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2016

THE INFLUENCE OF MANAGEMENT SUPPORT, COMPUTER ANXIETY AND ENJOYMENT ON SCIENCE TEACHERS’ PERCEPTION ON THE USE OF DIGITAL TECHNOLOGIES IN HAIL PRIMARY SCHOOLS: A SURVEY

BY

STUDENT’S NAME

A thesis submitted in fulfilment of the requirement for the degree of Doctor of Philosophy in Education

[Kulliyyah](http://www.google.com.my/url?url=http://www.iium.edu.my/educ&rct=j&frm=1&q=&esrc=s&sa=U&ei=KHqFVJaTIZKyuATNwoGoBw&ved=0CBMQFjAA&usg=AFQjCNH8CPBB4-yr6XSF1EeEZS5f3iT02w) of Education

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Abstract

This research sought to identify the availability of digital technologies in public primary schools in Hail, Saudi Arabia and their use in teaching science subjects from the viewpoints of science teachers in the city. Another primary focus of this research was to address the applicability of TAM. A total of 330 Science teachers (145 males and 185 females) were drawn from a stratified sample randomly. Two instruments were developed to collect data; the first instrument was a self-developed checklist to profile the data related to the availability of digital technologies and facilities and the second instrument was a questionnaire adopted from three previous studies. The findings indicated an acute lack in the availability of digital technology facilities in all the primary schools surveyed, both boys’ schools and girls’. Teachers’ use of digital technologies in teaching and learning is influenced by several factors, namely schools’ management support (MS), computer anxiety (CA) and enjoyment (E). The availability of digital technological facilities varied throughout the primary schools in Hail. Throughout the 12 digital technology facilities investigated in the study, only 4 were accessible in all the schools. This research would assert that management support (MS) and enjoyment (E) on Science teachers are positively correlated with perceived usefulness (PU) relative to digital technology usage. Moreover, it would further assert that (CA) on Science educators is negatively correlated to PE with regards to digital technology usage. The study found that the intention to use (IU) influenced Science teachers’ actual use (AU) of digital technologies in primary schools. It was also found that perceived ease of use (PE) and enjoyment (E) influence Science teachers’ intentions in making use of digital technologies in primary schools. But perceived usefulness (PU) seems to not influence Science teachers’ intentions to apply digital technologies in primary schools. The results showed that the TAM structure directly impacts the MS, CA, E, PE, PU, IU and AU contexts. These results demonstrate the success of the proposed extension in achieving the objectives of this study.

خلاصة البحث

Abstract in Arabic

سعى هذا البحث إلى تحديد مدى توافر التقنيات الرقمية في المدارس الابتدائية العامة و استخدامها في تدريس مادة العلوم من وجهة نظر معلمي العلوم في مدينة حائل، المملكة العربية السعودية. ركز هذا البحث أيضا على قابلية تطبيق نموذج قبول التكنولوجيا. ووضعت عينة طبيقية عشوائية من 330 من معلمي ومعلمات العلوم (145 ذكور و 185 إناث). تم تطوير أداتين لجمع البيانات؛ كان أول أداة قائمة مرجعية ذاتيه متقدمة لمعرفة البيانات المتعلقة بتوافر التقنيات والتسهيلات الرقمية في المدارس الابتدائية في مدينة حائل، المملكة العربية السعودية، و كانت الاداة الثانية عباره عن استبيان اقتبس من ثلاث دراسات. لوحظ في النتائج أن هناك نقص حاد في توافر مرافق التكنولوجيا الرقمية في جميع المدارس الابتدائية للبنين والبنات التي شملتها الدراسة. استخدام المعلمين للتقنيات الرقمية في التعليم والتعلم يتأثر بعدة عوامل، وهي الدعم الإداري وقلق الكمبيوتر والتمتع. تفاوت توفر وسائل التقنيات الرقمية داخل نطاق المدارس الابتدائية في مدينة حائل. ضمن وسائل التقنيات الرقمية الاثني عشرة المتناولة في هذا البحث لم تتوافر سوى أربعة منها في جميع المدارس. ويؤكد هذا البحث على أن الدعم الإداري والاستمتاع التي يشهدها المعلمون والمعلمات لديهما علاقة طردية مع متغير مدى الفائدة المرجوة فيما يخص استخدام التقنيات الرقمية. بالإضافة إلى ذلك فإنه يؤكد على أن الرهبة او القلق من الحواسيب لدى معلمي ومعلمات مادة العلوم لها علاقة عكسية مع متغير مدى سهولة الاستخدام فيما يخص استخدام التقنيات الرقمية. وقد وجد البحث بأن النية في الاستخدام تؤثر على الاستخدام الفعلي للتقنيات الرقمية داخل المدارس الابتدائية. وجد أيضا أن مدى سهولة الاستخدام المدركة والاستمتاع يؤثران على نية معلمي ومعلمات مادة العلوم في استخدام التقنيات الرقمية في المدارس الابتدائية. بالرغم من ذلك فإنه يبدو بأن مدى الفائدة المرجوة لا يؤثر على نية معلمي ومعلمات مادة العلوم في الانتفاع من التقنيات الرقمية في المدارس الابتدائية. أظهرت هذه النتائج أن هيكلة نظرية قبول التكنولوجيا TAM تؤثر تاثير مباشرا على السياقات المتعلقه بكل من الدعم الاداري والقلق تجاه الكمبيوتر والتمتع والفائدة المدركه من الاستخدام وسهولة الاستخدام المدركه ونية الاستخدام والاستخدام الفعلي للتكنولوجيا الرقمية. كذلك النتائج تدل على نجاح التمديد المقترح للنموذج في تحقيق أهداف هذه الدراسة.

