A Study of Factors Shaping Learners' Perceptions of ICT-based Teaching and Learning by Applying Personality and Technology Adoption Theories on Indigenous Knowledge Students

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ABSTRACT

Existing literature indicates that the use of Information and Communication Technologies (ICTs) and the inclusion of Indigenous Knowledge Systems (IKSs) in the school curriculum have the potential to increase academic performance. However, formal education is still unable to integrate ICTs into the teaching and learning of school subjects, especially, those that are related to IKSs. This research therefore aims to construct a model of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs. This aim is sub-divided into four research objectives: (a) to identify appropriate technology diffusion theories for the investigation of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs, (b) to construct a theoretical model of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs, (c) to perform an empirical confirmation of the above announced theoretical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs, and (d) to suggest new ideas for future research on learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs. A review of existing literature on eLearning adoption by students and learners was conducted in order to achieve objectives a, b, and d. As for objective c, it was achieved through the survey of 115 Hospitality studies learners from the ILembe and UMgungundlovu municipality districts in the KwaZulu-Natal (KZN) province of South Africa. The study's findings can be summarized as follows: (a) The Technology Adoption Model (TAM) is the backbone of the model designed by this study on the factors affecting learners' perceptions of the usefulness of ICTs for the teaching and learning of IKSs; (b) Learners' perceived usefulness of ICTs is hypothetically affected by the following factors: demographics, computer self-efficacy, trust in ICTs, and level of conscientiousness, (c) All these factors were empirically confirmed through a survey conducted by the current study, except that the only validated demographics were : school location, cell phone access, class grade and preferred subject; (d) This research recommends further investigation on the factors affecting learners' perceived usefulness of ICTs for the teaching and learning of IKSs, mainly because of the insufficient literature on this subject.

Keywords: eLearning, ICTs perceived usefulness, Indigenous knowledge, Hospitality studies

PUBLICATIONS

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DECLARATION

I, Khumbuzile Mornica Ngcobo, hereby to declare the originality of this dissertation and that all the materials used are correctly acknowledged and explicitly referenced on the appended bibliography.

I also certify that the dissertation and all its parts have never been submitted in any for a degree in any other institution of higher learning locally or internationally. It is also declared that any pictures or graphics contained in this dissertation, their sources are being given in this dissertation and in the bibliography section.

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K.M. Ngcobo Date

APPROVED FOR FINAL SUBMISSION

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Supervisor Date

Professor S.D. Eyono Obono

DEDICATION

This dissertation is dedicated my late parents and the entire Ngcobo family for amazing support, and unrelenting motivation throughout the duration of this study. Another special dedication to my husband, Bongani Mzobe together with my kids: Simthande, Kukhanya and Enhle Mzobe for their understanding, perseverance and sacrifice on their precious family times just for me to work towards this dissertation.

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Table of Contents

Contents

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE

INTRODUCTION

This chapter starts by defining what Indigenous Knowledge Systems (IKS) are, and proceeds to identify their characteristics. The importance of these types of knowledge systems is then highlighted as well as a brief presentation of some of their most prevalent types. The chapter continues with a brief analysis of the inclusion of Indigenous Knowledge Systems (IKS) into formal education in terms of its rationale, its current status in the school curriculum and its associated challenges. These challenges are then briefly examined in the context of eLearning in order to identify the main research problem, the main research question, as well as the main aim of this study. Thereafter, the research sub-problems, sub-questions, and objectives of this study are formulated. The chapter ends with the presentation of the structure of this dissertation.

1.1 Indigenous Knowledge Systems

This section intends to provide readers with a definition of the term Indigenous Knowledge Systems (IKS). It also identifies the main characteristics of IKS, as well as the variety of types as identified by this study. The section ends with a brief presentation of the importance of IKS within this modern world.

1.1.1 Definition of Indigenous Knowledge Systems (IKSs)

Indigenous knowledge systems is defined as the accumulation of long-standing wisdom, traditions and practices acquired over centuries by generations of indigenous communities from their life experiences and from their interactions with their environments. In many cases, indigenous knowledge is transmitted orally from generations to generations through stories, rituals, riddles, dances, legends, songs, arts, proverbs, and taboos (Kothari 2007; Chikonzo 2006; Msunya 2007). The list of life domains where IKS are used is almost as long as life itself. Examples of such

domains are medicine, agriculture, nutrition, education, ecology, law, spirituality, arts and governance (Warren 1996; Hammersmith 2009).

1.1.2 Characteristics of IKS

The main characteristic of Indigenous Knowledge Systems (IKS) is that they are community based (Dlamini 2005, Maferetlhane 2013). Moreover, the development of Indigenous Knowledge heavily depends on the behaviour and the attitudes of their communities (Baumwoll 2008, cited in Maferetlhane 2013). Such knowledge is shared by communities instead of being subjected to the individualist modern intellectual property system (Msunya 2007; Stoianoff 2012). The indigenous knowledge of a community is intimately linked to the identity of that community; and this identity includes attributes such as the community's location and its culture (Gorjestani 2001; Dlamini 2005; Msunya 2007). Another important characteristic of IKS is that they are a non-formal type of knowledge and they are holistic in nature (Msunya 2007; Stoianoff 2012).

1.1.3 Different types of IKS

This section briefly presents five of the most representative types of indigenous knowledge systems: indigenous food systems, indigenous medicine systems, indigenous beliefs systems, indigenous communication systems and indigenous games systems.

1.1.3.1 Indigenous food systems

Indigenous foods systems consist of processes and actors in the production, distribution, preparation, consumption and preservation of indigenous foods (Kwik 2008; Steiner 2008). These are foods that have been harvested and consumed in a specific indigenous area for many generations (Receveur *et al.* 1997; Kuhnlein and Receveur 1996; Costa *et al*. 2010). Typical knowledge on indigenous foods includes their methods of preparation, their seasonal availability, their methods of storage, their use, their socio-cultural meanings, composition, and their nutritional values (Ohiokpehai 2003; Kuhnlein and Receveur 1996; Kwik 2008). Some of the

advantages of indigenous foods are their affordability, their healthiness, their spirituality and their eco-friendliness (Receveur *et al.* 1997, Kuhnlein1995; Receveur and Kuhnlein 1998; Trichopoulou *et al*. 2006; Ibnouf 2012; Hancock 1985, cited in Kwik 2008). They are also credited for their economic benefits especially for tourism and for jobs creation (Rand *et al.* 2003).

1.1.3.2 Indigenous medicine system

Indigenous medicine practitioners make use of their spirituality and of their knowledge of natural elements such as plants, animals, water, wind, etc., for the purpose of providing health care services to indigenous communities (World Health Organization, cited in Patwardhan 2005; Elujoba *et al.* 2005; Olatokun 2010). Some of the routines that allow indigenous medicine practitioners to interact with spiritual forces include incantations, drumming, singing and praying (Struthers *et al.* 2004; Elujoba *et al.* 2005). The main benefits associated with indigenous medicine are its widespread accessibility, its affordability, its low toxicity, easy self-medication and its environmental friendliness. They also serve as a source of inspiration for modern medicine (Macfarlane and Alpers 2009; Elujoba *et al.* 2005; Sakkir *et al.* 2012; Raj *et al.* 2013; Patwardhan 2005; Fennell *et al.* 2004; Alves and Rosa 2007; Tabuti *et al.* 2003).

1.1.3.3 Indigenous belief systems

Indigenous belief systems make use of the different spiritual powers of life in order to establish the rules of conduct that are at the core of the customs and traditions of indigenous people. These spiritual powers are hidden behind the "holiness" of certain "apparent" natural phenomena (Luo *et al.* 2009; Anthwal *et al.* 2006; Negi 2005). As a result, indigenous belief systems contribute to the protection of biodiversity and of the ecosystem (Sasaki *et al.* 2010; Luo et al. 2009; Rim-Rukeh *et al.* 2013; Ngara and Mangizvo 2013). Here are few examples of taboos resulting from some indigenous beliefs: restraint from killing certain animals, prohibition of cutting certain trees and no unauthorised access to certain sites (Negi 2005; Ngara and Mangizvo 2013). The trespassing of these taboos is believed to trigger misfortunes

such as bad luck, sicknesses and sometimes, even death (Luo et al. 2009). Some of the main elements of common indigenous belief systems are rituals and sacrifices.

1.1.3.4 Indigenous communication system

Indigenous communication systems make use of indigenous modes of communication to assist indigenous people in the exchange of information (Ayirebasia 2008). The main types of indigenous modes of communication are indigenous languages, horns, drums and rituals. These modes of communication are also important for the preservation and transmission of culture from generations to generations (Ayirebasia 2008). There are even instances where people have access to modern communication systems, but they still rely on their indigenous modes of communication. This faithfulness can be explained by the following advantages of indigenous mode of communication. They are pervasive, affordable, culturally relevant and easy to use (Mushengyezi 2003; Ayirebasia 2008). In fact, more than two third of the populations in developing countries, still depend on indigenous modes of communication (Wilson 1987). For example, in most African countries; indigenous drums, horns, proverbs and whistling are still being used actively (Mushengyezi 2003, Wenje *et al.* 2015, Steiner 2008; Ibnouf 2012).

1.1.3.5 Indigenous games

Indigenous games are recreational and physical activities enjoyed by indigenous communities as part of their culture, identity and tradition (Burnett and Hollander 2004; Edwards 2009; Munyao 2010). Examples of popular indigenous games are five stones, rope jumping, three tins, marbles, cattle racing, stick fighting, marabaraba*, maborela*, Diketo* and kgati* (Bogopa 2015; Burnett and Hollander 2004; Munyao 2010). Indigenous games have several attributes. They can be physical, strategic, collective, skills driven, cognitive, and eco-friendly (Cheska 1987, cited in Burnett and Hollander 2004; Cheska 1987; Munyao 2010). They are also credited for many advantages compared to modern games, for example, minimal use of expensive devices (Burnett and Hollander 2004; Munyao 2010; Akbari 2010). They also promote human qualities such as peace, self-defence, self-confidence, discipline, teamwork and self-control (Munyao 2010).

1.1.4 Importance of Indigenous Knowledge (IK)

One may ask if indigenous knowledge systems are still relevant in this modern world. This section is an attempt to answer that important question in the domains of environmental conservation, disaster management, poverty alleviation and health care.

1.1.4.1 IK in environmental conservation

Existing research indicates that most indigenous rules, practices, customs, rituals, beliefs and taboos are eco-friendly (Trung and Le Xuan Quynh 2007; Steiner 2008). One example that comes to mind is the existence of indigenous sacred forests where animals and trees are automatically protected from being misused (Trung and Le Xuan Quynh 2007; Steiner 2008; Ngara and Mangizvo 2013). A second example is that of water conservation which is indirectly promoted by the taboo which interdicts lactating mothers from approaching a river (Cheserek 2005, cited in Maferetlhane 2013). Another example is that of indigenous land rotations which encourages indigenous communities to avoid the use of artificial fertilizers which are well known for being detrimental to the environment (Hens 2006; Steiner 2008). The use of ashes, cow dung, chicken manure and compost is also recognised as being part of some of the indigenous practices which encourages indigenous communities to distant themselves form the use of artificial material (Maferetlhane 2013). More examples on the eco-friendliness of indigenous practices can be found on Table 1.1 as described by Hens (2006) in the Ghanaian context

Table1.1: Examples of biodiversity conservation related practices in Ghana

Area of activities	*Practices*
Ecosystem preservation	Trees that are regarded as housing spirits: odum, African mahogany, tall palm trees
	Sacred animals: black and white colobus, mona monkey
	Totem animals and associated species
	Sacred groves
Water	Vegetation cannot be cleared along a strip of 30 m at both banks of streams and rivers
Farming	Traditional, 10 year, bush fallow system
	Traditional crops as cocoa and vegetables
Fishing	Days and periods of banned fishing
Hunting	Periods of banned hunting
	Do not hunt pregnant females
Herbal medicines	Use of herbs to prevent and treat (common) diseases in humans, animals and plants

1.1.4.2 IK in disaster management

Indigenous communities have their own unique indigenous methods for the prediction, the prevention and the mitigation of natural disasters such as hard rainfalls, draught, floods, windstorms, thunderstorms, landslides, lightning strikes, epidemics, earthquakes, landslides, frosts and solid fog (Steiner 2008; Mercer *et al*. 2010; Mercer et al. 2010; Pareek and Trivedi 2011; Pareek and Trivedi 2011; Maferetlhane 2013, Paulraj 2015). For example, some indigenous communities predict natural disasters based on their interpretation of the behaviour of certain animals and plants (Sunil, Steiner 2008, Anthony, Pareek and Trivedi 2011, Maferetlhane 2013, John). This is the case in Tanzania, where slaughtering a goat with an empty small intestine announces draught, famine and war. Still in Tanzania, an increase of libido in donkeys also announces a possible draught (Steiner 2008).

1.1.4.3 IKS in food security

According to Agea *et al*. (2008), IKS in food security refers to the indigenous production, processing, storage and preservation of food. For example, some indigenous communities make use of chicken manure and cow dung as fertilisers. This is well complemented by indigenous people's own understanding of the general properties of crops including their draught resistance, soil resistance, early maturation and their seasonality (Steiner 2008; Ibnouf 2012).

As for food processing, some examples of indigenous techniques are sun-drying, winnowing, pounding, roasting and stone grinding (Jacob, Steiner 2008). These techniques allow indigenous people to derive different food products from the same food as it is for example the case for the marula tree in Swaziland that is used both as a fruit, as a soup and as a traditional beer (Steiner 2008). Some well-known indigenous tools that are used for food storage include pots, baskets, calabashes, clay pots, granaries, sacks and even the underground. Finally, wood-ashes, fresh cow dungs and smoke are some examples that are also used for food preservation (Agea *et al*. 2008; Steiner 2008; Ibnouf 2012).

1.1.4.4 IK in health care

Indigenous knowledge systems have the ability to promote health care by providing traditional medicine to about 85% of the people as close as possible to the place where they live (Antwi-Baffour *et al*. 2014; Zhang 2004; Steiner 2008 Maferetlhane 2013; Beijing WHO declaration, cited in Place of TM). Indigenous medicine is also used as an alternative medicine in some developed countries and as a source of inspiration for the creation of therapeutic drugs (Raj *et al.* 2013; Maurya and Gupta 2006; Elujoba *et al.* 2005; Zhang 2004). This reliance on indigenous medicine is motivated by its affordability (Mander 1998, cited in Fennell *et al.* 2004). Moreover, Shenton (2004) postulates that indigenous medicine uses client-centred traditional healers who are credited to provide culturally appropriate and holistic health care. It also has the potential to relieve symptoms for some of the conditions that are resistant to western medicine (e.g. Malaria, Diabetes, HIV/AIDS, hypertension) (Macfarlane and Alpers 2009; Shenton 2004; Maurya and Gupta 2006; Tahraoui *et al.* 2007).

1.2 Inclusion of Indigenous Knowledge Systems in education

It is important to first understand why it makes sense to include IKS in mainstream education even though these two types of education systems are apparently opposed. It is also important to have an idea on the types of IKS that have so far been incorporated into mainstream education for selected countries.

The other critical issue to address here is the identification of the benefits and challenges associated with the inclusion of IKS in schools.

1.2.1 Rationale behind the inclusion of IKS in schools

Existing research shows that indigenous communities and indigenous professional educators have a prevalent and strong belief that meaningful educational experiences require an appropriate language and cultural context. They believe that a solid learning of traditions, knowledge and language(s) of the community can lay a good foundation for the introduction of foreign knowledge (Demmert and Towner 2003). Therefore, existing literature indicates that the inclusion of IKS in schools have a potential to increase academic achievements, promote social integration and encourage environmental education.

1.2.1.1 Academic achievement

Existing research suggests the incorporation of IKS into science education encourages academic participation (UNICEF annual report 2004 cited by Shizha 2007). It also allows schools to increase their expectations on the learning capabilities of their students (Dockett *et al*. 2006, cited in McCuaig *et al*. 2012). Other academic benefits linked to the incorporation of IKS into formal education are: improved academic performance (Michell *et al*. 2008), increased school attendance, higher school enrolments for indigenous students and a more meaningful involvement of indigenous learners in education (Demmert 2000; Lipka and McCarty 1994; McCarty & Lee 2014).

1.2.1.2 Social integration

The integration of IKS into formal education allows schools to offer to their indigenous students more opportunities to express and maintain their identity and to reduce the risk of being isolated from other learners. It also provides schools with the opportunity to value and involve students' families and their communities in their education (Dockett *et al*. 2006 as cited in McCuaig *et al*. 2012).

According to McCarter and Gavin (2011), the incorporation of IKS in schools can also contribute to the reduction of IKS conservation and transmission expenses, as well as to the contextualisation of formal education, so that it can become more relevant and provide a better sense of place and identity to pupils (3-5,26, cited in McCarter and Gavin 2011). Other social benefits of including IKS in schools are: elevating the status of IKS compared to western knowledge systems (McCarter and Gavin 2011), supporting national unity, and promoting human rights (Semali 1999). Examples of values that are promoted by the incorporation of IKS in schools include patience, generosity and kindness, respecting kinship, being a careful listener, balanced perspective and mind, not being lazy, hesitant, easily hurt, shy, or mad (Singh and Reyhner 2013).

1.2.1.3 Environmental education

Existing literature recognises that IKS plays an important role towards addressing environmental problems, especially through Environmental Education (EE) (Sheya 2014; Sakayombo 2014). EE aims to promote the awareness of the challenges of environmental conservation and to increase the ability to address these challenges (Bartosh 2003). EE is crucial in primary education mainly because this is the place where future citizens and decision makers are groomed (UNESCO). The incorporation of IKS into EE has the potential to increase students' participation in the preservation of a healthy ecosystem in their local communities (Swayze n.d; McCarter and Gavin 2011; Sakayombo 2014). The inclusion of IKS in EE may also provide means to give decision-making rights to indigenous people with regards to issues associated with their lands, their cultures, and their lifestyles (Sheya 2014).

1.2.2 IKS types in schools' Curricula

This section provides a list of the different types of IKS that are incorporated within the school curriculum. This list was compiled using the South African Curriculum and Assessment Policy Statements (CAPS) for primary and secondary education as released by the South African Department of Basic Education in 2011and available on www.tuthong.doe.gov.za. The keywords "indigenous" and "traditional" were used as a search key for each curriculum statement document in order to find out if the

subject curriculated by such a document did include some aspects of IKSs. The results of this search are presented by Table 1 and Table 2 respectively for primary education subjects and for secondary education subjects. Table 1 only includes grade 4 to grade 9 subjects even though primary education also includes subjects from grade R to grade 3. Subjects from grade R to grade 3 are not shown on Table 1 because it was found that, amongst them, only Life Skills contains some aspects of IKS.

1.2.2.1 Subjects without IKS

The following subjects were found not to contain any aspect of IKS: First additional language, Second additional language, Mathematics, Economics and Management Sciences, Agricultural Management practice, Agricultural Technology, Accounting, Business Studies, Economics, Design, Civil Technology, Electrical Technology, Mechanical Technology, Engineering Graphics and Design, Geography, Religion Studies, Mathematical Literacy, Computer Applications Technology, Information Technology and Consumer Studies.

1.2.2.2 Subjects with IKS

The following subjects were found to contain some aspects of IKS: Natural Science and Technology, Social Sciences, Creative Arts, Life Orientation, Natural Sciences, Technology, Agricultural Science, Dance Studies, Dramatic Arts, Music, Visual Arts, Life Sciences, History, and Hospitality Studies, Physical Sciences and Tourism.

1.2.2.3 Identification of IKS in schools' Curricula

Table 1.2 and 1.3 indicate that the different types of IKS that are included in the school curriculum can be divided into two categories: Arts and Culture versus Science and Technology. On the one hand, the types of IKS that are related to Arts and Culture are indigenous songs, games, poems, storytelling, dance, drama, music and art. On the other hand, the types of IKS that are related to Science and Technology include indigenous medicine, plants, animals, materials processing, homes, food processing and preservation and agricultural practices. The preparation of indigenous dishes is also included in the school curriculum even though one is not

able to clearly distinguish if it belongs to Arts and Culture or to Science and Technology. Moreover, indigenous languages were found to be taught throughout the South African curriculum for the entire primary and secondary education system.

