

***THE IMPACT OF LEARNERS'  
CHARACTERISTICS ON M-LEARNING  
PREFERENCES, AND HOW M-LEARNING  
PREFERENCES FORM CHOICES IN  
DIFFERENT CONTEXTS***

A thesis submitted for the degree of  
Doctor of Philosophy  
of the  
Australian National University



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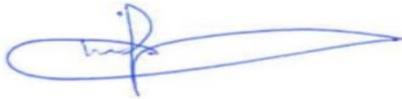
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I declare that, to the best of my knowledge, this thesis is my own original work and does not contain any material previously published or written by another person except where otherwise indicated.

Mazen Ibrahim Al Ismail

Date 30/05/2018

A handwritten signature in blue ink, consisting of a large, stylized loop followed by a horizontal line that tapers to a point on the right.



*To my mother, father, wife, brothers, sisters, and sons*

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# ABSTRACT

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Students adopt different strategies, show a range of preferences, and make individual choices as they learn to learn effectively and efficiently. Facilitating students to customise their own preferred techniques will maximise students' learning. Mobile devices allow learning to occur anywhere and at any time. However, the nature of mobile devices, such as the need to access a digital format on devices with small screens, influence students' e-learning preferences. There is now a growing research effort which aims to understand learners' mobile learning preferences to deliver digital learning materials that best satisfy learners' needs.

This thesis explores mobile learning (m-learning) preferences and choices in tertiary education to understand the best approaches to deliver digital learning materials (podcasts) in different physical (e.g. quiet, busy, or walking) and social spaces (e.g. alone, family, or with classmates). This study uses two quantitative methods to understand mobile learners' preferences and choices. First, 345 students completed a survey study concerning the role of mobile learners' characteristics on podcast preferences in different physical and social spaces. Characteristics which are included in this study are gender, age, nationality (Australian and Saudi), materials status, prior experience of podcasting, learning style, and personality traits. Second, 95 students participated in three experimental studies to examine whether mobile learners'

preferences for podcasts reflect their real choices in two different physical spaces which are quiet (e.g. home or library) and busy (e.g. cafe).

Overall, the results show that differences in characteristics affect m-learning preferences in some contexts (the result of overlapping physical and social spaces). On the other hand, preferences were reliable in predicting students' choices only in limited physical spaces. The reason behind these findings are discussed in this thesis. The approaches proposed in the provide ways to understand mobile learners' preferences and choices, taking in to account a novel method which is a person's spatial and social contexts.

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# PUBLICATIONS ARISING DURING MY PHD

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## Refereed conference and journal papers

- Al-Ismail, M., T. Gedeon, and M. Yamin, Effects of personality traits and preferences on M-learning. *International Journal of Information Technology*, 2017. 9(1): p. 77-86.
- Al-Ismail, Mazen, Gedeon Tom, Sankaranarayana Ramesh, and Yamin Mohammad. "M-Learning Preferences and Learning Preferences" *Proceedings of the 10th INDIACom; INDIACom-2016; IEEE Conference ID: 37465 2016 3rd International Conference on "Computing for Sustainable Global Development"*, 16th- 18th March, 2016 Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA).
- Al-Ismail, Mazen, Gedeon Tom, Sankaranarayana Ramesh, and Yamin Mohammad. " Big 5 Personality Traits Affect MLearning Preferences in Different Contexts and Cultures" *Proceedings of the 10th INDIACom; INDIACom-2016; IEEE Conference ID: 37465 2016 3rd International Conference on "Computing for Sustainable Global Development"*, 16th- 18th March, 2016 Bharati Vidyapeeth's Institute of Computer Applications and Management (BVICAM), New Delhi (INDIA).
- Al-Ismail, Mazen, and A. S. M. Sajeev. "Usability Challenges in Mobile Web Access: A Systematic Literature Review." *COMNETSAT 2014, IEEE*. (Jakarta).
- Al-Ismail, Mazen, and A. S. M. Sajeev. "Usability Challenges in Smartphone Web Access: A Systematic Literature Review." *Service Science and Knowledge Innovation*. Springer Berlin Heidelberg, 2014. 459-470.(Shanghai).





# Chapter 1 INTRODUCTION

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## 1.1 Background to the study

Learning is a crucial process for individuals and communities and is a lifelong experience, which can develop confidence, self-esteem, and lead to a better quality of life. Lifelong learning is not simply about economic success, but also personal development. Henry Ford, the founder of the Ford Motor Company, famously noted that ‘Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young’ ( <http://www.henry-ford.net/english/quotes.html>, accessed 17 April 2018).

Over the last few decades, learning is increasingly facilitated by learning technologies (e.g. tablets, laptops, and smartphones). The adoption of technology in education has many advantages, such as unlocking educational boundaries, increasing access to educational resources, stimulating students to learn, tracking students’ progress, enhancing individual learning, as well as increasing collaboration between students and teachers. Therefore, especially in industrialised nations, almost every student and teacher utilises educational technologies, which often means that learning can occur outside of the classroom and at times of the students’ choosing.

Mobile learning (m-learning) can complement traditional face to face learning, as m-learning uses mobile devices and wireless technology to extend learning beyond traditional classrooms. By using mobile devices, learning can be undertaken anywhere,

and at any time a mobile learner is willing to study. A mobile device is any wireless portable device capable of receiving learning content, and includes mobile phones, smartphones, tablets, PDAs, portable media players, and MP3 players. Thus, m-learning concentrates on sharing information among learners through interactive systems. All students or mobile learners can interact with each other to share knowledge and experiences, without the usual constraints of time or place. The number of mobile devices has increased dramatically compared to stationary devices (e.g. desktop computers). According to the ITU, mobile broadband subscriptions are four times more numerous than fixed broadband subscriptions (International Telecommunication Union, 2017). The reason for this is that portable devices are now more affordable, the capabilities of smartphones and other portable devices have been substantially enhanced, and networking infrastructures have been expanded.

However, the use of mobile devices in education is seen by some to be problematic, as the growth in these devices has led to sometimes contentious changes in education, such as presenting learning materials on small screen devices, and lack of face to face teaching. Consequently, there is a growing need to explore mobile learners' preferences, choices, and the effectiveness of educational m-learning tools to develop learning approaches that effectively complement traditional modes of instruction.

This thesis investigates how the personal and social characteristics of tertiary students influence m-learning preferences in different contexts. As well the thesis will investigate whether students' m-learning preferences are reflected in their actual choices. This chapter also established the rationale behind the study and the research focus. It begins by discussing the technological issues which influence learners' m-learning behaviours, and then identifies the gaps in m-learning preference research. The

study's objectives and research questions are also discussed. The chapter ends by highlighting the importance of this study and how the thesis has been organised.

## 1.2 Research problem

M-learning enables learning activities to be pursued anywhere and at any time. M-learning can receive and deliver diverse learning media (mainly text, audio, or video) that vary in length (short moderate, and long). These opportunities pose some challenges when used in traditional courses, such as (but not limited to) the limitation of location and time, the cost, the number of students, and the learner occasionally not fully concentrating as the teacher is not present. Thus, and along with traditional courses, curricula and feedback are digitally delivered to mobile devices as these devices are affordable, portable, personal, and ubiquitous.

Although m-learning allows portability, can be personalised, and is ubiquitous, these attributes give rise to two interrelated challenges, which are technological and behavioural. Mobile devices are small and easy to carry. Thus, mobile learners can encounter many unexpected social and environmental situations that influence his/her learning. The presentation of learning materials is limited by small screen sizes, which affect learning preferences and effectiveness. Unlike PCs, mobile devices have limitations of connectivity, battery capacity, and data storage, and these technical issues can have negative effects on the level of engagement, preferences, and effectiveness of learning. These issues have to be carefully addressed, as m-learning is utilised in different contexts, by learners' with different characteristics, and mostly occur away from the classroom.

Thus, understanding m-learning preferences is a challenging task. First, m-learning is mostly utilised in informal settings as learner interact with m-learning out of class, which means that these learning activities cannot be easily monitored by teachers. These m-learning activities also occur in different contexts, such as but not limited to social spaces (e.g. being alone or surrounded by family members) and physical spaces (e.g. at home, café, or while walking). These social and physical spaces can affect m-learning preferences, such as the type of media or level of engagement. Furthermore, in each context, learners' personal and social characteristics will play an important role in m-learning (Karimi, 2016). Research is required not only to determine m-learning preferences but also to understand the reasons behind these preferences.

### 1.3 Research gap in m-learning preferences

M-learning has received increased attention from both educators and researchers. Although researchers contribute to m-learning design, and evaluate its effectiveness and efficiency, there are few studies on mobile learners' preferences (Cassidy et al., 2014; Copley, 2007; Kobayashi, 2017; Matava, Rosen, Siu, & Bould, 2013; Parson, Reddy, Wood, & Senior, 2009; Phillips, Grosch, & Laosinchai, 2014; Rodgers, Mabley, & Garforth, 2017). The few studies that have been conducted however ignore one of the essential factors affecting mobile learners' preferences, which is how mobility influences mobile use in different contexts. It is vital to research m-learning in different contexts, such as social and physical spaces (Kukulaska-Hulme, Sharples, Milrad, Arnedillo-Sanchez, & Vavoula, 2009), and indeed the general effect of context on m-learning (M. Al-Ismail, Gedeon, Sankaranarayana, & Yamin, 2016; Mazen Al-Ismail, Gedeon, & Yamin, 2017; Karimi, 2016). This is because as mobility increases and

learners find themselves in different situations, no study has investigated m-learning preferences in different contexts. Thus, this study fills this gap by evaluating mobile learners' preferences in different contexts, such as the overlapping of physical spaces (quiet, busy, and moving) and social spaces (alone, family, friend, and with a classmate).

Differences in learners' characteristics influence m-learning. However, the majority of existing studies investigate the impact of mobile learners' characteristics on m-learning adoption and acceptance. In the marketing literature, consumers' characteristics are seen as essential to understanding their preferences and choices, though only one study examines the relationship between learner's characteristics and m-learning preferences (Bouhnik Dan & Alona, 2016).

Learners' preferences do not always predict their actual choices. The researcher could only find one study that investigated the influence of learners' preferences on their choices (Lee & Chan, 2007). The study disseminated online podcasts that could be accessed via different devices and investigated whether the type of device preferred (stationary or mobile devices) was eventually chosen to access the podcast. This study will investigate whether the preferred type of podcast will be chosen using only mobile devices in two different physical spaces, i.e. quiet and busy.

## 1.4 Research objectives

The overall aim of this thesis is to understand mobile learners' preferences for podcast types, to achieve this, two subsidiary aims have been established. First, examine the impact of mobile learners' characteristics (demographics, prior experience, learning style, and personality) on m-learning preferences for podcast types and length in

different contexts. Second, to determine if m-learning preferences are reflected in learners' actual choices, the study then investigates how the preferences of mobile learners' in tertiary education affect their choices of podcast in different contexts. To achieve the subsidiary aims, the following objectives need to be addressed:

- Determine the relation between mobile learners' demographics (gender, age, material status, and nationality) and m-learning preferences for podcast types and length in different contexts.
- Determine the relation between mobile learners' prior podcast experience (listening, reading, and watching) and m-learning preferences for podcast types and length in different contexts.
- Determine the relation between mobile learners' learning styles and m-learning preferences for podcast types (text, audio, video) in different contexts.
- Determine the relation between mobile learners' personality traits and m-learning preferences for podcast lengths: short, moderate, and long (level of engagement) in different contexts.
- Examine the effect of mobile learners' preferences on their choices for podcast types in different contexts (quiet and busy).

The theoretical model of the thesis is presented in Figure 1.1. It aims to understand the relation between the learners' characteristics, preferences, and choices in different contexts for m-learning. Factors that impact m-learning preferences are learner characteristics, in turn, m-learning preferences is effecting m-learning choices. The

model show learner characteristics which are learning styles, demographics, personality traits, and prior experience on m-learning. Learning style is to assess students' Visual, Aural, Read/write, and Kinesthetic (VARK) learning style and to suggest a learning strategy. On the other hand, demographics which are included in this study are gender, age, marital status, and nationality. This model also includes personality traits which to assess the degree of individual Openness to new experiences, Conscientiousness, Extraversion, Agreeableness, and emotional-stability. Lastly, prior experience is to assess students' prior podcast learning experience (e.g. audio as learning material) using mobile devices.

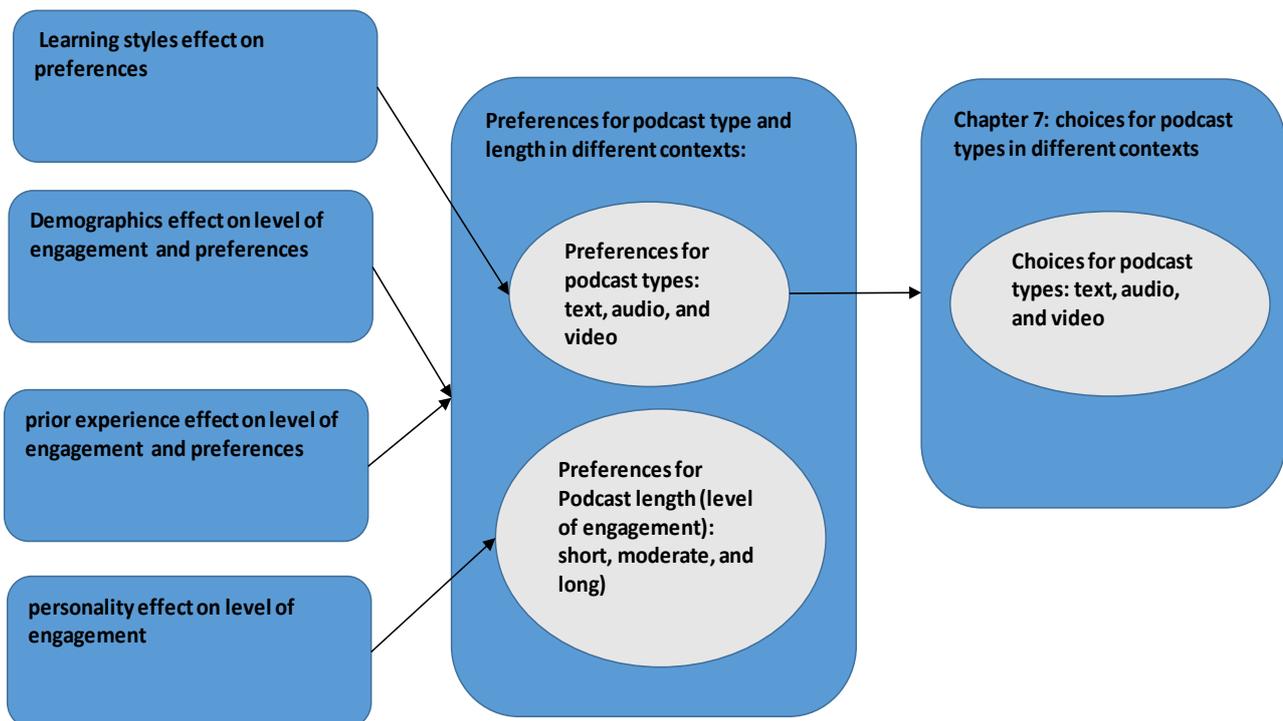


Figure 1.1. The thesis theoretical model of learners' characteristics, preferences, and choices relationships in m-learning.

Thus, the main research question and the four subsidiary research questions for this study are as follows:

What is the impact of mobile learners' characteristics on podcast preferences in different contexts, and how do m-learning preferences influence choices in different contexts?

Subsidiary question 1: is there a relationship between students' characteristics (gender, age, nationality, material status, and prior experience) and students' podcast preferences in different contexts?

Subsidiary question 2: is there a relationship between students' learning style and students' preference for podcast types in different contexts?

Subsidiary question 3: is there a relationship between students' personality traits and students' level of engagement with podcasts in different contexts?

Subsidiary question 4: is there a relationship between students' preferences and students' choices of podcasts in different contexts?

## 1.5 Research motivation

It is not clear which podcast type and length is preferred for learning through m-learning. This is due to the absent of including context in previous research settings. As m-learning can be done at anytime, anywhere and it is extremely dynamic, preferences for podcasts should be examined in different context such as stationary and non-stationary contexts. Moreover, the differences of learner characteristics impact student preferences, and these different characteristics give rise to different preferences in different contexts.

It is vital to address these risen issues to understand mobile learners' preferences. Thus, this research examines the impact of learner characteristics on m-learning preferences in different contexts. This will fill the gap in the literature and enhance our understanding of mobile learners' preferences.

## 1.6 The significance of the study

Understanding learning preferences helps to maximise students' learning potential and enhance the learner's personality. At a personal level, a focus on learning preferences can increase self-confidence, motivation, and enjoyment, and customising teaching techniques can assist the learners by allowing them to use strategies that are most effective for them. The study of learning preferences is not a new subject. However the dynamic development of mobile technologies, which are portable and allow real-time communication, opens up a new field or research in learning preferences.

This thesis aims to explore m-learning preferences and choices, which can lead to an improved understanding of the best way to efficiently and effectively deliver learning materials (podcasts). In doing so the study provides a better understanding of the role personal characteristics have on m-learning preferences in different contexts. It also provides a rationale and a balanced investigation, as this is the first study to examine m-learning preferences and choices in different physical and social spaces. The study also contributes to the development of theory about m-learning.

Thus, this study could contribute towards the development of the theory and practice of m-learning. In theory, the study fills a research gap by addressing the role of learner characteristics in forming m-learning preferences in different contexts, and by

examining how preferences form m-learning choices. Furthermore, the thesis recommends further investigation for future studies in m-learning. For practice, recommendations for appropriate m-learning podcast type and length based on learner characteristics and m-learning contexts are presented in chapter 4 and 6. Also, the methodology chapter provides details how m-learning practitioners can utilize different tools to measure students' preferences for m-learning.

## 1.7 Thesis structure

The thesis has eight chapters, which include the introduction, literature review, methodology, four chapters for the results and discussion, and the conclusion. Each chapter is briefly outlined below.

Chapter 2 defines m-learning and podcasts, as the latter is playing an important role on m-learning. The chapter then focuses on m-learning preferences for podcast types and length, where podcast length is also used in this thesis as a proxy for the level of engagement. After that, the theoretical framework is established, which deals with the impact of context, the characteristics on m-learning, and understanding the relationship between m-learning preferences and choices. Note that these three important issues are the main gaps in the literature on m-learning preferences and choices.

Chapter 3 will provides a detailed discussion of the methodology used in this thesis. In Chapter 3 I explain the main purpose of the research, followed by setting out the independent variables (IVs) and dependent variables (DVs). The survey and experimental instruments, data collection, and analyses are also described. Finally, the ethical considerations and study limitations are discussed.

Chapter 4 is the first results chapter, and discusses the effect of demographics, as well as prior experience, on m-learning preferences for podcast types and length in different contexts. Thus, the chapter explores the relationship between learners' characteristics (gender, age, material status, nationality, and prior experience) and podcast types and length preferences in different contexts. The chapter also investigates the effect of physical and social spaces on podcast type and length preferences.

Chapter 5 explores podcast type preferences and the differences between mobile learners' learning styles, e.g. visual learners and/or aural learners, in different contexts. The analysis firstly deals with students based on their learning styles, then explores whether there are differences in podcast type preference in different contexts.

Chapter 6 explains the effect of personality traits (Big Five) on podcast length preferences. Thus, the chapter examines the impact of students' Big Five personality traits (Openness, Conscientiousness, Extroversion, Agreeableness, and Emotional-stability) on m-learning engagement across physical and social spaces.

Chapter 7 is an experimental study that compares students' podcast preferences with their actual choices. The procedure has three stages: a survey on podcast preferences (for text, audio, and video) for different physical spaces (quiet and busy). The students are then exposed to these physical spaces to observe their actual podcast choices, after which the students' satisfaction based on their actual podcast choices is derived. This chapter is attempting to lay the groundwork for similar future studies to differentiate between the two approaches (preferences and choices), by examining the same range of podcast types using both survey and experiments.

Chapter 8 concludes the thesis and re-visits the aims of the research and reviews each chapter. It also discusses how this thesis contributes to knowledge in the research area and makes suggestions for future research.

## Chapter 2 LITERATURE REVIEW

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### 2.1 Chapter objectives

This chapter will focus on how personal and social characteristics influence m-learning preferences in different contexts, and explore the relationship between m-learning preferences and choices. The chapter begins by clarifying the potential ambiguities around the terms m-learning and e-learning. Second, it makes an argument that the study of the use of podcasts is a superior means of assessing m-learning. Finally, the chapter identifies the gaps in the research on m-learning preferences which this thesis is attempting to fill. These gaps are: the m-learning context, the vagueness in understanding the relationship between preferences and choices in m-learning, and the way that personal and social characteristics influence m-learning preferences (demographics, prior experience, learning styles, and personality traits).

### 2.2 M-learning is derived from e-learning: similarities and differences

In discussing m-learning, e-learning and distance education there is a need to provide clear definitions, as the first two terms are relatively recent, and the field of ICT mediated education is so dynamic and that there is a lack of clarity at times about the meaning of terms. M-learning derives from e-learning, while e-learning derives from distance learning (d-learning) (Georgiev, Georgieva, & Smrikarov, 2004). This is not just a semantic issue, as understanding the similarities and differences between these

different forms on non-traditional learning can help to avoid negative impacts, such as those caused by inadequate design (Güler, Kılıç, & Çavuş, 2014). Thus, m-learning and e-learning are not modalities that are in competition, as both have similar techniques and features, and m-learning complements but does not substitute for e-learning in blended learning environments. They complement each other because e-learning supports collaborative learning while m-learning supports situated learning (Ozuorcun & Tabak, 2012).

The most common shared features of m-learning and e-learning are that both use electronic devices, require internet connections, and are student-centred (Georgiev et al., 2004; Korucu & Alkan, 2011; Ozuorcun & Tabak, 2012). Students using both e- and m-learning can access a range of teaching materials including text, images, audio, video, and email and messages from peers and teachers. Using e- and m-learning means that geographic boundaries become less meaningful, and learning can be undertaken whenever internet connections are available. M-learning and e-learning both arise out of distance learning (d-learning), which originally relied on hard-copy course materials and assessments, provided for students who could not attend, for various reasons, regular face-to-face classes. Distance education now relies on various forms of electronic delivery, using platforms such as Moodle, but now also leverages mobile devices to broaden the ways that students can access courses.

The core difference between e-learning and m-learning revolves around tethering. E-learning requires tethering to a high bandwidth network via stationary devices (e.g. desktop computers), while m-learning is wirelessly connected (e.g. 3G and GPRS) via mobile devices (e.g. smartphones). So, m-learning, as it is reliant on mobile devices, supports learning anytime and anywhere, which can enhance informal learning outside

of the classroom. E-learning is also more formal and usually accessed at the home or the workplace. E-learning also uses a richer suite of media to deliver primarily text and graphics based instruction, while m-learning relies more on graphics and animation. (Korucu & Alkan, 2011). This is because e-learning uses powerful PCs connected to fast high bandwidth networks, which combined with more powerful data storage and e-learning platforms installed on the PC, means that e-learning can draw on a wider range of more powerful resources than the devices used for m-learning. However, it is important to note the unique contributions m-learning is making to e-learning, especially as there are now many more mobile devices owned than desktop computers (International Telecommunication Union, 2017). The impact of m-learning has been so great that the addition of m-learning opportunities to e-learning has altered the terminology applied to e-learning. The most widely used terms used to describe m-learning are: lightweight, informal, connected, situated, intimate, and spontaneous, while common terms for e-learning stress that it is media-rich, hyperlinked, interactive, and multimedia enabled (Korucu & Alkan, 2011).