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CHAPTER ONE

# INTRODUCTION

## BACKGROUND OF THE STUDY

In this age, the fields of science, technology and the utilisation of computer applications have become an important aspect in the development of nations. In that pursuit nations started to compete in the field of science and technology, while also helping the upcoming generation to acquire and learn how to deal with technologies and computers, and benefit from them, thus raising a generation characterised with objective thinking, creativity and productivity (Al-Humayli, 2005). In light of that, it has become an obligation upon the education institutions to utilise their available resources in order to adapt with the world of tomorrow, in which information and the strength of the accompanying technologies in transmitting that information will become the main factor in achieving economic growth and sustaining public welfare on the local, national and global arenas (Al-Musa & Al-Mubarak, 2005). In this regard, the cumulated information and technology possessed by advanced nations are considered national resources which are added to the economic and man-power resources (Juwayli, 2001). Those who possess more information and technology will become the possessors of the keys to power, dominance and control in the world (Al-Sabhi, 2002). For example, the United States of America emphasises the importance of information technology infrastructure in achieving its national and global objectives, manifested in the support of vigorous and continuous economic growth, strengthening democracies, facilitating in finding better solutions for global environmental challenges, and improving health care (Masmoodi, 1998). Also, the Europeans realised the importance of what they termed as the information society; they started to prepare for this through encouraging scientific research and development in the fields of communication and technology. All of this serves as clear evidence on the importance of the information and communication technology sectors where those who possess ICT infrastructure, knowledge, skills and talent are far better off in many aspects of development.

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## STATEMENT OF THE PROBLEM

Hail is a city in Saudi Arabia with a total population of 541 primary schools and a total population of 886 primary Science teachers. The primary schools in Hail offer Science education to children ages 6 to 12. The schools are equipped with various digital technologies such as the Internet, Multimedia technology, Smart board, Video, E-Book, E-Learning, Distant learning, The LCD projector, Digital Camera, Digital Overhead Projector, Audiotapes, Photographs, Screens for viewing, CD players, 3D models, Computer sets, Educational games, Laptop, Pictures, Illustrations and DVD players. The provision of these technologies to Hail primary schools was the result of the Saudi Ministry of Education realization of the importance of utilizing digital technologies in the classroom and the tremendous benefits they bring to the education of primary school students, especially in terms of science learning. In 1995, the Ministry started to emphasise to schools and teachers the importance of utilising these technologies for the improvement of the quality of teaching and learning by dedicating special rooms for learning facilities providing teachers with vocational training in the usage of computers and updating their knowledge with all that is new in the field of instructional and digital technologies. In addition, the school administration and the Education Supervision Centre in the city of Hail also encourage teachers to use digital technology for instructional purposes.

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## PURPOSE OF THE STUDY

This research sought to identify the availability and use of digital technologies in teaching Science subject in public primary schools in the city of Hail. The study focused on public schools and on the viewpoint of Science teachers. If digital technology has proven its effectiveness in teaching various subjects in various levels of education, they have a special role in teaching Science subject in primary schools. Indeed, teachers need varied digital technology and equipment to teach Science, in order to convey facts and concepts to students without causing boredom or difficulties. Digital technology is akin to educational technology, defined by Lever-Duffy and McDonald, (2011) as "Any technology used by educators in support of the teaching and learning process" (p. 394). In this study, the terms Computing, Information Technology and Information Management are used to describe any programme of learning which incorporates digital literacy (the teaching and assessing of ICT concepts and skills). It should be noted though that this terminology does not always clearly define the programme of learning or match the skills which are taught. Indeed, the desired educational development cannot be achieved without detailed studies of the status quo to find out the challenges and difficulties, and to present a clear vision in proper planning to reach satisfactory educational output.

## RESEARCH OBJECTIVES

The study aimed to achieve the following objectives:

1. To profile the current status of digital technologies availability in Hail primary schools.
2. To examine the impact of three variables (Management Support, Computer Anxiety and Enjoyment), on Hail teachers’ intention to use and actual use of available digital technologies in primary schools by including these three external variables into the TAM constructs, hence extending the model.
3. To determine the factors affecting teachers’ use of digital technologies in primary schools in Hail.
4. To establish the efficacy of the extended Technology Acceptance Model (TAM).

## RESEARCH QUESTIONS

1. What digital technologies are currently available for teaching the Science subject in Hail primary schools?

2. Is there any difference in the current availability of digital technologies for Science teaching at Hail primary schools for girls and Hail primary schools for boys?

3. Is Hail primary Science teachers’ actual use of digital technologies in Hail influenced by intention to use digital technologies?

4. Is Hail primary Science teachers’ intention to use digital technologies influenced by perceived ease of use, perceived usefulness and enjoyment?

5. Is Hail primary Science teachers’ perceived usefulness of using digital technologies influenced by perceived ease of use, management support, computer anxiety and enjoyment?

6. Is Hail primary Science teachers’ perceived ease of use of using digital technologies influenced by management support, computer anxiety and enjoyment?

## THEORETICAL FRAMEWORK

The goal of TAM is to provide "An explanation of the determinants of technology acceptance that is generally capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis, 1989, p. 985). The Technology Acceptance Model (TAM) can be defined as an information system theory that models how users come to accept and use a computer-based technology. It was developed by Davis (1986) to explain computer-usage behaviour. What is suggested in the model is that numerous factors influence users’ decision on how and when to use a new software package when they are presented with such.

### Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis (1989) to explain computer-usage behaviour. The original (TAM) has two core constructs, perceived usefulness (PU), which means " The degree to which a Science teacher believes that using digital technologies would enhance his or her teaching quality and performance and student learning" (Masrom & Hussein, 2008, p. 52), and perceived ease of use (PEU) (Masrom & Hussein, 2008) defined as “The degree to which a person believes that using a particular system would be free from effort" (p. 52). These two constructs influence Science teachers’ intention to use instructional digital technologies (IU) (Masrom & Hussein, 2008) which is defined as “The measure of the strength of the Science teacher's intention to use digital technologies" (p. 52), and their actual use of instructional digital technologies (AU), which means that which is measured in terms of the frequency in use of digital technologies (how often) and volume of use of digital technologies use (how much) by the Science teachers, as adopted from Davis (1989).