Table1.2: Types of IKSs included in the school curriculum of grade 4 to grade 9

SUBJECTS	INTERMEDIATE (Grade 4-6)	SENIOR (Grade 7-9)
Life Skills	Songs, Games, Poems, and Storytelling	Songs, Games, Poems, and Storytelling
Natural Science and Technology	Animals, Plants, Homes (structures), food processing, Cultural moon stories materials processing such as mats, clay pots etc.	
Social Sciences	Medicine, labor division	
Creative Arts		Storytelling, Poems, songs, dance, instruments
Life Orientation		Games
Natural Sciences		Usage of moon, sun and stars for calendar and weather prediction
Technology		Food preservation (storing grain, pickling, drying and salting)

Table1.3: Types of IKSs included in the school curriculum of grade 10 to grade 12

SUBJECTS	FET (Grade 10 – 12)
Agricultural Science	Breeds (Cattle, pig, poultry), crops and forests, IKS concepts, A comparison between indigenous and "scientific" knowledge, IK used in agriculture, The advantages and constraints of using IK in agriculture, The protection and management of IKS in South Africa
Dance Studies	Dance
Dramatic Arts	Oral traditions, Cultural performance, Storytelling and drama.
Music	Indigenous African music, music instruments, musical theatre, music practitioners
Visual Arts	Indigenous art
History	Indigenous people
Life Orientation	Law, belief system, games
Physical Sciences	Traditional names of compounds
Life Sciences	Medicine and healers
Hospitality Studies	Ingredients, preparing African dishes
Tourism	Cultural uniqueness and diversities

1.2.3 Challenges

The integration of IK into formal education comes with a number of challenges which, according to McCarter and Gavin (2011), can be classified as either practical or as epistemological.

1.2.3.1 Practical challenges

The main practical challenges that are associated with the integration of IK into formal education includes, the lack of IKS indigenous specialist teachers, insufficient curriculum time for IKS, the lack of support from school communities and the lack of proper teaching guidance (Owuor 2008; Mbambo 2005; McCarter and Gavin 2011; Semali 1991; Shizha 2007). Other practical challenges associated with the integration of IK into formal education are: insufficient funding, inappropriate teaching methodologies, use of modern languages as the medium of instruction and scarcity of teaching and learning materials (Semali 1999; Sakamboyo 2014; Phiri 2008; Michell *et al*. 2008). The fact that learners and teachers from the same school sometimes represent different indigenous tribes is also a challenge for the integration of IK into formal education (McCarter and Gavin 2011). Moreover, many indigenous people argue that the integration of IK into formal education devalues IKS by showcasing some of their negative and secret aspects, and by using teachers that do not even understand and connect with IKS (McCarter and Gavin 2011).

1.2.3.2 Epistemological challenges

Formal education is usually teacher-centred regardless of students' gender, age, or clan's affiliation. This model is almost incompatible with IKS which are embedded in everyday life, compared to formal schools that are perceived as distinct discrete entities existing outside of the student's real life. Knowledge in school is perceived as theoretical, and it is conceived and stored in books (McCarter and Gavin 2011; Owuor 2008). The inclusion of IK into formal education is also problematic because of the intellectual property issue. In fact, the modernization of the knowledge acquired from IKS can be claimed as the intellectual property of some modern persons without the due acknowledgement of the relevant indigenous people (McCarter and Gavin 2011; Maden *et al*. 2007). Foreign researchers can appropriate

traditional knowledge and apply for a patent, claiming to have invented a new product since traditional knowledge has attributes of communal ownership (Musingafi, *et al*. n.d).

1.3 The role of ICT in education

The previous section briefly describes how formal education is slowly integrating indigenous knowledge systems (IKS); but this description cannot be complete without mentioning the role of Information and Communication Technologies (ICTs) in that integration. This is the reason why this section is dedicated to the brief description of the role of ICTs in formal education.

ICTs offer many benefits to the following education main stakeholders: learners, teachers, managers and parents (Jewitt *et al*. 2010). ICTs have the ability to empower learners by enhancing learning through improved collaboration, creativity, enjoyment, motivation, participation, access to learning materials and time management. ICTs also enable teachers to be more productive by allowing them to access more teaching materials, to efficiently track students' progress and to improve teachers-learners collaboration. School managers can also improve the management of their schools through the use of the data made available by ICTs. ICTs also allow parents to improve their level of involvement in the school life of their children by giving them the opportunity to access more learning materials and communicate more with schools. Unfortunately, the integration of ICTs in schools also carries some challenges that are mainly cost related: training needs, inadequate infrastructure and poor technical support. The adoption of ICTs in schools is also hindered by the negative attitude of schools' stakeholders (Bingimlas 2009, Madzima *et al*. 2013).

1.4 Problem statement

Out of the dozen of practical and epistemological challenges above identified on the integration of IKSs into formal education, the main problem targeted by this study is the difficulty for formal education to find appropriate teaching methodologies for IKSs despite the existence of e-learning. In fact, even though IKS is included in the schools' curriculum statements of some subjects, teachers still face difficulties with

the practical delivering of its content. Such difficulties are linked to the lack of adequate methodologies and support resources such as textbooks and e-learning tools for the formal teaching of IK. In fact Boyle and Wallace (2011) are adamant that "The potential of etools, emedia and elearning to support the goals of Indigenous people, their communities and organisations for cultural, social and economic sustainability, is still relatively unrealised"; and that is the main problem targeted by this study with regards to the teaching of IK

1.5 Research Questions, Research Aims and Objectives

This sub-section focusses on the study's aim, objectives and questions around the problem of the difficulty for e-learning to reach its full potential in its role of supporting the effective teaching and learning of IK in formal education.

1.5.1 Main Research question

The above brief presentation of the interactions between ICTs, IKSs and formal education is a good illustration of the potential of ICTs to solve many contemporary problems; and it was just emphasized that formal education suffers from a lack of appropriate teaching methodologies for the introduction of IKSs. This is the reason why this study is mainly triggered by the following research question: Which factors are shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

1.5.2 Research Sub-questions

The following four sub-questions are an embodiment of the above stated research question:

Research question 1: Which theories are suitable for the examination of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research question 2: How can one design a hypothetical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research question 3: What is the empirical validation of the above announced hypothetical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research question 4: Which IKSs teaching and learning strategies can be suggested from the assessment of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

1.5.4 Research Aim

The purpose of this research is to develop a model of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs.

1.5.5 Research Objectives

The following four objectives are an embodiment of the above stated research aim:

a. To identify appropriate technology diffusion theories for the investigation of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs.
b. To construct a theoretical model of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs;
c. To perform an empirical confirmation of the above announced theoretical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs; and
d. To suggest new IKSs teaching and learning strategies based on the assessment of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs.

1.6 Study Rationale

There is ample evidence from existing studies that ICTs are perceived as being useful for several formal education stakeholders, such as teachers, learners, parents and managers. This is especially the case for mainstream subjects such languages, Mathematics and science and technology.

The examination of the usefulness of ICTs for the teaching and learning of IKSs is therefore an interesting exercise mainly because of the fact that IKSs are not yet considered as a mainstream subject in formal education despite their announced benefits.

1.7 Structure of the dissertation

There are six chapters in this dissertation. In the first chapter, the background introductory information on the study is presented. This is whereby critical terms and issues on the subject of Indigenous Knowledge Systems were discussed. Furthermore, the main problem, aim and questions of this research are identified with regards to the perceived usefulness of ICTs when introducing IKSs in formal education.

The second chapter is dedicated to the presentation of the technology adoption theories that have usefulness as a construct. This chapter also proposes a theoretical framework of the factors shaping learners' perceptions on the usefulness of Information and Communication Technologies (ICTs) when introducing IKSs in formal education.

The third chapter outlines the methodology of this study in order to perform the empirical assessment of above announced theoretical framework. In chapter four, the outcomes of these empirical tests are analysed.

Chapter 5 compares these empirical results with those from existing studies. Lastly, chapter 6 summarises the study by showing how each research question was answered, and by highlighting its limitations as well as the areas for future research.

1.8 Summary and Conclusion

This study seeks to develop a model of the factors shaping learners' perceptions on the usefulness of Information and Communication Technologies (ICTs) for the teaching and learning Indigenous Knowledge Systems (IKSs). IKSs are generated by indigenous communities from their life experiences and they are orally transmitted from generations to generations. IKSs are prevalent and beneficial to many life aspects such as health care, nutrition, communication environmental, conservation, disaster management, religion and entertainment. South Africa is one of the countries where IKSs are officially included in formal primary and secondary education in subjects such as Social Sciences, Creative Arts, Life Orientation, Natural Sciences, Technology, Agricultural Science, Dramatic Arts, Music, Life Sciences, History and Hospitality Studies. The main benefits associated with the inclusion of IKSs into formal education are improved academic performances, social integration and environmental education. This inclusion also faces many challenges such as the lack of IKSs specialist teachers, insufficient curriculum time, the lack of support from school communities and inappropriate teaching methodologies.

This research is driven by the above stated problem of the difficulty for formal education to find appropriate teaching methodologies for IKSs. The approach adopted by this study is to understand learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs. The examination of the usefulness of ICTs in education is quite common for mainstream subjects such as languages, Mathematics, science and technology. However, ICTs is not yet popular for non-mainstream topics such as IKSs: this is what makes this research innovative!

CHAPTER TWO

THEORETICAL REVIEW

The first objective of this study is outlined in this chapter, that is, the identification of appropriate technology diffusion theories for the investigation of the factors shaping learners' perceptions on the usefulness of Information and Communication Technologies (ICTs) for the teaching and learning of Indigenous Knowledge Systems (IKSs). There are many technology adoption theories, both from the precursors of the field and from subsequent researchers. Theories that do not have the usefulness construct are firstly identified. Thereafter, theories with the usefulness construct are analysed with the intention of identifying how their other constructs can be relevant to this study. Subsequently, the chapter presents the criteria for the selection of constructs to be used as the hypothetical factors shaping learners' perceptions on the usefulness of ICTs when considered as a support tool for teaching and learning of IKSs. The second objective of this study is achieved in the final section of this chapter which proposes a theoretical model of the factors shaping learners' perceptions on the usefulness of ICTs for teaching and learning IKSs.

2.1 Existing theories of technology adoption without the usefulness construct

It appears from the technology adoption models reviewed by this chapter that Information Technology Implementation (ITI) is the only model without the perceived usefulness (PU) construct, and with all the other constructs not linked to PU in any other model. ITI can be seen on Figure 2.1. It is made up of six constructs: task characteristics, technology characteristics, task complexity, technology complexity, compatibility and IT implementation (Randolph et al. 1990).

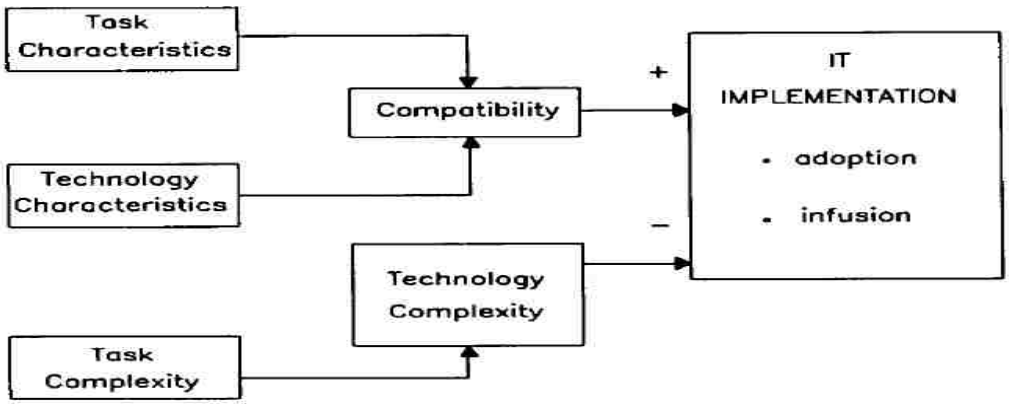

Figure 2.1: Information Technology implementation Model (Randolph et al. 1990)

2.2 Technology adoption theories with an implicit presence of the perceived usefulness construct

There are cases where some technology adoption theories do not have PU as one of their construct, but some of their constructs are linked to PU in other technology adoption theories. This is the case with the Theory of Planned Behaviour (TPB), the Theory of Reasoned Action (TRA) and the Information Systems Success model (ISS) (Korpelainen 2011; Jeyaraj et al. 2006).

2.2.1 Theory of Planned Behaviour (TPB)

TPB is made up of five constructs as illustrated by Figure 2.2 (Ajzen 1991): attitude towards the behaviour, subjective norms, perceived behavioural control, intention and behaviour. Even though perceived usefulness (PU) is not part of these constructs, some TPB constructs can still be linked to PU in other technology adoption theories. For example, attitude is seen as a consequence of PU by Taylor and Todd (1995) in Decomposed Theory of Planned Behaviour (DTPB).

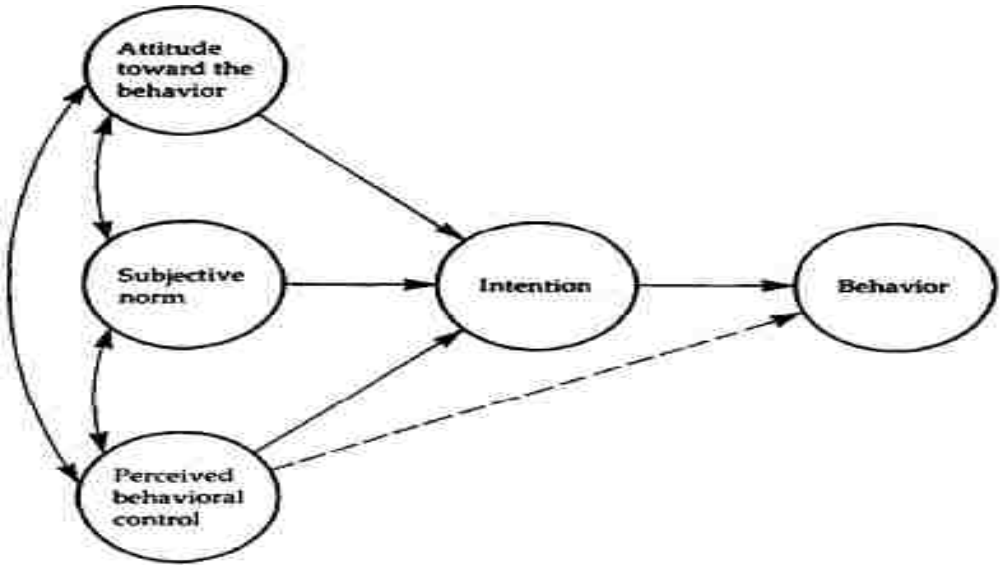

Figure 2.2: Theory of Planned Behaviour (Ajzen 1991)

Table 2.1 shows that perceived behavioural control is the only one of the five TPB constructs that does not have a relationship with PU. Out of the four other TPB constructs with a link to PU, only one of them, subjective norms, is considered as an antecedent of PU. The other three remaining constructs of TPB are considered as consequences of PU: Attitude towards the behaviour, Intention and Behaviour.

Table 2.1: Analysis of Theory Planned Behaviour in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Attitude towards the behavior	Consequence	TAM; (Taylor and Todd 1995); (Baraghani 2008); (Park 2009); (Reid & Levy 2008)
Subjective norms	Antecedent	TAM (1989)
Intention	Consequence	TAM; TAM2; UTAUT; Triandis model; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Behaviour	Consequence	(Campeau et.al1999); (Thompson *et al*.1991); (Lopez and Menson 1997); (Rogers 1983)
Perceived behavioral control	None	No relationship found in all reviewed theories

2.2.2 Theory of Reasoned Action (TRA)

TRA is made up of eight constructs as shown in Figure 2.3: beliefs, evaluation, normative beliefs, motivation to comply, attitude, subjective norms, intention, and behaviour (Fishbein and Ajzen 1975 cited in Braghani 2008). Even though perceived usefulness (PU) is not part of these constructs, some TRA constructs can still be linked to PU in other technology adoption theories. For example, attitude is seen as a consequence of PU by Taylor and Todd (1995) in Decomposed Theory of Planned Behaviour (DTPB).

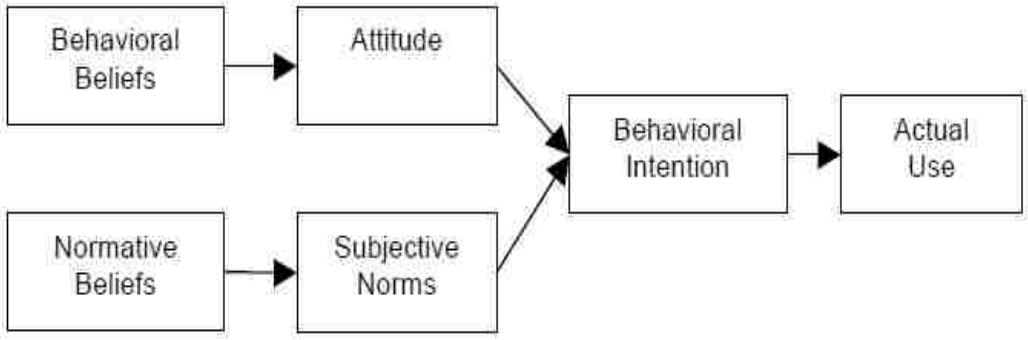

Figure 2.3: Theory of Reasoned Action (Fishbein and Ajzen 1975)

Table 2.2: Analysis of Theory of Reasoned Action in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Subjective Norms	Antecedent	TAM
Attitude	Consequence	TAM; (Taylor and Todd 1995); (Baraghani 2008); (Park 2009); (Reid & Levy 2008);
Behavioral intention	Consequence	TAM,TAM2, UTAUT; Triandis model (2001); (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Actual use	Consequence	(Campeau et.al1999); (Thompson *et al*.1991); (Lopez and Menson 1997); (Rogers 1983)
Behavioral beliefs	None	No relationship found in all reviewed theories
Normative beliefs	None	No relationship found in all reviewed theories

Table 2.2 indicates that behavioural beliefs and normative beliefs are the two of six TRA constructs that do not have a link with PU. Out of the four other TRA constructs with a link to PU, only one of them, subjective norms, is considered as an antecedent of PU. The other three remaining constructs of TRA are considered as consequences of PU: Attitude, Intention and actual use.

2.2.3 Information System Success model (ISS)

ISS model is made up of six constructs as illustrated by Figure 2.4.: system quality, information quality, use, user satisfaction, individual impact and organisational impact (Delon and Mclean 2003). Even though perceived usefulness (PU) is not part of these constructs, some ISS constructs can still be linked to PU in other technology adoption theories. For example, use is seen as a consequence of PU by Lopez and Manson (1997).

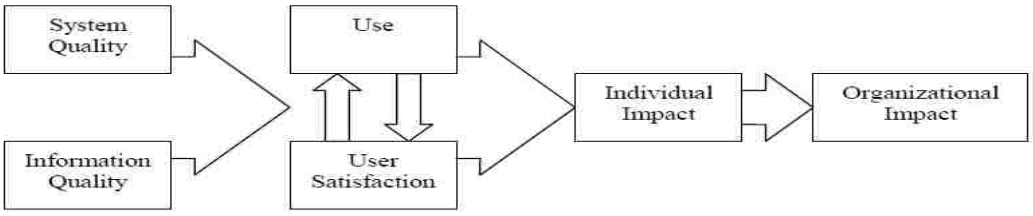

Figure 2.4: Information Systems Success Model (Delon and Mclean 2003)

Table 2.3: Analysis of Information System Success model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Actual System use	Consequence	(Campeau et.al1999); (Thompson *et a*l. 1991); (Lopez and Menson 1997); (Rogers 1983)
System quality	None	No relationship found in all reviewed theories
Information quality	None	No relationship found in all reviewed theories
User satisfaction	None	No relationship found in all reviewed theories
Individual impact	None	No relationship found in all reviewed theories
Organizational impact	None	No relationship found in all reviewed theories

Table 2.3 below indicates that Use in the only one of six ISS constructs that link with PU as a consequence. Other five ISS constructs do not have a link to PU: system

quality, information quality, use, user satisfaction, individual impact and organisational impact.

2.3 Technology adoption models with an explicit presence of the perceived usefulness construct

The aim of this section is to identify the theories of technology adoption that explicitly include the perceived usefulness (PU) construct. This section starts with the presentation of the precursors of the technology adoption field, as opposed to new theories which are presented later on.

2.3.1 Precursors' theories of technology adoption

According to the literature reviewed as part of this research, there are six theories of technology adoption from the precursors of the field that explicitly include perceived usefulness as a construct. These are: Technology Acceptance Model (TAM), TAM2, Adoption of innovation, Triandis model, Decomposed Theory of Planned Behaviour (DTPB) and Unified Theory of Acceptance and Use of Technology (UTAUT).

2.3.1.1 Technology Acceptance Model

Technology Acceptance Model (TAM) is made up of six constructs apart from the perceived usefulness, as shown by Figure 2.5 (Davis 1989). The relationships between the constructs of TAM and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.4.