### 2.2.1 Defining m-learning

For the purposes of this study, m-learning is defined as the ability for anyone to choose learning materials (e.g. text, audio, and video) at any time and anywhere using mobile devices. As m-learning is extremely dynamic, mobile learners can learn in a far broader range of contexts. This flexibility has several dimensions, such as, but not limited to: technology (e.g. the student can change from one device to another), environments (e.g. the student can study in different environments), social situations (e.g. such as being with family, friends, or classmates), which influences learners' willingness to study as

well as mobile learner choices of mode of delivery (e.g. audio, text, or video). The choices students make, dependent on their social and personal characteristics, should be considered in m-learning definitions for two interrelated reasons. First, learners have individual differences, which lead to a range of different choices. Second, m-learning, compared to traditional learning and e-learning, allows greater expressions of individual differences as learning occurs mostly in an informal setting, thus, the acquisition of knowledge is not well organized in informal setting compared to formal settings.

The majority of m-learning situations can be captured using three related concepts: the ability to learn, anywhere at any time, while using mobile technologies. Consequently, mobile learning is a process that leverages the mobility, access, immediacy, ubiquity, convenience and contextuality of communication services (Evrin, 2014), to provide meaningful learning experiences through wireless mobile technology such as cell phones, Personal Digital Assistants (PDA), mini-computers and ipods (Stevens & Kitchenham, 2011). More importantly, e-learning also includes the learning and teaching techniques that utilise mobile wireless technology to provide ubiquitous and seamless access to information, so that students can learn in a variety of environments (e.g., inside and outside classroom settings) using handheld and portable devices.

A number of earlier m-learning definitions are no longer valid, due to the massive expansion in mobile devices and networking infrastructures. For example, (C. Quinn, 2000) defined m-learning as ‘e-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone.’. Quinn’s definition showed that m-learning was highly dependent on e-learning, and that access to mobile learning was limited by the devices available. Nine years later mobile learning was defined as ‘the process of delivering educational content to individuals through mobile technologies

and devices' (Pocatilu & Boja, 2009). However, the capabilities of current mobile technologies allow more than just receiving educational content; they can now receive and send (e.g. learning materials, feedback, and quizzes) at any time and from anywhere. By 2013, mobile learning was defined more expansively as giving students the capacity to learn with their own context at any time and in different environments. Compton defined mobile learning as learning across multiple contexts, through social and content interactions, using personal electronic devices' (Crompton, 2013). As the development of m-learning is so fluid its definition will continue to change as new technologies emerge and m-learning innovations accumulate.

## 2.2.2 Significance of m-Learning

Over the last few years, the effectiveness of constructivist learning strategies, the change from computer-based learning to web-based learning, and the development of new technologies, has meant that mobile learning has become a widespread mode of educational provision (Göksu & Atici, 2013). These innovations address many of the problems of available distance learning methods. It also takes advantage of sympathetic innovations in non-traditional modes of learning, captured by initiatives such as lifelong learning, peripheral learning, learning when needed, autonomous learning, situated learning, and learning depending on the conditions (Göksu & Atici, 2013; Vavoula & Sharples, 2011).

Thus, the uniqueness of m-learning is the ability for anyone to engage with learning any time and anywhere, and how this offers educators and students new pedagogical possibilities. This is because m-learning affords portability, accessibility, and flexibility (Boja & Batagan, 2009). First, m-learning exploits portability as mobile devices are

lightweight and easy to carry. Second, it also offers accessibility anywhere and any time as mobile devices can access a range of networked communication modes, such as Wi-Fi, 3G, and Bluetooth. Consequently, opportunities are created for students to access course materials or platforms with few constraints of space or time. So, m-learning presents new opportunities to motivate students, especially when multimedia modes are available, and gaming can be combined with lessons, which make learning enjoyable. Also, m-learning can support independent learning and collaborative learning since students can share the same material.

Thus, the adaption of mobile learning is increasing, as mobile devices are developing, the availability of networks is increasing, and networking charges are becoming more affordable, which facilitates the adoption of podcasting (audio, text, and video) using mobile devices as learning materials. The next section will discuss in detail the use of podcasting for m-learning.

## 2.3 M-learning podcasts

### 2.3.1 What are podcasts and what is their relationship to m-learning

Podcasting is defined as an audio content syndication through RSS feeds (Cebeci & Tekdal, 2006), and is also described as audio, video, text and other media files that can be played on the computer or downloaded to MP3 players (Sprague & Pixley, 2008). Podcasting can support communication and the delivery of course materials between lecturers and students. Previous research studies have slightly different definitions of podcasts due to how swiftly they have evolved. All definitions agree that audio has to be a portion of the podcast. The current tendency in defining podcasts is that a podcast is a digital file that can be conveyed automatically to a device such as a portable media

player or a computer via the Internet (Takeda, 2013). For this study, podcasts are defined as text, audio, or video materials that support one-way communication to students’ mobile devices.

Thus, the types of podcasts mainly depend on the way they use video, audio and text. The video podcast known as Vodcast (Sutton-Brady, Scott, Taylor, Carabetta, & Clark, 2009) is the most popular podcast term. Vodcast also includes audio podcasts synced with images and text (Brittan & Glowacki, 2006; Sutton-Brady et al., 2009). Hence, the podcast types used in m-learning are described in Table 2.1, along with their merits and demerits.

Table 2.1. Advantages and disadvantages of podcast types (synthesised from the literature)

Types of podcasts used in m-learning	Merits	Demerits
Text	Easy to follow the information, and small file size.	The engagement is very low.
Audio	More engaged compared to text, lecturer's voice reduce students’ anxiety (Chan & Lee, 2005; Kemp, Myers, Campbell, & Pratt), and easy to download.	Easy to lose focus, and time-consuming in term of preparation.
Vodcast	More engaging compared to	Needs to a well-designed and

audio, and more 'real presented, and time-consuming world'. Stopping and to edit and produce. Requires rewinding provides high-speed internet for flexibility in learning. downloading and watching.

Many of the advantages of podcasts are useful for m-learning. In fact, Sutton-Brady et al. (2009) stated that podcasts empower m-learning. Table 2.2 details m-learning and its relation to podcast advantages. Kukulska-Hulme and Traxler (2005) list attributes of m-learning, such as spontaneity, personalisation, informality, portability, and ubiquity, which are defined in Table 2.2. Lee and Chan (2007) have also explored the relationship between podcast advantages and m-learning attributes by listing the possible manifestation in educational podcasting applications (see Table 2.2).

Table 2.2. Advantages of podcasting that relates to m-learning attributes (Lee & Chan, 2007).

**Attributes of**

<b>m-learning</b>	<b>description</b>	<b>Aspects of podcast relate to m-learning</b>
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<b>Spontaneous</b>	learning resources can be accessed whenever a chance arises.	Access is on-request as the podcast automatically becomes available. Furthermore, the capability of mobile devices and MP3 players with large memories allow learners to have 'libraries' of various podcasts while on the move.
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<b>Personal</b>	Learner-centred; the learning experience enhanced by	Mobile devices, MP3 and podcast players are personal.
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personalising

preferable media.

### **Informal**

Makes learning a casual and relaxed activity.

Podcasts can use the lecturer's or someone else's voice which affords a casual and relaxed feeling (Chan & Lee, 2005; Kemp et al.). Furthermore, background music can also be combined to form a friendly and informal feeling. Also, the podcasts can be listened to and watched in informal settings (e.g. walking or at the cafe).

### **Portable**

m-learning can be utilised in different locations with different devices.

Podcasts can be played on a variety of mobile devices, which enable to be used everywhere.

### **Ubiquitous**

using universally available mobile devices.

Audio MP3 and video MP4 playback functionality is universally integrated into mobile devices (e.g. smartphones) which are already pervasive.

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As well as the technological aspects of podcasts, learner preferences for podcasts are an important theme in research trends about m-learning and e-learning. Thus, the next section considers learners' podcast preferences and how preferences influence choices.

## **2.3.2 Learner preferences for length of podcast (level of engagement)**

Many studies have examined different podcast lengths to improve their effectiveness in teaching. Moreover, designing podcasts is often time-consuming (Carvalho et al., 2009; Sutton-Brady et al., 2009). In some cases, students would not use podcasts as they were

too long to be reliably downloaded. Thus, more studies to investigate the optimal podcast length are required to improve the educational effectiveness of podcasts.

The research for this thesis found only one study which explicitly classified podcast lengths (Carvalho et al., 2009). The study used podcasts in a blended learning environment at Minho University and categorised podcasts' lengths into short, moderate and long. The short length is a range of one to five minutes, moderate duration was six to fifteen minutes, and long was over fifteen minutes.

The majority of research studies have shown that students prefer short podcasts (Gillie, Dahli, Saunders, & Gibson, 2017; Lee & Chan, 2007; Sutton-Brady et al., 2009; Van Zanten, Somogyi, & Curro, 2012) while a few showed that students prefer moderate and long podcasts (Giannakos, Jaccheri, & Krogstie, 2016; Matava et al., 2013). Sutton-Brady et al. (2009) considered a short format of podcasting to be promising, as a shorter podcast does not take a long time to watch/listen to or download. Moreover, few studies have suggested that students would not watch/listen to podcasts longer than 7-8 minutes (Bell, Cockburn, Wingkvist, & Green, 2007; Gillie et al., 2017; Rodgers et al., 2017). The advantages of shorter podcasts, from the students' perspective, are that they highlight important information, assist study, extend and personalise learning, and assist assessment preparation (Sutton-Brady et al., 2009). Lecturers' perceptions, on the other hand, is that the concise presentation of information reinforces learning and increase students' interest. Both lecturers and students agreed that short format podcasts saved consultation time.

It is important to note here that the literature review for this thesis suggests that no studies have investigated how learners' personal and social characteristics influence

their preferences for podcast length. The current study addresses this gap by examining the effect of demographics and personality traits on podcast lengths in different contexts.

### 2.3.3 Learner podcast preferences

In the mid-2000s, audio was a popular media in education. Fill and Ottewill (2006) noted that although video has potential benefits for learners, audio was more commonly used. In the same period, two studies investigating learners' preferences and usage of podcasts were conducted. First, a study was conducted by (Brittan & Glowacki, 2006) using podcast lectures in three different formats (video, audio synced with PowerPoint slides, and audio) which students could choose. The second study (Copley (2007) disseminated audio and video podcasts to four different classes and found that more audio podcasts were downloaded than video podcasts. The file size of the video podcasts is much larger than an audio podcast. Thus, the time and cost is higher when a video is downloaded. Consequently, learners preferred audio to video, most probably due to the limitation of technology and networking infrastructure at that time.

In the decade of the teens, Vodcast (video) was the most popular format (Cassidy et al., 2014; Howard, Meehan, & Parnell, 2017; Phillips et al., 2014) and audio the least popular (Saunders & Hutt, 2015) choice amongst students. An interesting study on library services (Cassidy et al., 2014) investigated the emerging technologies in higher education explored the shifting trends in student usage between 2010 and 2013. In 2010, 38% of students of students were interested in video (e.g. YouTube) for library services, and interest in video rose to 52% by 2013. Moreover, researchers are now more likely to investigate vodcasting, as it has proved to be so effective (R. Kay, 2012),

as well as its emerging usage patterns (Giannakos, Jaccheri, & Krogstie, 2015), convenient length and purpose (Giannakos et al., 2015; Rodgers et al., 2017; Van Zanten et al., 2012). See Kay (2012) for a valuable literature survey about the educational use of vodcasts.

Currently, students readily use all podcast types irrespective of time and place, and in different contexts, though no studies have yet explored students' preferences in different contexts. More specifically, how students with different characteristics react to m-learning podcasts in different contexts has not been a topic of research. This study is trying to address this gap by conducting research on how students' personal and social characteristics and learning styles influence podcast preferences in different contexts.

However, preferences do not always accurately predict students' actual choices. Thus, the next section aims to differentiate between preferences and choices, in terms of definitions and research findings.

## 2.4 Are preferences reflecting choices?

Although some researchers could swap the terms preference and choice, there are differences between the terms. Preferences are latent and prior to actions, thus, preferences influence our choices, and choice is an act of intentional selection and is not a latent property (Brouwer, Dekker, Rolfe, & Windle, 2010; Hoeffler & Ariely, 1999; Savage & Waldman, 2008; Savani, Markus, & Conner, 2008). Thus, the methods used to address these problems, as would be expected in a mixed-methods study, need to approach preferences (e.g. surveys) and choices (e.g. experimental) using different techniques.

Only one study has examined both students' preferences and choices (Lee & Chan, 2007). Their study examines distance learners' choices and preferences for supplementary audio podcasting for one semester. Podcast choices and preferences were collected using surveys at the end of the semester. Most learners preferred audio podcasts because of being able to listen while moving using portable devices. However, when learners were asked about their use of audio podcasts, the majority had chosen to use podcasts at home, and access them on stationary computers. It appears that choices do not always reflect learners' preferences, thus, researchers have to select carefully the methodological approach when collecting data.

Preference and choice studies in online learning are set out in Table 2.3. The table shows the type of educational media examined and the outcome preference/choice of media suggested by corresponding studies. The existing literature, which has investigated preferences/choices for different online media and in different contexts, does not adequately address the relationship between preferences and choices as shown in Table 2.3.

Table 2.3. Learners' media preferences and choices for e-learning and m-learning.

<b>Preferences studies</b>	<b>Examined media</b>	<b>outcome</b>
(Kobayashi, 2017)	15 different media	The text media is highly preferred such as Email, texting/instant messaging, and lecture notes and assignments posted on LMS.

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(Phillips et al., 2014)	48 different media used by Thai students	Video and interactive media such as YouTube and Facebook are highly preferred by undergraduate Thai students.
(Cassidy et al., 2014)	preference for different library online services such as e-readers, YouTube, podcasts. Preferences were collected in 2010 and 2013	popularity for image and voice increased by 2013. For example, YouTube was 38% in 2010 and 52% in 2013.
(Matava et al., 2013)	audio, video, and (images + audio)	Canadian anesthesia residents prefer podcasts as follows: 34% audio, 37% (audio + slides), and video 28%.
(Parson et al., 2009)	audio and video	second-year psychology students prefer video over audio.
<b>Preference and choice:</b>		
(Lee & Chan, 2007)	Using audio as learning material on different devices (e.g. computers and MP3 players)	unexpected results. Learners prefer to play audio on MP3 players, however, many learners choose to play audio on

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computers.

**Choice studies:**

(Howard et al., 2017) Lectures to be delivered as video, live lecture, or in combination. Many learners chose video lecture over live lecture.

(Rodgers et al., 2017) Video as full lecture, tutorial solution, short key concept, revision lecture, chapter summary, or laboratory video. short concept video often chosen compared to other video types.

(Gillie et al., 2017) lecture podcasts, key-concept videos and tutorial solution videos Learner chose and value all three types of resources.

(Giannakos et al., 2015) different video length, and different platforms for watching video. no significant difference on chosen video length. While learners' choices for platforms are as follow: 38% NTNU Video, 42% YouTube, and 20% for both.

(Van Zanten et al., Video length: short vs long Students chose short video as useful and

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2012)

focused learning  
format.

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Based on the literature review there are no studies that investigate the influence of m-learning podcast preferences on students' choices of podcasts. Thus, this study addresses and tries to fill this gap by exploring students' preferences and choices of m-learning podcasts in different contexts (e.g. quiet and busy).

## 2.5 The effect of contexts on m-learning preferences

Previous studies on the impact of mobility on m-learning only considered discrete environments, such as a field around a school (Shih, Chu, Hwang, & Kinshuk, 2011) or a museum (Chiou, Tseng, Hwang, & Heller, 2010). Context in this study is a combination of mobility in physical space (the student has the freedom to move from one place to another) and social space (the student has the freedom to participate in different social events such as being with family members and/or friends) (M. Al-Ismail et al., 2016; Mazen Al-Ismail et al., 2017; Yamin, Al-Ismail, Gedeon, & Sankaranarayana, 2016). Physical and social spaces are very important in m-learning (Kukulska-Hulme et al., 2009). As a result, students can be in many combinations of physical and social environments yet still be engaged in learning. For example, a student can be in a busy environment such as a café with a friend, or in a busy environment alone.

Context is an important term in this thesis relating to mobility. It mainly relates to physical space and social space, but also embraces the use of technology, conceptual space, and engagement with educational institutions and less formal experiences spread

over time. Mobility in physical space allows learners to take advantage of gaps in daily life to engage with educational materials in different locations as they move from one place to another. The ability to learn as people are moving about is enabled by mobile devices which learners can easily carry, such as mobile phones, tablets and PDAs.

(Pocatilu & Boja, 2009)) define Mobile Learning Devices (MLD) as ‘the hardware component and is represented by any mobile electronic device that can be configured and has a minimal set of features that can provide support for executing and managing software applications’. Mobility of technology also means learners can shift from one mobile device to another, for example from a laptop to a tablet. Further to this, mobility in conceptual space rests on a transformation of learner attention. (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009) develop this concept using the example of an adult enrolled in a course with eight units (formal learning) who at the same time encounters everyday situations which also require learning (informal learning). In this situation, the learner’s attention shifts from one mode to another. In this scenario, a student meets the formal requirements of their course while engaging in more spontaneous learning moments, i.e. the student shifts attention between formal learning and informal learning. As well, mobility in social space means that learners could learn in a less traditional social situation, such as with their family or in the office. Finally, Sharples et al. (2009) illustrated learning dispersed in time by citing (Dierking, Falk, Rennie, Anderson, & Ellenbogen, 2003) who suggest that learning is a cumulative process involving connections and reinforcement among a variety of learning experiences, across formal and informal learning contexts.

Investigating the experience of m-learning in different contexts is essential to simplify learning design across contexts for mobile devices. Thus, Kukulska-Hulme et al. (2009) described context as a central construct in m-learning development and stressed the need to examine m-learning in different contexts.

There are a number of ways that context affects m-learning. For example, Karimi (2016) investigated factors that influenced the adoption of m-learning in two different contexts (formal and informal learning), and found that performance expectancy affect (formal learning) while personal innovativeness affect (only informal learning) to adopt m-learning. Also, many studies have confirmed that learners access podcasts in a range of contexts, such as being stationary (Collier-Reed, Case, & Stott, 2013; R. H. Kay, 2012), while moving (Kelly & Klein, 2016), after working hours (Hill & Nelson, 2011), and at the end of the academic year (Collier-Reed et al., 2013). Thus, evaluating m-learning in only one context (e.g. in the classroom) would not produce a well-rounded account to m-learning. Consequently, m-learning research should concentrate on different contexts such as physical and social spaces.

This study is trying to address this gap, i.e. little attention being paid to context, by evaluating m-learning preferences in different physical (quiet, busy, and moving) and social (alone, family, friend, and classmate) spaces. This is done by showing how students with different characteristics interact with m-learning in different contexts. The next section therefore discusses the effect of students' personal and social characteristics on their experience of m-learning.

## 2.6 Characteristics and its effect on m-learning

In marketing, customers' characteristics are regularly used to statistically model the customer's preferences and choices, however, very few studies on m-learning investigate the effect of learner's characteristics on m-learning preferences.

The characteristics that are seen as important factors influencing m-learning in this theses are demographics (e.g. gender, age, and culture), technological literacy (e.g. computer literacy and mobile literacy), learning styles, and personality traits.

### 2.6.1 Demographics and cultural effects on m-learning

Gender has always been a factor when investigating the effect of demographics on m-learning. Indeed, many studies have only investigated the gender effect on m-learning (Bao, Xiong, Hu, & Kibelloh, 2013; Chen, 2015; Kang, Lundeberg, Wolter, delMas, & Herreid, 2012; Padilla-Meléndez, del Aguila-Obra, & Garrido-Moreno, 2013; Smeda, Shiratuddin, & Wong, 2017; Yoo, Huang, & Kwon, 2015). Other studies address the combined effect of gender and age on m-learning (Bouhnik Dan & Alona, 2016; Wang, Wu, & Wang, 2009), and very few studies (Viberg & Grönlund, 2013) combined gender, age and culture to investigate their effect on m-learning. Based on the researcher's literature review, no study investigated the effect of other demographic variables such as material status and personal income on m-learning.

Most studies examine the effect of demographics on m-learning adoption and acceptance (Bao et al., 2013; Chen, 2015; Padilla-Meléndez et al., 2013; Smeda et al., 2017; Viberg & Grönlund, 2013; Wang et al., 2009; Yoo et al., 2015), while only one study examines the effect of demographics on m-learning preferences (Bouhnik Dan & Alona, 2016). There would appear to be little work done to investigate the relationship

between m-learning preferences and demographics. This thesis is trying to address this research gap by investigating the effect of gender, age, culture and material status on preferences and the level of engagement with m-learning in different contexts.

#### 2.6.1.1 Gender effect on m-learning

Research suggests that both men and women are positive about m-learning (Bao et al., 2013; Padilla-Meléndez et al., 2013; Smeda et al., 2017; Wang et al., 2009), however, females are more positive than males about m-learning when learning languages (Chen, 2015; Viberg & Grönlund, 2013). For example, Viberg and Grönlund (2013) have found that among Chinese and Swedish students females are significantly more positive about adopting mobile devices for learning languages in higher education than males. On the other hand, Wang et al. (2009) investigated m-learning adoption among Taiwanese students, and found that both genders intended to use m-learning

One study has investigated the gender effect on m-learning preferences (Bouhnik Dan & Alona, 2016). The study demonstrated that there are no gender differences in intentions to use mobile devices among higher education students in Israel. As m-learning is flexible in space and time, preferences need to be adequately assessed. For example, investigating m-learning preferences in different contexts (e.g. walking or at a cafe) might reveal gender differences. This study is trying to address this gap by investigating gender preferences for m-learning in different contexts.

#### 2.6.1.2 Age effect on m-learning

Although the literature review found few studies that examined how age influences m-learning, the studies found suggested that both younger and older students are positive about m-learning (Wang et al., 2009), while older students are more likely to adopt m-

learning for assessments (e.g. quizzes) (Viberg & Grönlund, 2013). However, there is no effect of age on m-learning preferences (Bouhnik Dan & Alona, 2016). As mentioned earlier this is probably because these studies have not investigated learners' preferences by including contexts.

### 2.6.1.3 Cultural effect on m-learning

Although cultural differences can be expected to play an important role in m-learning, very few studies have examined the impact of culture on m-learning. There are two reasons to research cultural influence. First, the influence of culture on the adoption of new technologies has been widely investigated (Dinev, Goo, Hu, & Nam, 2009; Li, Hess, McNab, & Yu, 2009; McCoy, Galletta, & King, 2005; Srite, 2006; Tarhini, Hone, Liu, & Tarhini, 2017). Second, some cultures may have varying responses in different contexts. Consequently, this study addresses culture (Australian vs Saudis) as a variable in m-learning engagement and preferences in different contexts. This is simply because major differences exist between the two cultures. First, Australia is considered as developed country, while Saudi Arabia is a developing country. Second, differences exist in Hofstede cultural dimensions between Australians and Saudis (e.g. the degree of power distance is very high in Saudi culture while it is very low in Australian culture).