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Perceived Usefulness

Perceived Ease of Use

Attitude Toward Using

Behavioural Intention to Use

Actual System to Use

External Variables

Figure . The Technology Acceptance Model (TAM)

Source: (Davis, Bagozzi & Warshaw, 1989)

## TEACHERS’ USE OF DIGITAL TECHNOLOGIES: THE INFLUENCE OF MANAGEMENT SUPPORT, COMPUTER ANXIETY AND ENJOYMENT

Management support refers to the perceived level of general support that the top management provides, inclusive of encouragement and resource support, both managerial and technical (Igbaria, Zinatelli, Cragg & Cavaye, 1997). As mentioned by Ang et al. (2001), due to the central role managers have in regards to schools, it does not come as a surprise that one of the most widely discussed organizational factors in several IT success studies is management support. By linking its influence on IT use, management support has been explored in numerous studies.

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Davis, Bagozzi and Warshaw (1992) mention that enjoyment refers to “the extent to which the activity of using a type of technology is perceived to be enjoyable in its own right”.Chatzoglou et al. (2009) observed through structural equation modelling that there is a direct effect exerted by enjoyment, perceived usefulness and perceived ease of use upon employees’ intention to use web-based training, while the strongest indirect impact on employees’ intention is produced by learning goal orientation. Yi & Hwang. (2003) argue that perceived enjoyment of using a system positively influences the perceived ease of use and the perceived usefulness. Therefore, it is hypothesized in this study that enjoyment will influence teachers’ use of digital technologies in teaching Science. The hypothesized model of teachers' intention to use digital technology and actual use of digital technologies in primary schools in Hail is illustrated in Figure 1.2.

**H11**

External

Variables

Perceived Usefulness

Perceived Ease of Use

Computer Anxiety

Intention to Use digital technologies

Management Support

Enjoyment

**H3**

**H1**

**H2**

**H5**

**H4**

**H7**

**H9**

**H8**

**H10**

**H6**

Actual Use of digital technologies

Figure . The Hypothesized Model of Science Teachers’ Actual Use of Digital Technologies in Primary Schools in Hail

## RESEARCH HYPOTHESES

Based on the eleven hypotheses postulating the relationships among management support, computer anxiety, enjoyment, perceived ease of use, perceived usefulness, intention to use digital technologies and actual use of digital technologies are tested in the study. The hypotheses are as follows:

H1 Perceived Ease of Use has a positive effect on Intention to Use digital technologies.

H2 Perceived Usefulness has a positive effect on Intention to Use digital technologies.

H3 Perceived Ease of Use has a positive impact on Perceived Usefulness of digital technologies.

H4 Management Support has a positive effect on Perceived Ease of Use digital technologies.

H5 Management Support has a positive effect on Perceived Usefulness of digital technologies.

H6 Computer Anxiety has a negative effect on Perceived Ease of Use digital technologies.

H7 Computer Anxiety has a negative effect on Perceived Usefulness of digital technologies.

H8 Enjoyment has a positive effect on Perceived Ease of Use digital technologies.

H9 Enjoyment has a positive effect on Perceived Usefulness of digital technologies.

H10 Enjoyment has a positive effect on Intention to Use digital technologies.

H11 Intention to use digital technologies has a positive influence on Actual use of digital technologies.

## SIGNIFICANCE OF THE STUDY

This study will contribute to decision makers to make any intervention based on the findings derived from this study to disseminate digital technologies adoption among Science teachers in the primary schools.

It stresses the importance of primary education as a level of education, and the role of digital technologies, while also being beneficial to specialists in digital technologies and curriculum planners and designers. Furthermore, this study is beneficial to specialists in teacher training and those in charge of their training in digital technologies by emphasising that trained teachers use digital technologies more effectively.

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## LIMITATIONS OF THE STUDY

The study sample was limited to Science teachers in public primary schools in Hail, under the Supervision of the Department of Education in Hail. This study was confined to using a checklist and questionnaires which were distributed amongst the teachers of the Science subject in government primary education schools.

The scope of the study was confined to the government primary education boys and girls schools in the city of Hail, and the time scope was the second term of the academic year 2012-2013. The subjects of the study comprise of all Science teachers in primary schools in the city of Hail, Kingdom of Saudi Arabia. The population for Science teachers was 886. This population was drawn from boys and girls primary schools operating in the city of Hail, Saudi Arabia.

## DEFINITIONS OF TERMS

**Instructional Digital Technologies**

Software or hardware built upon digital components, for example the Internet, Smart board, Video, E-Book, E-Learning, The LCD projector, Digital Camera, Digital Overhead Projector, CD players, 3D models, Computer sets, Educational games, Laptop and DVD players.

**Primary School in Saudi Arabia**

Fullatah (1983) defined it as “The type of official education which the pupil experiences between the age of six and twelve, providing him or her with care spiritually, physically, intellectually, emotionally and socially in a manner that corresponds with his or her nature as a child and with the objectives of the society in which he or she lives” (p. 13).

**Availability of Digital Technologies**

It is determining the presence of digital technologies for the Science subject in primary schools in the city of Hail in the Kingdom of Saudi Arabia.

**Management Support**

It refers to the perceived level of general support offered by top management in primary schools in Hail, inclusive of encouragement and resource support, both managerial and technical. (Igbaria et al. 1997).