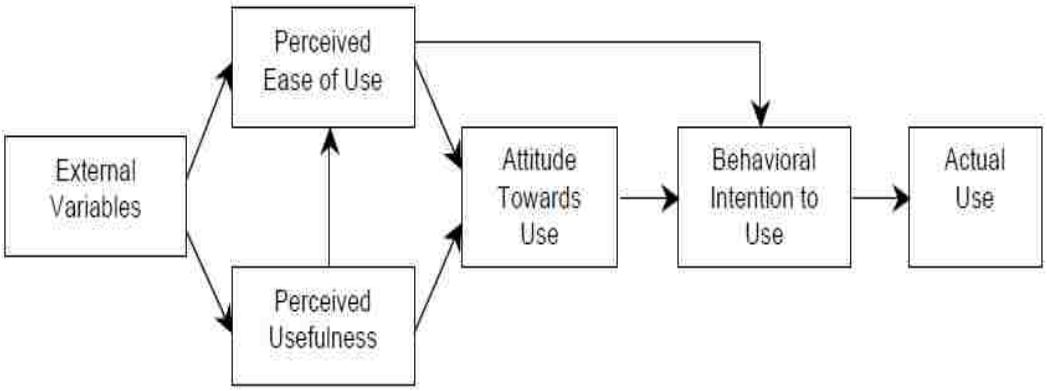

Figure 2.5: Technology Acceptance Model (Davis 1989)

Table 2.4 shows that the usefulness construct is related to all the TAM constructs, either directly from TAM itself, or indirectly from other technology adoption models. In fact, TAM clearly proposes external variable and PEOU as an antecedent of PU, and then attitude and BIU as consequence of PU. As for ASU, its direct relationship with PU is not explicitly present in figure 2.5, but Table 2.1 indicates that relationship mainly because of figure 2.20 and figure 2.21.

Table 2.4: Analysis of Technology Acceptance model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	Antecedent	TAM; TAM 2; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004)
External variables,	Antecedent	TAM
Attitude towards using	Consequence	TAM; (Taylor and Todd 1995); (Baraghani 2008); (Park 2009); (Reid & Levy 2008)
Behavioral intention to use	Consequence	TAM ; TAM2; UTAUT; (Triandis model 2001); (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Actual System use	Consequence	(Campeau and Higgin 1999); (Thompson *et al*.1991); (Lopez and Menson 1997); (Rogers 1983)

2.3.1.2 TAM2

TAM2 is made up of eight constructs apart from perceived usefulness as illustrated by Figure 2.6 (Venkatesh & Davis 2000). The relationships between the constructs of TAM2 and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.5.

According to Table 2.5, all the eight constructs of TAM2 have a relationship with PU. Six of these eight constructs are antecedents of PU and only two of them are consequences of PU. TAM2 antecedents constructs are subjective norms, Image job relevance, output quality and result demonstrability. The two TAM2 constructs which are consequences of PU are perceived ease of use (PEOU) and usage

behaviour. It is worth noting that usage behaviour is not explicitly shown by TAM2 as a consequence of PU, but such relationship is shown by Table 2.5 mainly because of figure 2.20 and figure 2.21.

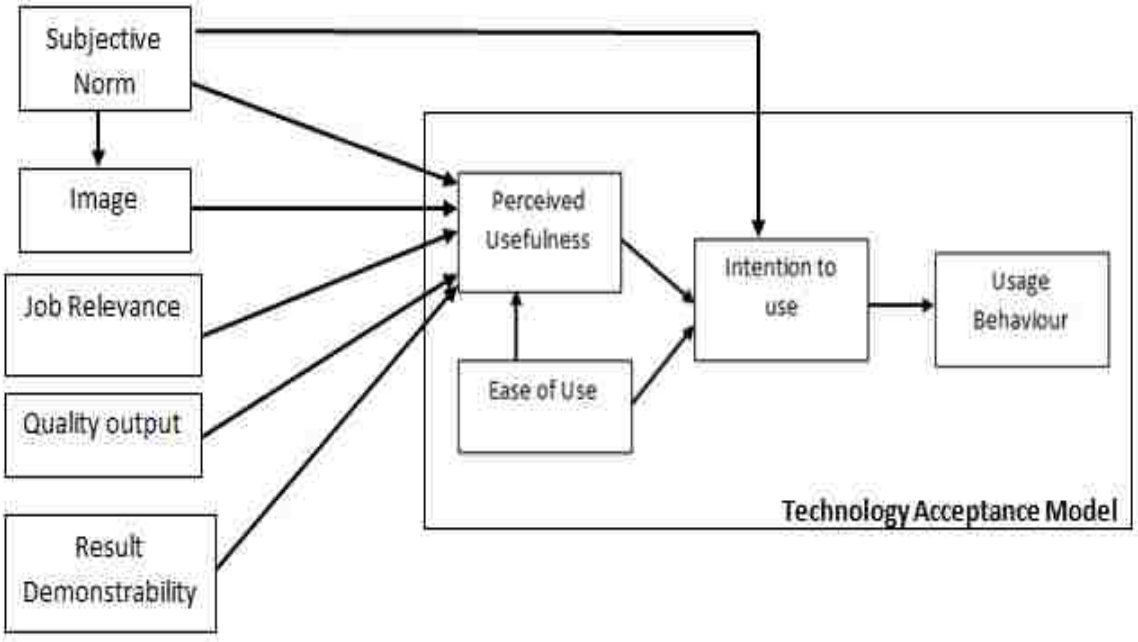

Figure 2.6: Extended TAM (TAM2) (Venkatesh and Davis 2000)

Table 2.5: Analysis of TAM 2 model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Subjective Norms	Antecedent	TAM2; (Park 2009); (Punnoose 2012); (Lopez and Menson 1997)
Image	Antecedent	TAM2
Job Relevance	Antecedent	TAM2
Output Quality	Antecedent	TAM2
Result Demonstrability	Antecedent	TAM2
Perceived Ease of Use	Antecedent	TAM2; TAM; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou (2003); (Park 2009); (Punnoose 2012); (Tang et al. 2004)
Intention to use	Consequence	TAM2; TAM; (UTAUT 2003); (Triandis model; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang et al. 2004)
Usage behavior	Consequence	(Campeau *et.al*. 1999); (Thompson *et al*. 1991); (Lopez and Menson 1997); (Rogers 1983)

2.3.1.3 Adoption of Innovation or Diffusion of Innovation (DOI) model

Diffusion of Innovation (DOI) is made up of six constructs, as illustrated by Figure 2.7 (Rogers 1983 cited in Wani and Sayed 2015). The relationships between the constructs of DOI and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.6. It is important to note that perceived usefulness corresponds to Relative advantage in DOI and it forms part of the perceived attributes of an innovation (Zolait 2014; Kim and Crowston 2011).

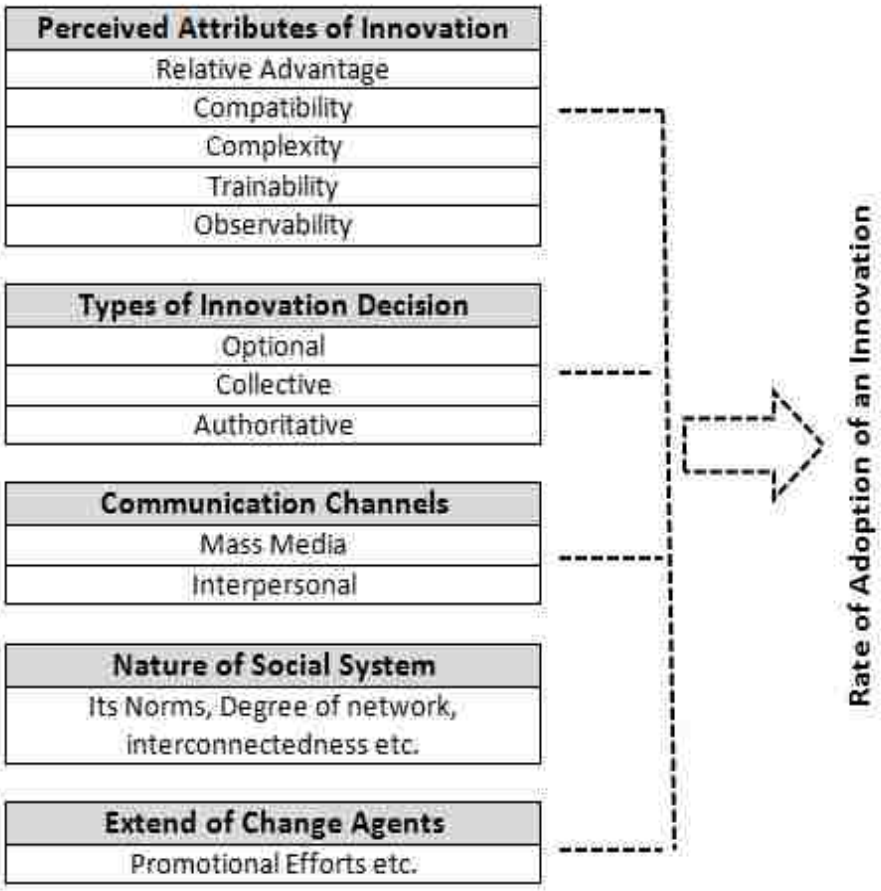

Figure 2.7: Adoption of Innovation Model (Rogers 1983)

According to Table 2.6, four of five constructs of the adoption of innovation model do not have a relationship with PU. There is only one Rogers' construct that relates with PU. Constructs that do not link with PU are types of innovation decision, communication channels, and nature of social system and extend of agents. A construct that links with PU is rate of adoption of innovation which is the

consequence of PU. It is important to note that the original construct of the adoption of innovation model that incorporates PU is Perceived Attributes of Innovation.

Table 2.6: Analysis of Adoption of Innovation model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Rate of adoption of innovation	consequence	(Rogers 1983)
Types of innovation decision	None	No relationship found in all reviewed theories
Communication channels	None	No relationship found in all reviewed theories
Nature of social system	None	No relationship found in all reviewed theories
Extend of change agents	None	No relationship found in all reviewed theories

2.3.1.4 Triandis model

Triandis model is made up of six constructs, apart from perceived consequences as shown by Figure 2.8 (source: Baraghan 2008). The relationships between the constructs of Triandis and perceived usefulness (PU) are highlighted in Table 2.7. It is important to note that perceived usefulness corresponds to perceived consequences in Triandis model (Zolait 2014).

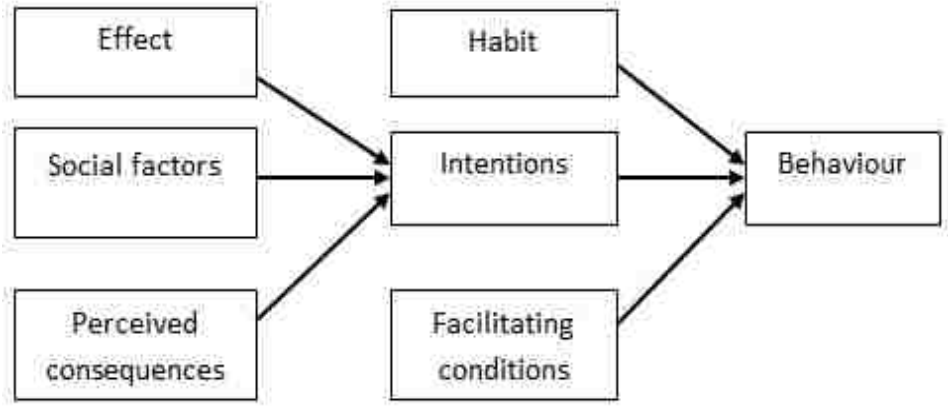

Figure 2.8: Triandis Model (source: Baraghani 2008)

According to Table 2.7, four of the six constructs of Triandis have a relationship with PU while the other two constructs do not have a relationship with PU. The Triandis constructs that do not have a relationship with PU are habit and facilitating conditions.

Triandis constructs that have a relationship with PU are intention, social factors and behaviour. Affect, intention and behaviour are consequences of PU, but social factors are antecedents of PU. It is important to note that the link between Social factors, affect and behaviours with PU is not explicitly shown in Triandis model, but such relationships are indicated in Table 2.7 mainly because of figure 2.6, figure 2.20 and figure 2.21.

Table 2.7: Analysis of Triandis model in relation to usefulness construct

Construct	Relationship with usefulness/perceived consequences	Evidence
Intentions	Consequence	Triandis model; TAM; TAM2; UTAUT; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang et al. 2004)
Social factors	Antecedent	TAM2
Affect	consequence	(Compeau *et al*.1999)
Habit	none	No relationship found in all reviewed theories
Facilitating conditions	none	No relationship found in all reviewed theories
Behaviour	Consequence	(Campeau *et.al*. 1999); (Thompson *et a*l.1991); (Lopez and Menson 1997)

2.3.1.5 Decomposition of Theory of Planned Behaviour (DTPB)

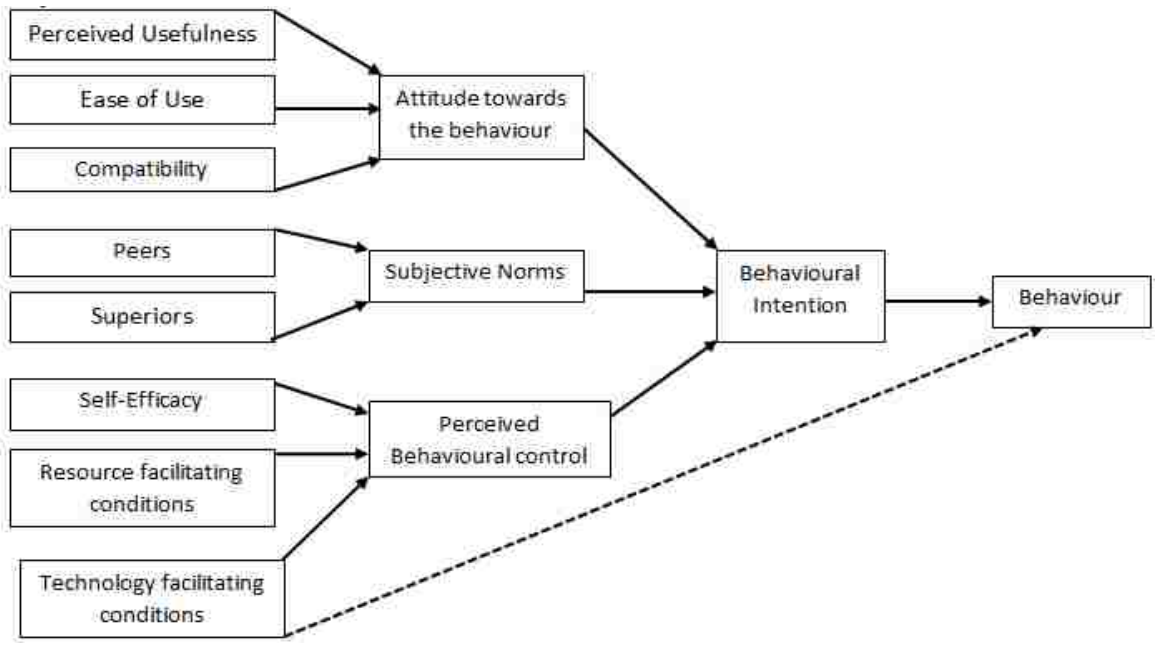

Figure 2.9: Decomposed Theory of Planned Behaviour (Taylor and Todd 1995)

DTPB is made up of twelve constructs excluding perceived usefulness, as illustrated by Figure 2.9 (Taylor and Todd 1995). The relationships between the constructs of DTPB and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.8.

Table 2.8: Analysis of Decomposed Theory of planned Behaviour in relation to usefulness construct

Construct	Relationship with usefulness/ performance expectancy	Evidence
Ease of use	antecedent	TAM2; TAM; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004)
Subjective norms	antecedent	TAM2
Self-efficacy	antecedent	(Park 2009); (Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Tang *et al*. 2004)
Behavioral intention	consequence	TAM; TAM2; UTAUT; Triandis model; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Attitude	consequence	TAM; (Taylor and Todd 1995); (Baraghani 2008); (Park 2009); (Reid & Levy 2008)
Behavior	consequence	(Campeau *et.al*. 1999); (Thompson *et al*. 1991); (Lopez and Menson 1997)
Compatibility	none	No relationship found in all reviewed theories
Peers	none	No relationship found in all reviewed theories
Superiors	none	No relationship found in all reviewed theories
Resource facilitating conditions	none	No relationship found in all reviewed theories
Technology facilitating conditions	none	No relationship found in all reviewed theories
Perceived behavioral control	none	No relationship found in all reviewed theories

Table 2.8 indicates that half of the twelve constructs of DTPB have a relationship with PU while the other half does not have a relationship with PU. Constructs of DTPB that do not have a relationship with PU are compatibility, peers, superiors, resource facilitating conditions, technology facilitating conditions and perceived behavioural control. Constructs of DTPB that have a relationship with PU are ease of use, subjective norms, self-efficacy, behavioural intention, behaviour and attitude. The first three constructs are antecedents and the last three are consequences.

However, for ease of use, subjective norms, behavioural intention, self-efficacy, behaviour and a relationship with PU is not explicitly shown in figure 2.9. Instead, Table 2.8 indicates such relationships mainly because of figure 2.4, figure 2.5, figure 2.11, figure 2.12, figure 2.13, figure 2.14, figure 2.20 and figure 2.21.

2.3.1.6 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT is made up of nine constructs apart from performance expectancy, as shown by Figure 2.10 (Venkatesh 2003). The relationships between the constructs of UTAUT and perceived usefulness (PU) are highlighted in Table 2.9. It is worth noting that perceived usefulness corresponds to performance expectancy in UTAUT (KIM and Crowston, 2011).

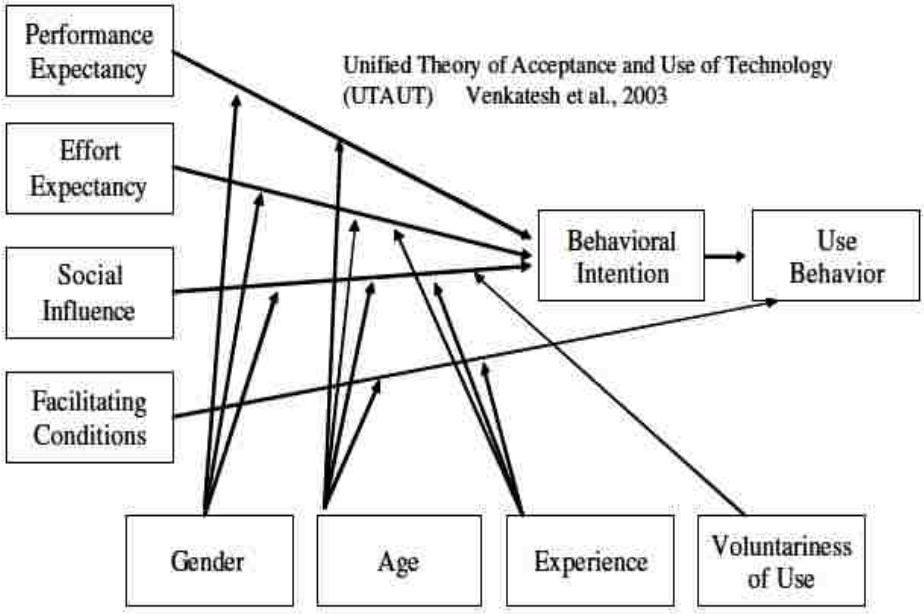

Figure 2.10: Unified Theory of Acceptance and use of Technology (Venkatesh et al 2003)

According to Table 2.9, three of nine constructs of UTAUT do not have a link with PU while six constructs are shown to have a relationship with PU. UTAUT constructs that do not link with PU are: facilitating conditions, experience and voluntariness of use. UTAUT constructs that have a link with PU are gender, age, behavioural intention, effort expectancy, social influence and use behaviour. For gender and age, their relationships exist as mediators when PU links with behavioural intention. Effort expectancy, social influence constructs are antecedents of PU. Behavioural intention and use behaviour are consequences of PU.

However, as for effort expectancy, social influence and use behaviour constructs; their relationship with PU is not explicitly shown in figure 2.10. Rather, Table 2.9 indicates that relationship mainly because of figure 2.5.