### 2.6.2 Students' experiences effect on m-learning

The literature on mobile learners' experiences has several different approaches, notably *instant experience vs prior experience* and *technological experience vs mobile experience*. The timing of when learner's gain experience is the difference between prior experience and instant experience. Prior experience is simply the acquisition of experience and knowledge of a particular technology (e.g. computer literacy). Instant

experience requires asking a learner about his/her experience immediately after using m-learning or any other form of educational technology. The m-learning literature addresses a range of types of learner's experiences with technology, such as their general knowledge of technology and computer literacy, as well as specific mobile literacy or forms of knowledge about m-learning.

The effect of students' *mobile experience* positively influences m-learning acceptance and effectiveness (Cavus & Uzunboylu, 2009; Chen, 2015; Mac Callum & Jeffrey, 2013). However, there was no influence on m-learning when students were asked about unrelated technological experience (e.g. advance information technology) (Mac Callum & Jeffrey, 2013). Technology is now extremely diverse and is used in specialised ways in every discipline. Thus, asking participants about their specific technological expertise (e.g. expertise in using mobile phones), rather than their use of other technologies (e.g. computer literacy), seems to be a more productive strategy.

As mentioned above, some studies investigated the effect of *instant experience* (e.g. pre-experience and post-experience) on m-learning adoption and effectiveness (Cavus & Uzunboylu, 2009; Chen, 2015), while other studies investigated the effect of *prior experience* on m-learning (Mac Callum & Jeffrey, 2013), such as self-reporting on usage experience of certain technology. To investigate the longer-term effects of experience with technology asking students about their *prior experience* rather than instant experience is necessary.

Based on the literature review for this thesis, no studies investigating the effect of m-learning experience on m-learning preferences and engagement was found. This study addresses this gap by investigating students' prior experience of using m-learning

materials (audio, text, and video) and these experiences' influence on m-learning preferences and engagement in different contexts.

### 2.6.3 Learning style models and its effect on m-learning

It is possible that the learning styles of individual students will influence how they engage with m-learning. Learning styles can be described as attitudes, factors, and behaviour that assist individual learning in certain conditions (Cassidy \*, 2004). The concept of learning styles groups together common learning attitudes and behaviours, though individuals may not have a unique learning style, as people tend to display a mix of learning styles. So, for example, a student may prefer to use both visual and aural learning styles. However, some learners have dominant learning styles, for example, a learner might prefer reading, while occasionally using visual techniques. There are also some learners whose strategies are context-based, which means they will adopt a learning style that suits their current situation.

Some researchers are critical of the learning style approach, which they describe as a 'myth' (Kirschner, 2017). Thirteen learning styles models were reviewed to assess their validity, reliability, and internal consistency. Although VARK (Fleming, 2009) is one of the better-known model of learning styles, it was not included in (Kirschner, 2017). However, M. M. Quinn, Smith, Kalmar, and Burgoon (2017) argue that it is not fair to discard this educational tool, though there is some recognition that collecting data on learning styles is problematic because of many confounding variables, such as the learner's cognitive ability, motivation, etc.

The VARK is a questionnaire on learning styles developed by Fleming and Mills (1992). The result of a VARK survey categorises students as unimodal or multimodal

learners, which can be subdivided into 23 possible combinations (Fleming, 2009). More details of VARK categorisations are shown in Table 2.4.

Table 2.4. *VARK learning preference (Fleming, 2009).*

<i>Learning Preference</i>	<i>Description</i>
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)'.
Multimodal (bimodal, trimodal, and quadmodal)	Those who do not have a standout mode with one preference score well above other scores are defined as multimodal.
VARK Type One	There are those who are flexible in their communication preferences and who switch from mode to mode depending on what they are working with. They are context specific. They choose a single mode to suit the occasion or situation.
VARK Type Two	There are others who are not satisfied until they have had input (or output) in all of their preferred modes. They take longer to gather information from each mode and, as a result, they often have a deeper and broader understanding. They may be seen as procrastinators or slow-deliverers, but some may be merely gathering all the information before acting – and their decision making and learning may be better because of that breadth of understanding.
VARK Transition	Individuals whose preferences fall between VARK Type 1 and VARK Type 2.

Thus, this study is trying to address a gap in the literature by investigating the relationship between student's learning style and podcast preferences in different contexts. As the relationship between students' preferences and students' learning

preferences (learning styles) in m-learning is still unclear, it is methodologically useful to have a well-established and standardised instrument (the VARK questionnaire) that can be applied in the field to address this aspect of the research.

#### 2.6.4 Personality trait models and its influence on learning

The effect of personality traits on learning (Clark & Schroth, 2010) and e-learning (Keller & Karau, 2013) is not a new topic. For example, a study was conducted by (Keller & Karau, 2013) to examine the relationship between personality traits and students' impressions of online courses, where conscientiousness (an aspect of personality traits) was a good predictor for online courses impressions. Another example, Clark and Schroth (2010), found that people who are extraverted and agreeable have a higher level of motivation to attend college. Most of these studies utilise a well-known model called the Big Five personality traits.

The Big Five Traits taxonomy (BFI-44) (John & Srivastava, 1999) is a widely accepted psychological tool for evaluating personality traits. These five broad personality traits are extraversion, openness, agreeableness, emotional-stability, and conscientiousness. Within each broad dimension, a range of more specific personality traits are also defined. For more details about the Big 5 personality traits see Table 2.5.

However, the relationship between students' traits and students' m-learning engagement is still unclear. Thus, this research is trying to address this gap by examining the relationship between learners' traits utilising Big 5 categories and podcast length preferences in different contexts.

Table 2.5. Big Five dimensions.

<i>Trait Dimension</i>	<i>Endpoints of the dimensions</i>
Emotional stability	Calm vs anxious Secure vs insecure Self-satisfied vs self-pitying
Extraversion	Sociable vs retiring Fun-loving vs sober Affectionate vs reserved
Openness	Imaginative vs practical Preference for variety vs preference for routine Independent vs conforming
Agreeableness	Soft-hearted vs ruthless Trusting vs suspicious Helpful vs uncooperative
Conscientiousness	Organized vs disorganized Careful vs careless Disciplined vs impulsive

Agreeableness, Conscientiousness and Emotional-Stability will probably affect m-learning preferences in social situations (e.g. communicating with peers and lecturers, and surrounding people while using m-learning). This is because these traits are seen as socially desirable (Digman, 1997), and mobile devices promote social interactions by allowing people to communicate more freely.

Individuals with high agreeableness scores value social harmony and their friends' opinions, which means that peer support for computer-based assessment is likely to influence them to accept it as well (Terzis, Moridis, & Economides, 2012). Also,

Keller and Karau (2013) have found with students high agreeableness scores value online courses as an engagement tool (e.g. discussion and forums), but have not shown any preference for online courses over traditional courses. This is probably because traditional courses provide more social opportunities than online courses.

Conscientiousness is the degree to which an individual is organised, careful, disciplined, and applies themselves to tasks. Thus, learners with high conscientiousness are potentially more likely to value m-learning as it allows them greater flexibility in accessing educational materials. It has also been suggested that learners with high conscientiousness scores are positively correlated with accessing online learning assessment (Terzis et al., 2012) and self-regulated learning (Ghyasi, Yazdani, & Amini Farsani, 2013). Thus, learners who are very conscientious are satisfied with online academic courses (Cohen & Baruth, 2017; Keller & Karau, 2013), as well as digital tools such as digital annotations, which assist them to read materials deeply (Omheni, 2017).

Individuals with low emotional-stability prefer one-way communication and avoid two-way communication. Thus, they spend more time on the internet (Armstrong, Phillips, & Saling, 2000) and engaging in online academic activities (Mark & Ganzach, 2014). Their preference for one-way communication, such as listening to music or watching movies, which is in a sense like podcasting, may make them more accepting to m-learning (Swickert, Hittner, Harris, & Herring, 2002). However, they avoid two-way forms of communication, such as text messaging (Amiel & Sargent, 2004) or chatting (Swickert et al., 2002), which causes anxiety and stress for individuals with low emotional-stability.

## 2.7 Chapter Conclusion

This chapter has highlighted the characteristics and influences of m-learning preferences in different contexts and the gap between preferences and choices in m-learning. The chapter started by clarifying the difference between m-learning and e-learning. It then defined podcasts as a superior way to measure m-learning by defining the relationship between them. Finally, the chapter defined the gaps in research on m-learning preferences, which are: the effect of m-learning context, the vagueness between preferences and choices in m-learning, and the effect of personal and social characteristics on m-learning preferences (demographics, learning styles, and personality traits).



## Chapter 3 METHODOLOGY

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The aim of this thesis is to determine the podcast preferences of mobile learners and their actual podcast choices by examining podcast types and podcast lengths in different contexts, such as physical and social spaces. Two quantitative techniques, using a combination of surveys and experiments, was adopted. The cross-sectional data from surveys included podcast preferences as dependent variables, while demographics, prior experience of podcasting, personality traits, and learning preferences as independent variables, from a sample of Australian and Saudi Arabian students. An experiment using One-Group Pretest-Posttest Design was conducted to compare the students' perceived preferences with their actual choices.

### 3.1 Research design

Two quantitative techniques were adopted to investigate mobile learner podcast preferences and choices in a range of contexts. This methodology helps to overcome the combined limitations of surveys and the small sample size of experimental studies. Surveys can access large samples, which will show only m-learning preferences (or opinions), and the potential relationship between m-learning preferences and choices. On the other hand, the experiment is designed to determine m-learning choices, although the sample size is small compared to the survey.

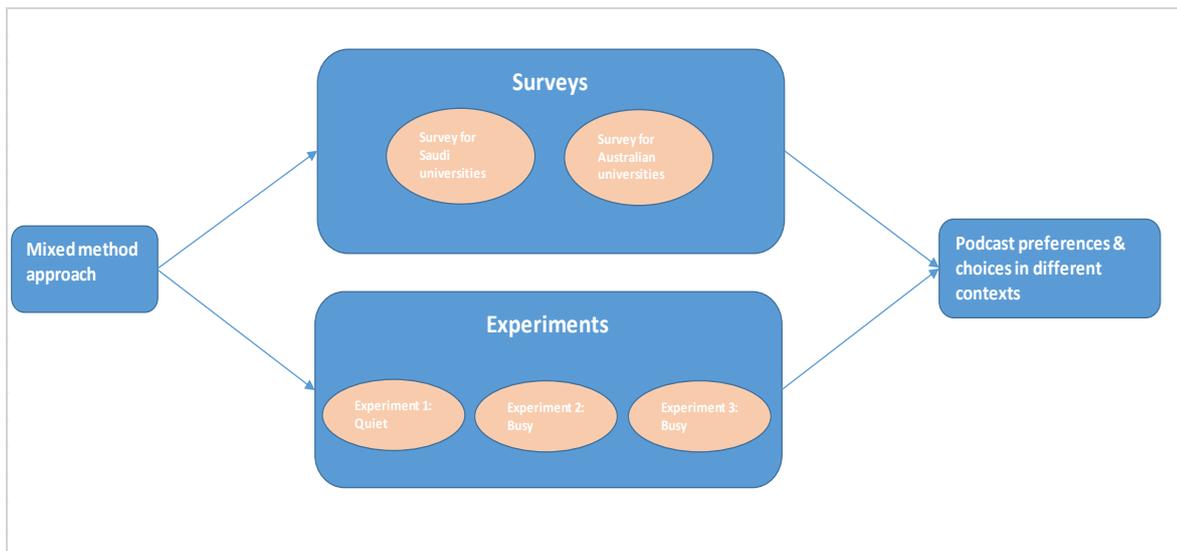


Figure 3.1. Research design of the study with mixed methods approach to determine podcast preferences.

The survey method has been extensively used in social sciences to evaluate people's attitudes, the frequency of a phenomenon, situation, problem, or issue by questioning a cross-section of the population (Creswell, 2013). The survey method, which uses questionnaires as data collection techniques, is cost-effective, able to reach a wide range of people and can even be administrated remotely (e.g. emailing or posting a survey link in an online forum). In this study, a questionnaire was designed and distributed to students in Australian and Saudi universities to collect data on students' podcast preferences in different contexts. Demographic data such as gender, nationality, marital status and age, as well as prior experience with podcasting, learning preferences (VARK) and personality traits (Big 5) were also collected.

A user experiment study using One-Group Pretest-Posttest Design was conducted to compare the students' podcast preferences (pretest) and their actual podcast choice (posttest). This design was intended to validate the preference findings by

checking the actual podcast choices. More specifically, students were observed in two physical spaces; a quiet environment (e.g. library) and a busy environment (e.g. cafe) in experimental settings. The experiment allowed observation of the students' decision-making in way that imitated real-life mobile learning contexts.

Figure 3.2 illustrates the conduct of the experiment.

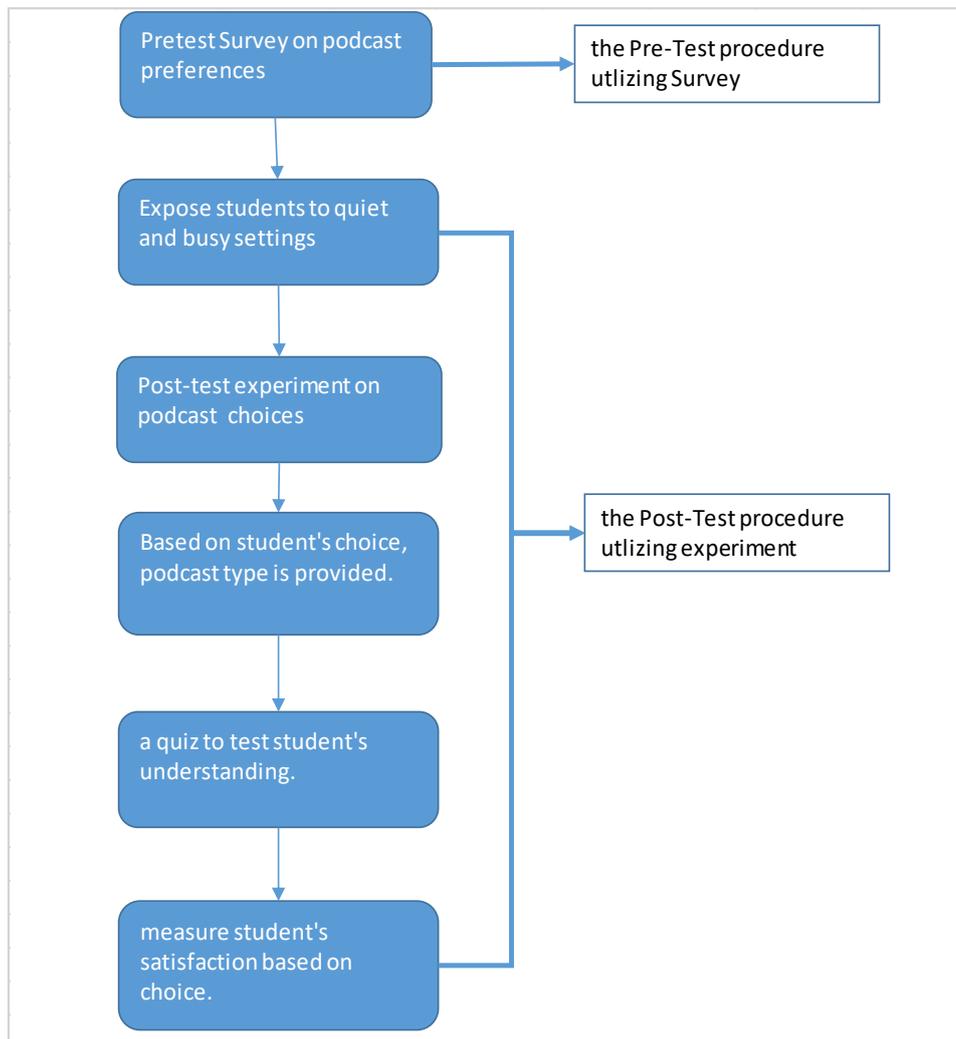


Figure 3.2. Experiment process to compare preferences and choices for podcasting in quiet and busy contexts.

## 3.2 Definition of variables

### 3.2.1 Contexts

In this thesis, the combination of physical space and social space is called 'context'.

Mobility in physical space (the student has the freedom to move from one place to another) and social space (the student has the freedom to engage in different social activities, such as being with family members and/or friends) are key characteristics in m-learning (Kukulska-Hulme et al., 2009). Thus, students can be in different environments constituted by physical and social spaces when learning. For example, a student can be in a busy environment such as a café with a friend, or in a busy environment by themselves. The result of combining physical spaces and social spaces are presented in Table 3.1.

It is most likely that the mobile learners reaction (whether will be away of learning or involved in learning) occur in these 12 contexts or similar contexts. We have 12 contexts which are the results of combining physical space and social space. Physical space consists of two stationary contexts (quiet and busy), and two non-stationary contexts (walking and vehicle). On the other hand, social spaces consist of being alone, with family, with friend, or with classmate. Thus, mobile learners' reactions occur in the 12 contexts or similar contexts.

Table 3.1. The result of combining physical space and social space (contexts).

	Alone	Family	Friend	Classmate
Quiet	Quiet & alone	N/A	N/A	N/A
Busy	Busy & alone	Busy with family	Busy with friend	Busy with classmate
Walking	Walking alone	Walking with family	Walking with friend	Walking with

				classmate
Moving on a vehicle	N/A	Vehicle with family	Vehicle with friend	Vehicle with classmate

The combination of physical spaces and social spaces produces 12 contexts as shown in Table 3.1. The podcast preference questions in the questionnaire are drawn from the 12 contexts, so that there are 12 questions in the questionnaire, which have been formulated for each context of podcast type and length preference. Therefore, there are 12 questions for podcast type preference, and podcast length as a matrix table. The questionnaire can be found in appendix A.

### 3.2.2 Demographics

This research is to investigate if a relationship exists between podcast preference and the independent demographic variables (age, nationality, material status, and gender).

### 3.2.3 Prior experience

The aim is to find if there is a relationship between podcast preferences and the independent variable which is student's prior experience.

Hence, some questions in the questionnaire were about prior podcast learning experience using mobile devices, phrased as "Have you ever listened/watched/read educational learning materials using your mobile device?"

### 3.2.4 VARK

Students have different learning preferences (learning styles), thus, one of the research aims is to investigate the relationship between student's podcast preferences in different contexts and students' learning preference using (VARK).

VARK is a reliable, validated and widely used questionnaire about learning preferences which was developed by Neil Fleming and Colleen Mills (Fleming and Mills 1992). It is necessary to keep in mind, however, that the relationship between students' preferences and students' learning preferences (learning styles) is still unclear. The result of a VARK survey categorises students as unimodal and multimodal learners, which can be subdivided into 23 possible combinations (Fleming 2009). More details of VARK categorizations are shown in Table 3.2.

Table 3.2. *VARK learning preference (Fleming, 2009).*

<i>Learning Preference</i>	<i>Description</i>
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).”
Multimodal (bimodal, trimodal, and quadmodal)	Those who do not have a standout mode with one preference score well above other scores, are defined as multimodal.
VARK Type One	There are those who are flexible in their communication preferences and who switch from mode to mode depending on what they are working with. They are context specific. They choose a single mode to suit the occasion or situation.
VARK Type Two	There are others who are not satisfied until they have had input (or output) in all of their preferred modes. They take longer to gather information from each mode and, as a result, they often have a deeper

and broader understanding. They may be seen as procrastinators or slow-deliverers, but some may be merely gathering all the information before acting – and their decision making and learning may be better because of that breadth of understanding.

VARK Transition                      Individuals whose preferences fall between VARK Type 1 and VARK Type 2.

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The VARK questionnaire consists of 16 questions, each question has four options where participants can leave blank, or choose one or more options. To have a valid entry, 12 out of 16 questions must be completed (i.e. be non-blank). 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. A reliable algorithm has been applied by VARK Learn Limited to classify different VARK subclasses or cohorts free of charge (Fleming, 2009; Leite, Svinicki, & Shi, 2010), this algorithm basically classifies the VARK subclasses into single-mode preference, bi-modal preference, tri-modal preference, or all four-modes preferences VARK, for more details on how to classify VARK please visit: <http://vark-learn.com/introduction-to-vark/research-statistics/>.

### 3.2.5 Personality traits (Big 5)

The study aims to investigate the relationship between students' podcast preferences and students' personality traits in different contexts. The impact of personality on e-learning and m-learning is not a new topic. However, the relationship between students' traits and students' preferences are unclear. One of the well-known major achievements in psychological tools for evaluating personality traits is known as The Big Five Traits taxonomy (BFI-44 (John & Srivastava, 1999)). These five broad personality traits are

extraverted, openness, agreeableness, emotional-stability, and conscientiousness. Within each broad dimension, a range of more specific personality traits are also defined, for more details about the Big 5 personality traits see Table 3.3. The survey consists of 44 self-report questions with a five-point Likert scale to measure. Allocating each trait score has been calculated based on a manual developed by Dr Oliver P. John (Martinez and John), which is attached in Appendix B. Thus, this research examines the relationship between student’s podcast preferences and the independent variable Big 5 personality traits. The Big Five questionnaire is presented in Appendix B.

Table 3.3. Big Five dimensions.

<i>Trait Dimension</i>	<i>Endpoints of the dimensions</i>
Emotional stability	Calm vs anxious Secure vs insecure Self-satisfied vs self-pitying
Extraversion	Sociable vs retiring Fun-loving vs sober Affectionate vs reserved
Openness	Imaginative vs practical Preference for variety vs preference for routine Independent vs conforming
Agreeableness	Soft-hearted vs ruthless Trusting vs suspicious Helpful vs uncooperative
Conscientiousness	Organized vs disorganized Careful vs careless

## 3.3 Methods

### 3.3.1 Sample population

#### 3.3.1.1 The survey study

The survey sample includes Australian and Saudi university students. The Australian universities were: Australian National University (ANU) and University of New England (UNE). The Saudi Arabian universities were: Gassim University and King Abdulaziz University. Details of the courses for the first semester of 2015 are as follows:

1. ANU, unit code: COMP1710/6780, Web Development and Design, 110 students enrolled.
2. UNE, school of computer science.
3. King Abdulaziz, unit code: CPCS206, Principles of Programming, 195 students enrolled.
4. Gassim University, unit codes: MIS243 (Concepts of Computer Programming) and MIS361 (Management Information Systems), 88 students enrolled.

#### 3.3.1.2 The experiment.

The experiment was conducted at ANU, in the School of Computer Science, unit code: (COMP2410/COMP6340) Networked Information Systems. The number of enrolled students in the first semester in 2016 was 150 students. This course is available in the

first semester for students from the schools of Computer Science and Management Information Systems.

### 3.3.2 Participants

#### 3.3.2.1 The survey study

For the survey, paper-based and online survey questionnaires were administered to students in Australia and Saudi Arabia. A total of 345 university students (126 Australians and 219 Saudis) from two Australian universities and two Saudi Arabian universities took part in the study. For more details on participants' demographic data, see Table 3.4.

Table 3.4. Participants' demographics for the survey study.