**Computer Anxiety**

It refers to the tendency of the Science teacher in primary schools in Hail, to be apprehensive, phobic and uneasy towards present or futuristic use of computers and other digital technologies generally. (Compeau et al. 1995).

**Enjoyment**

It refers to the extent to which a Science teacher finds the activity of using digital technologies to teach Science in primary schools in Hail to be enjoyable in its own right. (Davis et al. 1992).

**Perceived Usefulness**

It refers to the degree in which a Science teacher believes that using digital technologies would enhance his or her teaching quality and performance and student learning. This definition was adapted from Davis (1989).

**Perceived Ease of Use**

It refers to the degree in which a Science teacher believes that using digital technology will be free from effort. This definition was adapted from Davis (1989).

**Intention to Use Digital Technologies**

It refers to the measure of strength of the Science teacher's intention to use digital technologies. This definition was adopted from Masrom & Hussein, (2008).

## CHAPTER SUMMARY

This chapter has presented and discussed the background of the study. It explained why digital technology are vital to the educational environment, definitions of concepts were included numerous sources. Additionally, the statement of the problem was discussed, as this study set to discover the availability and use of digital technologies in teaching Science subject in public primary schools in the city of Hail. This was followed by the body of literature on Technology Acceptance Model (TAM), which is the theoretical framework of this study, and on the three external variables, management support, computer anxiety and enjoyment. This chapter also presented the research questions, hypotheses and objectives. The significance of the study followed, highlighting how this study fills the gap in research literature on digital technology utilisation inside classrooms. Finally, the limitations of the study were mentioned, followed by brief definitions of the key terms in this study.

CHAPTER TWO

# LITERATURE REVIEW

## PART ONE: THEORETICAL REVIEW

## INTRODUCTION

Since the study aimed to identify the availability and usage of digital technologies in teaching the Science subject of the primary education in terms of the influence of the proposed variables (management support, computer anxiety, enjoyment, perceived usefulness, perceived ease of use and intention to use digital technologies) to actual use of digital technologies, it is of importance to take a look at the primary education in terms of its definition and importance. Furthermore, the review will emphasize on digital technologies from the perspective of their role, their importance for the teacher and their various types. What should also be covered is the utilisation of digital technologies in science education, explaining digital technologies from the perspective of TAM and the factors influencing teachers' use of digital technologies.

## PRIMARY EDUCATION AND ITS IMPORTANCE

Primary Education is defined by Al-Huqayl (1991) as “the level in which the pupil joins once he reaches the age of six, the duration of which is six years during which the pupil elevates from one class to a higher class at the end of the year”(p.29). Eesa (1978) defined Primary Education as the main basis upon which the upbringing of the upcoming generation for their future life is placed. From the perspective of quantity, it is a general level which includes the children of the whole nation, being termed as the compulsory level. It usually lasts from the age of six until the age of twelve, which is late childhood. From the qualitative perspective, the pupils must be equipped with the fundamentals of creed, sound orientations, information and skills. Primary Education is considered as the basis of the educational ladder in all societies. Fullatah (1983) holds the view that Primary Education works on cultivating the features of the child's personality, defining its general perspective after its main elements had formed in the house, and planting the seeds of formal education in all of his behavioural, physical, intellectual and social aspects.

## DIGITAL TECHNOLOGIES

Digital technologies are considered to be an offspring of instructional technology. Instructional technology has been defined by Lowther et al., (2008) as "The specific use and knowledge of tools and crafts in education, and it can encompass tools such as the Internet, hardware and computers. These fit nicely into the categorisation of digital technologies" (p. 4). Hollander (2010) defined digital technologies as tools that utilize a discrete method such as letters or numbers to pass on information, the alternative of which is the analogue system that instead utilizes a continuous method to pass on information. The teacher possesses the main role in making the teaching and educational process a success, and in directing it towards achieving the goals. It is he who interprets the curriculum into a tangible reality which he can notice and measure its effect. Digital technology achieves many privileges for the teacher, as mentioned by Al-Mushayqih (1993), “Digital technology helps the teacher bring the reality closer, since the produced vistas might not fully encompass the event and scene that are sought from the explanation, and even if it did, some aspects are most likely would quickly vanish, to the contrary of the event witnessed in reality through a film production or a tangible object” (pp. 6-8).

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Table . Studies on the Influencing Teachers' Use of Digital Technologies: An Empirical Review *Management Support*

|  |  |  |  |
| --- | --- | --- | --- |
| **Author and Year** | **Variables** | **Sample** | **Instrument** |
| Chatzoglou et al., (2009) | *Management Support,* Enjoyment, Self-Efficacy, Computer Anxiety and Learning Goal Orientation | 500 employees | Questionnaire |
| Kim et al., (2006) | Experience, Self Efficacy, Equivocality, *Organizational Support* and Subjective Norm | 600 employees | Questionnaire |
| Igbaria et al., (1997) | Computing Support, Computing Training and *Management Support* | 504 firms | Questionnaire |
| Igbaria et al., (1996) | Skills, Perceived Complexity, *Organizational Support*, Organizational Usage, Perceived Enjoyment and Perceived Usefulness | 471 managers and professionals | Questionnaire |
| Igbaria & Chakrabarti, (1990) | Organizational level, Computer Experience, Computer training,Computer Anxiety, Computer System Quality and *Management Support* | N/A | Questionnaire |

## TEACHERS' USE OF TECHNOLOGY AND THE INFLUENCE OF COMPUTER ANXIETY

Computer anxiety is the individual’s tendency to be apprehensive, phobic, and uneasy towards present or futuristic use of computers generally. (Compeau et al., 1995). It has been supported by Venkatesh (2000) that computer anxiety has a negative influence on the perceived ease of use of a system. As observed by Igbaria & Chakrabarti. (1990) previous research has given much attention to the causes of anxiety in a variety of domains including the utilisation of computers, due to its central role in influencing key dependent variables

Exploring the impact of computer anxiety on original TAM construct such as perceived ease of use and perceived usefulness has been the quest of many researchers. It has been supported by Venkatesh (2000) that computer anxiety has a negative influence on the perceived ease of use of a system. Also Igbaria and Iivari. (1995) managed to prove empirically that computer anxiety is negatively related to perceived usefulness. Later, Igbaria et al. (1996) provided more evidence supporting a direct relationship between computer anxiety and computer use.