Table 2.9: Analysis of Unified Theory of Acceptance and use of Technology in relation to usefulness construct

Construct	Relationship with usefulness/ performance expectancy	Evidence
Effort expectancy/ ease of Use	antecedent	TAM2; TAM; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004)
Social influence/ "Subjective norms	antecedent	TAM2; (Park 2009); (Punnoose 2012); (Lopez and Menson 1997)
Behavioral intention	consequence	UTAUT; TAM; TAM2; Triandis model; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004)
Usage behavior	consequence	(Campeau *et.al*. 1999); (Thompson *et al*. 1991); (Lopez and Menson 1997)
Gender	bidirectional	UTAUT
Age	bidirectional	UTAUT
Facilitating conditions	none	No relationship found in all reviewed theories
Experience	none	No relationship found in all reviewed theories
Voluntariness of use	none	No relationship found in all reviewed theories

2.3.2 New models of technology adoption

This section now presents new theoretical models that have been identified and developed as an extension of already existing theories of adoption.

2.3.2.1 Baraghani model

This model is made up of six constructs, apart from perceived usefulness as illustrated by Figure 2.11 (Barghani 2008). The relationship between the constructs of this model and perceived usefulness (PU) are highlighted in Table 2.10. According to Table 2.10, from six constructs of model (2008), there is only one construct without a relationship with PU, i.e. perceived behavioural control (PBC). The five Baraghani's constructs that have a relationship with PU are perceived ease of use (PEOU), trust, subjective norms, attitude and intention; with the first three being antecedents of PU and the last two being consequences of PU. It is worth

mentioning that Figure 2.11 does not show an explicit relationship between subjective norms and PU, however, Table 2.10 indicates that relationship mainly because of the proposal by figur 2.6.

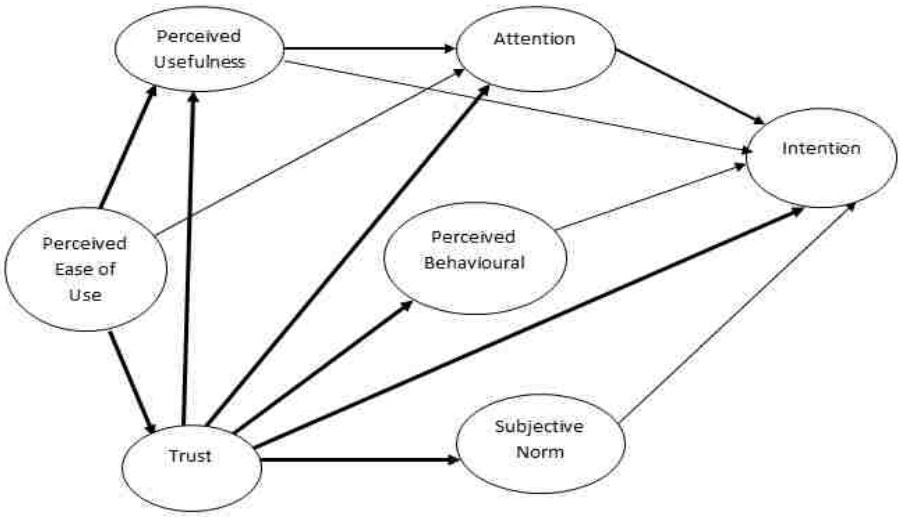

Figure 2.11: Baraghani technology adoption model (2008)

Table 2.10: Analysis of Baraghani technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	antecedent	(Baraghani 2008); TAM; TAM2; (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Trust	antecedent	(Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003)
Intention	consequence	(Baraghani 2008); TAM; TAM2; UTAUT; Triandis model; (Park 2009); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Punnoose 2012); (Tang *et al*. 2004)
Attitude	consequence	(Baraghani 2008); TAM; (Taylor and Todd 1995); (Park 2009); (Reid & Levy 2008)
Subjective Norms	antecedent	TAM2
Perceived Behavioral	none	No relationship found in all reviewed theories

2.3.2.2 Reid and Levy model

This model is made up of five constructs, apart from perceived usefulness, as illustrated by Figure 2.12 by Reid and Levy (2008). The relationships between the constructs of this model and the perceived usefulness (PU) construct are highlighted in Table 2.11.

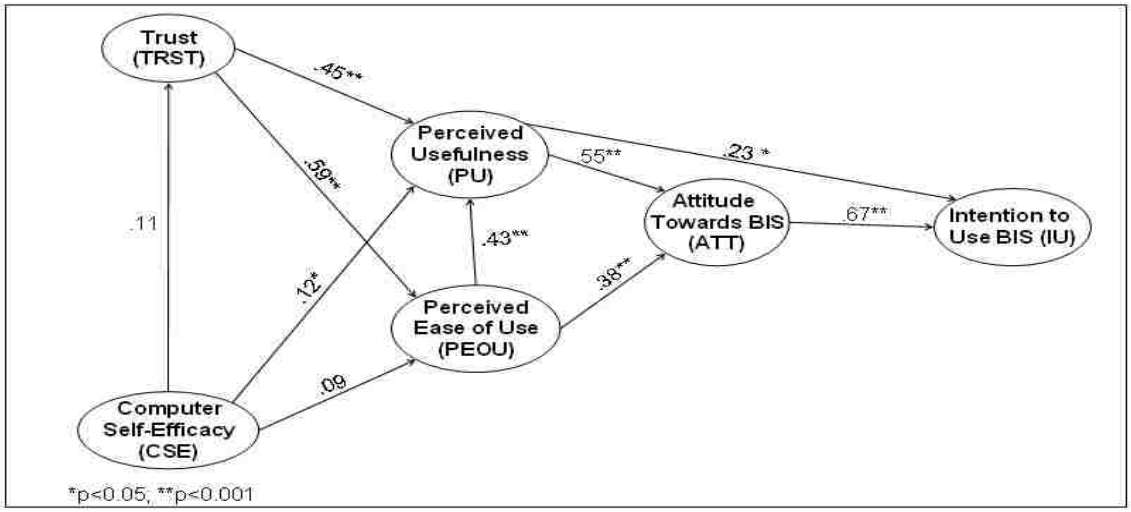

Figure 2.12: Reid and levy technology adoption model (2008)

Table 2.11 indicates that all five constructs of Reid and Levy model have a link with PU. On the one hand, Computer Self-Efficacy is perceived ease of use (PEOU) and Trust constructs are determinant of PU. On the other hand, attitude and intention are consequences of PU (Reid and Levy: 2008).

Table 2.11: Analysis of Reid and Levy technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	antecedent	(Reid & levy 2008), TAM; TAM2; (Baraghani 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Trust	antecedent	(Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Baraghan 2008)
Computer self-efficacy	antecedent	(Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Park 2009); (Tang *et al*. 2004); (Compeau *et al*. 1999)
Attitude	consequence	(Reid & Levy 2008); (Taylor and Todd 1995); (Baraghani 2008); (Park 2009); TAM
Intention	consequence	(Reid & Levy 2008); (Baraghani 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004); TAM; TAM2; UTAUT; Triandis model

2.3.2.3 Gefen et al. model

This model is made up of eight constructs, excluding perceived usefulness, as illustrated by Figure 2.13 (Gefen et al. 2003). The relationship between the constructs of this model and perceived usefulness (PU) are highlighted in Table 2.12.

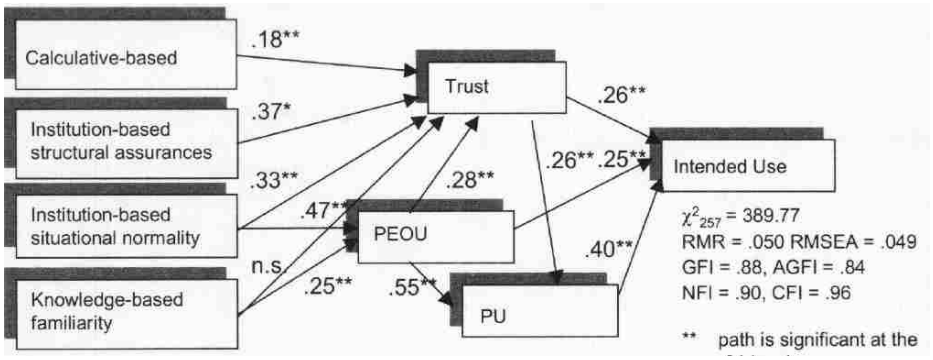

Figure 2.13: Gefen et al. technology adoption model (2003)

According to Table 2.12, four of seven constructs of Gefen et al. model do not have a link with PU while the other three constructs relate with PU. Gefen et al. constructs that do not link with PU are calculative based beliefs, knowledge based beliefs and institution based. This includes both structural assurance and situational normality beliefs. Perceived ease of use (PEOU) and trust are determinants of PU, while intended use is a consequence of PU.

Table 2.12: Analysis of Gefen et al. technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	antecedent	(Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004); TAM; TAM2
Intend to use	consequence	(Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004); TAM; TAM2; UTAUT; Triandis model
Trust	antecedent	(Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); Baraghani (2008)
Calculative based beliefs	none	No relationship found in all reviewed theories
Structural assurances	none	No relationship found in all reviewed theories
Situational normality	none	No relationship found in all reviewed theories
Familiarity	none	No relationship found in all reviewed theories

2.3.2.4 Pavlou model

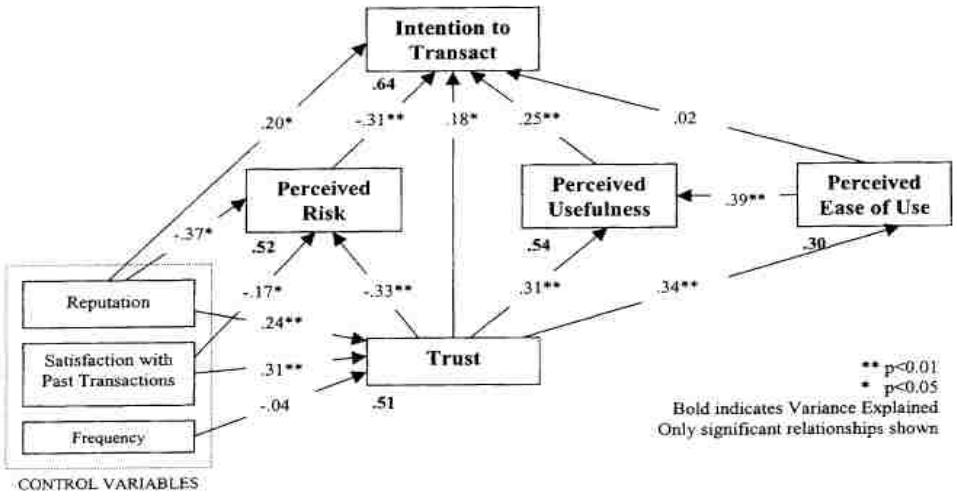

Figure 2.14: Pavlou technology adoption model (2003)

This model is made up of seven constructs apart from perceived usefulness as shown by Figure 2.14 (Pavlou 2003). The relationships between the constructs of this model and perceived usefulness (PU) are highlighted in Table 2.13.

Table 2.13: Analysis of Pavlou technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	antecedent	(Pavlou 2003); (Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004); TAM; TAM2
Interaction to transact	consequence	Pavlou (2003), (Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004); TAM; TAM2; UTAUT; Triandis model
Trust	antecedent	(Pavlou 2003); (Reid & Levy 2008); (Gefen 2003); Baraghani (2008)
Perceived Risk	none	No relationship found in all reviewed theories
Reputation	None	No relationship found in all reviewed theories
Satisfaction with past transactions	none	No relationship found in all reviewed theories
frequency	none	No relationship found in all reviewed theories

According to Table 2.13, four of seven constructs of Pavlou's model do not link with PU. There are three Pavlou's constructs that have a relationship with PU.

Pavlou's constructs that do not relate with PU are reputation, satisfaction with past transactions, frequency and perceived risk. Trust and perceived ease of use (PEOU) constructs are antecedents of PU, and intension to transact is a consequence of PU.

2.3.2.5 Munguatosha et al. model

This model is made up of ten constructs excluding perceived usefulness as illustrated by Figure 2.15. (Munguatosha *et al.* 2011). The relationships between the constructs of this model and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.14.

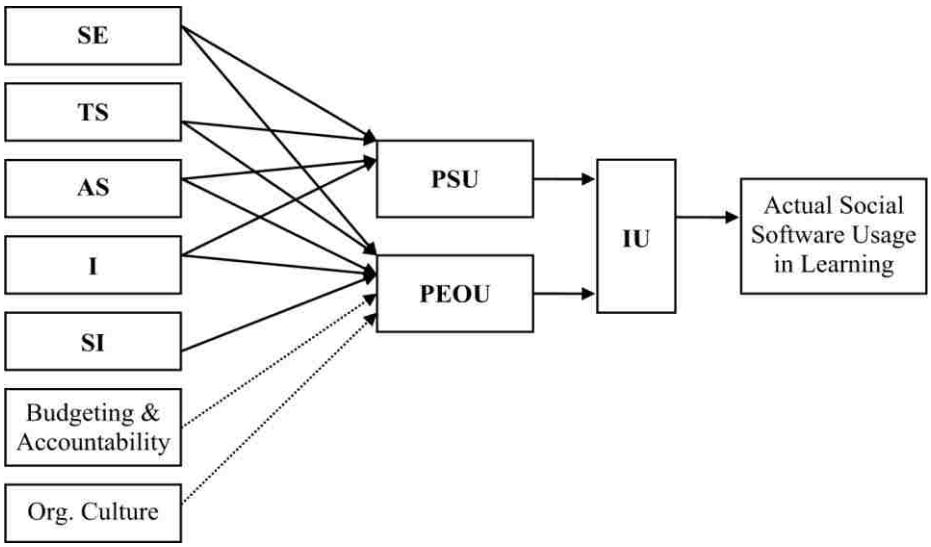

Figure 2.15: Munguatosha et al. technology adoption model (2011)

According to Table 2.14, only two of ten constructs of Munguatosha do not relate with PU, while eight constructs relate with PU. Munguatosha's constructs that do not have a relationship with PU are system interactivity and budgeting and accountability. Constructs that have a link with PU are self-efficacy, technical support, administrative support, infrastructure, organizational culture perceived ease of use (PEOU), user intention and actual usage. The first five constructs are antecedents of PU, and the last two are consequences of PU. However, as for organizational culture, PEOU and actual usage, figure 2.15 do not explicitly show their relationship with PU. Such relationships are indicated in Table 2.14 mainly because of the proposed models shown in Figure 2.16, Figure 2.20 and Figure 2.21.

Table 2.14: Analysis of Munguatosha et al. technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	antecedent	(Pavlou 2003); (Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Park 2009); (Punnoose 2012); (Tang *et a*l. 2004); TAM; TAM2
Self-Efficacy	antecedent	(Munguatosha *et al*. 2011); (Reid & Levy 2008); (Lopez & Mension 1997); (Park 2009); (Tang *et al*. 2004); (Compeau *et al*. 1999)
Technical support	antecedent	(Munguatosha *et al*. 2011)
Administrative support	antecedent	(Munguatosha *et al*. 2011)
Infrastructure	antecedent	(Munguatosha *et al*. 2011)
User intention	consequence	(Munguatosha *et al*. 2011); (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004); TAM; TAM2, UTAUT; Triandis model
Actual social usage in eLearning	antecedent	(Campeau *et.al*. 1999); (Thompson *et al*. 1991); (Lopez and Menson 1997)
Organizational culture	antecedent	(Lopez and Manson 1997)
System Interactivity	none	No relationship found in all reviewed theories
Budgeting and accountability	None	No relationship found in all reviewed theories

2.3.2.6 Lopez and Manson model

This model is made up of four constructs excluding perceived usefulness, as illustrated by Figure 2.16 (Lopez and Menson 1997). The relationship between the constructs of this model and perceived usefulness (PU) are highlighted in Table 2.15.

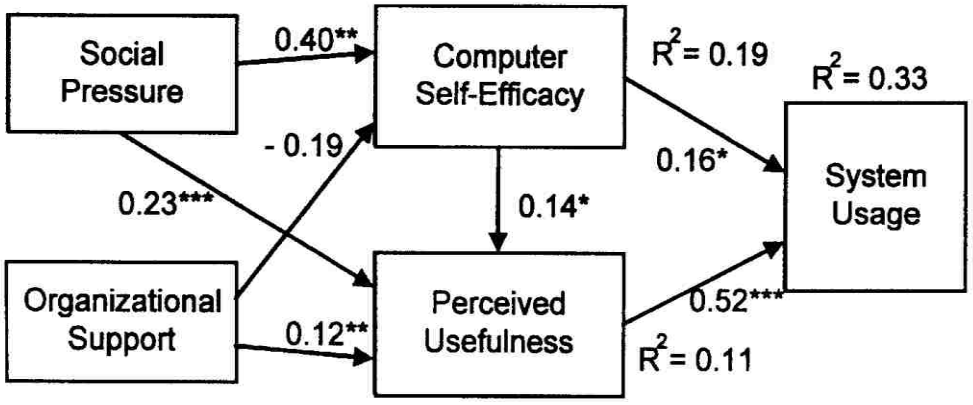

Figure 2.16: Lopez and Manson model (1997)

A brief description on Table 2.15, all four constructs of Lopez and Menson's model are shown to have a relationship with PU. Computer self-efficacy, social pressure and organizational support are the determinants of PU while system usage is a consequence of PU (Lopez and Menson 1997).

Table 2.15: Analysis of Lopez and Manson technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Computer self-efficacy	antecedent	(Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Park 2009); (Tang *et al*. 2004); (Compeau *et al.* 1999)
Social pressure	antecedent	(Lopez & Mension 1997); (Park 2009); (Punnoose 2012); TAM2
Organizational Support	antecedent	(Lopez & Mension 1997)
System usage	consequence	(Lopez & Mension 1997); (Campeau *et.al*.1999); (Thompson *et. a.l*. 1991)

2.3.2.7 Park Model

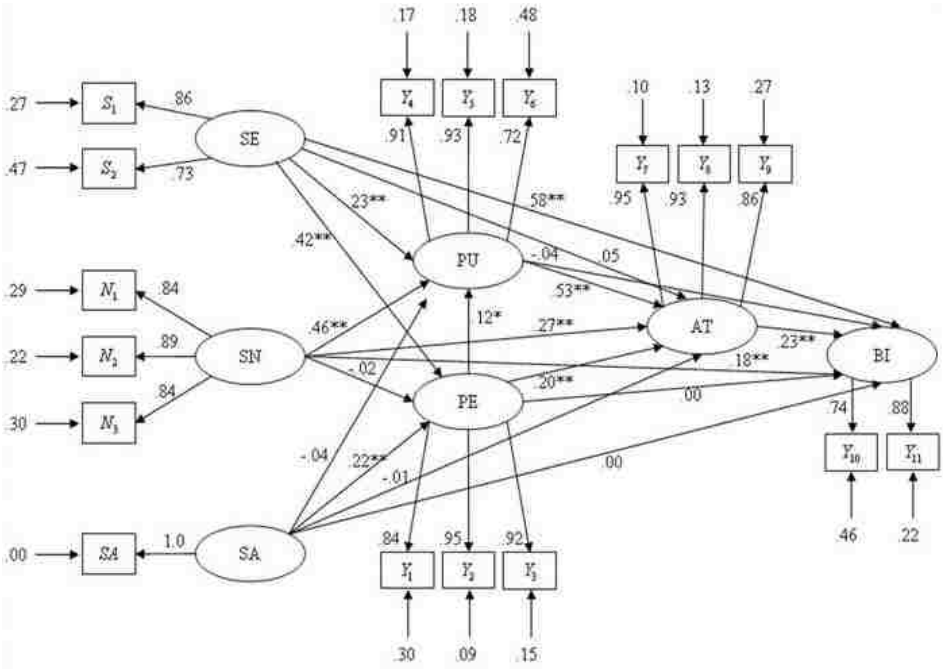

Figure 2.17: Park technology adoption model (2009)

This model is made up of six constructs apart from perceived usefulness, as illustrated by Figure 2.17 (Park 2009).

The relationship between the constructs of this model and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.16.

Table 2.16: Analysis of Park technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Computer self-efficacy	antecedent	(Park 2009); (Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Tang *et al*. 2004); (Compeau *et al.* 1999)
Perceived Ease of Use	antecedent	(Park 2009); (Pavlou 2003); (Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Punnoose 2012); (Tang *et a*l. 2004); TAM; TAM2
Subjective Norms	antecedent	(Park 2009); (Punnoose 2012); (Lopez & Mension 1997); TAM2
Attitude	consequence	(Park 2009); (Taylor and Todd 1995); (Baraghani 2008); (Reid & Levy 2008); TAM
Behavioral Intention	consequence	(Park 2009); (Baraghani (2008); (Reid & Levy (2008); (Gefen 2003); (Pavlou 2003); (Punnoose 2012); (Tang *et*. *al*. 2004); TAM; TAM2; UTAUT; Triandis model
System Accessibility	antecedent	(Park (2009)

Table 2.16 shows that there is a relationship between PU and all six constructs of Park's models. On the one hand, the perceived ease of use, computer self-efficacy, subjective norms, system accessibility are determinants of PU. On the other hand, attitude and behavioural intention are listed as consequences of PU (Park 2009).