	<b>Demographics</b>	<b>Australian, N(%)</b>	<b>Saudi, N(%)</b>
<b>Gender</b>	<b>Male</b>	88 (70%)	143 (65%)
	<b>Female</b>	38 (30%)	76 (35%)
<b>Material status</b>	<b>Single</b>	109 (86%)	178 (81%)
	<b>Married</b>	17 (14%)	41 (19%)
<b>Age</b>	<b>18-24</b>	97 (77%)	166 (76%)
	<b>25-34</b>	21 (16%)	34 (15%)
	<b>35-44</b>	7 (6%)	13 (6%)
	<b>45-55</b>	1 (1%)	6 (3%)

### 3.3.2.2 The experimental study

In the experiment, the researcher asked the unit convenor of (COMP2410/COMP6340) Networked Information Systems in the ANU Computer Science School, to recruit students enrolled in the unit to participate in the experiment. Students were informed that their personal details would be anonymous. Three experiments were conducted, one in a quiet place, and two in busy places. In the quiet space, there were 62 participants, and 33 in the busy environment. Consequently, the total number of participants was 95 (63 males, and 32 females), with 54 students aged 18-24, 36 students 25-34, and 5 students aged 35-45.

### 3.3.3 Survey instrument

The survey is cross-sectional with a quantitative approach, and has five sections which are:

1. questions on students' demographic characteristics: gender, age, nationality, and marital status (Appendix A).
2. three questions on students' prior experience with educational podcasting (Appendix A).
3. twelve questions on podcast types and podcast length preference based on 12 different contexts (Appendix A).
4. sixteen questions on students' learning preference using VARK (Appendix C).
5. Forty-four questions on personality traits: BIG5 (Appendix B).

The demographic questions ask for the students' gender (male or female), nationality (Australian or Saudi students), marital status (single or married) and age categorized as 18-24, 25-34, 35-44, and 45-55 years of age. Prior experience with educational podcasts

was assessed by three (yes/no) questions. The questions concerning watching listening and/or reading educational podcast address prior experience via mobile devices.

The third part concerns students' podcast preferences in different contexts (the combination of physical and social spaces), where students reveal their preferences for podcast type and podcast length for all 12 constructed contexts. Students' range of preferences of podcast types are (text, audio, video, and slides synced with audio), whereas podcast lengths are (short less than 5 minutes, moderate less than 15 minutes, and long less than 30 minutes). Moreover, each of the 12 constructed contexts has an option " I don't like to use mobile devices for studying in this context", which indicates that the student is not happy to study using mobile devices in this particular context.

The fourth part is to determine students' learning preferences utilising the VARK questionnaire. The VARK questionnaire consists of 16 questions; each question has four options which participants can leave blank, or choose one or more options. The maximum score is 16 for each set (visual, aural, read/write, and kinesthetic). The result of a VARK survey categorises students as unimodal and multimodal learners, which can be subdivided into 23 possible combinations (Fleming 2009).

The final part was a questionnaire on personality traits. The survey consists of 44 self-report items, with a five point Likert scale to measure the big five traits. The Big five has five broad personality traits which are extraverted, openness, agreeableness, emotional-stability, and conscientiousness. Within each dimension, a range of more specific personality traits are identified, for more details of Big 5 personality traits see Table 3.3.

### 3.3.4 Survey data collection

The survey consists of quantitative questions and self-administrated surveys. Students were recruited from Australia and Saudi Arabia. Participants have been informed that participation was optional and there were no rewards. The survey data was collected in two ways: provision of the survey link by the unit convenor, and paper-based questionnaires administered by the researcher. The survey link was created and published through SurveyMonkey, a well-known cloud-based platform for online surveys, for more details please see: [www.surveymonkey.com](http://www.surveymonkey.com).

On the first page of the survey, an introduction to the thesis topic and background information about the study was provided. In terms of participants' personal details, they have been informed that they will be anonymous. A statement about the importance of participating in the study, and contact details for the researcher and supervisors, and ethics committee (approval no. 2012/006), were also provided. The survey data was collected between January 2015 and April 2015 in Australia and Saudi Arabia.

### 3.3.5 Survey analysis

The survey has been analysed based on the research questions, hypotheses, and nature of the variables. Thus, the independent variables are: demographics, students' prior experience of educational podcasting (dichotomous variable), physical and social spaces (contexts; note context has been treated as an independent variable only in chapter four section 4.4 as nominal variable), personality traits (BIG5) (continues variable), and learning preferences (VARK) as nominal variable. Dependent variables are: students' preference for podcast types: audio, video, text, slides synced with audio, and multiple (when a student has more than one preference, e.g. audio and video) as nominal in chapter 4 and 7, while it is been treated ad ordinal variable in chapter five, and students' preferences for podcast lengths (short, moderate, and long) as ordinal variable in

different contexts. Both dependent variables also have 'none' as a category, which indicates that the student has no preference to study in a particular context (explained in Section 3.3.3). Consequently, the analyses have been conducted based on research questions and hypotheses as follows.

For Chapter Four (the next chapter) three research questions to investigate the two dependent variables (podcast types and podcast lengths), both variables have different natures.

Ch4; RQ1: Is there a significant difference/relationship for podcast preferences in different contexts?

*H0: There is no significant difference/relationship for podcast preferences in different contexts.*

*H1: There is significant difference/relationship for podcast preferences in different contexts.*

A multinomial regression was run to determine if a relationship exists between preferences for podcast type and the twelve constructed contexts. As well, to determine if there are *differences* in podcast preferences between different contexts, a one-way repeated measures ANOVA was conducted to determine whether there was a statistically significant difference in podcast length preferences over context (physical and social spaces).

Ch4; RQ 2: Is there a statistically significant relationship between student's demographic characteristics (gender, material status, nationality, and age) and podcast preferences in different contexts?

*H0: There is no significant relationship between demographic characteristics (gender, material status, nationality, and age) and podcast preferences in different contexts.*

*H1: There is a significant relationship between demographic characteristics (gender, material status, nationality, and age) and podcast preferences in different contexts.*

A Goodman and Kruskal's  $\lambda$  was run to determine if there is a relationship between demographic characteristics (age, gender, marital status, and nationality) and students' podcast type preferences. This helped to determine whether the of students' age, gender, material status, and nationality were correlated with their preferences for podcast types across the contexts (physical and social spaces). Further to this, to determine if there is a relationship between demographic characteristics and students' podcast length preferences, a point-biserial correlation was run to determine the relationship between demographic characteristics with dichotomous variables (gender, material status, and nationality) and podcast length preferences. A Spearman's rank-order correlation test to assess the association between age and podcast length preferences was also conducted.

Ch 4; RQ 3: Is there a significant statistical relationship between a student's prior experience of podcasts and a student's podcast preferences in different contexts?

*H0: There is no relationship between students' prior experience of podcasting and podcast preferences.*

*H1: There is a relationship between students' prior experience of podcasting and podcast preferences.*

A Goodman and Kruskal's  $\lambda$  was run to determine if there is a relationship between students' prior experience of podcasts and students' podcast type preferences. This was to determine whether the prior experience of students listening, reading, or watching podcasts could be better predicted by knowledge of their preferences of podcast types across the contexts (physical and social spaces). On the other hand, to determine if there is a relationship between students' prior experience and students' podcast length preferences, a point-biserial correlation was run between students' prior experience and students' preferences for podcast length in different contexts.

Ch5; RQ 4: Is there a significant difference in podcast preferences between different students' learning preferences (VARK) in different contexts?

*H0: There is no difference in podcast preferences based on students' learning preference (VARK) in different contexts.*

*H1: There is a difference in podcast preferences based on students' learning preferences (VARK) in different contexts.*

To determine the podcast preferences of students with a range of learning preferences (VARK) in different contexts, a Kruskal-Wallis H test was conducted to see if there were differences in preferences for podcast richness between VARK cohorts. Podcast types have usually been ordinally ranked based on Media Richness Theory (MRT). MRT is applied to media preferences in organisational settings; through this theory, podcast types can be ranked based on medium richness (Daft and Lengel 1986) as text, audio, Vodcast, and multiple preferences, respectively.

RQ 5: Is there a statistical relationship between students' personality traits and the level of m-learning engagement in different contexts?

*H0: There is no statistical relationship between personality traits and the level of m-learning engagement in different contexts.*

*H1: There is a statistical relationship between personality traits and the level of m-learning engagement in different contexts.*

To determine if there is a relationship between students' personality traits and *the level of m-learning engagement*, a cumulative odds ordinal logistic regression with proportional odds was run. This test helps to determine the effect of the Big 5 personality traits, namely: Extraverted, Agreeableness, Conscientiousness, Emotional-stability, and Openness, on mobile learners' podcast length preferences in different contexts.

### 3.3.6 Experiment data collection

In many experiments, only a convenience sample is possible because the investigator must use naturally formed groups (e.g., a classroom, an organisation, a family unit) or volunteers. When individuals are not randomly assigned, the procedure is called a quasi-experiment.

Prior to data collection an ethics application was approved by the university's human research ethics committee (approval no. 2012/006). University students' responses were collected anonymously, and they could opt out at any time.

Ninety-five participants were recruited (62 males, and 33 females), 54 students aged 18-24, 36 students 25-34, and 5 students aged 35-45. Students were recruited from the Computer Science School at the Australian National University, from unit code COMP2410/6340, which had an enrolment of 150 students. Access was gained via the unit coordinator, who asked the students to participate. The researcher also asked the students to take part and introduced them to the experiment, and why it was important to join in. In the quiet environment, 62 students participated, and in the busy environment, 33 students participated.

For the busy environment, there were two experiments (second and third), this is because only 14 students participated in the second experiment, and the plan was to enrol 30 participants or more for the busy environment. Thus, to increase participation for the third experiment, the students were emailed twice a week, with the email providing information on when and where the experiment would take place, how long it would take, and how important it is to participate. The experiment was scheduled after 5:00 PM as students were less likely to have classes at this time. The researcher made sure that students who participated in the second experiment would not participate in the third experiment.

### 3.3.7 Experiment learning material and tasks

For the learning materials students were to choose from, three kinds of lecture were prepared for podcast, those were audio, text, and slides synchronized with the audio (Vodcast) (see the examples of the text and slides material in Figure 3.3). The materials were from one of the lectures in the previous semester, which participants had

not yet attended, and edited to suit each format. That is, the text materials (slides) were the same to the contents of Vodcast (slides + audio). As shown in Figure 3.3, tasks (quizzes) were also prepared from the content of the lecture by the lecturer. Note, the quizzes are out of the PhD's scope.

Figure 3.3. An example of podcast text (left), and quizzes provided (right).

### 3.3.8 Experimental Design and procedure

We prepared web pages using Qualtrics software (<https://www.qualtrics.com/>) in the following sequence. The first phase (*the pretest*) is a survey consisting of consent forms, and asks participants to select one or more of the learning materials (podcast type), i.e. audio, text, and/or slides synchronised with audio, for two different environments (physical spaces), quiet and busy. This phase is called Podcast Preference. The second phase is (*the post-test*) where participants select the Podcast Choice. Based on the podcast choice, the selected podcast type is presented, and quizzes are provided to

investigate the learning effect (which is out of the PhD's scope). After that, a page measures the user's satisfaction with their choices.

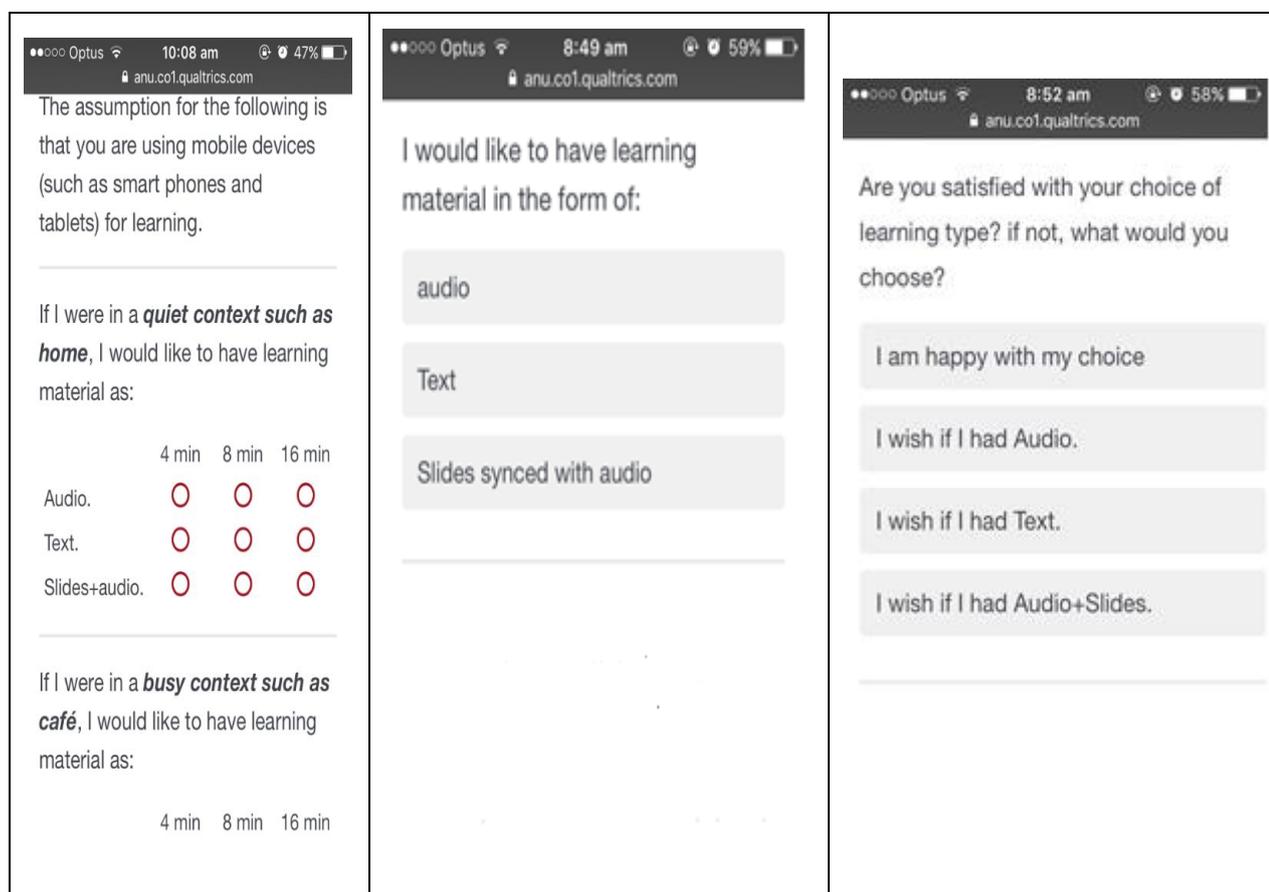


Figure 3.4. students' podcast preferences (left), students' podcast choices (middle), page measures students' satisfaction regarding their choices (right).

Three experiments were conducted to examine learners' preferences for learning material according to the learning environments (quiet and busy). The first experiment was held with a lecture theatre as the quiet learning environment (see Figure 3.5). We firstly provided ear-phones to prevent participants being disturbed by each other due to the sounds of the learning materials. When all participants were ready with their own mobile devices, such as smartphones, tablets, and laptops, the web URL and a QR code were shown by using a beam projector to allow the participants to access the learning materials and tasks.

The second and third experiments were conducted in a busy learning environment. We prepared food (pizza and bread), drinks (coffee and tea) and background music in a small lecture room as shown in Figure 3.6, so that participants feel like they are in a café. Participants were free to access the drinks and food while attending the experiment.

The procedure in the second and third experiments was very similar to the first one. However, the web pages displayed different tasks and learning materials to prevent participants remembering the materials and quizzes from the first experiment. Participants were assisted with any issue concerning the experiment by experimenters, and there were no time limits to finish the tasks.



Figure 3.5. Students in lecture theatre as a quiet environment where headphones were provided to prevent noise.

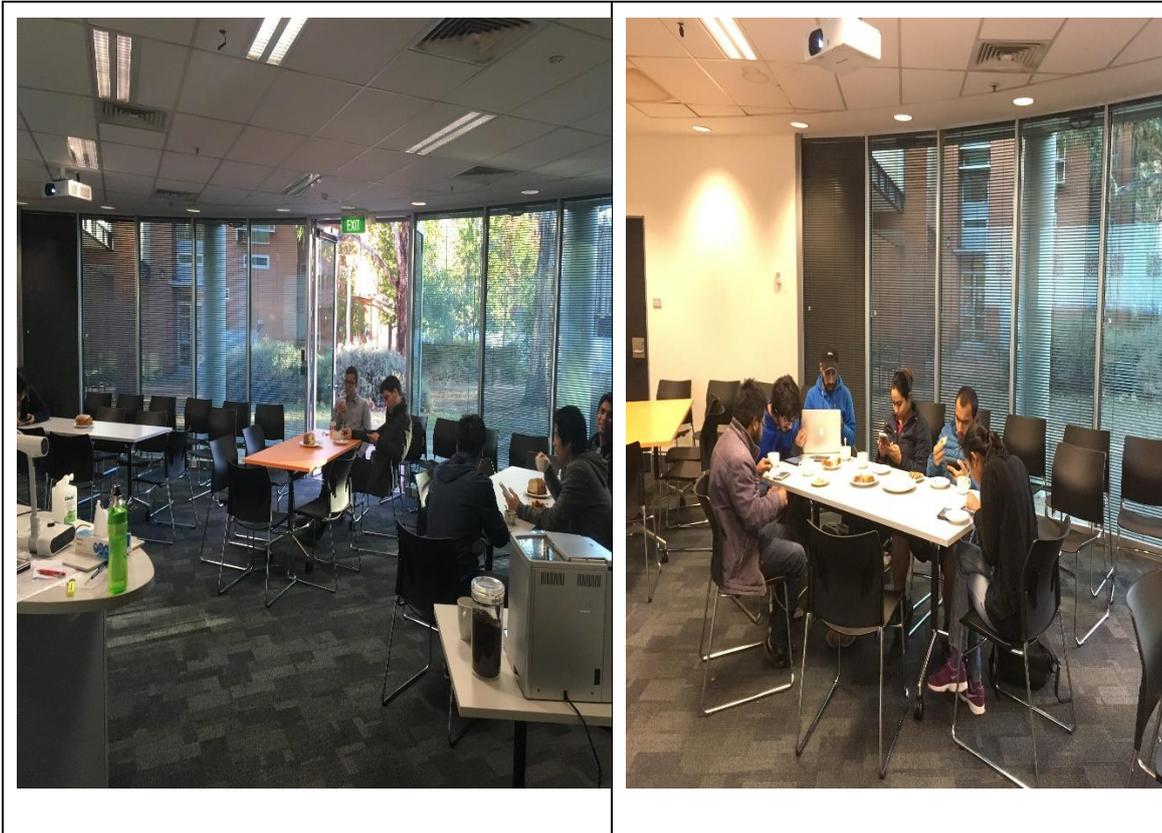


Figure 3.6. Students in lecture theatre as a busy environment.

### 3.3.9 Experiment data analysis

The aim is to determine students' preferences (a nominal factor) and compare students' choices of podcasting type (a nominal dependent variable). Thus, our research question and hypotheses are as follows:

*Are podcast preferences similar to podcast choices in different physical spaces (quiet and busy), and what are the mobile learners' satisfaction levels based on podcast choices?*

*H0: student podcast preferences will be similar to student podcast choices in different physical spaces.*

*H1: student podcast preferences will not be similar to student podcast choices in different physical spaces.*

The analysis of experimental data is presented in three phases. First, a descriptive analysis to explore the nature of the data to show students' podcast preferences, podcast choices, and satisfaction in quiet and busy environments. Second, students were classified based on podcast preferences to show the students' choices as well as their satisfaction. Third, based on the classification explained in the second phase, a two multinomial regression has been run (for quiet and busy contexts) to investigate if choices can be predicted by acknowledging students' preferences for podcast types. Thus, our factor is students' preferences from three categories (audio, text, and Vodcast) and our dependent variable is students' choices from three categories (audio, text, and Vodcast) in two different contexts.

### 3.3.10 Validity and reliability

The survey instrument for determining podcast preferences in different contexts has been tested for validity and reliability. First, a pilot study was conducted with three Australian students to make sure that the podcast preferences survey questions were understandable and clear. Next, the same pilot study with the Arabic translated version was conducted with three Saudi students. Regarding reliability, podcast preferences consist of 24 questions. The scale had a high level of internal consistency, as determined by a Cronbach's alpha of 0.963 for the Arabic version, and 0.959 for the English version.

For personality traits, the Big Five have been widely used in research, and they have been shown to have excellent psychometric properties (John & Srivastava, 1999). The

big five 44-items reliability for each trait are as follow: extraversion 0.88, agreeableness 0.79, conscientiousness 0.82 emotional-stability 0.84, and openness 0.81 (John & Srivastava, 1999). The VARK learning preferences questionnaire is also well-known and has been used in many fields, especially in educational research, and all VARK subscales proved satisfactory for reliability (Leite et al., 2010). The reliability (Cronbach's alpha) for VARK subscales are: visual.85, aural.82, read/write .84, and kinesthetic 0.77 (Fleming, 2009).

The experiment is to validate and overcome the weakness of the survey results. Regarding experimental validity, the researcher ensured that the pre-test and post-test items are clear to understand.

### 3.3.11 Limitations

I have to acknowledge several limitations in this thesis. First, there is a small sample size for the surveys and experiments. Second, a gender imbalance is noticeable for both the data collected in the surveys and experiments. Third, there is an imbalance in the sample size collected for the surveys for nationality (the number of Australian participants compared to participation from the Saudi students). Fourth, the students are selected from computer science and similar disciplines, as I assume that they have more interest and background towards technologies such as mobile learning compared to students from other disciplines. Fifth, the sampling technique for both the survey and experiments are convenience sampling, which implies a nonrandom procedure used for selecting the sample. Consequently, with those limitations and nonprobability sampling (convenience sampling), thesis findings have limits if generalising to a larger population.

There are a number of limitations of using big five test and one of the major limitations is the lack of other personality traits such as sense of humour and honesty. Another drawback is the cultural influence with respect to two aspects. First, participants' reaction to the big five questionnaire most likely to provide answers which are acceptable by society and surrounded culture rather than revealing on what they really feel. The other aspect is that culture is affecting the degree of each personality trait, in

other word, a different cultures show significant different in personality traits (e.g. the degree of Saudis' agreeableness is significantly higher than Australians).

Regarding the instruments, and especially with the VARK questionnaire, there is no match between the Kinaesthetic dimension as one of the factor's levels and the nature of the dependent variable (podcast types: audio, text, Vodcast). This is because Kinaesthetic learning (one of the VARK cohorts) is learning by physical activities, and none of the podcast types (text, audio, and Vodcast) can be engaged with in that way.

### 3.4 Result chapters' organization

This thesis has four results chapters. Chapters 4 to 6 present results from the survey study, while Chapter 7 presents results drawn from the experimental study. The following discussion explains the independent variables and dependent variables in each chapter.

Chapter 4 has been inferentially analysed, with the dependent variables being podcast types and lengths. The independent variables are social and physical spaces (contexts), demographic characteristics (gender, material status, nationality, and age), and prior experience. This chapter will show the effect of contexts on podcast preferences, the relationship between demographic characteristics and podcast preferences in different contexts, and the relationship between prior experience and podcast preferences in different contexts.