Furthermore, Hong and Koh (2002) indicate that the relationship was significantly lower computer anxiety corresponded to positive attitudes toward computers. Saade and Kira (2009) presented evidence indicating a direct relationship between computer anxiety and computer use. When the computer anxiety construct is concerned, in a recent study by Chatzoglou et al. (2009) it was proposed that the existence of a negative relationship between computer anxiety and perceived ease of use. Table 2.2 summarizes studies on the influencing teachers' use of digital technologies, an empirical review on computer anxiety.

Table . Studies on the Influencing Teachers' Use of Digital Technologies: An Empirical Review *Computer Anxiety*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author and Year** | **Variables** | **Sample** | **Instrument** | |
| Chatzoglou et al., (2009) | Management Support, Enjoyment, Self-Efficacy, *Computer Anxiety* and Learning Goal Orientation | 500 employees | Questionnaire | |
| Saade and Kira, (2009) | *Computer Anxiety*, Perceived Ease of Use and Computer Self-Efficacy | 649 students | Questionnaire | |
| Hong et al., (2002) | *Computer Anxiety* | 112 male and 88 female secondary school teachers | | Questionnaire | |
| Venkatesh (2000) | Computer Self-Efficacy, Perceptions of External Control, *Computer Anxiety*, Computer Playfulness and Perceived Enjoyment | 58 employees / 145 employees | | Questionnaire | |
| Igbaria et al., (1996) | Skills, *Perceived Complexity*, Organizational Support, Organizational Usage, Perceived Enjoyment and Perceived Usefulness | 471 managers and professionals | | Questionnaire | |
| Igbaria and Chakrabarti, (1990) | Organizational level, Computer Experience, Computer training, *Computer Anxiety*, Computer System Quality and Management Support | N/A | | Questionnaire | |

## TEACHERS' USE OF TECHNOLOGY AND THE INFLUENCE OF ENJOYMENT

Enjoyment refers to “the extent to which the activity of using the technology is perceived to be enjoyable in its own right” (Davis et al., 1992).Chatzoglou et al. (2009) observed through structural equation modelling that there is a direct effect exerted by enjoyment, perceived usefulness and perceived ease of use upon employees’ intention to use web-based training, while the strongest indirect impact on employees’ intention is produced by learning goal orientation. Yi & Hwang. (2003) argue that perceived enjoyment of using a system positively influences the perceived ease of use and the perceived usefulness.

Prior research defined enjoyment as a determinant of behavioural intention and usefulness, as there is a significant positive interaction between usefulness and enjoyment (Afzal, S, Paras. G & Gangwani. S., 2015; Davis et al., 1992) and is a determinant of ease of use (Venkatesh, 2000). Following that, it was conceptualized that enjoyment functions as an precursor of ease of use, with the latter’s impact growing as users’ experience with the system grows too (Venkatesh, 2000). As for the web-based context, the particular effect of enjoyment on ease of use has been grossly overlooked. The result indicate that perceived enjoyment and perceived ease of use, and perceived usefulness have significant and direct effect on intention to use technology. Also, perceived enjoyment and perceived ease of use have significant and direct of effect on perceived usefulness. Perceived enjoyment significant and direct effect on perceived ease of use (Zare. H., & Yazdanparast. S., 2014)

Perceived enjoyment was introduced by Davis et al., (1992) who placed it as a cognitive response in parallel to the main belief constructs of TAM. Subsequently, researchers have observed that perceived enjoyment of using a system positively influences perceived usefulness (Yi & Hwang, 2003), perceived ease of use (Venkatesh, 2000), and behavioural intention to use a system (Davis et al., 1992). Yi & Hwang. (2003) found that enjoyment is a significant determinant of ease of use. All in all, the direct relationships between enjoyment, perceived usefulness, and perceived ease of use with intention to use a system have been found by Chatzoglou et al. (2009) to be statistically significant.

Table . Studies on the Influencing Teachers' Use of Digital Technologies: An Empirical Review *Enjoyment*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author and Year** | **Variables** | **Sample** | **Instrument** | |
| Chatzoglou et al., (2009) | Management Support*, Enjoyment*, Self-Efficacy,Computer Anxiety and Learning Goal Orientation | 500 employees | Questionnaire | |
| Yi & Hwang, (2003) | *Enjoyment* and Computer Self-Efficacy | 109 students | Questionnaire | |
| Venkatesh (2000) | Computer Self-Efficacy, Perceptions of External Control,Computer Anxiety, Computer Playfulness and *Perceived Enjoyment* | 58 employees / 145 employees | | Questionnaire | |
| Igbaria et al., (1996) | Skills, Perceived Complexity, Organizational Support, Organizational Usage, *Perceived Enjoyment* and Perceived Usefulness | 471 managers and professionals | | Questionnaire | |
| Davis et al., (1992) | Perceived Usefulness, *Enjoyment,* Perceived Ease of Use and Perceived Output Quality | 200 MPA students | | Questionnaire | |

## CHAPTER SUMMARY

Throughout this chapter primary education has been presented and discussed in terms of definition and importance. There has also been a review of the digital technologies with a brief description of their role, their importance for the teacher and their various types. What also has been covered is the utilisation of digital technologies in science education, explaining digital technologies from the perspective of TAM. Finally, the factors which are (i) management support, (ii) computer anxiety, (iii) enjoyment, (iv) perceived usefulness, (v) perceived ease of use, (vi) teachers’ intention to use digital technologies and (vii) teachers’ actual use of digital technologies influencing science teachers' use of digital technologies.