2.3.2.8 Tang et al. model

This model is made up of four constructs excluding perceived usefulness, as illustrated by Figure 2.18 (Tang *et al*. 2004). The relationship between the constructs of this model and PU are highlighted in Table 2.17. According to Table 2.17, perceived credibility is the only one of four constructs that does not have a relationship with PU. Constructs that relate with PU are computer self-efficacy and perceived ease of use (PEOU) as antecedents of PU and behavioural intention as consequence of PU.

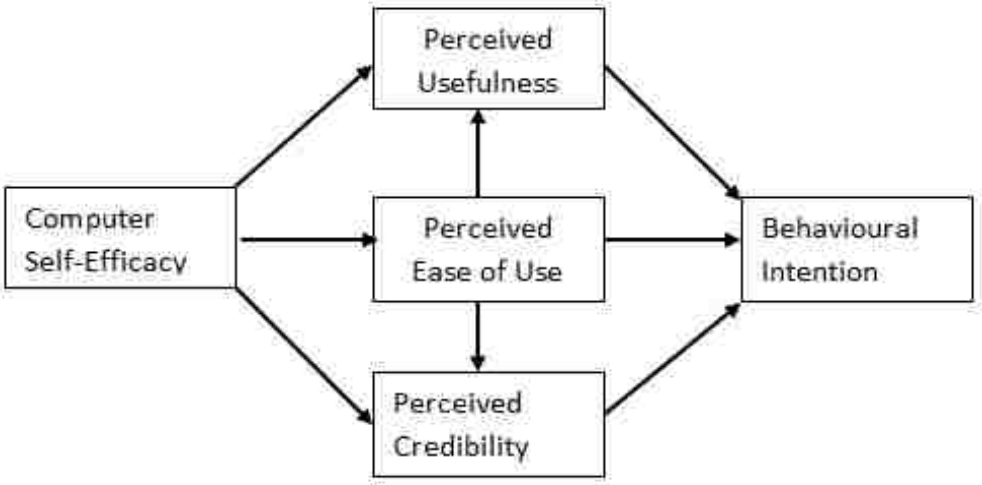

Figure 2.18: Tang et al technology adoption model (2004)

Table 2.17: Analysis of Tang et al. technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Perceived Ease of Use	antecedent	(Tang *et a*l. 2004); (Park 2009); (Pavlou 2003); (Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); (Punnoose 2012); TAM; TAM2
Behavioral intention	consequence	(Tang *et*. *al*. 2004); (Park 2009); (Baraghani (2008); (Reid & Levy (2008); (Gefen 2003); (Pavlou 2003); (Punnoose 2012); TAM; TAM2; UTAUT; Triandis model
Computer self-efficacy	antecedent	(Tang *et.al*. 2004); (Park 2009); (Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Compeau *et al*. 1999)
Perceived Creditability	none	No relationship found in all reviewed theories

2.3.2.9 Punnoose model

This model is made up of eight constructs apart from perceived usefulness as shown by Figure 2.19 (Punnoose, 2012). The relationships between the constructs of this model and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.18.

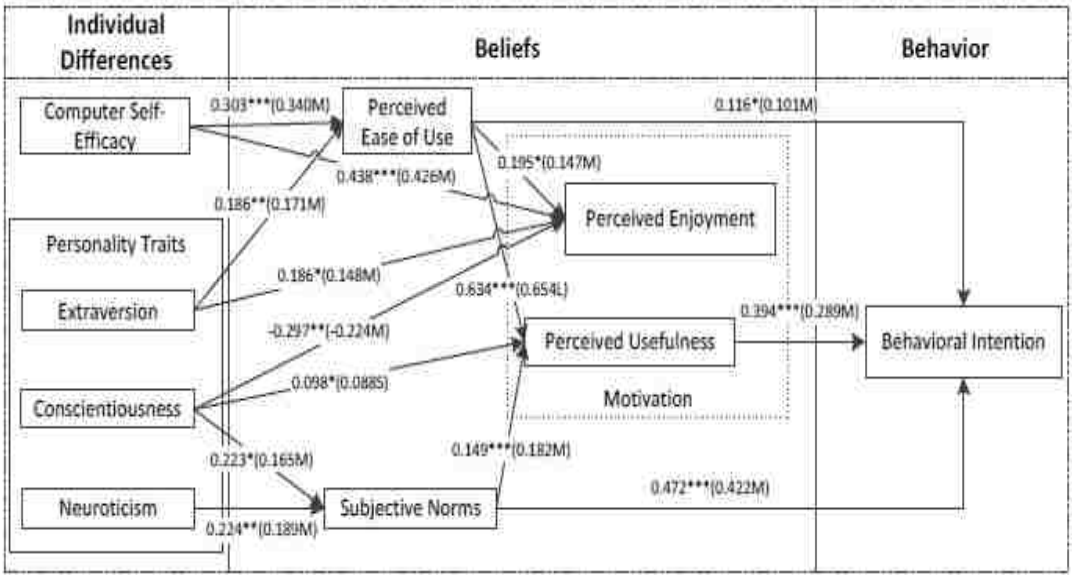

Figure 2.19: Punnoose technology adoption model (2012)

According to Table 2.18, three of eight constructs of Punnoose's model do not have a relationship with PU, while five Punnoose's constructs relate with PU. Punnoose constructs without a relationship with PU are extraversion, neuroticism, and perceived enjoyment. Punnoose constructs having a relationship with PU are, conscientiousness, ease of use, computer self-efficacy, and subjective norms, and behavioural intention norms are the determinants of (PU) which is an antecedent of behavioural intention. It is important to note that figure 2.19 do not show an explicit relationship between computer self-efficacy and PU, however such relationship is indicated on Table 2.18 mainly because of the evidence in models shown in Figure 2.12, Figure 2.16, Figure 2.17 and figure 2.18.

Table 2.18: Analysis of Punnoose technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness	Evidence
Computer Self-Efficacy	antecedent	(Tang *et.al*. 2004); (Park 2009); (Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Compeau *et al*. 1999)
Conscientiousness	antecedent	(Punnoose 2012)
Perceived Ease of Use	antecedent	(Punnoose 2012); (Tang *et a*l. 2004); (Park 2009); (Pavlou 2003); (Gefen 2003); (Baraghani 2008); (Reid & Levy 2008); TAM; TAM2
Subjective Norms	antecedent	(Punnoose 2012); (Park 2009); (Lopez & Mension 1997); TAM 2
Behavioral Intention	consequence	(Punnoose 2012); (Tang *et. al*. 2004); (Park 2009); (Baraghani (2008); (Reid & Levy (2008); (Gefen 2003); (Pavlou 2003); TAM; TAM2; UTAUT; Triandis model
Extraversion	none	No relationship found in all reviewed theories
Neuroticism	none	No relationship found in all reviewed theories
Perceived Enjoyment	none	No relationship found in all reviewed theories

2.3.2.10Compeau et al. model

This model is made up of five constructs apart from perceived usefulness, as illustrated by Figure 2.20 (Compeau *et al*. 1999). The relationships between the constructs of this model and perceived usefulness (PU), the main variable of this research, are highlighted in Table 2.19. In this model perceived usefulness is similar as outcome expectations (Kim and Crowston 2011).

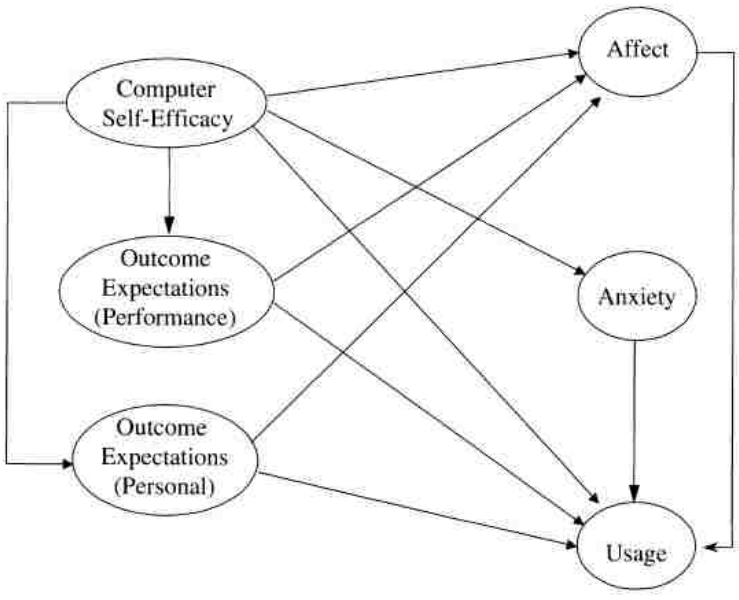

Figure 2.20: Compeau et al. technology adoption model (1999)

According to Table 2.19, anxiety is the only one of four constructs of Compeau *et al*. that does not have a relationship with PU. Three constructs having a relationship with PU are computer self-efficacy, affect and usage constructs. The first one is an antecedent of PU and the last two are consequences.

Table 2.19: Analysis of Compeau et al. technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness/ outcome expectations	Evidence
Computer self-efficacy	antecedent	(Compeau *et al*. 1999); (Reid & Levy 2008); (Munguatosha *et al.* 2011); (Lopez & Mension 1997); (Park 2009); (Tang *et al*. 2004)
Affect	consequence	(Compeau *et al*. 1999)
Usage	consequence	(Compeau *et al*. 1999); (Thompson *et al*. (1991); (Lopez and Menson 1997); (Rogers 1983)
Anxiety	none	No evidence in all reviewed theories

2.3.2.11Thompson et al. model

This model is made up of five constructs excluding long term consequences of PC use and job fit with PC use (Figure 2.21) (Thompson *et al*.1991) The relationships between the constructs of this model and PU are highlighted in Table 2.20. In this model PU is similar as long term consequences and as well as job fit with PC use.

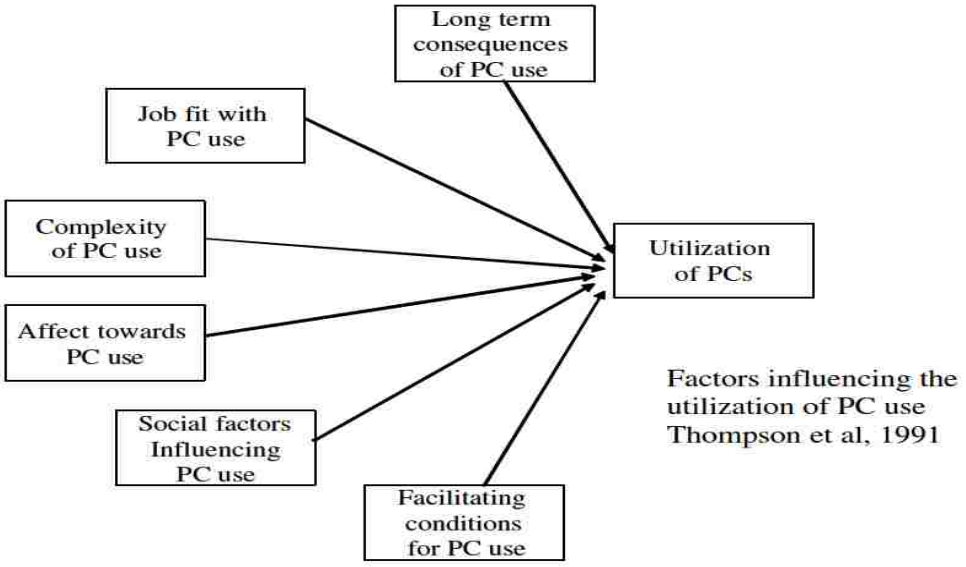

Figure 2.21: Thompson et al. technology adoption model (1991)

As briefly explained in Table 2.20, two of five constructs of Thompson *et al*. model do not have a relationship with PU, and three constructs relate with PU. Thompson's constructs that do not relate with PU are complexity of PC use and facilitating conditions. Constructs that relate with PU are social factors, affects towards PC use and utilization of PC; with the first one as an antecedent and the last two as consequences. According to Figure 2.21, affects towards PC use and social factors have no explicit link with PU, but, Table 2.20 indicates such relationships mainly because of the relationships indicated by models in Figure 2.20 and Figure 2.6.

Table 2.20: Analysis of Thompson et al. technology adoption model in relation to usefulness construct

Construct	Relationship with usefulness/ outcome expectations	Evidence
Utilization of PC	consequence	(Thompson *et al*. 1991); (Campeau *et.al*. 1999); (Lopez and Menson 1997)
Complexity of PC use	none	No evidence in all reviewed theories
Affect towards PC use	consequence	(Campeau *et.al.* 1999)
Social factors	antecedent	(Park 2009); (Punnoose 2012); (Lopez and Menson 1997); (Rogers 1983); TAM2
Facilitating conditions	none	No evidence in all reviewed theories

2.4 Synthetic analysis of technology adoption theories in relation to the usefulness construct.

The technology adoption constructs that are not connected with perceived usefulness are presented in the next sub-section. Then the ones that are related to perceived usefulness are analysed for the sake of identifying which ones will be used in the theoretical framework of this study.

2.4.1 Constructs without a relationship with usefulness

The following constructs are not linked to perceived usefulness: Types of innovation decision, Communication channels, Nature of social system, Habits, Compatibility, Peers, Superiors, Resource facilitating conditions, Technology facilitating conditions, Perceived behavioural control, Experience, Voluntariness of use, Calculative based beliefs, Structural assurances, Situational normality, Familiarity, Perceived Risk, Reputation, Satisfaction with past transactions, frequency, System Interactivity,

Budgeting and accountability, perceived creditability, extraversion, neuroticism and Complexity of PC use.

2.4.2. Constructs with a relationship with perceived usefulness

The technology adoption constructs that are linked to perceived usefulness are shown by Table 2.21.

Table 2.21: Analysis of technology adoption constructs that are linked with Perceived Usefulness

Construct	**Relationship with usefulness/relative advantage/ perceived consequences or outcome expectations**	**Evidence**
Perceived Ease of Use	Antecedent	TAM; TAM2; (Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); (Park 2009); (Punnoose 2012); (Tang *et al*. 2004)
Computer self-efficacy	Antecedent	(Park 2009); (Reid & Levy 2008); (Munguatosha *et al*. 2011); (Lopez & Mension 1997); (Tang *et al*.(2004); Compeau *et al*. 1999)
External variables/ Subjective norms/Social influence/Social factors/ Social variables/ Social pressure	Antecedent	TAM2; (Park 2009); (Punnoose 2012); (Lopez and Menson 1997); (Thompson *et al.* 1991); UTAUT
Image	Antecedent	TAM2
Job relevance	Antecedent	TAM2
Output quality	Antecedent	TAM2
Result demonstrability	Antecedent	TAM2
Trust	Antecedent	(Baraghani 2008); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003)
Technical support	Antecedent	(Munguatosha *et al*. 2011)
Administrative support	Antecedent	(Munguatosha *et al*. 2011)
Infrastructure	Antecedent	(Munguatosha *et al*. 2011)
Organizational support/culture	Antecedent	(Lopez and Menson 1997); (Munguatosha *et al*. 2011)
System accessibility	Antecedent	(Park 1997)
Conscientiousness	Antecedent	(Punnoose(2012)
Attitude towards use	consequence	TAM; (Baraghani 2008); Park (2009), (Taylor and Todd 1995); (Reid & Levy 2008)
Behavioral intention	consequence	(Tang *et al*. 2004), Triandis model

		(Punnoose 2012); (Baraghani 2008); (Park 2009); (Reid & Levy 2008); (Gefen 2003); (Pavlou 2003); TAM2, TAM, UTAUT
Actual use/ Behaviour/ Utilization/Adoption of innovation	consequence	(Campeau *et.al* 1999); (Thompson *et al.* 1991); (Lopez and Menson 1997); (Rogers 1983)
Affect	consequence	(Compeau *et al*.1999)
Age	Mediator	UTAUT
Gender	Mediator	UTAUT

2.4.3 Constructs selection criteria

Out of the twenty constructs from Table 2.21, fourteen are antecedents of PU, four are the consequences of PU and two are mediators when PU is related to other variables. The research variables of this study are selected from the fourteen antecedents of PU form Table 2.21 in accordance with the aim of this study which is to develop a model of the factors shaping learners' perceptions on the usefulness of Information and Communication Technologies (ICTs) as a support tool for the teaching of IKSs. The choice made in this study is to lessen its number of constructs and to focus on the factors that have not yet received enough attention from existing research: Computer self-efficacy, Trust and Conscientiousness.

2.4.4. Proposed conceptual model for this research

Figure 2.22 is the theoretical framework of this research. It represents the following hypotheses of this study on the examination of factors shaping learners' perceptions on the usefulness of ICTs as a support tool for the teaching of IKSs:

- HaA0: There is correlation between learners' demographics and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.
- HaB0: There is a correlation between learners' demographics and their computer self-efficacy.
- HaC0: There is a correlation between learners' demographics and their level of trust in ICTs.
- HaD0: There is a correlation between learners' demographics and their conscientiousness.

- Hb0: There is a correlation between learners' computer self-efficacy and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.
- Hc0: There is a correlation between learners' level of trust in ICTs and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.
- Hd0: There is a correlation between learners' conscientiousness and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.

The constructs of the proposed hypothetical model are borrowed from the above reviewed models on the basis of the selection criteria presented in section 2.4.3

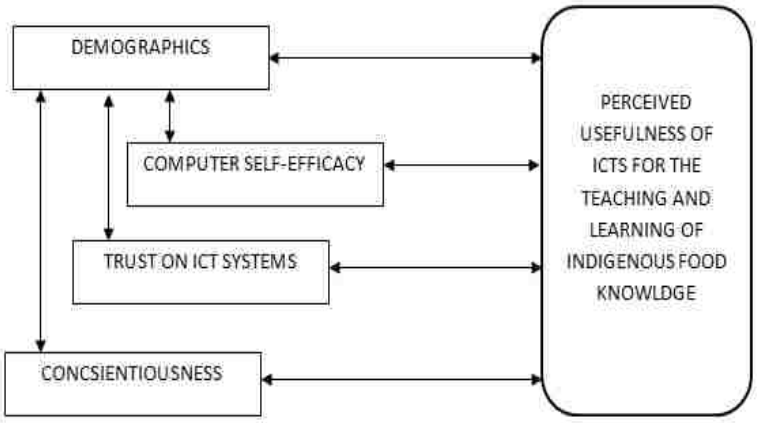

Figure 2.22: Proposed research model

2.5 Conclusion

Out of the twenty one technology adoption theories reviewed by this chapter, one does not comprise the perceived usefulness construct either implicitly or explicitly, four implicitly comprise usefulness and sixteen explicitly contain it. Trust, computer self-efficacy and consciousness are the three constructs selected from these sixteen theories for the construction of the theoretical framework of this study. The choice of these three constructs by this study is driven by the willingness to lessen its number of constructs and to focus on the factors that have not yet received enough attention from existing research. The methodology used for the empirical confirmation of the theoretical framework proposed by this chapter is discussed on the next chapter.

CHAPTER THREE

RESEARCH DESIGN

This chapter provides a detailed description of the methodology used for the confirmation of the theoretical framework of this study. The research population, the sampling method, the research instruments and the data analysis method of the survey conducted by this study are presented.

3.1 Research Population

ILembe and UMgungundlovu Hospitality Studies learners for the 2014 academic year formed the core of the population of this survey. ILembe and UMgungundlovu were two of the twelve municipality districts in the KwaZulu-Natal (KZN) province of South Africa where hospitality studies were offered at school at the time of this study. The twelve secondary schools from these two district municipalities had a total of about 1,181 learners registered for the subject (Education Management Information Systems 2013). Hospitality studies were chosen here because of the inclusion of indigenous foods in their curriculum; and indigenous foods are part of IKSs which are at the core of this study. Only learners from grade 10 to grade 12 were included in this study mainly because it was only in these grades where Hospitality Studies was offered (National Curriculum statement). These two districts of ILembe and UMgungundlovu had a total of four circuits. A choice was then made to have two schools from each circuit in the survey, the biggest school and the smallest school, in terms of the number of learners. There were therefore eight schools in the survey out of the twelve schools from the two districts; and these eight schools had a total of 864 learners.

The ILembe district municipality is situated about 65km north of Durban (see figure 3.1). It is mainly situated at KwaDukuza with the majority of its 560,000 residents. A for UMgungundlovu district municipality, is located 145 km north-west of Durban and its main city is Pietermaritzburg and the majority of its 927,000 inhabitants (see figure 3.2). For both districts, an overwhelming majority of residents speak IsiZulu language.