Chapter 5 has ordered podcast types based on media richness theory, with the following order (no preference, text, audio, video, and multiple podcast). The aim is to examine if there is a relationship existing between students' podcast preferences and students' learning style (VARK) in different contexts. Thus, the dependent variable is podcast

richness preference in different contexts, whereas student's learning preferences are the independent variables.

Chapter 6 focuses on podcast length preferences. This chapter examines the effect of personality traits and contexts on podcast length preferences. Thus, the dependent variable is podcast length preferences, and personality traits and contexts are independent variables.

Chapter 7 reports on an experimental study to compare podcast preferences with podcast choices, and to measure satisfaction based on student choice. The factor is students' preferences for three categories (audio, text, and Vodcast) and the dependent variable is students' choices from three categories (audio, text, and Vodcast) in two different contexts (quiet and busy).

# Chapter 4 THE EFFECT OF DEMOGRAPHICS, PRIOR EXPERIENCE, AND CONTEXT ON PODCAST PREFERENCES

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## 4.1 Introduction

This chapter focuses on the relationship between podcast preferences, and the physical and social spaces student's inhabit. The analysis will focus on the students':

1. Age groups, gender, and material status.
2. Podcast prior experience (listened, watched, and read).

The chapter demonstrates that students' demographic characteristics affect m-learning (podcast) preferences significantly in some contexts. The reasons why m-learning preferences are affected by students' social characteristics are discussed in this chapter.

## 4.2 Exploring the relationship between demographics and podcast preferences in different contexts

### 4.2.1 The association between demographics and podcast type preference

In this section, the connection between demographics and preferences for podcast types will be examined in a number of different contexts. Thus, a Goodman and Kruskal's  $\lambda$  test was run to determine whether a set of characteristics, i.e., students' age, gender, material status, and nationality, can be predicted by their preferences for podcast types in different physical and social contexts (see Table 4.1).

Table 4.1. Predicting podcast type preferences based on age, material status, and nationality

Predictors:	Age		Material status		Nationality
	AU	SA	AU	SA	Both AU&SA
Walking alone					14%**
Vehicle with friend	13.2%**		9.2%*		
Vehicle with family				9.4%*	

Note: significant level: \*P<0.05; \*\*P<0.01.

The Goodman and Kruskal's  $\lambda$  was 13.2% (as shown in Table 4.1) for being in a car with a friend and age. This was a statistically significant reduction in the proportion of errors due to knowing the students' age as a predictor of the type of podcast preferred in the context of being in a vehicle with a friend. Hence, Table 4.2 is provided to show the distribution of podcast preferences by students' age.

This shows that Australian students in the age category from 25 to 44 preferred to access multiple podcasts (43%-62%) when compared to 18-24 years old students (23%). This means that many students in the youngest age category (18-24) are not willing to access podcasts (44%) when they are with friends in a vehicle.

Goodman and Kruskal's  $\lambda$  was 9.2% as shown in Table 4.1. This was a statistically significant reduction in the proportion of errors due to knowledge of the students' age as a predictor of the type of podcast preferred for Australian students in vehicle with friend context. Hence, Table 4.2 is provided to show the distribution of podcast preferences by students' material status. The table show that married Australian students are more willing to access podcasts compared to single students if they are in a vehicle with friends.

Goodman and Kruskal's  $\lambda$  was 9.4% as shown in Table 4.1. This was a statistically significant reduction in the proportion of errors due to the knowledge of Saudi students' material status as a predictor of the type of podcast preferred in a vehicle with friend context. Hence, Table 4.2 is provided to show the distribution of podcast preferences according to students' material status. The table shows that single Saudi students are more willing to access multiple podcasts compared to Saudi married students in the 'vehicle with family' context.

Goodman and Kruskal's  $\lambda$  was 14% as shown in Table 4.1. This was a statistically significant reduction in the proportion of errors due to knowledge of students' nationality (Australian and Saudi) as a predictor of the type of podcast preferred while walking alone. Hence, Table 4.2 is provided to show the distribution of

podcast preferences by students' nationality. Finally, while walking alone, the Australians prefer audio (47%) while Saudi students prefer multiple podcasts (35%).

Table 4.2 the distribution of preferences by age, material status, and nationality in statistically significant contexts.

Context & nationality	predictor		Multiple podcast	Vodcast	Audio	Text	None
Australian in vehicle with friend	Age:	18-24	23%	2%	15%	15%	44%
		25-34	62%	0%	5%	11%	24%
		35-44	43%	0%	29%	0%	29%
Australian in vehicle with friend	Material status	Married	59%	0%	18%	6%	18%
		Single	27%	2%	14%	15%	43%
Saudis in vehicle with family		Married	17%	20%	5%	10%	49%
		Single	42%	14%	4%	7%	33%
Comparison between both nationalities while walking alone	Nationality	Australian	15%	1%	47%	2%	36%
		Saudi	35%	12%	20%	11%	23%

#### 4.2.2 The effect of demographics on podcast length preferences

This section explores the association between demographics and podcast length preferences in different contexts. A point-biserial correlation was run to determine the relationship between demographics with dichotomous values (gender, material status, and nationality) and podcast length preferences. A Spearman's rank-order correlation was also used to assess the association between age and podcast length preferences.

As shown in Table 4.3, there were statistically significant correlations between gender and preferred podcast length (level of engagement) in social contexts namely: Busy with friend, Busy with family, Walking with Friend, and Vehicle with Friend. Saudi male students were more engaged with podcasting than Saudi female students.

Also, Table 4.3 shown that there were statistically significant correlations between material status and preferred podcast length (level of engagement) in moving social contexts for Australian students, and in family contexts for Saudi students. Married Australian students were more engaged with podcasting than single students; however single Saudi students singles were more engaged with podcasting than married students.

There is a negative correlation between Australian students' age and podcast length in the 'busy' and 'family' contexts. This indicates that the older Australian students are less receptive to accessing podcasts while they are busy with family. Also, for age, a positive correlation between age and podcast length can be seen in

different contexts for Saudi students. This suggests that the older the Saudi students, the longer the length of podcast they prefer when they are alone, in a busy context, or in a vehicle with classmates or friends.

Regarding nationality, Australian students are willing to receive longer podcasts in the 'busy' and 'vehicle' contexts compared to Saudi students, regardless of social status or space. Alternatively, Saudi students prefer longer podcast lengths compared to Australians when they are walking, regardless of the social space (alone, family, classmate, or friend).

#### 4.3 A correlation between students' demographics and podcast length preferences in different contexts.

Demographics:	Gender		Age		Material status		Nationality
	AU	SA	AU	SA	AU	SA	Both
Context:							
Quiet & alone							
Busy & Alone				.159*			.129*
Busy with family		.144*	-.199**			.143*	
Busy with friend		.204**					
Busy with classmate							.187**
Walking alone							-.137*
Walking with family						.135*	-.115*
Walking & Friend		.187**			-.329**		-.156**
Walking & Classmate					-.250**		-.144**
Vehicle with family							.116*

<b>Vehicle with friend</b>	.249**	.133*		
<b>Vehicle with classmate</b>		.149*	-.235**	.109*

Note: significant level: \*P<0.05; \*\*P<0.01.

### 4.3 The relation between prior podcast experience and podcast preferences

This section explores the relationship between prior experiences of podcasts and podcast preferences. A total of 126 Australian and 219 Saudi Arabian students answered the question: ‘Have you ever listened/watched/read educational learning materials using your mobile device?’, as shown in Table 4.4.

Table 4.4. Students experience of accessing educational learning materials using mobile devices

	<b>Listening</b>	<b>Watching</b>	<b>Reading</b>
<b>Australia</b>	43.7%	84.9%	94.4%
<b>Saudi Arabia</b>	75.8%	89.5%	83.1%

There are two questions to be answered here: the first explores the association between prior experience and podcast preference type, and the second examines the impact of prior experience on podcast length preferences (level of engagement).

A chi-square test for independence was conducted to determine the influence of prior podcast experience by nationality (Australians and Saudis). The differences were found to be statistically significant for prior podcast experiences listened and read, both with a p-value < 0.01, indicating that Australian compared to Saudis have more experience on reading learning materials using mobile devices, while

Saudis have more experience listening to learning materials compared to Australians using mobile devices.

#### 4.3.1 The association between prior experience and podcast type preference

This section explores the effect of prior experiences (read, listened, and watched) on preferences for podcast type (multiple, Vodcast, audio, text, and none). Thus, Goodman and Kruskal's  $\lambda$  tests were run to determine whether the prior experience of students could be better predicted by knowledge of their preferences of podcast types across the contexts (physical and social spaces).

Goodman and Kruskal's  $\lambda$  was 11.1% for only one context, indicating a statistically significant reduction in the proportion of errors due to knowledge of Saudi students' podcast listening experience as a predictor of the type of podcast preferred in a vehicle with classmate context. Hence, Table 4.5 is provided to show the distribution of podcast preferences cross-tabulated with students' podcast listening experience. The table shows that the students with prior listening experience are open to experiencing more text, audio, vodcast, and multiple podcasts, compared to students' with no listening experience, in the 'vehicle' context with a classmate.

Table 4.5. shows Saudi students' preferences for different podcast types in *the 'vehicle with classmate'* context based on prior experience listening to podcasts.

Prior experience on podcast?	No preference	Text	Audio	Vodcast	Multiple podcast
No	58%	2%	2%	8%	30%
Yes	31%	7%	8%	13%	41%

### 4.3.2 The association between prior experience and podcast length preference

This section explores the relationship between students' prior experience of podcasts and their preferences for length of the podcast. Thus, a point-biserial correlation was run between students' prior experience and students' preferences for podcast length (none, short, moderate, and long) in different contexts.

Positive correlations were found for students' prior experience of (listening & watching) and preferred podcast length (level of engagement) in a number of contexts as shown in Table 4.6. This indicates that students with listening and watching experience preferred to be more engaged with podcasts than students with no listening and watching experience.

Table 4.6. The association between students' preferences for podcast engagement and their prior experience of podcasts (listening, watching, reading).

Context	Listening		Watching		Reading	
	AUS	SA	AUS	SA	AUS	SA
Quiet & Alone	.224*	.153*	.182*	.178**		
Busy & Alone		.151*				
Busy with Classmate		.137*				
Vehicle with family		.158*				

Note: significant level: \*P<0.05; \*\*P<0.01.

## 4.4 The effect of context on podcast preferences

This section discusses the effect of physical and social space (explained in Chapter 3) on students' preferences for podcast type (none, text, audio, Vodcast, and

multiple) and podcast length (none, short, moderate, and long). This is important, as previous studies have not considered the effect of mobility on preferences of podcast type and length, as explained in chapters 1 and 2. This section has been divided into two subsections: *the effect of physical and social spaces on podcast type preferences*, and *the effect of physical and social spaces on podcast length preferences*.

#### 4.4.1 The effect of physical and social spaces on podcast type preferences

This section shows the effect of context (physical and social spaces) on Australian and Saudi students' preferences for podcast types (text, audio, vodcast, multiple preference, or a selection of two or more podcast types), and no preference (when a student has no preference for receiving podcasts in particular contexts).

Table 4.7. The effect of contexts on podcast type preferences.

	No preference							
	(Away from m-learning)		Text		Audio		Vodcast	
	Exp(B)		Exp(B)		Exp(B)		Exp(B)	
	AU	SA	AU	SA	AU	SA	AU	SA
1	.359**	.135***	.974	.751	.170**	.434	12.361***	1.250
2	.526	.704	2.357*	1.683	.350*	.292*	7.000*	.945
3	2.778***	1.894**	1.913	.979	.315	.255*	3.939	.916
4	2.926***	2.274***	3.202**	.876	.090*	.569	8.069**	.854
5	.558	.779	2.339*	.775	.096**	.504	6.741*	.739
6	3.241***	.665	.391	1.930	8.074***	3.127***	1.368	1.135
7	7.164***	2.150***	.218	.741	2.600*	1.193	3.059	.551

<b>8</b>	8.797***	2.082***	.796	.636	3.157**	1.285	3.714	.771
<b>9</b>	3.737***	1.416	.571	1.140	2.300*	1.976	2.000	1.038
<b>10</b>	1.130	.999	1.211	1.276	1.357	.691	1.696	1.369
<b>11</b>	1.754	1.659*	1.619	1.641	1.200	1.156	1.333	1.333

\*p < .01, multiple podcast and vehicle with classmate as reference, Note: 1: (quiet & alone), 2: (busy alone),3: (busy with family) ,4: (busy with friend) ,5: (busy with classmate),6: (walking alone),7: (walking with family),8: (walking with friend),9: (walking with classmate),10: (vehicle with family), and 11: (vehicle with friend).

Thus, we can summarise students’ preferences for (audio, text, and Vodcast) in the contexts as follows:

- **Text:** Australian students prefer text in all busy contexts except with family nearby.
- **Audio:** both cultures prefer audio while walking alone, and Australian students prefer audio in all walking contexts. On the other hand, students dislike audio in all stationary contexts (quiet and busy).
- **Vodcast:** students prefer Vodcast in all stationary contexts except with family.
- Finally, students (Australian and Saudi) are less open to accessing m-learning while friends and family are around, and in all walking contexts for Australian students.

#### 4.4.2 The effect of physical and social spaces on podcast length preferences

In this section, we will investigate the differences in podcast engagement between contexts. So, podcast length preferences are the dependent variables, and the contexts of physical and social spaces are the independent variables. A one-way

repeated measures ANOVA was conducted to determine the differences in podcast engagement between different contexts.

The results show significant differences for podcast engagement across contexts for both Australian and Saudi students. Thus, post hoc tests with Bonferroni adjustments were applied to determine the differences in podcast engagement across the 12 contexts for both cultures. Refer to Table 4.8 for Australian students, and Table 4.9 for Saudi students.

Tables 4.8 and Table 4.9 demonstrate the differences in podcast engagement in different contexts. For example, the level of engagement with m-learning is very high in quiet and alone contexts, compared to the walking with friends contexts.

Table 4.10 presents information about the level of engagement with m-learning based on contexts. The context order has been ranked from highest to lowest according to podcast engagement. That is the first context has the highest engagement level, and the subsequent ones have lower engagement levels.

Table 4.8. the effect of contexts on m-learning (podcast) engagement for Australian students.

	1	2	3	4	5	6	7	8	9	10	11	12
1												
2	1.560*											
3	4.184*	2.624*										
4	3.928*	2.368*	-.256									
5	1.616*	.056	-2.568*	-2.312*								
6	3.320*	1.760*	-.864*	-.608	1.704*							
7	4.952*	3.392*	.768*	1.024*	3.336*	1.632*						
8	5.080*	3.520*	.896*	1.152*	3.464*	1.760*	.128					
9	4.472*	2.912*	.288	.544	2.856*	1.152*	-.480	-.608*				
10	2.296*	.736	-1.888*	-1.632*	.680	-1.024	-2.656*	-2.784*	-2.176*			
11	3.224*	1.664*	-.960	-.704	1.608*	-.096	-1.728*	-1.856*	-1.248*	.928*		
12	2.424*	.864	-1.760*	-1.504*	.808	-.896	-2.528*	-2.656*	-2.048*	.128	-.800*	

\*p < .01, Note: 1: (quiet&alone), 2: (busy alone),3: (busy with family) ,4: (busy with friend) ,5: (busy with classmate),6: (walking alone),7: (walking with family),8: (walking with friend),9: (walking with classmate),10: (vehicle with family),11: (vehicle with friend),12: (vehicle with classmate).

Table 4.9. the effect of contexts on m-learning (podcast) engagement for Saudi students.

1	2	3	4	5	6	7	8	9	10	11	12
1											
2	2.479*										
3	4.147	1.668*									
4	4.270	1.791*	.123								
5	2.981	.502	-1.166*	-1.289*							
6	2.436	-.043	-1.711*	-1.834*	-.545						
7	4.303	1.825*	.156	.033	1.322*	1.867*					
8	4.242	1.763*	.095	-.028	1.261*	1.806*	-.062				
9	3.578	1.100*	-.569	-.692*	.597	1.142*	-.725*	-.664*			
10	3.071	.592	-1.076*	-1.199*	.090	.635	-1.232*	-1.171*	-.507		
11	3.768	1.289*	-.379	-.502	.787*	1.332*	-.536*	-.474	.190	.697*	
12	3.152*	.673	-.995*	-1.118*	.171	.716	-1.152*	-1.090*	-.427	.081	-.616*

\*p < .01, Note: 1: (quiet&alone), 2: (busy alone),3: (busy with family) ,4: (busy with friend) ,5: (busy with classmate),6: (walking alone),7: (walking with family),8: (walking with friend),9: (walking with classmate),10: (vehicle with family),11: (vehicle with friend),12: (vehicle with classmate).

Table 4.10. The order of contexts by level of engagement with m-learning.

The level of engagement with m-learning	Context name	
	Australian	Saudi
<b>1 (very high)</b>	Quiet and alone	Quiet and alone
	Busy and alone	
<b>2 (high)</b>	Busy and classmate	Walking alone
	Vehicle with family	
	Vehicle with classmate	
<b>3 (high to moderate)</b>	Vehicle with friend	Busy and alone
		Busy with classmate
<b>4 (moderate)</b>	Walking alone	Vehicle with family
		Vehicle with classmate
<b>5 (moderate)</b>	Busy with friend	Walking with classmate
		Vehicle with friend
<b>6 (moderate to low)</b>	Busy with family	Busy with family
		Busy with family
		Walking with classmate
<b>7 (low)</b>	Walking with classmate	Walking with friend
		Walking with family
<b>8 (low)</b>	Walking with family	
<b>9 (very low)</b>	Walking with friend	

## 4.5 Discussion and conclusion

In this section, the more important findings are highlighted, and the effect of demographics and prior experience on m-learning preferences in different contexts are discussed, as well as the impact of contexts on m-learning preferences. Thus, this section has three subsections.

#### 4.5.1 The effect of demographics on m-learning preferences

Males in some contexts seem to be more engaged with m-learning than females. Table 4.3 shows that many contexts have a significant correlation between m-learning engagement and male students. This is to be expected, as females and males have been shown to have different learning preferences (Bolliger, Supanakorn, & Boggs, 2010; Wehrwein, Lujan, & DiCarlo, 2007). This may be explained by the general tendency of males to use technology more readily than females (Durnell & Thomson, 1997; Mitra et al., 2000; Whitley, 1997).

Compared with single and younger students, married and older students prefer to engage more with m-learning while their families are not around. This can be seen in Table 4.3 and the positive correlation between married students and m-learning engagement while being alone or with a friend and classmates. On the other hand, single students more readily access m-learning while around their families (e.g. context busy with family) than married students. Similarly, older students engage more with m-learning while alone or with friends and classmates than younger students. Consequently, older and married students prefer to use more rich podcasts when they are around friends and classmates compared to young and single students, as shown in Table 4.2. This can be explained by the time constraints of m-learning users, as found by Pagani (2004) who surveyed 1000 participants on the perceived usefulness of mobile devices, where time-saving was the second most important issue in the mobile context. Similarly, Torres and Gerhart (2017) demonstrated that participants' time urgency has a significant effect on perceived usefulness to use mobile devices. In this study, a possible

reason is due to the greater time constraints and family responsibilities of older/married students compared to younger/unmarried students while family around. The family usually means partners and children for older/married students, but more likely means parents and siblings for younger/single students. Thus, various responsibilities make it more difficult for older students to engage in m-learning than younger students in family contexts.

With regards to cultural differences and m-learning preferences, Saudi students engage more with m-learning while walking, and Australians are more engaged when classmates are around. Table 4.3 shows that Australian students are more engaged with m-learning when around classmates except when walking, compared to Saudi students, who are more engaged with m-learning in all walking contexts. Likewise, Hamidi and Chavoshi (2017) have found that cultural differences have a significant effect on m-learning adoption. In this study, a possible reason could be that walking in Saudi Arabia is less distracting than in Australia. Australian people often walk every day, and mostly during daytime, for various purposes (e.g. shopping for groceries, walking to public transport and to work). However, because of the very high temperatures in Saudi Arabia (even by Australian standards), people are most likely to be walking after daylight hours, and mostly for recreation. Thus, most Saudis walk for leisure, while Australians are more likely walking for a purpose, which means that Saudi students have more opportunities for m-learning while walking than Australians.

#### 4.5.2 The effect of prior experience of podcasting on m-learning preferences

Prior experiences of listening to and watching podcasts have positive effects on m-learning engagement. Table 4.6 shows that students with listening experience prefer m-learning in several contexts: quiet and alone, busy alone, busy with a classmate, and vehicle with family. Previous experience watching podcasts has only one positive effect on engagement with m-learning, i.e., in the quiet and alone context. In general, prior experience on m-learning has a significant effect on students' intention to use m-learning (Hamidi & Chavoshi, 2017; Karimi, 2016; Kim, Lee, & Rha, 2017). As with this study, Copley (2007) found that the majority of students rated audio and video as positive learning experiences. Another study (Bolliger et al., 2010) showed that course grades were significantly higher when students revised with Vodcast rather than traditional revision methods. The same study also showed that student grades are positively correlated with student's prior vodcast experience. Thus, research results show that watching has only a small effect compared to listening. This is probably because of two inter-related reasons. First, vodcast requires more time and is more data intensive than audio, which is why students with watching experience prefer Vodcasting in quiet contexts (e.g. home and library), which usually have access to free WiFi or a cheap internet subscription.

Prior experience with reading and m-learning does not affect preferences in all m-learning contexts, as shown in Table 4.6. In fact, in a study by (Woodcock, Middleton, & Nortcliffe, 2012), respondents noted the difficulty of reading using smartphones and stressed the need for software to facilitate reading text. This is

probably due to technical challenges such as small screen size. Thus, reading as prior experience did not feature significantly in the results.

Watching learning materials (e.g. Vodcast) through m-learning may be more readily used in m-learning in the near future. It is expected that connectivity will be faster, and data subscriptions will be cheaper. This will minimise the negative features that currently make Vodcasting less attractive, such as the time required to download, and the high cost of data, especially in outdoor contexts (e.g. walking). On the other hand, reading learning materials using smartphones will probably do not effect m-learning engagement in the near future, as the small screen size of smartphones is unlikely to change.

#### 4.5.3 The effect of contexts on m-learning preferences

The context 'quiet and alone' has a positive effect on m-learning engagement, as does podcast richness. On the other hand, contexts such as 'walking with a friend' have a perceived low preference in m-learning engagement and podcast richness. Table 4.10 shows students' preferences for podcast engagement, from the longest to the shortest according to m-learning contexts, while Table 4.7 shows preferences for podcast type in each context. Similar to our study, Karimi (2016) has found that m-learning adoption varies from context to another (e.g. personal innovativeness has a positive effect on informal m-learning context, but no effect on formal m-learning contexts). In this study, contexts have similar effects on podcast type and length preferences, i.e. the longer the length of podcast a student

prefers in a particular context, the more likely they are to prefer a rich podcast in the same context.