CHAPTER FIVE

# DISCUSSION AND CONCLUSION

## INTRODUCTION

This chapter discusses the results and findings of the study presented in the preceding chapter in light of prior research. The discussion of findings is guided by the six research questions posed in the study. However, the focus of the discussion is effectively geared towards significant findings and their theoretical, methodological and practical contributions to the standing body of knowledge on digital technology acceptance and utilization; especially within the primary school context. Moreover, on the basis of what was found, the chapter presents a number of recommendations for (i) further studies by researchers who are interested in investigating determinant factors of digital technology acceptance, specifically in regard to Science teachers as a sample of study, (ii) relevant authorities in the Ministry of Education office in the city of Hail who act as the role of decision and policy makers, and finally, (iii) principals and teachers of all primary schools operating in Hail and elsewhere throughout Saudi Arabia.

The discussion will be guided by the six research questions posed:

1. What digital technologies are currently available for teaching the Science subject in Hail primary schools?

2. Is there any difference in the current availability of digital technologies for Science teaching at Hail primary schools for girls and Hail primary schools for boys?

3. Is Hail primary Science teachers’ actual use of digital technologies in Hail influenced by intention to use digital technologies?

4. Is Hail primary Science teachers’ intention to use digital technologies influenced by perceived ease of use, perceived usefulness and enjoyment?

5. Is Hail primary Science teachers’ perceived usefulness of using digital technologies influenced by perceived ease of use, management support, computer anxiety and enjoyment?

6. Is Hail primary Science teachers’ perceived ease of use of using digital technologies influenced by management support, computer anxiety and enjoyment?

## THE PROFILE OF DIGITAL TECHNOLOGY AVAILABILITY IN PRIMARY SCHOOLS IN HAIL, SAUDI ARABIA

The present study discovered that the availability of digital technology facilities varied throughout the range of primary schools in Hail. Among the 12 digital technology facilities investigated in the study, only 4 were accessible in all the schools; namely video playback technology, CD players, computer platforms and DVD players. The availability of other devices such as the Internet, smart boards, E-Book, E-learning utilities, LCD projectors, digital cameras, digital overhead projectors and 3D models varied from boys’ primary schools to girls’ primary schools. The device with the least availability was the digital camera, which was present at less than 7% of the girls’ primary schools (6.5%), as opposed to a slightly greater availability at boys’ primary schools (8.14%).

Previous research suggests that the digital camera is among the digital technologies devices that help teachers to deliver content more effectively (Lowther et al., 2008). The digital camera is a type of input device, and is defined as the kind of camera which utilizes a charge-coupled device as a recording medium instead of a traditional film, leading to the image being digitally recorded (Lowther et al., 2008, p.369). The digital camera is defined as a camera that is similar to a traditional camera, except that instead of using light sensitive film the photos are captured as digital data (Lever-Duffy & McDonald, 2011). A digital camera is a device enabling users to photograph images and digitally store them, as opposed to traditional film storage mechanisms (Shelly & Vermaat, 2012). In addition to taking photos, unlike traditional cameras, digital cameras can also serve as a recording device for capturing videos with full audio footage. In addition to that difference, the quality, termed as the resolution, of the photos taken is easily controllable, in accordance to the needs of the educator. While many digital cameras look like a traditional camera, some are built into smart phones and other mobile devices (Shelly & Vermaat, 2012). Based on this, it is safe to say that there is a severe deficiency in the supply of digital cameras in both girls’ and boys’ primary schools in the city of Hail.

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## DETERMINANTS OF SCIENCE TEACHERS’ ACTUAL USE OF DIGITAL TECHNOLOGY IN PRIMARY SCHOOLS IN HAIL

In line with previous research on digital technology adoption utilizing TAM (Igbaria, 1996; Malhotra & Galletta, 1999; Yang & Choi, 2001; Yi & Hwang, 2003; Legris, Ingham & Collerette, 2001; Chatzoglou et al., 2009; Sanchez-Franco, 2009; Scott & Walczak, 2009; Tai, Zhang, Chang, Chen & Chen, 2012; Nur, 2012), a holistic model was suggested based on TAM. The research model effectively illustrates the tested hypotheses. Furthermore, the acceptance of technology is dependent on the technology itself, and the inherent level of proficiency possessed by the individual making use of said technology (Nelson, 1990). This research would assert that MS and E on Science teachers be positively correlated with perceived usefulness (PU) relative to digital technology usage. Moreover, it would further assert that computer anxiety (CA) on Science educators be correlated to perceived ease of use (PE) with regards to digital technology usage. Reviewing the original TAM framework, variables such as management support (MS), computer anxiety (CA) and E are found to mediate perceived usefulness and ease of use in influencing acceptance of technology. In the case, however, where longitudinal studies are unfeasible, a number of studies make use of either the intention to utilize or the actual use as the dependent variable. For the reason that the intention to use is essentially a prediction for the future and holds lower accuracy than the use in its actuality; the attitude variable has been dropped from a number of TAM studies. The attitude variable has been dropped in for the simple reason that attitude is unable to act as a direct independent variable, or yet even a full mediating variable. In the study, the attitude mediating variables were eliminated for the purposes of creating a simpler and more concise model. (Refer to Figure 4.10, Page 14).