Figure 3.1: ILembe District Municipality, KwaZulu-Natal. South Africa

Figure 3.2: UMgungundlovu District Municipality, KwaZulu-Natal, South Africa

3.2 Sampling

Equation 3.1 from Naing *et al.*(2006) was used for the calculation of the sample size of this study. The parameters used by this equation are: n= sample size, Z=confidence level, P=Estimated proportion, d=precision or acceptable margin of error, and N=Population size. For the calculation of the sample size of this survey, the following values were used: Z=1.96, P=0.05, d=0.0371 and N= 864. This led to a sample size of 115 learners.

$$n = \frac{NZ^2P(1-P)}{d^2(N-1)+Z^2P(1-P)}$$ Equation 3.1: (Naing *et al.* 2006)

Table 3.1 shows the calculation of the sample size for each of the eight big and small schools. The ratio of the number of learners in each school was calculated compared to the total number of learners in the study's population (864). This ratio was then multiplied by the sample size (115) in order to get the number of learners to be sampled for each school.

Table 3.1: Sampling of learners per school

CIRCUIT	SCHOOL TYPE	NUMBER OF LEARNERS	RATIO	SAMPLE SIZE
Lower Tugela	Biggest school	117	0.135417	15.57292
	Smallest school	73	0.084491	9.716435
Maphumulo	Biggest school	84	0.097222	11.18056
	Smallest school	46	0.053241	6.122685
Ndwedwe	Biggest school	85	0.09838	11.31366
	Smallest school	34	0.039352	4.525463
Midlands	Biggest school	329	0.380787	43.79051
	Smallest school	96	0.111111	12.77778
	TOTAL	864	1	115

3.3 Data Collection

A questionnaire was used for the collection of the data of the survey conducted in this study. The five variables of the questionnaire were extracted from the conceptual model proposed in the previous chapter: demographics, computer self-efficacy, trust in ICTs systems, conscientiousness and the usefulness of ICTs for learning about IKSs. The last four variables were all built from five point Likert-scale items (strongly disagree, disagree, weakly agree, agree and strongly agree).

A: Demographics. The following 10 categorical items were designed for the identification of the demographic background of the learners.

- A1. Gender: Hospitality studies learners could specify their gender as males or as females.

- A2. School Location: Hospitality studies learners could specify the location of their school as rural or as urban.
- A3. Age Group: Hospitality studies learners could specify their age group from the following options: younger than 14, between 14 and 15, between 16 and 17 and 18 or older.
- A4. Learners' Grade: Hospitality studies learners could specify their class grades from the following options: Grade 10, Grade 11 and Grade 12.
- A5 Cell phone access: Hospitality studies learners could specify from the following options the type of cell phone they were using: No cell phone, a cell phone with Internet access, a cell phone without Internet access and a cell phone with other advanced features.
- A6. Internet access on computer: Hospitality studies learners could specify from the following options the place where they accessed Internet: Nowhere, at home, at school and both at home and at school.
- A7. Preferred subject: Hospitality studies learners could specify their preferred subjects from the following options: Languages, Mathematics, Science and Technology and Social Sciences.
- A8. Computer Usage: Hospitality studies learners could specify from the following options how often they use ICTs and computers: No usage, daily usage, weekly usage and monthly usage.
- A9. Frequency of indigenous food consumption: Hospitality studies learners could specify from the following options how frequently they consume indigenous foods: Almost every day, almost every week, almost once a month, hardly once a year and only on traditional occasions.
- A10. Place of indigenous food consumption: Hospitality studies learners could specify from the following options the place where they usually consume indigenous foods: In traditional ceremonies, at home only, in restaurants only and both at home and in restaurants.

B: Computer Self-efficacy. This variable is made of the ten below listed Likert scale items adapted from the computer self-efficacy scale proposed by Teo and Koh (2010).

- B1. Ability to use Internet to search for information and resources: Hospitality studies learners could rate their ability to search for information and resources on the Internet.
- B2. Ability to use Word processors (e.g. Microsoft Word) to create, edit and format documents: Hospitality studies learners could rate their skills in the use of word processing software.
- B3. Ability to use Presentation Software (e.g. Microsoft PowerPoint) for school work: Hospitality studies learners could rate their skills in the use of presentation software.
- B4 Ability to use Spreadsheets Software (e.g. Microsoft Excel) to compute data: Hospitality studies learners could rate their skills in the use of spreadsheet software.
- B5. Ability to use E-mailing Software (e.g. Hotmail, Outlook, Yahoo and Gmail) for communication: Hospitality studies learners could rate their skills in the use of e-mail software.
- B6. Ability to use Learning management systems (LMSs) (e.g. Blackboard, WebCT) for my school work: Hospitality studies learners could rate their skills in the use of learning management systems.
- B7. Ability to use Video editing software (e.g. MovieMaker, Ulead VideoStudio) for my school work: Hospitality studies learners could rate their skills in the use of video editing software.
- B8. Ability to use Graphic Editors (e.g. Adobe Photoshop) for my school work: Hospitality studies learners could rate their skills in the use of graphic editing software.
- B9. Ability to use animation software (e.g. Macromedia Flash) for my school work: Hospitality studies learners could rate their skills in the use of animation software.
- B10. Ability to use Blogging for personal use: Hospitality studies learners could rate their skills in the use of blogs.

C: Trust on using ICTs. This variable is made of the ten below listed Likert scale items adapted from the scale proposed by Mcknight *et.al.* (2002).

- C1. Solidarity: Hospitality studies learners could specify whether they think that people really do care about the well-being of others.
- C2. Honesty: Hospitality studies learners could specify whether they think people are generally honest when dealing with others.
- C3. General trustworthiness: Hospitality studies learners could specify whether they think people are generally trustworthy.
- C4 Trustworthiness of computer professionals: Hospitality studies learners could specify whether they think computer professionals are generally trustworthy.
- C5. Trustworthiness of computer systems vendors: Hospitality studies learners could specify whether they think that vendors of computer systems are generally trustworthy.
- C6. Trustworthiness of legal and technological protection structures: Hospitality studies learners could specify whether they think that legal and technological protection structures are generally trustworthy.
- C7. Trustworthiness of computer systems: Hospitality studies learners could specify whether they think that computer systems are generally trustworthy.
- C8. Trustworthiness of computerised information: Hospitality studies learners could specify whether they think that computerised information is trustworthy.
- C9. Trustworthiness of the security of computer systems: Hospitality studies learners could specify whether they think that the security of computer systems is trustworthy.
- C10. Willingness to provide confidential information to computer systems: Hospitality studies learners could specify their level of willingness to provide confidential information to computer systems.

D: Conscientiousness. This variable is made of the ten below listed Likert scale items adapted from scale proposed by MacCann *et al*. 2009.

- D1. Thoroughness: Hospitality studies learners could specify whether they consider themselves as a person who is generally thorough.

- D2. Carefulness: Hospitality studies learners could specify whether they consider themselves as a person who is generally careful.
- D3.Reliability: Hospitality studies learners could specify whether they consider themselves as a person who is generally reliable.
- D4. Organization: Hospitality studies learners could specify whether they consider themselves as a person who is generally organized.
- D5. Laziness: Hospitality studies learners could specify whether they consider themselves as a person who is generally not lazy.
- D6. Perseverance: Hospitality studies learners could specify whether they consider themselves as a person who is generally perseverant.
- D7. Efficiency: Hospitality studies learners could specify whether they consider themselves as a person who is generally efficient.
- D8. Systematism: Hospitality studies learners could specify whether they consider themselves as a person who is generally systematic.
- D9. Perfectionism: Hospitality studies learners could specify whether they consider themselves as a person who is generally perfect.
- D10. Tidiness: Hospitality studies learners could specify whether they consider themselves as a person who is generally tidy.

E: The usefulness of ICTs for improving indigenous foods knowledge. This variable is made of the ten below listed Likert scale items adapted from the South African National Curriculum Statement of Hospitality Studies.

- E1. Career guidance: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about the different sectors of the hospitality industry and their career possibilities especially for indigenous foods.
- E2. Kitchen and restaurant operations: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about kitchen and restaurant operations especially for indigenous foods.

- E3. Cultural influences: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about cultural and other influences on South African cuisine especially for indigenous foods.
- E4. Nutrition, menu planning, and costing: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about nutrition, menu planning, and costing especially for indigenous foods.
- E5. Food commodities: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about food commodities especially for indigenous foods.
- E6. Food purchasing, storage, and control: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about food purchasing, storage, and control especially for indigenous foods.
- E7. Food preparation and cooking techniques: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about food preparation and cooking techniques especially for indigenous foods.
- E8. Resource management: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about managing resources especially for indigenous foods.
- E9. Food and beverage services and customer care: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about food and beverage services and customer care especially for indigenous foods.
- E10. Hygiene, safety, and security in a hospitality industry environment: Hospitality studies learners could specify whether they think that ICTs can be useful for learning about learning about hygiene, safety and security in a hospitality industry environment especially for indigenous foods.

3.4 Data Analysis

The data collected by this study was analysed in SPSS (Statistical Package for Social Sciences) version 21.0 (IBM-SPSS Inc. 2012) starting with reliability and validity analysis through Cronbach Alpha coefficient for all four Likert Scale variables of the

study: learners' level of computer self-efficacy, learners' level of trust in ICT systems, learners' level of conscientiousness and their perceptions on the usefulness of ICTs for learning about indigenous foods. The analysis of the descriptive statistics of this study was performed before the analysis of its inferential statistics. This descriptive statistic consisted of means and frequencies while inferential statistics consisted of the following tests: Pearson's correlation tests, ANOVA and ANCOVA. The confidence level for these tests was set to 95% and significance p-value was between 0.00 and 0.05. ANOVA tests were always conducted between a demographic item and a Likert scale variable in accordance with the theoretical model proposed in chapter 2. However, these ANOVA tests were not performed between the Likert scale Computer self-efficacy variable and the following two demographic items: Frequency of indigenous food consumption and the place of indigenous food consumption. The main reason behind this decision is the fact that these two demographic items do not really have anything to do with computer self-efficacy.

3.5 Summary

This study's sample consists of 115 Hospitality Studies learners chosen from a population of 864 learners studying in iLembe and uMgungundlovu during the 2014 academic year. The instrument used for the collection of the data of this survey is a questionnaire with the following five variables: learners' demographics, computer self-efficacy, trust in ICT systems, conscientiousness and perceived usefulness of ICTs for learning about IKSs especially for indigenous foods. The computer self-efficacy scale was adapted from Teo and Koh (2010), the trust scale was adapted from Mcknight *et.al*. (2002), the conscientiousness scale was adapted from MacCann *et al*. (2009) and the ICT usefulness scale was adapted from South African National Curriculum Statement of Hospitality Studies.

SPSS (Statistical Package for Social Science) was used to run the following statistical tests on the data of this survey: means analysis, frequency analysis, Pearson's correlation tests, ANOVA tests and ANCOVA tests.

CHAPTER FOUR

RESULTS

This chapter outlines the results of the survey conducted as part of this study. These results are presented in the form of descriptive and inferential statistics including for the assessment of the validity and the reliability of the research data. These statistics were computed with the objective to empirically confirm the new theoretical model announced in the second chapter of this study. It is the interpretation of these statistics that will lead to the empirical confirmation of some of the factors that are shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs

4.1 Data Validity and Reliability

Table 4.1 confirms the validity and the reliability of the data collected by this study judging by the fact that the Cronbach's alpha are all greater than 0.7 except for conscientiousness. It is important to note that the value of the Cronbach's alpha (α) coefficient for the conscientiousness variable is between 0.6 and 0.7, and this means that the validity and reliability of that variable is questionable even though it is neither poor nor unacceptable (George and Millery 2003, cited in Gliem and Gliem 2003). This variable will therefore be given special attention in this chapter when and where necessary.

Table 4.1: Reliability coefficients for research variables

Research Variable	**No of items**	**Cronbach's Alpha (α)**
Computer Self Efficacy	10	0.850
Trust in ICT systems	10	0.728
Conscientiousness	10	0.648
ICT Usefulness	10	0.813

4.2 Descriptive Statistics

The aim of this section is to present the descriptive statistics of this study on learners' demographics, their computer self-efficacy, their trust in ICT systems, their conscientiousness and their perceptions on the usefulness of ICTs for the teaching and learning of indigenous foods.

4.2.1 Demographics

According to Table 4.2, the overwhelming majority of the learners who participated in this study are female and they are evenly spread among the different grades. They are mostly older than 16 years and they are evenly spread between urban and rural schools. Most learners have an access to a cell phone with Internet but not to a computer. Indigenous foods are consumed at home at least once a month by the majority of learners.

Table 4.2: Demographics of Learners

A		Percentage
A1	Male	37.4
	Female	62.6
A2	Urban	41.7
	Rural	58.3
A3	14-15	8.7
	16-17	40
	18 and above	51.3
A4	Grade 10	29.6
	Grade 11	47.8
	Grade 12	22.6
	None	13.9
A5	Cell phone with Internet	62.6
	Cell phone with no Internet	20.9
	Other	2.6
A6	None	62.6
	Home	21.7
	School	11.3
	Home and school	4.3
A7	Languages	67.8
	Mathematics	11.3
	Science &Technology	13.9

	Social Sciences	7
A8	None	44.3
	Daily	13
	Weekly	19.1
	Monthly	23.5
A9	Almost everyday	13
	Almost every week	27
	Almost once a month	37.4
	Hardly once a year	7.8
	On traditional occasions only	14.8
A10	In traditional ceremonies	17.4
	At home only	42.6
	At restaurant only	7
	Both home and restaurant	33

4.2.2 Learners' Computer self-efficacy

According to Table 4.3, most learners perceive their computer self-efficacy as low. This is particularly noticeable for the following computer technologies: animation software, video editing software and Learning Management Systems (LMSs). However, the popularity of Internet search tools is visible from these descriptive statistics.

Table 4.3: Descriptive statistics on learners' computer self-efficacy

B	S1	S2	S3	S4	S5	Mean	SD
B1	0	5	31	52	11	3.7	0.74
B2	6	51	31	9	3	2.5	0.842
B3	10	66	14	10	0	2.23	0.762
B4	21	57	16	5	1	2.08	0.807
B5	7	22	59	8	4	2.81	0.847
B6	31	59	4	3	3	1.86	0.826
B7	32	57	9	2	1	1.83	0.729
B8	35	44	17	3	1	1.91	0.854
B9	49	43	8	1	0	1.61	0.671
B10	33	36	27	3	2	2.04	0.931
Average	22.4	44	21.6	9.6	2.6		

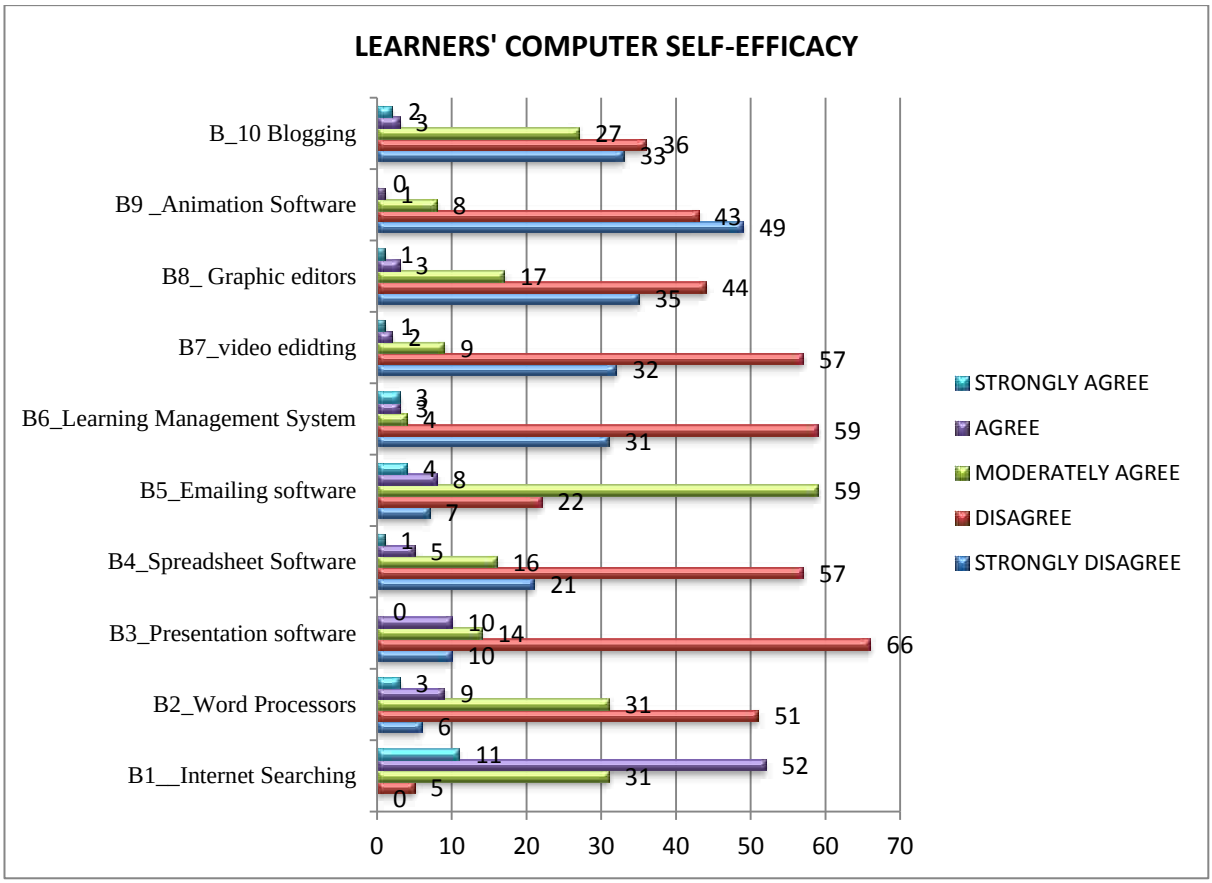

Figure 4.1: Distribution chart for Learners' computer self-efficacy

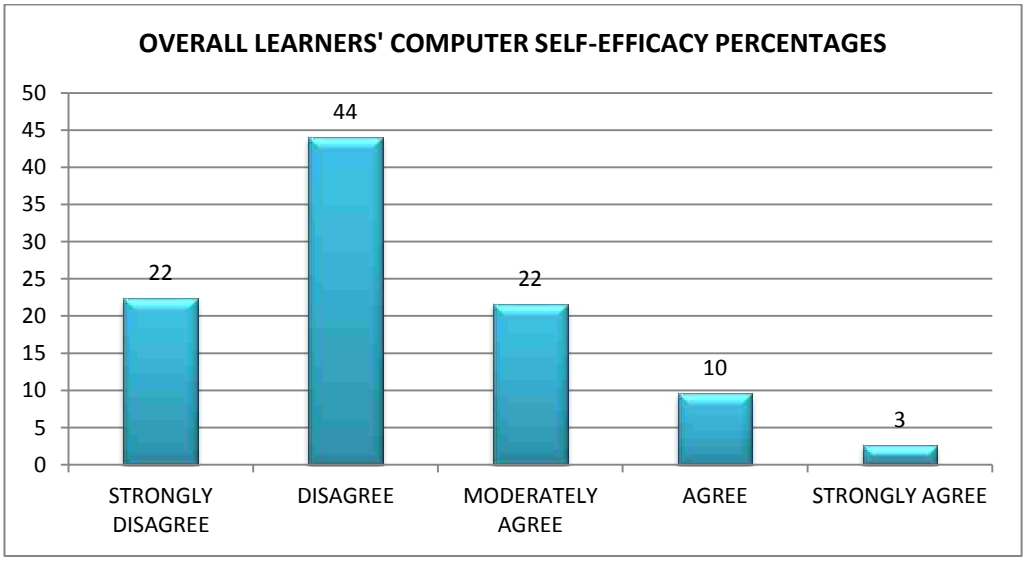

Figure 4.2: Overall distribution chart for learners' computer self-efficacy

4.2.3 Learners' Trust in ICT systems

According to Table 4.4, most learners highly trust people as well as ICT systems. This is particularly noticeable for the trust that they are investing in other people in general and for the trust that they are investing in computer professionals.