# Chapter 5 THE RELATION BETWEEN LEARNING PREFERENCES (VARK) AND PODCAST PREFERENCES IN DIFFERENT CONTEXTS

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## 5.1 Introduction

This chapter investigates the relationship between mobile learners' learning preferences (VARK) and their preferences of podcast type in a range of physical and social spaces (See chapter 3 for VARK learning preferences and the context of physical and social spaces). Thus, this chapter aims to:

- Categorise mobile learners' learning preferences (VARK) into different cohorts.
- Explore the relationship between learning preferences(VARK) and podcast type preferences in different contexts.
- Investigate podcast preferences for each VARK group individually in different contexts.

In this chapter, podcast types have been ranked drawing on Media Richness Theory (MRT) (Daft & Lengel, 1986) which is explained in Chapter 3. Thus, students' preferences for m-learning have been ranked based on podcast richness as illustrated in Table 5.1.

Table 5.1. Podcast type preferences have been ranked based on MRT from low to high.

Podcast types	podcast richness
No preference	<div style="text-align: center;">  </div>
Text	
Audio	
Vodcast/ or slides synced with audio	
Multiple podcast preference	

Wu et al. (2012) conducted a comprehensive review of podcast trends and concluded that the impact of individual differences on podcast design has rarely been studied. By considering learning styles which may affect podcast type preferences, the results of this study may be useful for designing educational podcasts for people with a range of learning preferences and in different contexts.

This chapter shows that four VARK groups' podcast richness preferences fluctuate between high and low across the contexts, and discusses the possible causes of

these fluctuations. The results also show that there is no consistent relationship between VARK groups and podcast preferences for all contexts, which is elaborated in the discussion section.

## 5.2 Result

### 5.2.1 Students classification based on VARK learning preferences

Out of 345 participants from both cultures (Australian and Saudis) we have included 338 participants. This is because VARK guidelines require that at least 12 out of the 16 questions of the VARK questionnaire are answered for the respondent to be included (Fleming, 2009). Thus, 7 participants were excluded out of 345, as they have not met this threshold.

Students from both cultures have been classified into nine VARK cohorts. The classification is based on VARK guidelines illustrated in detail by Fleming (2009), which can identify up to 23 cohorts. Thus, the nine VARK cohorts are: Aural (A), Kinesthetic (K), Read/write (R/W), Visual (V), Visual/Kinesthetic (VK), Visual/Read/Write (VR), VARK Type One (VARK1), VARK Transition (VARK-T), and VARK Type Two (VARK2).

An illustration of the distribution of VARK cohorts based on gender and culture is provided in Table 5.2, Figure 5.1, and Figure 5.2. Table 5.2 shows the distribution of the VARK cohorts cross-tabulated with gender and culture. Figure 5.1 shows the distribution of the VARK cohorts by gender for Australians, while Figure 5.2 shows gender for the Saudis.

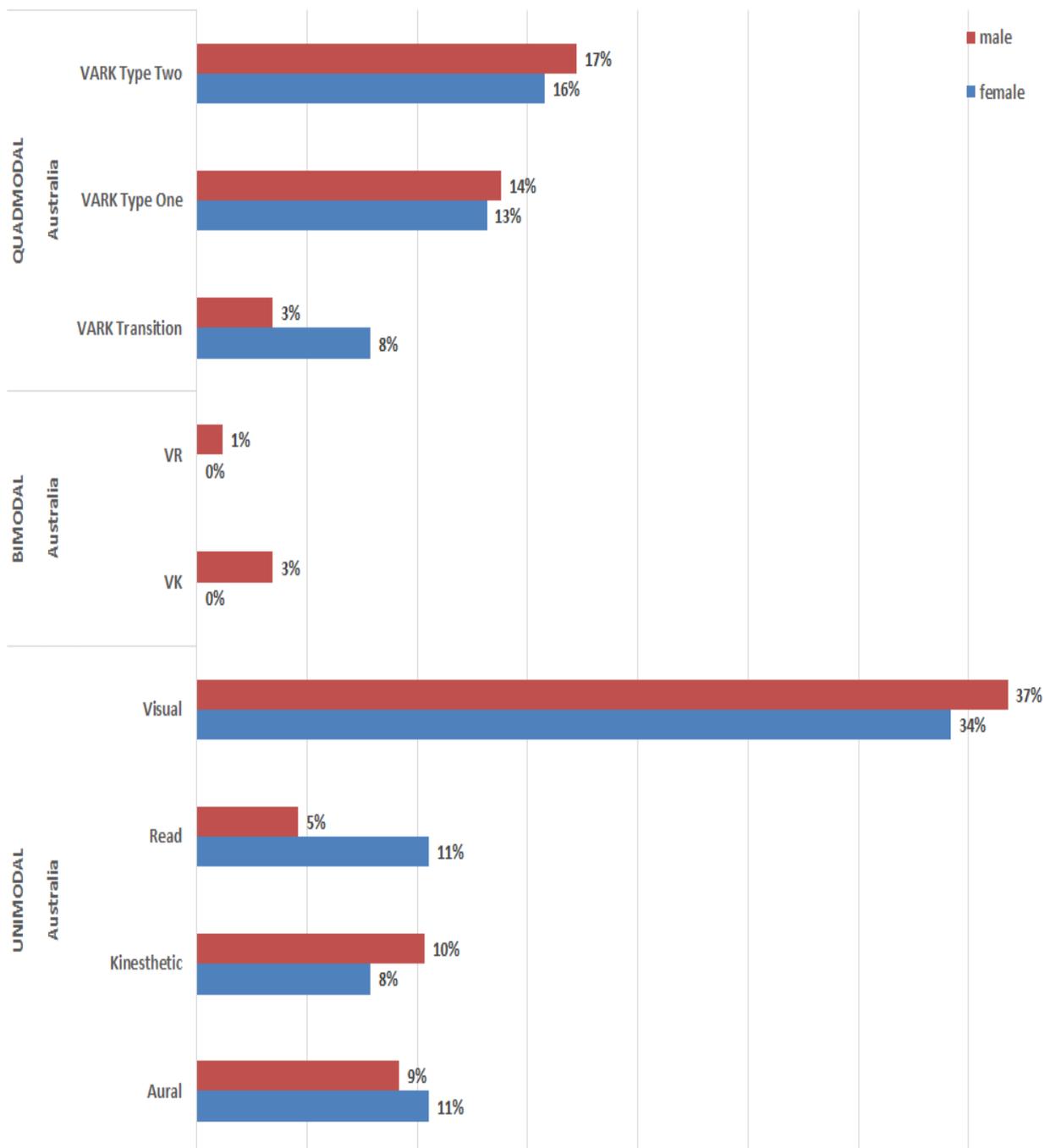


Figure 5.1. distribution of mobile learners based on VARK categories and gender for Australian students. Bimodal VR: Visual/Read/Write, Bimodal VK: Visual/Kinesthetic.

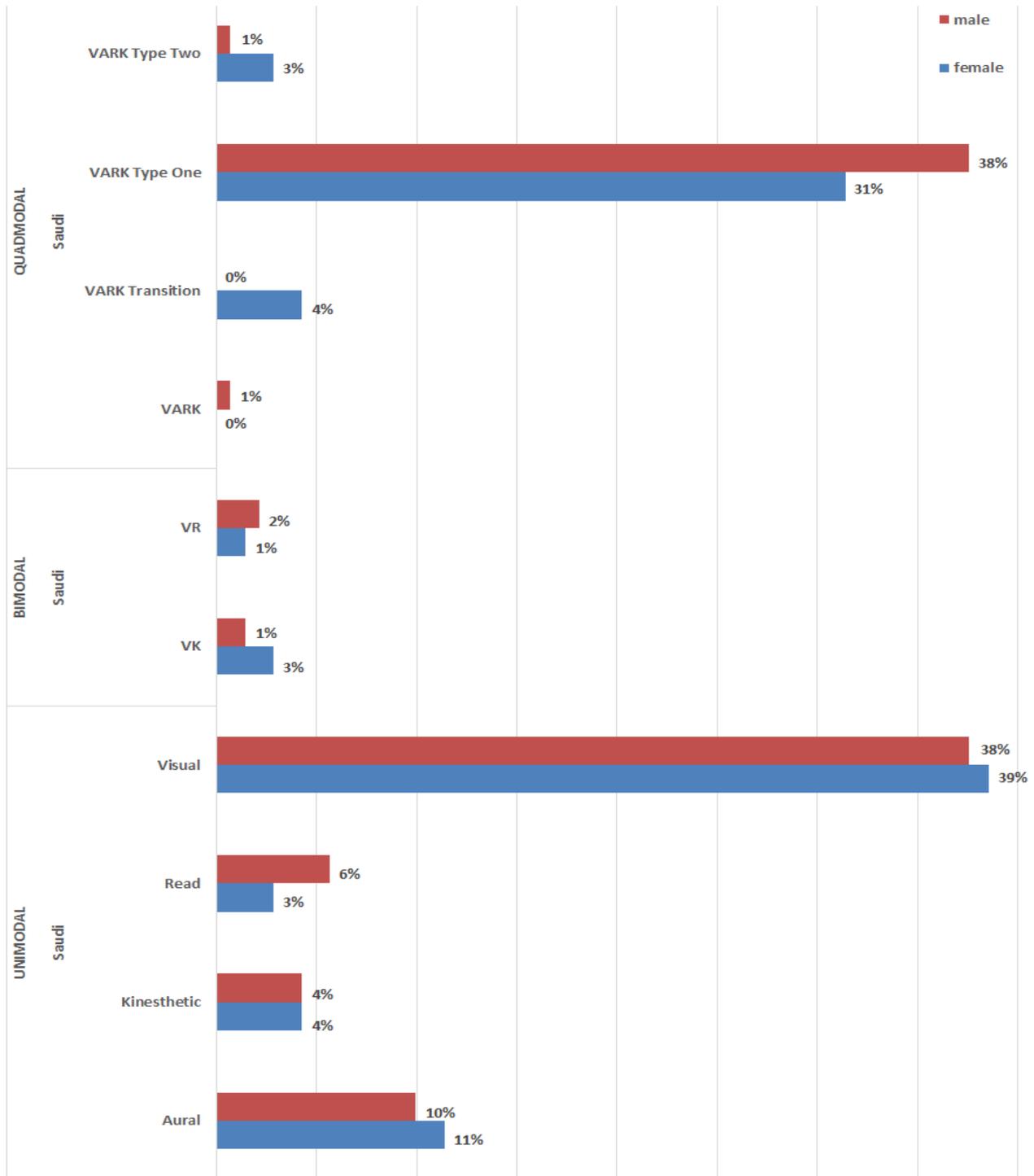


Figure 5.2. distribution of mobile learners based on VARK categories and gender for Saudi students. Bimodal VR: Visual/Read/Write, Bimodal VK: Visual/Kinesthetic.

Table 5.2. *The distribution of VARK cohorts by gender and nationality.*

<i>VARK cohorts</i>	<i>Male (Australian)</i>	<i>Female (Australian)</i>	<i>Male (Saudi)</i>	<i>Female (Saudi)</i>
Aural	8(9%)	4(11%)	14(10%)	8(11%)
kinesthetic	9(10%)	3(8%)	6(4%)	3(4%)
Read/Write	4(5%)	4(11%)	8(6%)	2(3%)
Visual	32(37%)	13(33%)	53(38%)	27(39%)
VK	3(3%)	0(0%)	2(1%)	2(3%)
VR	1(2%)	0(0%)	3(2%)	1(1%)
VARK Type One	12(14%)	5(13%)	53(38%)	22(31%)
VARK Transition	3(3%)	3(8%)	0(0%)	3(5%)
VARK Type Two	15(17%)	6(16%)	1(1%)	2(3%)
Total=	88(100%)	38(100%)	143(100%)	76(100%)

*Note: learning preferences as follow: VK: Visual and Kinesthetic, VR: Visual and Read/Write.*

The results show that most students in both Australia and Saudi Arabia are visual learners. Similarly to this research, other studies (Elkalmi et al., 2015; Hsu, 2016; Saleem, Hassali, Ibrahim, Alrasheedy, & Aljadhey, 2015) have shown that visual learners are the dominant cohort.

A chi-square test for association was performed to test the relationship between gender and the VARK cohorts. There was not a statistically significant relationship

between genders for VARK cohorts for both Australians and Saudi Arabian students (respectively,  $\chi^2(8) = 4.59$ ,  $p = .80$ ,  $\chi^2(8) = 9.56$ ,  $p = .29$ ). However, there was a statistically significant relationship between Australian VARK cohorts and Saudis VARK cohorts,  $\chi^2(8) = 47.91$ ,  $p = .00$ . The post hoc analysis confirms that Australian and Saudi mobile learners from the VARK1 and VARK2 cohorts are very different. That is, there are statistically significant differences between the Australian VARK1 and Saudi VARK1 cohorts, and also between the Australian VARK2 and Saudi VARK2 cohorts.

### 5.2.2 The relation between VARK cohorts and podcast preferences in different contexts

This section will examine whether VARK cohorts differ regarding their preferences for podcast richness in different contexts, in other words, it explores the relationship between VARK cohorts and podcast preferences. A Kruskal-Wallis H test was conducted twice (for both Australian and Saudi Arabian students) to determine if there were differences in preferences for podcast richness between VARK cohorts in different contexts. This is a between-subject design, where the nominal factor is VARK cohorts, and our ordinal dependent variable is preferences for podcast richness.

A Kruskal-Wallis H test shows no significant differences between VARK cohorts' preferences for podcast richness in many contexts for both cultures. However, a few contexts: *“Walking & Friend”*, *“Walking & Classmate”*, *“Vehicle & Friend”*, and *“Vehicle & Classmate”*, show significant differences for Australian students. Table 5.3 is provided to show the differences between VARK cohorts' preferences in non-

stationary contexts. As podcast types have been ordered based on (MRT), the number 4 indicates a preference for the richest podcasts, and the smaller the number, the lower the preference for podcast richness (see Table 5.1).

Table 5.3. Median values for Australian Mobile learners' preference for podcast richness on non-stationary contexts

<i>Median/Context</i>	<i>Walking &amp; Friend</i>	<i>Walking &amp; Classmate</i>	<i>Vehicle &amp; Friend</i>	<i>Vehicle &amp; Classmate</i>
Aural	0.00	3.00	4.00	4.00
kinesthetic	0.00	0.00	0.00	0.50
Read/Write	0.00	0.50	0.50	1.00
Visual	0.00	0.00	1.00	2.00
VK	0.00	0.00	2.00	2.00
VR	4.00	4.00	4.00	4.00
VARK Type One	1.00	3.00	2.00	4.00
VARK Transition	1.00	1.00	3.00	4.00
VARK Type Two	0.00	0.00	1.00	1.00
$\chi^2(8) =$	19.91	18.28	15.660	21.139
$p =$	0.011	0.019	0.048	0.007

*\*P <.05; \*\*P<.01; \*\*\*P<.0001; Note: learning preferences as follow:RW: Read/Write, V:Visual, VK: Visual and Kinesthetic, VR: Visual and Read/Write.*

Thus, pairwise comparisons were conducted for the contexts: “Walking & Friend”, “Walking & Classmate”, “Vehicle & Friend”, and “Vehicle & Classmate”, which are presented in Table 5.3. Subsequently, post hoc analysis revealed no statistically significant differences between the VARK cohorts' median scores. This suggests

that there are no significant differences in preferences for podcast richness between VARK cohorts in all contexts, in other words, no relationship was found between VARK cohorts and podcast preferences.

### 5.2.3 The preferences of VARK cohorts across contexts

This section discusses the differences in podcast preferences for each VARK cohort across the contexts. Thus, a Friedman test was applied twice for Australians (Table 5.4) and Saudis (Table 5.5) to compare preferences for podcast richness for each VARK cohort between contexts. As illustrated in the previous section, the nominal factor is VARK cohorts, and the ordinal dependent variable is preferences for podcast richness. However, a Friedman test was selected as this is a within-subject design.

Table 5.4 (Australian students) and Table 5.5 (Saudi students) show the differences in podcast richness preferences for each VARK cohort between the contexts. Both tables show the result of differences in preferences for podcast richness for each VARK cohort across the contexts.

Table 5.4. Median values for VARK subgroups across context for Australian mobile learners

Context/VARK	A	K	R/ W	V	VK	VR	VAR K1	VAR K-T	VAR K2
Quiet&Alone	4.0	3.5	3.0 0	3.0	3.0	3.0	3.0	3.5	3.0
Busy&Alone	1.5	1.0	1.0	3.0	3.0	1.0	3.0	4.0	3.0
Busy&Family	1.0	0.0	0.0	0.0	0.0	4.0	1.0	0.5	0.0
Busy&Friend	1.5	0.0	0.5	0.0	0.0	4.0	1.0	0.5	1.0
Busy&Classmate	4.0	1.0	1.0	2.0	3.0	4.0	3.0	3.5	3.0
Walk&Alone	1.0	2.0	0.5	2.0	0.0	2.0	2.0	1.0	2.0
Walk&Family	0.0	0.0	0.0	0.0	0.0	2.0	2.0	1.0	0.0
Walk&Friend	0.0	0.0	0.0	0.0	0.0	4.0	1.0	1.0	0.0
Walk&Classmate	3.0	0.0	0.5	0.0	0.0	4.0	3.0	1.0	0.0
Vehicle&Family	1.5	1.5	1.5	2.0	2.0	4.0	4.0	1.5	2.0
Vehicle&Friend	4.0	0.0	0.5	1.0	2.0	4.0	2.0	3.0	1.0
Vehicle&Classmate	4.0	0.5	1.0	2.0	2.0	4.0	4.0	4.0	1.0
<i>p</i> =	.00***	.00***	.03*	.00***	.09	.44	.04*	.03*	.00***

\**P* <.05; \*\**P*<.01; \*\*\**P*<.0001; Note: learning preferences as follow: A:Aural, K: Kinesethetic,RW: Read/Write, V:Visual, VK: Visual and Kinesthetic, VR: Visual and Read/Write.

Table 5.5. Median values for VARK subgroups across context for Saudi mobile learners

Context/VARK	A	K	RW	V	VK	VR	VARK1	VARK-T	VARK2
Quiet&Alone	4	3	3	3	3	2.5	3	4	4
Busy&Alone	3	4	3.5	3	3	3.5	3	4	0
Busy&Family	0	3	0	0	0	1.5	0	0	0
Busy&Friend	2	3	0	0	0	3.5	0	0	0
Busy&Classmate	3	4	1.5	3	1.5	4	3	0	0
Walk&Alone	2.5	2	1	2	3	1	3	3	2
Walk&Family	1	2	0	0	0	0.5	0	1	0
Walk&Friend	0.5	2	0	0	0	2.5	0	0	0
Walk&Classmate	2	2	1	2	0	4	1	3	2
Vehicle&Family	2	4	2	2.5	1.5	2	3	1	3
Vehicle&Friend	3	4	0.5	0	1.5	2.5	1	0	0
Vehicle&Classmate	3	2	3	2	1.5	4	1	4	4
<i>p</i> =	.00***	.57	.02*	.00***	.07	.17	.00***	.07	.14

\**P* <.05; \*\**P*<.01; \*\*\**P*<.0001; Note: learning preferences as follow: A:Aural, K: Kinesthetic, RW: Read/Write, V:Visual, VK: Visual and Kinesthetic, VR: Visual and Read/Write.

Pairwise comparisons were performed for the Australian VARK cohorts: “Aural”, “Kinesthetic”, “R/W”, “Visual”, “VARK1”, “VARK-T”, and “VARK2”. Subsequently, post hoc analysis revealed no statistically significant differences for the “Aural”,

“R/W”, “VARK1”, and “VARK-T” cohorts. However, post hoc analysis revealed statistically significant differences for the “Kinesthetic”, “Visual”, and “VARK2” cohorts.

The Australian Kinesthetic cohort show significant differences for m-learning preference between “quiet & alone” and “walk & family” (P = .004), and between “quiet & alone” and “walk & friend” (P = .004), as well as between “quiet & alone” and “walk & classmate” (P = .05).

Australian mobile learners with the “Visual” and “VARK2” cohorts show significant differences in m-learning preference in various contexts. Table 5.6 shows the results for Australian mobile learners from the “visual” cohort and Table 5.7 for mobile learners from the “VARK2” cohort.

Table 5.6. *Post hoc analysis for Australian mobile learner with visual preference*

<i>From richer contexts:</i>	<i>To leaner contexts:</i>
quiet & alone (3)	walk & family (0) ***
	busy & family (0) ***
	walk & friend (0) ***
	walk & classmate (0) ***
busy & alone (3)	walk & family (0) ***
	walk & friend (0) ***
	walk & classmate (0) ***
family & vehicle (2)	walk & family (0) **
	walk & friend (0) ***

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	busy & friend (0) **
busy & classmate (2)	vehicle & classmate (2) **
	walk & friend (0) ***
vehicle & classmate (2)	walk & friend (0) ***

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\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .0001$

Table 5.7. *Post hoc analysis for Australian mobile learner with VARK2 preference*

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<i>From richer contexts:</i>	<i>To leaner contexts:</i>
quiet & alone (3)	Walk & family (0)***
	Walk & friend (0) ***
	Walk & classmate (0)*
Busy & alone (3)	Walk & family (0) ***
	Walk & friend (0) ***
	Walk & classmate (0) ***
Busy & classmate (3)	Walk & family (0) ***
	Walk & friend (0) ***
	Walk & classmate (0) ***

---

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .0001$

Pairwise comparisons were performed for the Saudi VARK subgroups: “Aural”, “R/W”, “Visual”, and “VARK1”. Subsequently, post hoc analysis revealed no statistically significant differences for “Aural” and “R/W”. However, post hoc analysis revealed statistically significant differences for the “Visual”, and “VARK1” cohorts.

Saudi mobile learners from the “Visual” and “VARK1” cohorts show significant differences in m-learning preferences between various contexts. Table 8 shows Saudi mobile learners from the “visual” cohort and Table 9 for mobile learners from the “VARK1” cohort.

Table 5.8. *Post hoc analysis for Saudi mobile learners from the visual cohort*

<i>From richer contexts:</i>	<i>To leaner contexts:</i>
Quiet & alone (3)	Busy & family (0)***
	Walk & friend (0)***
	Busy & friend (0)***
	Vehicle & family (2.5)*
	Vehicle & friend (0)***
	Vehicle & classmate (2)*
	Walk & family (0)***
Busy & classmate (3)	Walk & family (0)*
	Vehicle & friend (0)*

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .0001$

Table 5.9. *Post hoc analysis for Saudi mobile learner with VARK1 preference*

<i>From richer contexts:</i>	<i>To leaner contexts:</i>
Quiet & alone (3)	Walk & family (0)***
	Busy & family (0)*
	Walk & friend (0)***
	Busy & friend (0)***
	Walk & classmate (1)**
	Vehicle & friend (1)**
	Vehicle & classmate (1)**
	Walk & alone (3)
	Busy & friend (0)*
Busy & classmate (3)	Busy & friend (0)*

*\*P <.05; \*\*P<.01; \*\*\*P<.0001*

Table 10 summarises the preferences for the rich learning contexts (rich podcast) and informal learning contexts (lean podcast) for visual, VARK1, VARK2, and Kinesthetic learners.