The study found that the intention to use (IU) influenced science teachers’ actual to use of digital technologies in primary schools. These factors were found to be statistically and practically significant predictors of Science teachers’ actual use of digital technologies (AU), recording a path co-efficient with intention to use at (.428). The co-efficient suggests that Science teachers’ perception of benefits acquired by means of using digital technology significantly explained much regarding their decision to utilize digital technology in instruction and education as opposed to their perception of digital technologies’ intention to use. In this study, the results have again determined the efficacy of core TAM which formulates the intention to use as determinants of users’ actual will to utilize digital technology in achieving their purposes.

## THE INFLUENCE OF PERCEIVED USEFULNESS, PERCEIVED EASE OF USE AND ENJOYMENT ON SCIENCE TEACHERS’ INTENTION TO UTILIZE DIGITAL TECHNOLOGIES IN PRIMARY SCHOOLS IN HAIL

The study found that perceived ease of use (PE) and enjoyment (E) influenced Science teachers’ intention to use digital technologies in primary schools. These factors were found to be major statistical and practical determiners of Science teachers’ intentions to exploit digital technologies (IU), with the recording path co-efficient with intention to use resting at (.394) for PE – IU and (.213) for E – IU. But perceived usefulness (PU) did not influence Science teachers’ intentions to apply digital technologies in primary schools. These factors were found to be no significant predictors of Science teachers’ intention to use digital technologies (IU). The presented co-efficients imply that Science teachers’ perception of benefits of digital technology explained a significant amount of their respective decision to use digital technology for teaching and learning than their perception of digital technologies' ease of use and enjoyment. In the context of the present study, this may be interpreted as follows: Science teachers are more likely to be concerned with the ease of use in digital technology and enjoyment in making decisions to use the technology for teaching, as opposed to how digital technology would facilitate better education and learning through their use. This is particularly significant in light of the fact that with regards to the primary school context, Science teachers are required to achieve instructional objectives and curriculum goals by all viable means and methods.

As far as perceived ease of use is concerned, its positive link to intention has been confirmed in a number of other studies (Moon & Kim, 2001; Liu & Wei, 2003). These findings assert that in the case the trainee has realized the easiness of a training program; the individual would then comprehend its on-the-job usefulness and acquire intent to use it (Chatzoglou, et al., 2009). In general, however, these direct relationships between the enjoyment and ease of use with intention have been found to be statistically significant. Interestingly enough, the relationship of highest magnitude is that which exists between enjoyment and perceived usefulness (0.748). The second more important relationship seems to be situated between intention to use and actual use (0.428), while the third in ranking may be found between ease of use and intention (0.394).

When it is promised that digital technologies can benefit the teacher in teaching and assist in achieving the teacher’s educational ends, such teachers are willing to make use of them even though some measure of extra effort may be required. In this study, the results have once again established the efficacy of the core TAM which suggests perceived usefulness and perceived ease of use are determiners of users’ intentions to effectively utilize digital technology in achieving their objectives. This finding is consistent with results in prior conducted research on enjoyment directly affecting employees’ intentions to utilize web-based training, while learning that goal-orientation holds the strongest indirect impact on employees’ intention (Chatzoglou et al., 2009). All these direct relationships standing between enjoyment, ease of use, usefulness and intention reflect statistical significance (Chatzoglou et al., 2009).

## THE INFLUENCE OF MANAGEMENT SUPPORT, COMPUTER ANXIETY, ENJOYMENT AND PERCEIVED EASE OF USE ON SCIENCE TEACHERS’ PERCEIVED USEFULNESS OF DIGITAL TECHNOLOGY IN PRIMARY SCHOOLS IN HAIL

The research findings support the significance and influence of enjoyment (E) on respective Hail Science teachers’ perception of usefulness of digital technologies; recording relatively higher path co-efficients of (.748) for enjoyment (E) – perceived usefulness PU, and (.128) for management support (MS) – perceived usefulness (PU). The co-efficients indicate that enjoyment significantly explained Hail Science teachers’ perceptions of digital technology efficacy and utility. However, has a perceived ease of use, to relatively no influence on Science teachers’ perceived usefulness of digital technologies in primary schools.

This indicates that Hail’s Science teachers were likely to perceive digital technologies as useful and beneficial for teaching and learning processes if they held an adequate measure of confidence in their ability to use such technology. In the context of the present study, these findings suggest that the greater the application and use of digital technology the more efficacious a Hail Science teacher becomes; as he or she is going to perceive digital technology to be useful for instructional purposes.

This finding is consistent with results of previous research on the positive influence of enjoyment on users’ perceptions of benefits of digital technology use (Yi & Hwang, 2003; Davis et al., 1992). In other words, Science teachers would not perceive that digital technology would enhance their performance or aid them in performing their tasks if they did not feel a measure of enjoyment from their respective primary schools to integrate digital technologies into the instructional process. In the long term, however, this lack of support would likely decrease Science teachers’ perceived usefulness as the benefits of using it are not realized.

Davis et al., (1992) introduced perceived enjoyment and placed it parallel to the main belief constructs of TAM as a form of cognitive response. Scholars argue that perceived enjoyment of using a system positively influences perceived usefulness (Yi & Hwang, 2003).