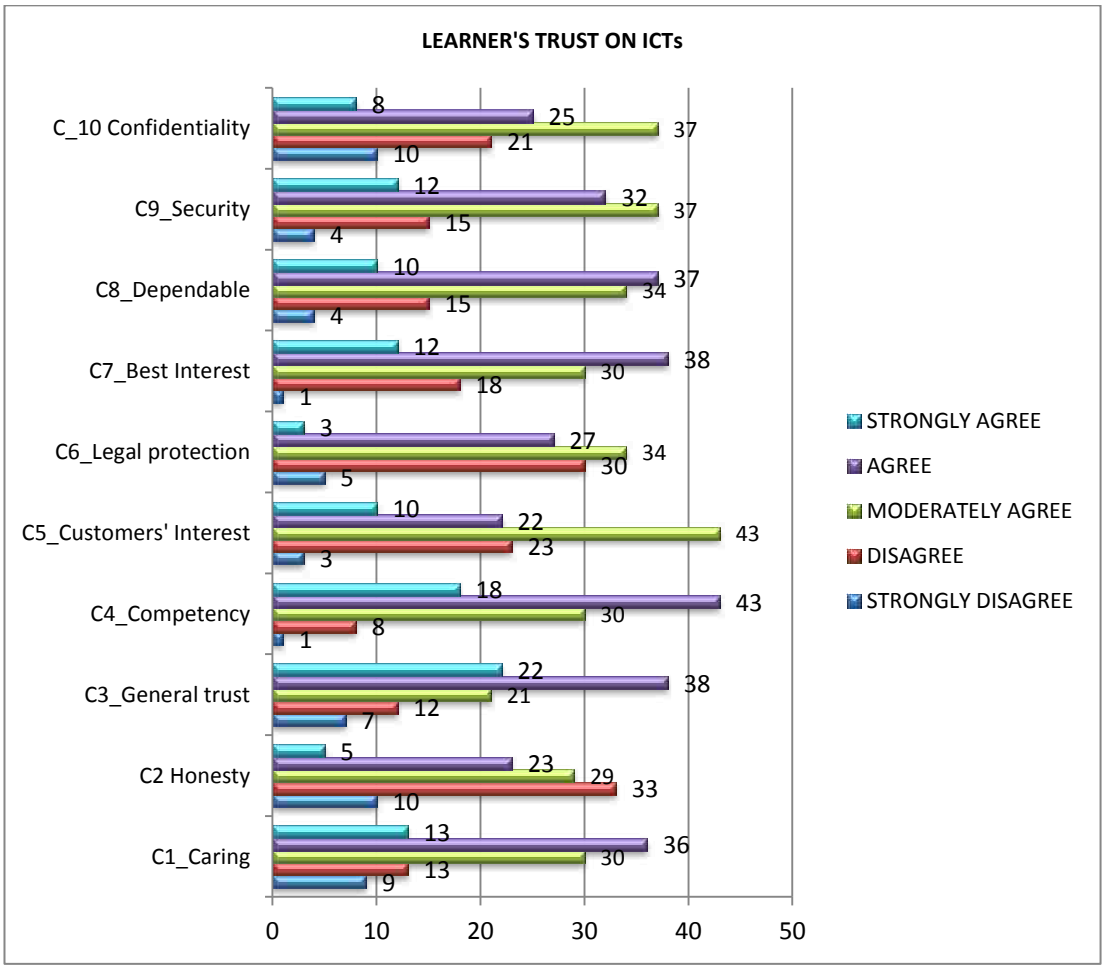

Figure 4.3: Distribution chart for learners' trust in ICT systems

Table 4.4: Descriptive statistics on learners' trust in ICTs

C	S1	S2	S3	S4	S5	Mean	SD
C1	9	13	30	36	13	3.31	1.127
C2	10	33	29	23	5	2.79	1.072
C3	7	12	21	38	22	3.56	1.164
C4	1	8	30	43	18	3.70	.890
C5	3	23	43	22	10	3.12	.966
C6	5	30	34	27	3	2.93	.962
C7	1	18	30	38	12	3.43	.956
C8	4	15	34	37	10	3.34	.999
C9	4	15	37	32	12	3.33	1.015
C10	10	21	37	25	8	3.01	1.080
Average	5.4	18.8	32.5	32.1	11.3		

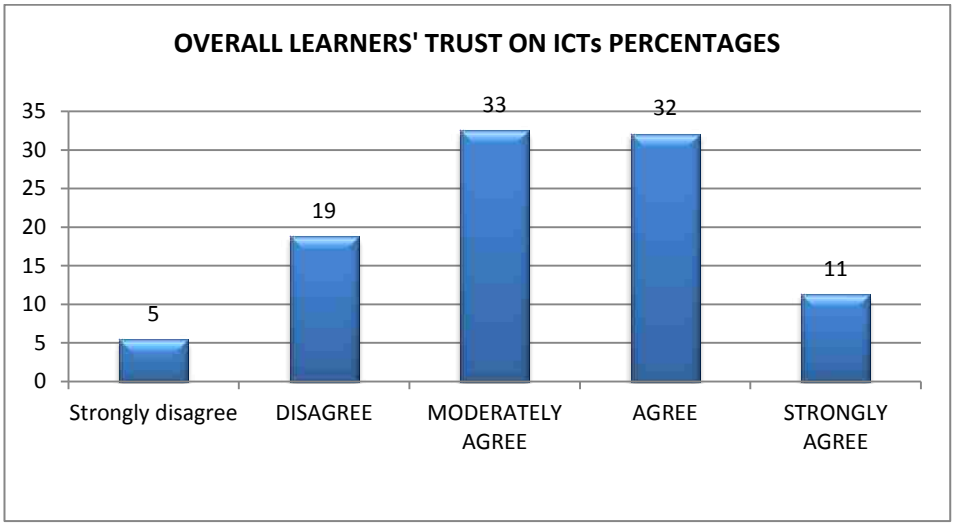

Figure 4.4: Overall distribution chart for learners' trust in ICT systems

4.2.4 Learners' Conscientiousness

According to Table 4.5, most learners perceive themselves as highly conscientious people. This is particularly noticeable for the following aspects: being tidy, and being reliable.

Table 4.5: Descriptive statistics on learners' conscientiousness

D	S1	S2	S3	S4	S5	Mean	SD
D1	4	6	30	45	14	4.14	1.197
D2	0	3	14	53	30	4.34	.889
D3	1	7	30	37	24	4.55	.867
D4	0	5	20	43	32	4.38	.979
D5	3	12	21	33	30	4.31	1.030
D6	1	8	37	31	23	4.46	1.017
D7	3	9	46	29	14	4.43	1.045
D8	1	10	37	37	15	4.40	1.028
D9	1	8	32	40	19	4.48	1.017
D10	1	8	24	37	30	4.60	.844
Average	1.5	7.6	29.1	38.5	23.1		

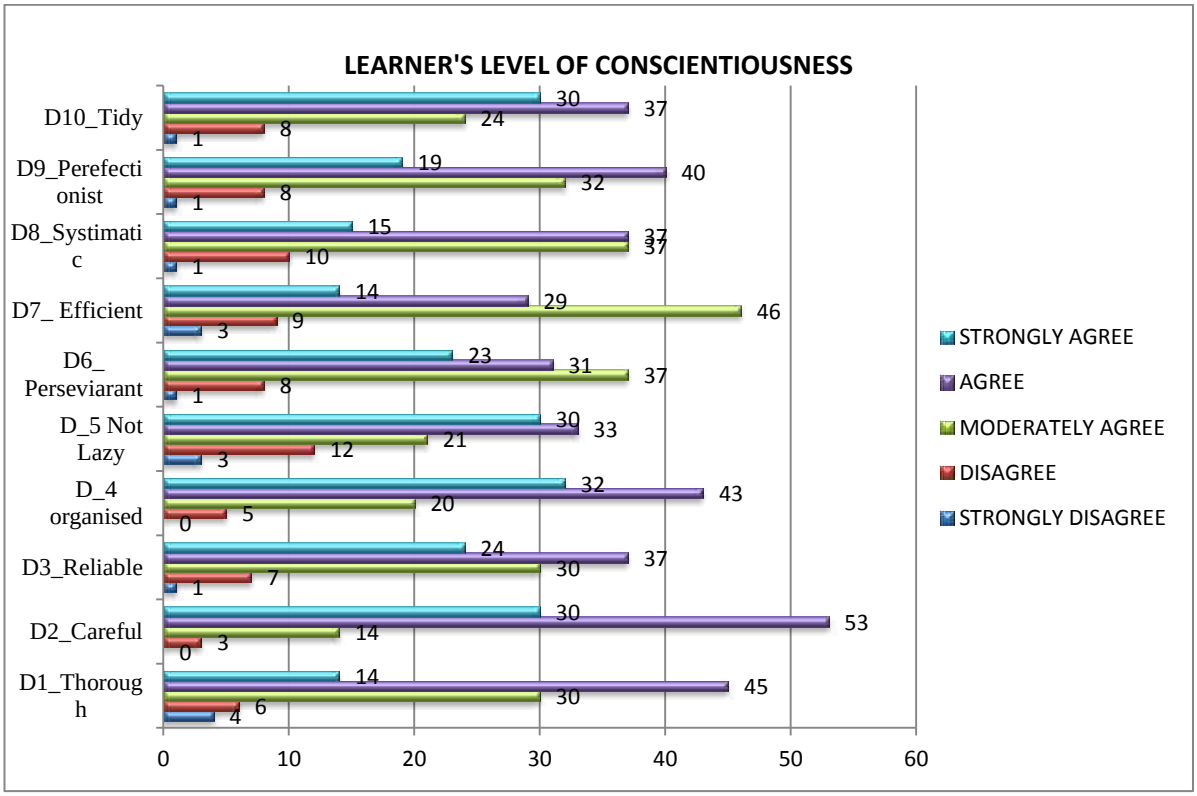

Figure 4.5: Distribution chart for learners' conscientiousness

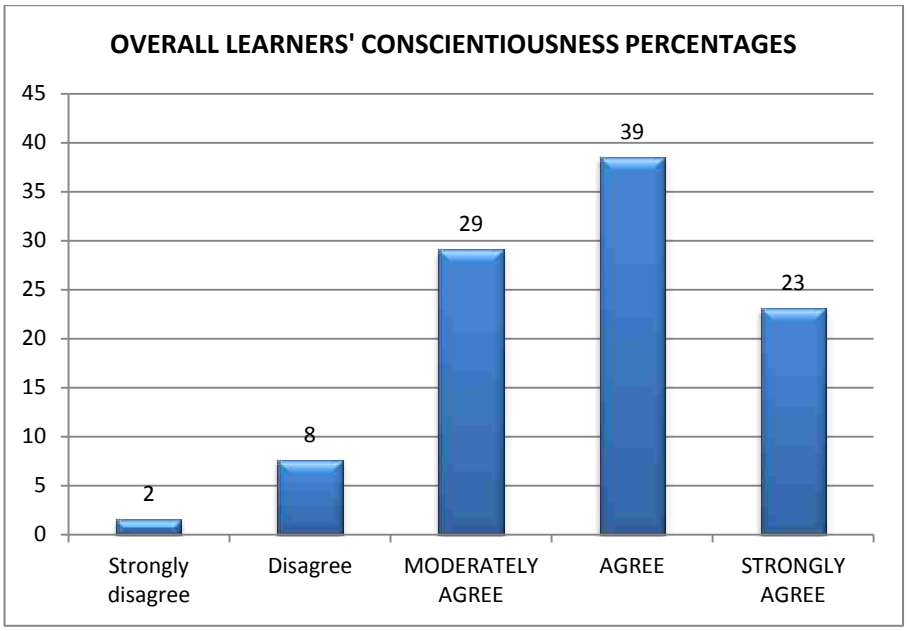

Figure 4.6: Overall distribution chart for learners' conscientiousness

4.2.5 Learners' Perceptions on ICTs usefulness

According to Table 4.6, most learners perceive ICTs as highly useful for teaching and learning, especially for indigenous foods. This is particularly noticeable for the following knowledge domains: food services and customer care and cultural influences in South African cuisine especially for indigenous foods.

Table 4.6: Descriptive statistics on learners' perceptions on ICTs usefulness

E	S1	S2	S3	S4	S5	Mean	SD
E1	1	11	22	39	27	3.80	.993
E2	3	4	30	44	18	3.71	.906
E3	0	4	30	46	20	3.82	.801
E4	0	10	29	42	20	3.72	.894
E5	3	9	42	30	17	3.47	.985
E6	1	10	30	38	20	3.66	.945
E7	0	9	30	43	18	3.70	.868
E8	0	6	29	47	18	3.77	.817
E9	0	4	23	47	26	3.95	.815
E10	0	1	19	43	37	4.17	.760
Average	0.8	6.8	28.4	41.9	21.1		

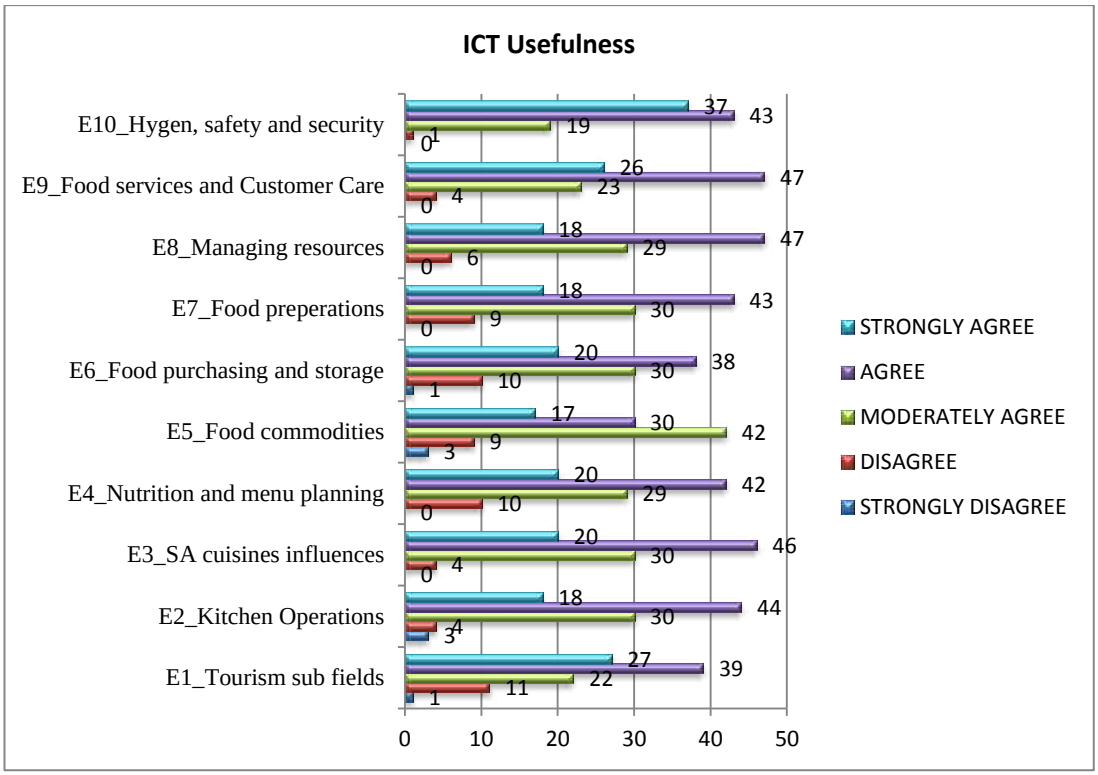

Figure 4.7 Distribution chart for learners' perceptions on the usefulness of ICTs for learning about indigenous foods

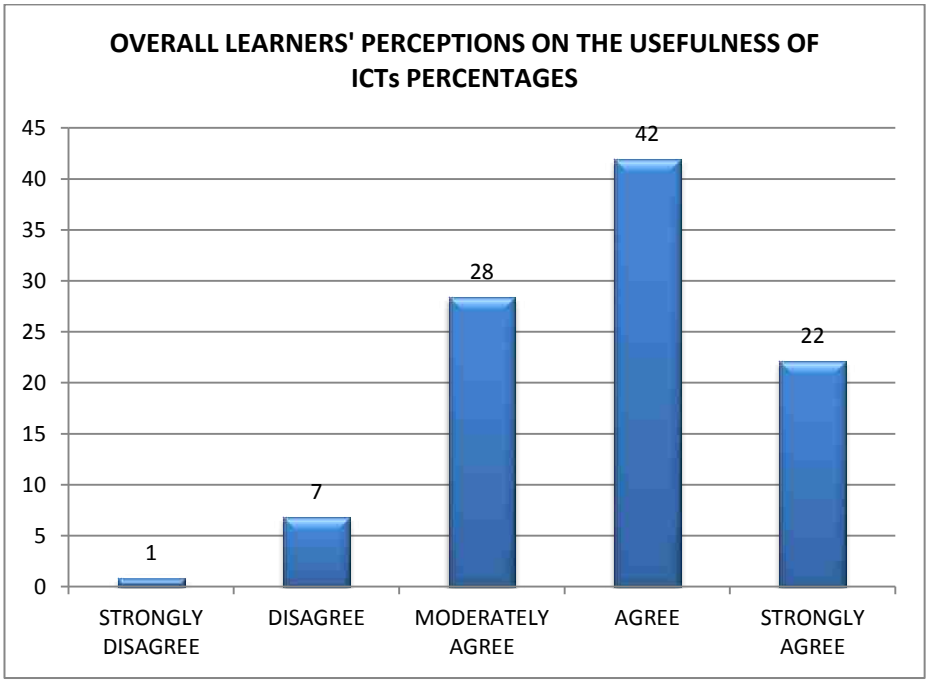

Figure 4.8: Overall distribution chart for learners' perceptions on ICTs usefulness of ICTs for learning about indigenous foods

4.3 Inferential Statistics (Correlations)

The results of the two inferential tests carried out by this study are hereby presented. These tests are the ANOVA test and the Pearson correlations test.

4.3.1 ANOVA test results

The ten tables from Table 4.7 to Table 4.16 contain the results of the ANOVA tests of this study. The confirmed hypotheses on the relationship between learners' demographics and other variables are listed below.

