcast content containing practical examples, may be found to be better for kinesthetic learners. We postulate that learning-materials-with-practical-examples such as audio or video may be better than mere video. Thus our future work will include descriptions of the content of the m-learning resources as well as the nature of their delivery.

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