Table 5.10. *rich and lean learning contexts for visual, VARK1, VARK2, and kinesthetic learners based on podcast preferences for both cultures*

<i>Context/VARK</i>	<i>Visual</i>	<i>VARK1</i>	<i>VARK2</i>	<i>Kinesthetic</i>
Quiet&Alone	rich	rich	rich	rich
Busy&Alone	rich		rich	
Busy&Family	lean	lean		
Busy&Friend	lean	lean		
Busy&Classmate	rich	rich	rich	
Walk&Alone	rich	rich		
Walk&Family	lean	lean	lean	lean
Walk&Friend	lean	lean	lean	lean
Walk&Classmate	lean	lean	lean	lean
Vehicle&Family	rich			
Vehicle&Friend	lean	lean		
Vehicle&Classmate	lean	lean	rich	rich

### 5.3 Discussion & conclusion

This section will highlight the significant results presented in section (5.2.2), and section (5.2.3).

### 5.3.1 The relation between VARK cohorts and podcast preferences in different contexts

There are two possibilities with regards to the relation between VARK cohorts and podcast preferences, but only one of the arguments is credible. First, there may be a relationship between some VARK cohorts and podcast preferences in different contexts, but there is no statistically significant relationship due to the limited number of participants. Second, there is no relationship between VARK cohorts and podcast preferences in different contexts, as Kirschner's survey study suggests (Kirschner, 2017). Both arguments will be discussed below in more detail.

First, there seems to be a relationship between the aural and read/write cohorts for rich and lean podcast respectively in different contexts. Figure 5.3 shows the median scores of mobile learners from two VARK cohorts, aural and read/write, compared with the average of all VARK cohorts in different contexts. The figure shows the level of podcast richness preferred by students in the aural and read/write cohorts compared with the mean of all VARK cohorts in different contexts.

Richer podcasts are preferred by students with the aural preference in both cultures in many contexts compared with other VARK cohorts. This is probably because richer podcasts, such as Vodcast, have audio content which students with aural preferences are comfortable with. On the other hand, students in the Read/Write cohorts in both cultures are looking for lean podcasts, such as those that are text heavy, or are perhaps less likely to pursue m-learning in different contexts. A Mann-Whitney U test was run to determine if there were differences

between Australian and Saudi students in the read/write and aural cohorts in all contexts. The test shows no significant difference between the Australian and Saudi aural cohorts in all contexts, likewise, for the read/write cohort, which supports the claim that the aural and read/write cohorts in both cultures show similar preferences.

Similarly, a study conducted by (William A. Drago, 2004) shows that students with the read/write preference are not very open to online delivery of educational materials. Drago's study also shows that other VARK cohorts, such as aural, are more open to using online materials. These findings suggest the need for more research into how students with read/write learning preferences approach e-learning and m-learning. Also, it is important to address this issue in this study by ensuring that there are sufficient participants and that interviews are used to provide a deeper understanding of their experiences.

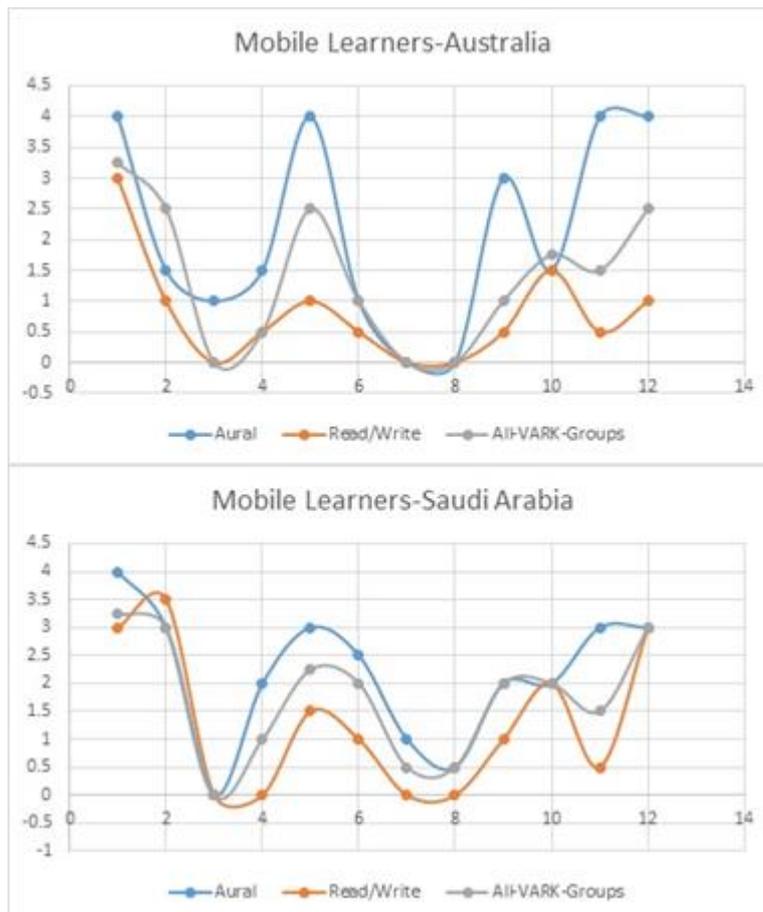


Figure 5.3. Mobile learners with aural and read/write preference compared with average of all VARK groups. The preference of podcast richness presented on Y-axis, 0: no preference, 1: low preference (e.g. text), 2: moderate preference (e.g. audio), 3: high preference (e.g. Vodcast), 4: very high preference (e.g. multiple podcasts). The 12 contexts are presented on X-axis as follow: 1: (quiet&alone), 2: (busy alone),3: (busy with family) ,4: (busy with friend) ,5: (busy with classmate),6: (walking alone),7: (walking with family),8: (walking with friend),9: (walking with classmate),10: (vehicle with family),11: (vehicle with friend),12: (vehicle with classmate).

Second, there is no relationship between learning styles and m-learning preferences. Kirschner (2017) has reviewed the impact of well-known learning styles studies in education and concludes that all the studies reviewed failed to find a relationship between learning styles and preferences for learning materials. However, Kirschner's study has not considered VARK, which makes the first argument (there is a relationship between VARK and m-learning preferences) more credible.

### 5.3.2 The preferences of VARK cohorts across contexts

Some VARK cohorts show significant differences in preferences for podcast richness across contexts. These VARK cohorts are visual, VARK1, VARK2, and Kinesthetic, which display more flexibility or fluctuations in preferences across contexts compared with other VARK cohorts.

Visual mobile learners from both cultures have significant differences in preferences across the contexts. Because they are visual learners, they tend to choose a richer podcast. This is consistent with the results of a study by (Ibem, Oni, Adisa, Samuel, & Oyemomi, 2017), which shows that visual learners prefer rich podcasts, such as video. Also, visual learners have been shown to have a positive attitude towards e-learning and m-learning, as they rated mobile devices, such as iPods, to be an important device for learning (Peter Richardson, 2013), and were open to being using ICT in learning (Hsu, 2016). Consequently, visual mobile learners prefer richer podcasts in many contexts.

As with visual learners, VARK2 learners are looking for richer podcasts in formal learning contexts, however there are significant differences when in informal learning contexts. VARK2 mobile learners are not happy until they have been presented with information in most of their preferred podcast types. They take more time to accumulate data from every podcast type and, subsequently, they frequently have a more profound and more extensive understanding of the material. They might be seen as slackers or moderate deliverers. However some might be simply assembling all the data before acting, and their learning experience may be superior because of the breadth of comprehension.

Kinesthetic learners have shown a preference for richer podcasts in certain contexts while in other contexts they prefer lean or no podcasts at all. (Ibem et al., 2017) have shown that Kinesthetic learners prefer richer podcasts such as video. Also, Kinesthetic learners have been shown to have a positive attitude towards e-learning and m-learning (Hsu, 2016). Kinesthetic learners have a cognitive preference which privileges experience and practice. Thus, it is recommended that future studies should consider the prior experience of Kinesthetic learners with any educational technology.

VARK1 mobile learners are defined as being: 'They are context specific. They choose a single mode to suit the occasion or situation.' This definition explains why mobile learners in the VARK1 cohort choose different podcast richness levels to suit their current learning context.

# Chapter 6 THE EFFECT OF PERSONALITY TRAITS ON PODCAST ENGAGEMENT IN DIFFERENT CONTEXTS

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## 6.1 Introduction

This chapter focuses on the effect of personality traits on the level of engagement with podcasts, taking in to account a person's spatial and social contexts, i.e. where they are, who they are with and what they are doing. The analysis will distinguish between Saudi and Australian students, and those with high, medium and low scores on the personality scales. This will directly address Wu et al. (2012) contention, in their comprehensive review of podcast trends, that the impact of individual differences on podcast design has not been comprehensively researched. By considering the personality factors influencing individual's preferences for podcast length, the results of this study may be useful for designing educational podcasts and will help to fill a gap in the literature.

This chapter will demonstrate that students with high agreeableness and high emotional-stability are, in some contexts, less open to accessing podcasts. The reasons why students with high agreeableness and high emotional-stability are

resistant to accessing podcasts, the contexts this occurs in, and possible strategies to overcome this disinclination, are discussed.

## 6.2 The effect of personality traits on podcast length preferences

This section reports the results of statistical analyses which test the extent to which personality traits determine students' preferences for the length of podcasts they choose. The data discussed in this chapter is drawn from Saudi Arabian and Australian students, and uses the results of testing the 'big 5' personality traits (Extraversion, Agreeableness, Conscientiousness, Emotional-stability and Openness) and assessing their effect on engagement levels with podcasting. These engagement levels use preferences for length of podcast as a proxy for engagement (long podcast, moderate podcast, short podcast, or no preference). Accordingly, the independent variable is personality traits, where individuals' scores range from 0 to 100 for each trait (Extraverted, Agreeableness, Conscientiousness, Emotional-stability, and Openness). For example, a student who scored 95 on emotional stability can be assumed to be very emotionally stable, while a low score for emotional stability indicates that the student's mood fluctuates, and their emotions are insecure, where the boundaries are: low < 33, moderate < 66, and high < 100. The dependent variable is podcast length preferences, which have four ordinal levels (long podcast, moderate podcast, short podcast, or no preference).

Students in this study were given personality tests that measure the 'big five' personality traits, and a cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of the 'big five' personality traits

on preferences for m-learning engagement (podcast lengths). The descriptive data, such as the means and standard deviations for each personality trait, separated by gender and nationality, are presented in Table 6.1. The test of model effect and exponentiation (B) for personality traits are presented for each context in Tables 6.2 & 6.3 for Australian and Saudi students respectively. Table 6.4 summarises the statistically significant findings from Table 6.2 and Table 6.3.

Table 6.1. Means and standard deviations for each personality trait by gender and nationality.

	<i>Personality Type</i>	<i>Male</i>		<i>Female</i>	
		<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
<b>Australian context</b>	Extraverted	2.97	0.74	3.15	0.71
	Agreeableness	3.66	0.52	3.86	0.52
	Conscientiousness	3.33	0.61	3.38	0.63
	Emotional-Stability	3.19	0.70	3.16	0.67
	Openness	3.54	0.51	3.53	0.49
<b>Saudi Context</b>	Extraverted	3.15	0.49	3.19	0.49
	Agreeableness	3.87	0.54	4.21	0.47
	Conscientiousness	3.68	0.53	3.69	0.58
	Emotional-Stability	3.15	0.60	3.04	0.59
	Openness	3.58	0.43	3.69	0.48

Note: The number of students by gender (88 male; 38 female) for Australians, (143 male; 76 female) for Saudis.

Table 6.1 displays the mean values for personality traits (Australian and Saudi students). Note that the trait with the highest mean value, for both genders and cultures, is agreeableness. Thus, the highest mean value trait among Australian males is agreeableness, likewise for Australian females, Saudi males, and Saudi

females. Regarding differences of the trait's mean values between males and females, the highest gender difference could be observed for Saudi Agreeableness (male:3.87, female:4.21), and for Australian Extraverted (male:2.97, female:3.15).

Table 6.2 (Australian students) and table 6.3 (Saudi students) present the influence of personality traits on the level of engagement with podcasts when the student is in different contexts. These contexts are: quiet & alone, busy & alone, busy & family, busy & friend, busy & classmate, walking alone, walking with family, walking with friend, walking with classmate, vehicle with family, vehicle with friend, and vehicle with classmate, respectively.

Table 6.2. The result of ordinal regression to show the effect of personality traits on level of engagement with m-learning for Australian students in different contexts.

Contexts	Extraverted		Agreeableness		Conscientiousness		Emotional-Stability		Openness	
	EB	TME	EB	TME	EB	TME	EB	TME	EB	TME
1	1.001	0.007	0.997	0.142	1.002	0.074	1.002	0.118	0.998	0.08
2	0.987	3.786	1.006	0.746	1.005	0.648	0.996	0.383	1.002	0.106
3	0.998	0.115	0.999	0.02	1.005	0.445	0.991	1.431	0.998	0.108
4	1.005	0.602	0.996	0.33	1.005	0.556	.985*	4.484*	1.001	0.045
5	1.002	0.067	0.999	0.038	0.999	0.037	0.996	0.328	1.007	1.005
6	0.99	2.096	1.008	1.456	1.003	0.237	0.995	0.632	1.002	0.079
7	0.991	1.069	0.996	0.21	1.015	3.389	.983*	3.965*	0.999	0.013
8	0.989	1.622	0.994	0.481	1.024*	7.625*	.977*	6.323*	1.002	0.084
9	1.001	0.017	1.006	0.725	1.013	3.157	.984*	4.444*	0.994	0.59

10	0.989	2.519	1.001	0.04	1.008	1.419	0.999	0.049	1.003	0.222
11	0.993	0.923	0.998	0.073	1.012	3.02	.984*	4.930*	1.003	0.214
12	0.998	0.081	1.001	0.013	1.006	0.89	0.993	1.182	0.997	0.177

\* $p < .05$ , \*\* $p < .01$ ; EB: odds ratio, TME: WALD statistic from ordinal regression; Note: 1: (quiet & alone), 2: (busy alone), 3: (busy with family), 4: (busy with friend), 5: (busy with classmate), 6: (walking alone), 7: (walking with family), 8: (walking with friend), 9: (walking with classmate), 10: (vehicle with family), 11: (vehicle with friend), and 12: (vehicle with classmate).

Table 6.3. The result of ordinal regression to show the effect of personality traits on level of engagement with m-learning for Saudi students in different contexts.

Contexts	Extraverted		Agreeableness		Conscientiousness		Emotional-Stability		Openness	
	EB	TME	EB	TME	EB	TME	EB	TME	EB	TME
1	0.997	0.446	0.997	0.288	1.009	2.765	0.995	0.816	1.009	2.926
2	0.997	0.442	0.998	0.196	1.004	0.502	0.994	1.515	0.999	0.085
3	0.996	0.542	0.991	3.28	1.001	0.012	0.995	0.76	1.001	0.022
4	1	0.006	0.991	3.185	1	0.007	0.997	0.231	1.002	0.177
5	0.999	0.071	0.996	0.725	0.999	0.053	1.004	0.835	0.998	0.131
6	1.001	0.08	.989*	5.027*	1.009	2.882	0.999	0.032	0.994	1.421
7	1.005	0.972	.987*	5.821*	0.999	0.02	1.003	0.237	1.003	0.279
8	1.007	1.657	.982*	11.182*	0.999	0.021	0.996	0.486	1.006	1.283
9	1.001	0.083	.990*	3.993*	0.999	0.017	0.999	0.024	1.004	0.652
10	1	0.004	.986*	7.735*	1.003	0.406	0.994	1.474	1.006	1.536
11	1	0.001	.988*	5.563*	0.996	0.634	0.998	0.18	0.998	0.171

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12	1.002	0.24	.983*	11.260*	1.004	0.583	0.997	0.382	1.006	1.466
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\* $p < .05$ , \*\* $p < .01$ ; EB: odds ratio, TME: WALD statistic from ordinal regression; Note: 1: (quiet & alone), 2: (busy alone), 3: (busy with family), 4: (busy with friend), 5: (busy with classmate), 6: (walking alone), 7: (walking with family), 8: (walking with friend), 9: (walking with classmate), 10: (vehicle with family), 11: (vehicle with friend), and 12: (vehicle with classmate)..

Table 6.4 summarises the significant findings for Table 6.2 and Table 6.3. Table 6.4 indicates that Saudi students with high agreeableness, and Australian students with high emotional-stability, are not receptive to podcasting in the contexts listed in Table 6.4, compared to students with lower scores on agreeableness and emotional stability. In other words, Australian students with high emotional-stability scores are unlikely to access podcasts when they are busy with a friend, walking with their family, walking with a friend, walking with a classmate, or being in a vehicle with a friend, compared to students with lower emotional stability scores. Likewise, Saudi students with high agreeableness scores are not receptive to using podcasts when walking alone, walking with family, walking with friends, walking with classmates, or being in a vehicle with family, or a vehicle with a classmate, compared to students with lower agreeableness scores.

Table 6.4. A summary table show the significant results of the effect of personality traits on level of engagement with m-learning for Australian and Saudi students in different contexts.

<i>Context</i>	<i>High-Emotional-Stability</i>	<i>High-Agreeableness</i>	<i>High-Conscientiousness</i>
Busy with friend	Australian		
Walking alone		Saudis	
Walking with family	Australian	Saudis	
Walking with friend	Australian	Saudis	Australian
Walking with classmate	Australian	Saudis	
Vehicle with family		Saudis	
Vehicle with friend	Australian	Saudis	
Vehicle with classmate		Saudis	

Note: grey labels = less likely to engage with m-learning, and unlabeled = more likely to engage with m-learning.

## 6.3 Discussion

This section will highlight the significance of the results presented in table 6.4, and focus on two personality traits: emotional-stability for Australian students and agreeableness for Saudi students.

### 6.3.1 Australian students with high emotional-stability

It is important to consider what influence high scores in emotional stability have on the preferences students make for podcast length, as understanding this will

help to better target Australian students by adjusting podcast lengths. The findings suggest that Australian students with high emotional stability tend not to access podcasts when they are in social contexts; in this case if they are busy with friends, walking with family, walking with a friend, walking with a classmate, or in a vehicle with a friend, compared to students with lower emotional stability scores. This implies that people who score lower on the emotional-stability scale are more likely to engage with podcasts in social contexts.

It is not easy to determine why this is the case, as there are several factors and ways their interactions can be interpreted. There are however two convincing, and inter-related, reasons why students with low emotional-stability scores make these choices. First, podcasting in this study is defined as a form of one-way-communication; second, individuals who score low on emotional-stability feel more anxiety and stress in social contexts. Previous studies show that individuals with low emotional-stability scores spend more time on the internet (Armstrong et al., 2000) and engaging in online academic activities (Mark & Ganzach, 2014). Moreover, they tend to dislike two-way forms of communication, such as text messaging (Amiel & Sargent, 2004) or chatting (Swickert et al., 2002), as they cause more anxiety and stress for individuals with low emotional-stability. On the other hand, those with low emotional-stability scores tend to prefer one-way communication, such as listening to music or watching movies, which is in a sense like podcasting, (Swickert et al., 2002).

It is important to contrast the choices made by students with high and low emotional stability scores to fully understand how emotional stability impacts on

preferences for podcast length. The calmness of those students who score high on emotional stability seems to allow them to enjoy their time away from m-learning, for example when they are socialising with family, friends or classmates. Individuals with high emotional-stability are characterised as being calmer and more secure compared to individuals with low emotional-stability scores. Students regularly face stressful situations, such as exams, quizzes, and assessment deadlines, so that most students may feel stressed during the semester, but students with high emotional stability are less stressed in these situations.

### 6.3.2 Saudi students with high agreeableness

Saudi students with high agreeableness scores are also not accessing podcasts in a number of contexts; walking alone, walking with family, walking with friends, walking with a classmate, in a vehicle with their family, in a vehicle with a friend, and in a vehicle with a classmate; compared to students with lower agreeableness scores. Two main things stand out from this: all contexts are non-stationary, and all contexts (except walking alone) are socialised contexts. Possible reasons for this will be discussed below.

Why might agreeableness influence whether a student is more or less likely to access a podcast? Keller and Karau (2013) have found that students with high agreeableness scores value online courses as an engagement tool (for discussion and forums), but significantly have not shown any preference for online courses over traditional courses. This may be because the latter involve greater social engagement and concern for social harmony than online courses. Thus, mobile

learners with high agreeableness scores tend to value friendly and warm interactions, even formal ones such as with classmates. This may be because of the concern for social harmony people with high agreeableness scores display. Individuals with high agreeableness tend to be more helpful, are more likely to promote compromise to make peace, and are more empathetic compared to individuals with lower agreeableness scores. It is possible that being more sensitive to maintaining social harmony leads students with high agreeableness scores to show more care towards friends and family. This means that they are less likely to access m-learning while socialising, and are more likely to value and look forward to learning alongside their classmates.

Another possible reason that students with high-agreeableness may not access m-learning in non-stationary contexts, compared to students with lower agreeableness scores, as they are more responsive and agreeable to what they encounter. This may stem from a potential drawback with high agreeableness as a personality trait, i.e. that individuals with high-agreeableness may too readily agree on everything and with everyone around them. The data shows that there is a significant difference in students' preferences for podcasts when they are in non-stationary contexts (moving contexts). The nature of movement, for example walking, exposes individuals to the surrounding environment, such as shops and restaurants, where individuals may to different degrees be attracted or distracted by what they encounter.

The practical outcome of these observations about personality and podcast preferences is that educators can use these insights to develop suites of podcasts

that may appeal to students with different personality profiles. Once the personality traits that have the most effect on whether students will access podcasts have been identified, and the contexts this operates in clarified, then educators can use this information to develop strategies to engage potential mobile learners that take in to account their personal preferences and tendencies. For students with high agreeableness, a possible solution is to send them very short podcasts, as these students are easily distracted in some social or physical contexts. It may also be possible that podcasts which involve engagement and discussion with others are a preferable format that students with high agreeableness scores are more likely to utilise. Also, short rather than longer podcasts could encourage students with high emotional-stability scores to study. As high emotional-stability students feel secure and calm, recognising that their calmness needs to be perturbed a bit to gain their attention poses a challenge to m-learning. An example might be reminding them more frequently than other students about deadlines.

# Chapter 7    PODCAST TYPE PREFERENCES, CHOICES, AND SATISFACTION

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## 7.1 Introduction

This chapter focuses on decision-making about preferences and choices, and exploring students' satisfaction with podcast types (audio, text, and Vodcast), taking in to account their physical context (quiet and busy), and what they are doing. Although some researchers might see little difference between the terms preference and choice, there are nuances that are relevant to this research. Preferences are latent and present before action. Preferences may effect our choices, and while choice is an act of intentional selection, it is not a latent property. This chapter directly addresses work on preference and choice (Brouwer et al., 2010; Hoeffler & Ariely, 1999; Savage & Waldman, 2008; Savani et al., 2008), and analyses the differences between students' preferences and choices in two contrasting physical spaces. Consequently, the results of the study may be useful to future m-learning researchers in distinguishing between preferences and choices.

This chapter demonstrates that the busier the context, the lower the effect of preferences on choices. Also, with regards to satisfaction, Vodcast was given the highest rating in

both the quiet and busy contexts. Discussion of the more important results and suggestions follows in this chapter.