## THE INFLUENCE OF MANAGEMENT SUPPORT, COMPUTER ANXIETY AND ENJOYMENT ON SCIENCE TEACHERS’ PERCEPTION OF DIGITAL TECHNOLOGY EASE OF USE IN PRIMARY SCHOOLS IN HAIL

Several key findings emerge from the current work. Significant support of the determinants of perceived ease of use in the model was found that computer anxiety is a major factor influencing perceived ease of use of digital technologies. The findings, moreover, support the significant and negative influence of computer anxiety (CA) on Hail Science teachers’ perceptions of the ease of use of digital technologies, recording a path co-efficient of (-.208) for CA - PE. On the other hand, management support (MS) and enjoyment (E) exert no influence over Science teachers’ perceived ease of use of digital technologies. The co-efficients indicate that computer anxiety (CA) significantly explained Hail Science teachers’ perception of digital technology’s ease of use. In the context of the present study, however, these findings suggest that the more digital technology proficient a Hail Science teacher is, the more likely he or she is going to perceive digital technology as useful for instructional purposes. This finding is consistent with the results of previous research on the negative influence of computer anxiety on users’ perception of the benefits of ease of use in digital technology (Igbaria & Chakrabarti, 1990; Venkatesh, 2000; Chatzoglou et al., 2009). Many researchers have attempted to document the significance of computer anxiety on the original TAM construct, as is the case with perceived ease of use. First of all, Igbaria and Iivari, (1995) presented empirical support for the presumption that computer anxiety is negatively related to perceived usefulness. Moreover, Venkatesh (2000) supported that computer anxiety has a negative influence on the perceived ease of use of the system.

## IMPLICATIONS AND CONCLUSION

The current findings have several implications theoretically, methodologically and practically to the body of knowledge. First, in terms of theory, the current study has extended TAM following confirmed results regarding the effects of three additional variables on Science teachers’ acceptance and utilization of digital technology. Management support, computer anxiety and enjoyment, in addition to the core constructs of perceived ease of use, perceived usefulness, intention to use and actual use are shown to be significant determinants of digital technology acceptance among Science teachers teaching at Hail primary schools.

Secondly, the contribution of this work rests in several areas of empirical analysis and implementation, where in regards to implementation the study examined the viability of the TAM model which was established in a western cultural context, while explaining a relevant case in a non-western cultural context.

Also supporting the interrelationships among key constructs in a technology acceptance model. The extension was comprised of decomposing the technical source dimension of the facilitating condition construct of the TAM structure variable.

The empirical analysis part of this study contributed to knowledge in this area of research. The research utilized a structural equation analytical technique that permits a concurrent assessment of the adequacy of the measurement model and the conceptual model. Specifically speaking, the research employed confirmatory factor analysis in order to validate the measurement with a higher-order structure incorporated into the proposed research model. The current research utilized two types by means of SEM technique; namely measurement and structural weights invariance using the co-variance structure analysis, and the mean and co-variance structure analysis, to effectively examine the impact of moderators on the research model.

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## RECOMMENDATIONS

Based on the current findings, the study makes the following recommendations for directions in future research, management support, computer anxiety and enjoyment:

**1. Directions for Future Research**

Since it is a highly complex phenomenon involving a complex interplay of internal and external variables, Science teachers’ acceptance and utilization of digital technology can be further assessed and examined by including more variables relevant to the context in which it is assessed. Variables such as political intervention, primary schools, science teachers and cultural norms may be able to explain some of the variances unaccounted for in this study. Involving more diverse variables would yield a better understanding of the underlying factors influencing digital technology acceptance among Science teachers.

The results of this study have one major implication for the utilisation of digital technologies in teaching and learning. The extended TAM model is applicable to a non-western nation as much as it is compatible with a western nation. Nevertheless, there is still a prevailing need for further research, and a need for examining other possible variables that might provide more strength and depth in explaining the use of digital technologies in non-western countries.

The study depends on a cross-sectional survey of respondents through structured questionnaires. Legris et al., (2001) suggested that the influence of some factors on the intention of using information technology varies at different stages in the implementation process. A longitudinal study would be more informative in investigating the problem of individual acceptance of digital technologies. The relevance of certain constructs in the model may, therefore, be scrutinized carefully in the future.

Future research should also look into the manner in which digital technologies are being used within the classroom, and whether teachers possess the requisite knowledge and skills to integrate digital technologies into the various Science subjects that they teach. Having digital technologies facilities in schools and equipping Science teachers with digital technology skills alone are insufficient to guarantee the teachers’ uptake, not to mention the success and proliferation of digital technology use. Finally, further research on teacher’s characteristics that influence acceptance, such as organization support, subjective norm, self-efficacy and training in this context should receive more attention.

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**4. Enjoyment**

Enjoyment points to the extent to which the activity of using a computer system is perceived to be personally enjoyable in its own respect aside from the relative intrinsic value of the technology (Davis et al., 1992). Prior research suggested enjoyment as a factor towards behavioural intention (Davis et al., 1992) and as a factor for ease of use (Venkatesh, 2000). As stated by Davis et al. (1992), the performance of a particular activity for the reason that it is perceived to be instrumental in achieving valued outcomes which are distinct from the activity itself is known in the academia as extrinsic motivation. In contrast, however, intrinsic motivation refers to carrying out an activity with no obvious reinforcement besides the performance of the activity alone. Davis et al. (1992) classified enjoyment as form of intrinsic motivation and perceived usefulness as a form of extrinsic motivation. Later, Venkatesh (2000) conceptualized enjoyment as the antecedent to ease of use, whose effects grow over time as users accrue more experience with the system. The specific effect of enjoyment on ease of use, however, has been unfortunately overlooked in a web-based context. Moon and Kim, (2001) examined a conceptually similar yet distinctive intrinsic motivation construct.

The results of this study clearly indicate the vital roles of variables such as enjoyment in influencing the decision to use digital technology and subsequent actual use. The model effectively reveals the underlying relationships between these motivational variables and existing TAM variables, while providing insights into how the acceptance and use of digital technology may be further facilitated. An application-specific enjoyment has been found to be a strong determinant of perceived usefulness and intention to use. The findings identify important sources for enhancing individual confidence in using digital technology by means of enjoyment. Enjoyment was found to have significant effects on application-specific management support. Finally, enjoyment holds a significant direct effect upon perceived usefulness and intention to use digital technologies in Hail primary schools. For successful acceptance of technology, practitioners and researchers alike ought to actively pursue various means to encourage and facilitate individuals to enjoy their use of digital technologies.

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