## 7.2 Result

In this section, decision-making over podcast preferences, choices, and satisfaction (audio, text, and Vodcast) in two different physical spaces (quiet and busy contexts) will be explored. Podcasts to be used as learning materials for the unit (COMP2410/COMP6340) Networked Information Systems were prepared on web pages using Qualtrics software to observe and collect data on students' preferences, choices, and satisfaction, in the following sequence. First, students' preferences were surveyed for one or more of the learning materials (podcast type - audio, text, and/or Vodcast) in two different contexts, i.e. quiet and busy. Second, participants in the quiet and busy contexts were asked to select one of the podcast choices (audio, text, or Vodcast). Based on their choice, their preferred podcast type was presented to them, and quizzes were provided to investigate the learning effect (out of the scope of the thesis) of the podcast. Third, a page was provided to collect the user satisfaction scores regarding their choices.

Thus, there are two subsections. The first descriptively explores the raw data regarding students' preferences, choices, and satisfaction in quiet and busy contexts. The second inferentially analyses the effect of preferences on choices in the two physical spaces, i.e. are preferences a reliable predictor for choices in the two contexts (quiet and busy).

### 7.2.1 Descriptive analysis of preferences, choices, and satisfaction

In this section, students' preferences, choices, and satisfaction with podcast types in two physical spaces (quiet and busy) are explored. Table 7.1 shows the distribution of

preferences, choices, satisfaction, and alternative preferences when unsatisfied with choices of podcast type. Phase one is to assess students' preferences for one or multiple selections. That is, students' podcast preferences can be for single (audio, text, or Vodcast), dual (audio and text (AT), audio and Vodcast (AV), or text and Vodcast (TV)), or triple (audio, text, and Vodcast (ATV)) formats or combinations of formats. Second, students select one of the podcast choices when exposed to quiet and busy contexts, and then reveal their level of satisfaction with their podcast choice, and if dissatisfied, select their alternative preference.

Table 7.1. the distribution of students' preferences, choices, satisfaction, preferences when dissatisfied in quiet and busy contexts.

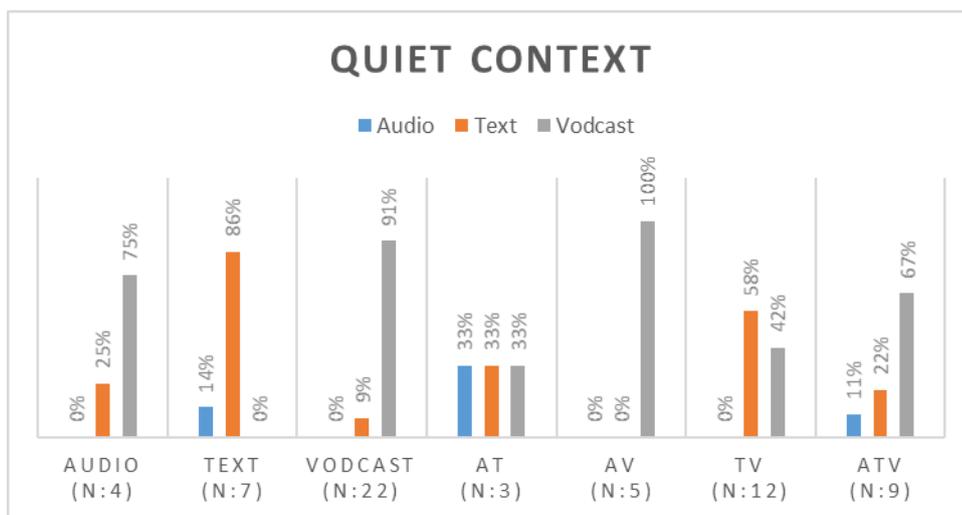
		Quiet	Busy
		<i>n</i> (%)	<i>n</i> (%)
<b>Preferences</b>	<b>Audio</b>	4(6%)	4(12%)
	<b>Text</b>	7(11%)	13(39%)
	<b>Vodcast</b>	22(35%)	4(12%)
	<b>AT</b>	3(5%)	1(3%)
	<b>AV</b>	5(8%)	1(3%)
	<b>TV</b>	12(19%)	2(6%)
	<b>ATV</b>	9(15%)	8(24%)
<b>Choices</b>	<b>Audio</b>	3 (5%)	1 (3%)
	<b>Text</b>	19 (31%)	23 (70%)
	<b>Vodcast</b>	40 (65%)	9 (27%)
<b>Satisfaction on choices</b>	<b>Audio</b>	0 (0%)	0 (0%)
	<b>Text</b>	12 (63%)	11 (48%)
	<b>Vodcast</b>	28 (70%)	6 (67%)
<b>Alternative choice if dissatisfied</b>			

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<b>Audio</b>		
<b>Text</b>	3	1
<b>Vodcast</b>	0	0
<b>Text</b>		
<b>Audio</b>	1	0
<b>Vodcast</b>	6	12
<b>Vodcast</b>		
<b>Audio</b>	2	0
<b>Text</b>	10	3

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Note: preference for: audio and text (AT), audio and Vodcast (AV), text and Vodcast (TV), audio, text, and Vodcast (ATV).



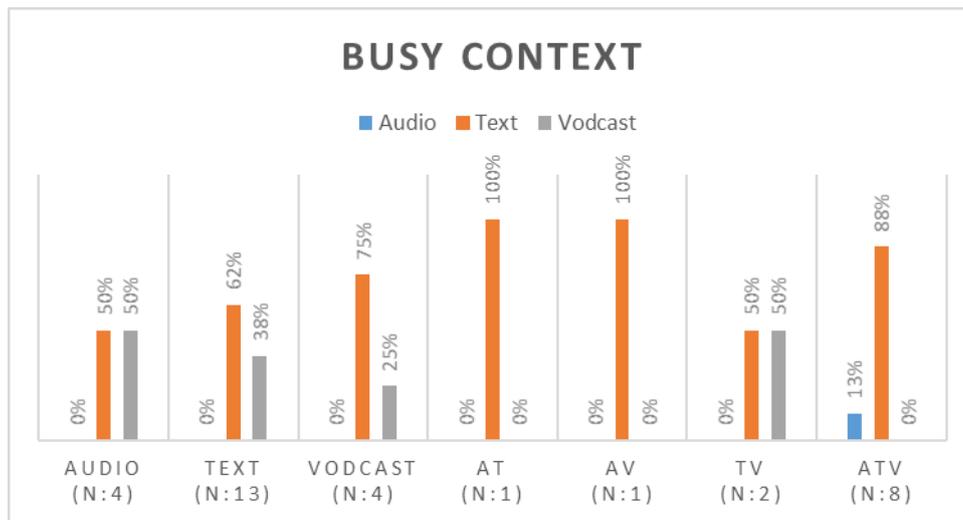


Figure 7.1. Students' choices for (audio, text, and Vodcast), based on preferences in quiet and busy contexts. Note: preference for: audio and text (AT), audio and Vodcast (AV), text and Vodcast (TV), audio, text, and Vodcast (ATV).

In general, students' preferences in a quiet context are more reliably followed than in a busy context. In a quiet context, 91% of students' choices matched the preference they had nominated, while only 48% of choices followed the nominated preferences in a busy context. Unlike the quiet context, most students chose text regardless of their preferences in the busy contexts (see Figure 7.1). For example, the preference for Vodcast in both contexts is surprising, as in the quiet context most students chose Vodcast (91%), which is expected, yet most students (75%) in the busy context chose text, which was unexpected.

Students' preferences for audio appear not to have influenced their choices in the two contexts. Figure 7.1 shows that none of the students who preferred audio in the quiet and busy contexts actually chose audio. Moreover, audio is the least popular choice in both contexts (see Table 7.1).

In both contexts, the students' are most satisfied with Vodcast, while audio has the lowest satisfaction. Table 7.1 shows that students' satisfaction with Vodcast is high, at 70% and 67% for quiet and busy contexts respectively. On the other hand, students' satisfaction for audio is the lowest, at 0% for both contexts.

The expectation is that greater experience with podcasts will lead students to prefer Vodcast for two interrelated reasons. First, the students' satisfaction with Vodcast is higher than the other options. Second, Table 7.1 shows that all students prefer text when unsatisfied with audio, while all (except one student) prefer Vodcast when dissatisfied with text. Consequently, the expectation is that the more podcasts are used, students who are dissatisfied with audio will come to prefer Vodcast instead of text-based formats.

### 7.2.2 Do preferences effect choices in different contexts?

In this section, the effect of preferences on choices for m-learning podcasts in two physical spaces, quiet and busy, are explored. Two multinomial regressions were conducted (for quiet and busy contexts) to investigate the effect of preferences on podcast choices. The factor is students' podcast preferences: audio, text, and Vodcast; and the dependent variable is students' podcast choices, again: audio, text, and Vodcast. Table 7.2 shows the result of the regression analysis for the quiet and busy contexts.

Table 7.2. The effect of preferences on choices for m-learning podcasts in quiet and busy contexts.

Predictor	Quiet context		Busy context	
	Audio	Text	Audio	Text
	OR(95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Preference				
Text	9.00(.85, 94.90)	4.46 (1.59, 11.96)*	.33 (.01, 8.18)	.47 (.08, 2.75)
Audio	4.80 (.40, 57.02)	.87 (.24, 3.18)	1.00 (.03, 29.81)	.92 (.11, 7.67)

\*p < .01. Note: Referent category = Vodcast.

Preferences influence choices only in the quiet context as shown in Table 7.2. That is, students who preferred text are more likely to choose text in the quiet context. Similarly, students who prefer Vodcast are more likely to choose Vodcast in the same context. On the other hand, preferences did not influence choices in the busy context. In other word, students' choices diverged from their preferences in the busy context.

### 7.3 Discussion and conclusion

This section will highlight the significance of the results, and focus on the importance of Vodcast and the effect of preferences on choices in the quiet and busy contexts.

Vodcast was the first preference and choice for the quiet context, and satisfaction in both contexts is shown in Table 7.1. There are many studies that confirm high levels of satisfaction with Vodcasts (Copley, 2007; Gillie et al., 2017; Rodgers et al., 2017; Saunders & Hutt, 2015). This is probably due to the greater richness of Vodcasts, as they usually include audio, images and text. Unsatisfied students who chose text

preferred Vodcasts (except for one student), which shows that students with different podcast choices (other than Vodcast) preferred Vodcast as an educational media. Although unsatisfied students who chose audio preferred text (Table 7.1), the expectation is that Vodcast will be their preference once they have experienced text.

The impact of the busy context on choices is greater than the impact of preferences on choices. In other words, the busier the context, the less we can predict students' choices by reference to their preferences. Table 7.2 shows that choices in the quiet context are predictable, while they are not in the busy context. Similarly, previous studies show that predicting choices based on preferences is unreliable when technology is involved. For example, in one case the majority of students indicated a preference to play podcasts using mobile devices, but they actually tended to play podcasts using computer devices. Also, Savage and Waldman (2008) have found that preferences are not accurate in predicting choices for online surveys when compared to mail responses. In this study, the nature of busy contexts, such as cafés, has a stronger effect than the quiet contexts, perhaps because of being surrounded by people and being exposed to background noise. So, the busy contexts are more likely to overcome personal preferences.

## Chapter 8 CONCLUSION

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In conclusion, the aim of this thesis was to investigate students' preferences and choices for podcast (text, audio, and video) using mobile devices in different contexts. The study was to answer the research question: What is the impact of mobile learners' characteristics on podcast preferences in different contexts, and how do m-learning preferences influence choices in different contexts? To answer the research question, self-administrated surveys were completed by 345 Australian and Saudi students, to determine the impact of learners' characteristics on podcast preferences in different contexts. This was followed by 95 students participating in three experiment studies to determine how m-learning preferences influence choices in different contexts.

These studies found that including context is a successful model to determine students' preferences and choices as students using mobile devices encounter different contexts. Also, the joint impact of contexts and characteristics on m-learning raise the question of individual differences as seen in this thesis. Especially, the characteristics' impact on m-learning engagement (preferences for podcast length) is remarkable. However, there is little impact of characteristics on podcast types.

The experiments show that the busier the context, the less we can predict student choices by reference to preferences. This is probably because of the nature of busy

contexts, which have background noise and people close by, overwhelming personal preferences, so that most students have chosen text and disregarded their preferences.

## 8.1 Contribution

The contributions of this thesis might be beneficial for researchers, and educators, especially for those who design podcasts, which in turn will help to prepare better learning materials (podcasts) that are more efficient and effective for mobile learners.

The introduction section has contributed by defining the literature gap and introducing physical and social spaces as the base of research investigation, as this inclusion made the investigation of podcast preference and choices more realistic, and provides a more nuanced understanding on m-learning preferences and choices. Thus, future research on m-learning preferences will take into consideration physical and social spaces as well as learner characteristics.

Chapters (4-6) provide a better understanding of the role of characteristics on m-learning preferences in different contexts. This is followed, whenever the impact is significant and clear, by suggestions for an appropriate podcast type and length in the 12 designed contexts based on mobile learners' characteristics, which are demographics, prior experience, learning styles, and personality traits. For example, section (4.4.1) suggested suitable contexts to receive audio, text, and Vodcast, and section (5.2) showed that individuals with high scores in agreeableness and emotional-stability are willing to receive shorter podcast in certain contexts compared with individuals with lower scores.

Chapter 7 differentiates between two different approaches, m-learning preferences and choices, by suggesting that future research might investigate whether m-learning

preferences might be reliable only in quiet contexts. Thus, the busier the context the better it is to have a range of m-learning choices. Also, this chapter confirmed previous findings that mobile learners are highly satisfied with Vodcasts.

## 8.2 Recommendations for designing podcasts

In general, rich and long podcast is recommended while a student alone, even while walking, as we have seen in chapter four that Saudi students highly prefer to be engaged with m-learning while walking alone.

Students highly prefer vodcast and text respectively in busy contexts, so if possible providing slides synchronised with audio in a way that students can read the slide and opt to listen to their lecturer explanation for each slide. Students highly prefer audio while walking alone, and this research show that Australian students prefer audio in all walking contexts. On the other hand, students dislike audio in quiet and busy contexts. So, it is highly recommended to avoid disseminate audio podcasting in stationary context.

In terms of length, as mentioned above long podcasts are highly recommended while the student alone. In terms of demographics, long podcast is recommended for singles and young students while family around. On the other hand, while family are not around, long podcast is recommended for married and old students. With regards to students' personality traits, I suggest having short podcast for students with high agreeableness and emotional-stability in socialised context, as students with mentioned traits are socialised more compared with others. it is recommended to send podcasts which involve engagement and discussion with other students for high agreeableness, as this format is preferable for high agreeableness students and more likely to utilise. Also, as

emotional-stability students feel secure and calm, recognising that their calmness needs to be perturbed a bit to gain their attention. An example might be reminding them more frequently than other students about deadlines.

Overall, the above recommendation might be applicable for Australian and Saudi cultures and similar cultures, as cultural differences affect m-learning preferences as shown in chapter four and prior studies. Moreover, preferences can reflect students' real choices in quiet contexts, as it shown on chapter seven, the busier the context the less we can predict student choices.

### 8.3 Future work

Further research is recommended to extend knowledge of m-learning preferences and choices, such as but not limited to: addressing the limitations of this study provided in section (3.3.11), expanding physical and social spaces and if possible to see the impact of context in field, comparing different cultures (as chapter four demonstrated that significant differences exist between cultures), utilising other tools for personality and learning styles, and including other characteristics. For example, Big Five traits model is missing of other personality traits such as sense of humour and honesty. Also, investigating both primary and secondary education is a promising potential area of research, as students in those ages are digital natives, and a rich resource to investigate future directions in m-learning.









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# APPENDICES

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## Appendix A:

### **A. Background and demographics.**

1. Would you please write down your email:
2. What is your age?
3. Which of the following best describes your current relationship status?
4. Have you ever listened to an educational podcast using your mobile device?
5. Have you ever watched to an educational video using your mobile device?
6. Have you ever read to an educational materials using your mobile device?

**Questionnaire for preferences has the same structure scenarios based on podcast type, length, and context (a combination of physical space and social space) as shown below:**

**64. If I were in quiet place such as home, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**65. If I were alone in busy place such as cafe, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**66. If I were with family members in busy place such as cafe, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**67. If I were with a friend in busy place such as cafe, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**68. If I were with a classmate in busy place such as cafe, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**69. If I were alone in moving context such as walking, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**70. If I were with a family member in moving context such as walking, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**71. If I were with a friend in moving context such as walking, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**72. If I were with a classmate in moving context such as walking, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**73. If I were with a family member in moving context such as a car and I am not driving, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**74. If I were with a friend in moving context such as a car and I am not driving, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

**75. If I were with a classmate in moving context such as car and I am not driving, I would like to learn through my mobile device having**

	I will spend 1-5 Minutes	5-16 Minutes	More than 16 Minutes
Audio Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PowerPoint with Audio Materials.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reading Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I would not like to learn using mobile devices in this context (Please tick below)

# Appendix B:

## B. Big Five Questionnaires

All short phrases has to be answered with Likert scale: *Strongly agree .... Strongly disagree*

*I see myself as someone who:*

### **Is talkative**

Tends to find fault with others

Does a thorough job

Is depressed, blue

Is original, comes up with new ideas

Is reserved

Is helpful and unselfish with others

Can be somewhat careless

Tends to be disorganized

Worries a lot

Has an active imagination

Tends to be quiet

Is generally trusting

Tends to be lazy

Is emotionally stable, not easily upset

Is inventive

Has an assertive personality

Can be cold and aloof

### **Is relaxed, handles stress well**

Is curious about many different things

Is full of energy

Is a reliable worker

Can be tense

Is ingenious, a deep thinker

Generates a lot of enthusiasm

Has a forgiving nature

Values artistic, aesthetic experiences

Is sometimes shy, inhibited

Is considerate and kind to almost everyone

Does things efficiently

Remains calm in tense situations

Prefers work that is routine

Is outgoing, sociable

Is sometimes rude to others

Makes plans and follows through with them

Gets nervous easily

Perseveres until the task is finished

Likes to reflect, play with ideas

Can be moody

Has few artistic interests

Likes to cooperate with others

Is easily distracted

Is sophisticated in art, music, or literature

**Arabic translation for Big Five questionnaire is shown below**

**ارى نفسي كشخص**

ثرار	هادئ
يميل إلى إيجاد اخطا الآخرين	يوأتمن به
أقوم بالعمل على اكمل وجه	كسول
مكتئب و حزين	مستقر عاطفيا غير سهل الإحباط
مميز يأتي بأفكار جديده	شخص مبدع
محافظ	ذو شخصية حازمه
مساعد وغير أناني مع الآخرين	منعزل و بارد
مهمل او غير مبالي	مثابر حتى كمال المهمة
متمهل يتعامل مع الضغوطات بشكل جيد	مزاجي
فضولي محب الاطلاع على أشياء مختلفة	يقدر التجارب الفنية والجمالية
مليء بالطاقة	خجول وحساس
يبدأ بالجدال مع الآخرين	مراعي شعور الآخرين ولطيف مع الناس
عامل يعتمد عليه	يقوم بالعمل بشكل فعال
قابل للتوتر	يبدو هادئ في المواقف المتوترة
مبتكر ذو تفكير عميق	يفضل العمل الروتيني
يولد الكثير من الحماس	سهل التعامل واجتماعي
لديه شخصيه متسامحة	فظ مع الآخرين

يرسم الخطط ويقوم باتباعها	يميل ان يكون فوضوي
سريع الغضب	يميل ان يكون فوضوي
يتفاعل مع الأفكار	كثير القلق
لديه اهتمامات فنية	ذو خيال نشط
سريع التشتت	يحب التعاون مع الاخرين
مغرم بالفن او الموسيقى او الأدب	

## Appendix C:

### E.VARK questionnaire

**1. You are helping someone who wants to go to your airport, the center of town or railway station. You would:**

- go with her.
- tell her the directions.
- write down the directions.
- draw, or show her a map, or give her a map.

**2. A website has a video showing how to make a special graph. There is a person speaking, some lists and words describing what to do and some diagrams. You would learn most from:**

- seeing the diagrams.
- listening.
- reading the words.
- watching the actions.

**3. You are planning a vacation for a group. You want some feedback from them about the plan. You would:**

- a. describe some of the highlights they will experience.
- b. use a map to show them the places.
- c. give them a copy of the printed itinerary.
- d. phone, text or email them.

**4. You are going to cook something as a special treat. You would:**

- a. cook something you know without the need for instructions.
- b. ask friends for suggestions.
- c. look on the Internet or in some cookbooks for ideas from the pictures.
- d. use a good recipe.

**5. A group of tourists want to learn about the parks or wildlife reserves in your area. You would:**

- a. talk about, or arrange a talk for them about parks or wildlife reserves.
- b. show them maps and internet pictures.
- c. take them to a park or wildlife reserve and walk with them.
- d. give them a book or pamphlets about the parks or wildlife reserves.

**6. You are about to purchase a digital camera or mobile phone. Other than price, what would most influence your decision?**

- a. Trying or testing it.
- b. Reading the details or checking its features online.
- c. It is a modern design and looks good.
- d. The salesperson telling me about its features.

**7. Remember a time when you learned how to do something new. Avoid choosing a physical skill, eg. riding a bike. You learned best by:**

- a. watching a demonstration.
- b. listening to somebody explaining it and asking questions.
- c. diagrams, maps, and charts - visual clues.
- d. written instructions – e.g. a manual or book.

**8. You have a problem with your heart. You would prefer that the doctor:**

- a. gave you a something to read to explain what was wrong.
- b. used a plastic model to show what was wrong.
- c. described what was wrong.
- d. showed you a diagram of what was wrong.

**9. You want to learn a new program, skill or game on a computer. You would:**

- a. read the written instructions that came with the program.
- b. talk with people who know about the program.
- c. use the controls or keyboard.
- d. follow the diagrams in the book that came with it.

**10. I like websites that have:**

- a. things I can click on, shift or try.
- b. interesting design and visual features.
- c. interesting written descriptions, lists and explanations.
- d. audio channels where I can hear music, radio programs or interviews.

**11. Other than price, what would most influence your decision to buy a new non-fiction book?**

- a. The way it looks is appealing.
- b. Quickly reading parts of it.
- c. A friend talks about it and recommends it.
- d. It has real-life stories, experiences and examples.

**12. You are using a book, CD or website to learn how to take photos with your new digital camera. You would like to have:**

- a. a chance to ask questions and talk about the camera and its features.
- b. clear written instructions with lists and bullet points about what to do.
- c. diagrams showing the camera and what each part does.
- d. many examples of good and poor photos and how to improve them.

**13. Do you prefer a teacher or a presenter who uses:**

- a. demonstrations, models or practical sessions.
- b. question and answer, talk, group discussion, or guest speakers.
- c. handouts, books, or readings.
- d. diagrams, charts or graphs.

**14. You have finished a competition or test and would like some feedback. You would like to have feedback:**

- a. using examples from what you have done.
- b. using a written description of your results.
- c. from somebody who talks it through with you.
- d. using graphs showing what you had achieved.

**15. You are going to choose food at a restaurant or cafe. You would:**

- a. choose something that you have had there before.
- b. listen to the waiter or ask friends to recommend choices.
- c. choose from the descriptions in the menu.
- d. look at what others are eating or look at pictures of each dish.

**16. You have to make an important speech at a conference or special occasion. You would:**

- a. make diagrams or get graphs to help explain things.
- b. write a few key words and practice saying your speech over and over.
- c. write out your speech and learn from reading it over several times.
- d. gather many examples and stories to make the talk real and practical.