- HaAa0: There is a direct relationship between the location of the school of a learner and his or her perceptions on the usefulness of ICTs for the teaching and learning of indigenous foods;
- HaAb0: There is a direct relationship between the class grade of a learner and his or her perceptions on the usefulness of ICTs for the teaching and learning of indigenous foods;
- HaAc0: There is a direct relationship between the type of cell phones access available to a learner and his or her perceptions on the usefulness of ICTs for the teaching and learning of indigenous foods;
- HaAd0: There is a direct relationship between the preferred subjects of a learner and his or her perceptions on the usefulness of ICTs for the teaching and learning of indigenous foods;
- HaBa0: There is a direct relationship between the type of cell phones access available to a learner and his or her level of computer self-efficacy;
- HaBb0: There is a direct relationship between the place of access to Internet by a learner and his or her level of computer self-efficacy;
- HaBC0: There is a direct relationship between the frequency of computer usage by a learner and his or her level of computer self-efficacy;
- HaCa0: There is a direct relationship between the type of cell phones access available to a learner and his or her level of trust in ICT systems;
- HaCb0: There is a direct relationship between the place of access to Internet by a learner and his or her level of trust in ICT systems;

- HaCc0: There is a direct relationship between the frequency of computer usage by a learner and his or her level of trust in ICT systems; and
- HaDa0: There is a direct relationship between the type of cell phones access available to a learner and his or her level of conscientiousness;

Table 4.7: ANOVA test result for learners' gender

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	.406	1	.406	.015	.904
	Within Groups	3135.855	113	27.751		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	10.658	1	10.658	.347	.557
	Within Groups	3472.072	113	30.726		
	Total	3482.730	114			
Conscientiousness	Between Groups	.610	1	.610	.029	.865
	Within Groups	2359.355	113	20.879		
	Total	2359.965	114			
ICT Usefulness	Between Groups	31.841	1	31.841	1.099	.297
	Within Groups	3274.281	113	28.976		
	Total	3306.122	114			

Table 4.8: ANOVA test results for learners' school location

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	1.232	1	1.232	.044	.833
	Within Groups	3135.029	113	27.744		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	68.057	1	68.057	2.252	.136
	Within Groups	3414.673	113	30.218		
	Total	3482.730	114			
Conscientiousness	Between Groups	20.537	1	20.537	.992	.321
	Within Groups	2339.428	113	20.703		
	Total	2359.965	114			
ICT Usefulness	Between Groups	141.261	1	141.261	5.044	.027
	Within Groups	3164.861	113	28.008		
	Total	3306.122	114			

Table 4.9: ANOVA test results for learners' age group

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	33.661	2	16.831	.608	.546
	Within Groups	3102.600	112	27.702		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	105.870	2	52.935	1.756	.178
	Within Groups	3376.860	112	30.151		
	Total	3482.730	114			
Conscientiousness	Between Groups	5.296	2	2.648	.126	.882
	Within Groups	2354.670	112	21.024		
	Total	2359.965	114			
ICT Usefulness	Between Groups	105.362	2	52.681	1.843	.163
	Within Groups	3200.760	112	28.578		
	Total	3306.122	114			

Table 4.10: ANOVA test results for learners' class grade

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	10.839	2	5.420	.194	.824
	Within Groups	3125.422	112	27.906		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	10.262	2	5.131	.165	.848
	Within Groups	3472.468	112	31.004		
	Total	3482.730	114			
Conscientiousness	Between Groups	14.685	2	7.342	.351	.705
	Within Groups	2345.280	112	20.940		
	Total	2359.965	114			
ICT Usefulness	Between Groups	232.351	2	116.176	4.233	.017
	Within Groups	3073.771	112	27.444		
	Total	3306.122	114			

Table 4.11: ANOVA test results on learners' cell phone access

		Sum of Squares	df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	308.921	3	102.974	4.043	.009
	Within Groups	2827.340	111	25.472		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	319.682	3	106.561	3.740	.013
	Within Groups	3163.049	111	28.496		
	Total	3482.730	114			
Conscientiousness	Between Groups	254.486	3	84.829	4.472	.005
	Within Groups	2105.479	111	18.968		
	Total	2359.965	114			
ICT Usefulness	Between Groups	230.573	3	76.858	2.774	.045
	Within Groups	3075.549	111	27.708		
	Total	3306.122	114			

Table 4.12: ANOVA test results on learners' Internet access

		Sum of Squares	Df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	880.503	3	293.501	14.442	.000
	Within Groups	2255.758	111	20.322		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	358.087	3	119.362	4.240	.007
	Within Groups	3124.644	111	28.150		
	Total	3482.730	114			
Conscientiousness	Between Groups	40.568	3	13.523	.647	.586
	Within Groups	2319.397	111	20.895		
	Total	2359.965	114			
ICT Usefulness	Between Groups	105.114	3	35.038	1.215	.308
	Within Groups	3201.007	111	28.838		
	Total	3306.122	114			

Table 4.13: ANOVA test results on learners' preferred subjects

		Sum of Squares	Df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	194.097	3	64.699	2.441	.068
	Within Groups	2942.163	111	26.506		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	131.190	3	43.730	1.448	.233
	Within Groups	3351.540	111	30.194		
	Total	3482.730	114			
Conscientiousness	Between Groups	4.542	3	1.514	.071	.975
	Within Groups	2355.423	111	21.220		
	Total	2359.965	114			
ICT Usefulness	Between Groups	229.385	3	76.462	2.759	.046
	Within Groups	3076.737	111	27.718		
	Total	3306.122	114			

Table 4.14: ANOVA test results on learners' Computer Usage Frequency

		Sum of Squares	Df	Mean Square	F	Sig.
Computer Self-Efficacy	Between Groups	947.365	3	315.788	16.014	.000
	Within Groups	2188.896	111	19.720		
	Total	3136.261	114			
Trust In ICT Systems	Between Groups	566.606	3	188.869	7.189	.000
	Within Groups	2916.124	111	26.271		
	Total	3482.730	114			
Conscientiousness	Between Groups	56.421	3	18.807	.906	.441
	Within Groups	2303.544	111	20.753		
	Total	2359.965	114			
ICT Usefulness	Between Groups	158.519	3	52.840	1.863	.140
	Within Groups	3147.603	111	28.357		
	Total	3306.122	114			

Table 4.15: ANOVA test results on learners' indigenous foods consumption frequency

		Sum of Squares	Df	Mean Square	F	Sig.
Trust In ICT Systems	Between Groups	53.020	4	13.255	.425	.790
	Within Groups	3429.711	110	31.179		
	Total	3482.730	114			
Conscientiousness	Between Groups	118.209	4	29.552	1.450	.222
	Within Groups	2241.756	110	20.380		
	Total	2359.965	114			
ICT Usefulness	Between Groups	88.633	4	22.158	.758	.555
	Within Groups	3217.489	110	29.250		
	Total	3306.122	114			

Table 4.16: ANOVA test results on leaners' place of indigenous foods consumption

		Sum of Squares	Df	Mean Square	F	Sig.
Trust In ICT Systems	Between Groups	87.188	3	29.063	.950	.419
	Within Groups	3395.542	111	30.590		
	Total	3482.730	114			
Conscientiousness	Between Groups	71.738	3	23.913	1.160	.328
	Within Groups	2288.227	111	20.615		
	Total	2359.965	114			
ICT Usefulness	Between Groups	13.577	3	4.526	.153	.928
	Within Groups	3292.545	111	29.663		
	Total	3306.122	114			

4.3.2 Differences between groups

After ANOVA tests, further tests were conducted on the comparison of the differences between the different groups of the demographic items that were found collating with other research variables. The following ANOVA results can be found from Table 4.17 to Table 4.40. According to Table 4.17, learners in urban location schools have higher perceptions on the usefulness of ICTs for teaching and learning about indigenous foods. Learners in grade 12 have higher perceptions on the usefulness of ICTs for teaching and learning about indigenous foods (see Table 4.18).

Learners with an access to a cell phone with other features seem to have higher computer self-efficacy, more conscientiousness and higher perceptions on the usefulness of ICTs for the teaching and learning about indigenous foods (see Table 4.20, Table 4.24 and Table 4.26), while those who do not have cell phone access at

all were found to highly trust ICT systems (see Table 4.22). According to Table 4.28 and Table 4.30, learners with Internet access at home and at school were found to have high computer self-efficacy and those with Internet access at home were only found to highly trust ICT systems. Learners who preferred Mathematics and Social Sciences subjects were found to have higher perceptions on the usefulness of ICTs for teaching and learning about indigenous foods (see Table 4.32). Table 4.34 and Table 4.36 indicate that learners that use computers on daily basis were found to have higher computer self-efficacy as well as higher trust in ICT systems.

Table 4.17: Descriptive of differences between learners' perceptions on ICT usefulness and their school locations

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Urban	48	39.0833	5.03111	.72618	37.6225	40.5442	27.00	48.00
Rural	67	36.8358	5.47057	.66834	35.5014	38.1702	27.00	48.00
Total	115	37.7739	5.38526	.50218	36.7791	38.7687	27.00	48.00

Table 4.18: Descriptive of differences between learners' perceptions on ICT usefulness and their grades groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Grade 10	34	36.0294	6.21574	1.06599	33.8606	38.1982	27.00	48.00
Grade 11	55	37.8000	4.97177	.67039	36.4559	39.1441	27.00	47.00
Grade 12	26	40.0000	4.30813	.84489	38.2599	41.7401	28.00	47.00
Total	115	37.7739	5.38526	.50218	36.7791	38.7687	27.00	48.00

Table 4.19: Multiple comparisons on learners' grades and their perceptions on the usefulness of ICTs

Dependent Variable: ICT usefulness						
Tukey HSD						
(I) Grade		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Grade 10	Grade 11	-1.77059	1.14288	.272	-4.4852	.9441
	grade 12	-3.97059*	1.36482	.012	-7.2124	-.7288
Grade 11	Grade 10	1.77059	1.14288	.272	-.9441	4.4852
	grade 12	-2.20000	1.24681	.186	-5.1615	.7615
grade 12	Grade 10	3.97059*	1.36482	.012	.7288	7.2124
	Grade 11	2.20000	1.24681	.186	-.7615	5.1615

*. The mean difference is significant at the 0.05 level.

Table 4.20: Descriptive of differences between learners' computer self-efficacy and their cell phone access groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
None	16	20.4375	4.68997	1.17249	17.9384	22.9366	15.00	35.00
Cell phone with Internet	72	23.6111	5.38531	.63466	22.3456	24.8766	17.00	40.00
Cell phone with no Internet	24	20.3750	4.32196	.88222	18.5500	22.2000	14.00	32.00
Other	3	26.3333	2.08167	1.20185	21.1622	31.5045	24.00	28.00
Total	115	22.5652	5.24510	.48911	21.5963	23.5341	14.00	40.00

Table 4.21: Multiple comparisons on learners' computer self-efficacy and their cell phone access groups

Dependent Variable: Computer self-efficacy

Tukey HSD

(I) Cell phone access		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
None	Cell phone with Internet	-3.17361	1.39490	.110	-6.8120	.4648
	Cell phone with no Internet	.06250	1.62889	1.000	-4.1863	4.3113
	Other	-5.89583	3.17529	.253	-14.1782	2.3865
cell phone with Internet	None	3.17361	1.39490	.110	-.4648	6.8120
	Cell phone with no Internet	3.23611*	1.18957	.037	.1333	6.3390
	Other	-2.72222	2.97393	.797	-10.4794	5.0349
Cell phone with no Internet	None	-.06250	1.62889	1.000	-4.3113	4.1863
	Cell phone with Internet	-3.23611*	1.18957	.037	-6.3390	-.1333
	Other	-5.95833	3.09060	.222	-14.0198	2.1031
Other	None	5.89583	3.17529	.253	-2.3865	14.1782
	Cell phone with Internet	2.72222	2.97393	.797	-5.0349	10.4794
	Cell phone with no Internet	5.95833	3.09060	.222	-2.1031	14.0198

*. The mean difference is significant at the 0.05 level.

Table 4.22: Descriptive of differences between learners' trust in ICTs and their cell phone access groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
None	16	34.8125	4.59302	1.14826	32.3651	37.2599	25.00	43.00
Cell phone with Internet	72	32.9722	5.63683	.66431	31.6476	34.2968	22.00	46.00
Cell phone with no Internet	24	29.5000	4.94316	1.00902	27.4127	31.5873	19.00	41.00
Other	3	33.3333	3.78594	2.18581	23.9285	42.7381	29.00	36.00
Total	115	32.5130	5.52723	.51542	31.4920	33.5341	19.00	46.00

Table 4.23: Multiple comparisons on learners' trust in ICTs and their cell phone access groups

Dependent Variable: Trust in ICTs						
Tukey HSD						
(I) Cell phone access		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
None	Cell phone with Internet	1.84028	1.47539	.598	-2.0081	5.6887
	Cell phone with no Internet	5.31250*	1.72288	.014	.8186	9.8064
	Other	1.47917	3.35852	.971	-7.2811	10.2395
Cell phone with Internet	None	-1.84028	1.47539	.598	-5.6887	2.0081
	Cell phone with no Internet	3.47222*	1.25822	.034	.1903	6.7541
	Other	-.36111	3.14554	.999	-8.5659	7.8436
Cell phone with no Internet	None	-5.31250*	1.72288	.014	-9.8064	-.8186
	Cell phone with Internet	-3.47222*	1.25822	.034	-6.7541	-.1903
	Other	-3.83333	3.26894	.645	-12.3600	4.6933
Other	None	-1.47917	3.35852	.971	-10.2395	7.2811
	Cell phone with Internet	.36111	3.14554	.999	-7.8436	8.5659
	Cell phone with no Internet	3.83333	3.26894	.645	-4.6933	12.3600

*. The mean difference is significant at the 0.05 level.

Table 4.24: Multiple comparisons on learners' conscientiousness and their cell phone access groups

Dependent Variable: Conscientiousness						
Tukey HSD						
(I) Cell phone access		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
None	Cell phone with Internet	-2.02083	1.20373	.340	-5.1606	1.1190
	Cell phone with no Internet	.93750	1.40565	.909	-2.7290	4.6040
	Other	-6.14583	2.74012	.118	-13.2931	1.0014
Cell phone with Internet	None	2.02083	1.20373	.340	-1.1190	5.1606
	Cell phone with no Internet	2.95833*	1.02654	.024	.2807	5.6360
	Other	-4.12500	2.56636	.379	-10.8190	2.5690
Cell phone with no Internet	None	-.93750	1.40565	.909	-4.6040	2.7290
	Cell phone with Internet	-2.95833*	1.02654	.024	-5.6360	-.2807
	Other	-7.08333*	2.66704	.044	-14.0400	-.1267
Other	None	6.14583	2.74012	.118	-1.0014	13.2931
	Cell phone with Internet	4.12500	2.56636	.379	-2.5690	10.8190
	Cell phone with no Internet	7.08333*	2.66704	.044	.1267	14.0400

*. The mean difference is significant at the 0.05 level.

Table 4.25: Descriptive differences between learners' conscientiousness and their cell phone access groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
None	16	36.1875	4.16683	1.04171	33.9672	38.4078	30.00	44.00
cell phone with Internet	72	38.2083	4.51894	.53256	37.1464	39.2702	28.00	48.00
Cell phone with no Internet	24	35.2500	4.03517	.82368	33.5461	36.9539	25.00	41.00
Other	3	42.3333	3.21455	1.85592	34.3479	50.3187	40.00	46.00
Total	115	37.4174	4.54988	.42428	36.5769	38.2579	25.00	48.00

Table 4.26: Descriptive differences between learners' perceptions on ICT usefulness and their cell phone access groups

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
None	16	37.9375	3.99114	.99778	35.8108	40.0642	33.00	47.00
Cell phone with Internet	72	38.3611	5.30029	.62465	37.1156	39.6066	27.00	48.00
Cell phone with no Internet	24	35.3333	5.82847	1.18973	32.8722	37.7945	27.00	48.00
Other	3	42.3333	5.50757	3.17980	28.6518	56.0149	36.00	46.00
Total	115	37.7739	5.38526	.50218	36.7791	38.7687	27.00	48.00

Table 4.27: Multiple comparisons on learners' perceptions on ICT usefulness and their cell phone access groups

Dependent Variable: ICT USEFULNESS						
Tukey HSD						
(I) Cell phone access		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
None	Cell phone with Internet	-.42361	1.45484	.991	-4.2184	3.3712
	Cell phone with no Internet	2.60417	1.69889	.421	-1.8272	7.0355
	Other	-4.39583	3.31174	.548	-13.0341	4.2424
Cell phone with Internet	None	.42361	1.45484	.991	-3.3712	4.2184
	Cell phone with no Internet	3.02778	1.24069	.075	-.2084	6.2640
	Other	-3.97222	3.10173	.577	-12.0627	4.1183
Cell phone with no Internet	None	-2.60417	1.69889	.421	-7.0355	1.8272
	Cell phone with Internet	-3.02778	1.24069	.075	-6.2640	.2084
	Other	-7.00000	3.22341	.138	-15.4079	1.4079
Other	None	4.39583	3.31174	.548	-4.2424	13.0341
	Cell phone with Internet	3.97222	3.10173	.577	-4.1183	12.0627
	Cell phone with no Internet	7.00000	3.22341	.138	-1.4079	15.4079

*. The mean difference is significant at the 0.05 level.

Table 4.28: Multiple comparisons on learners' computer self-efficacy and their Internet access groups

Dependent Variable: COMPUTER SEL-EFFICACY						
Tukey HSD						
(I) Internet Access on Computer		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
None	Home Computer	-4.98167*	1.04649	.000	-7.7113	-2.2520
	School Computer	-6.46474*	1.35849	.000	-10.0082	-2.9213
	Home and School computer	-6.74167*	2.08487	.009	-12.1798	-1.3035
Home Computer	None	4.98167*	1.04649	.000	2.2520	7.7113
	School Computer	-1.48308	1.54147	.771	-5.5038	2.5377
	Home and School computer	-1.76000	2.20846	.856	-7.5205	4.0005
School Computer	None	6.46474*	1.35849	.000	2.9213	10.0082
	Home Computer	1.48308	1.54147	.771	-2.5377	5.5038
	Home and School computer	-.27692	2.37227	.999	-6.4647	5.9109
Home and School computer	None	6.74167*	2.08487	.009	1.3035	12.1798
	Home Computer	1.76000	2.20846	.856	-4.0005	7.5205
	School Computer	.27692	2.37227	.999	-5.9109	6.4647

*. The mean difference is significant at the 0.05 level.

Table 4.29: Descriptive differences between learners' computer self-efficacy and their Internet access groups

	N	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
					Lower Bound	**Upper Bound**		
None	72	20.4583	3.48007	.41013	19.6406	21.2761	14.00	32.00
Home Computer	25	25.4400	5.71606	1.14321	23.0805	27.7995	17.00	40.00
School Computer	13	26.9231	5.02430	1.39349	23.8869	29.9592	20.00	36.00
Home and School computer	5	27.2000	8.78635	3.92938	16.2903	38.1097	18.00	40.00
Total	115	22.5652	5.24510	.48911	21.5963	23.5341	14.00	40.00

Table 4.30: Descriptive differences between learners' trust in ICTs and their Internet access groups

	N	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
					Lower Bound	**Upper Bound**		
None	72	31.3194	5.46648	.64423	30.0349	32.6040	19.00	43.00
Home Computer	25	33.9600	5.08658	1.01732	31.8604	36.0596	22.00	46.00
School Computer	13	36.4615	4.11532	1.14139	33.9747	38.9484	31.00	44.00
Home and School computer	5	32.2000	6.68581	2.98998	23.8985	40.5015	23.00	40.00
Total	115	32.5130	5.52723	.51542	31.4920	33.5341	19.00	46.00

Table 4.31: Multiple comparisons on learners' trust in ICTs and their Internet access groups

Dependent Variable: TRUST IN ICTs						
Tukey HSD						
(I) Internet Access on Computer		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
None	Home Computer	-2.64056	1.23165	.146	-5.8532	.5721
	School Computer	-5.14209*	1.59886	.009	-9.3125	-.9717
	Home and School computer	-.88056	2.45376	.984	-7.2809	5.5198
Home Computer	None	2.64056	1.23165	.146	-.5721	5.8532
	School Computer	-2.50154	1.81422	.515	-7.2337	2.2306
	Home and School computer	1.76000	2.59923	.906	-5.0198	8.5398
School Computer	None	5.14209*	1.59886	.009	.9717	9.3125
	Home Computer	2.50154	1.81422	.515	-2.2306	7.2337
	Home and School computer	4.26154	2.79202	.425	-3.0211	11.5442
Home and School computer	None	.88056	2.45376	.984	-5.5198	7.2809
	Home Computer	-1.76000	2.59923	.906	-8.5398	5.0198
	School Computer	-4.26154	2.79202	.425	-11.5442	3.0211

*. The mean difference is significant at the 0.05 level.

Table 4.32: Multiple comparisons on learners' perceptions on ICT usefulness and their preferred subjects

Dependent Variable: ICT USEFULNESS						
Tukey HSD						
(I) Preferred Subjects		**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Languages	Mathematics	-3.43590	1.57720	.136	-7.5498	.6780
	Science and Technology	-1.75321	1.44491	.620	-5.5221	2.0157
	Social Sciences	-3.87821	1.95452	.200	-8.9763	1.2199
Mathematics	Languages	3.43590	1.57720	.136	-.6780	7.5498
	Science and Technology	1.68269	1.96585	.827	-3.4450	6.8104
	Social Sciences	-.44231	2.36579	.998	-6.6132	5.7286
Science and Technology	Languages	1.75321	1.44491	.620	-2.0157	5.5221
	Mathematics	-1.68269	1.96585	.827	-6.8104	3.4450
	Social Sciences	-2.12500	2.27973	.788	-8.0714	3.8214
Social Sciences	Languages	3.87821	1.95452	.200	-1.2199	8.9763
	Mathematics	.44231	2.36579	.998	-5.7286	6.6132
	Science and Technology	2.12500	2.27973	.788	-3.8214	8.0714

*. The mean difference is significant at the 0.05 level.

Table 4.33: Descriptive differences between learners' perceptions on ICT usefulness and their preferred subjects

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Languages	78	36.8718	5.35338	.60615	35.6648	38.0788	27.00	47.00
Mathematics	13	40.3077	3.90266	1.08240	37.9493	42.6660	35.00	47.00
Science and Technology	16	38.6250	5.59613	1.39903	35.6430	41.6070	29.00	48.00
Social Sciences	8	40.7500	5.57418	1.97077	36.0899	45.4101	32.00	48.00
Total	115	37.7739	5.38526	.50218	36.7791	38.7687	27.00	48.00

Table 4.34: Descriptive differences between learners' computer self-efficacy and their computer usage

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
None	51	19.5882	2.63193	.36854	18.8480	20.3285	14.00	24.00
Daily	15	27.0667	6.27315	1.61972	23.5927	30.5406	19.00	40.00
Weekly	22	25.3636	5.82724	1.24237	22.7800	27.9473	18.00	40.00
Monthly	27	23.4074	4.71707	.90780	21.5414	25.2734	17.00	36.00
Total	115	22.5652	5.24510	.48911	21.5963	23.5341	14.00	40.00

Table 4.35: Multiple comparisons on learners' computer self-efficacy and their computer usage

Dependent Variable: COMPUTER SELF-EFFICACY

Tukey HSD

(I) Computer Usage		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
None	Daily	-7.47843*	1.30434	.000	-10.8807	-4.0762
	Weekly	-5.77540*	1.13270	.000	-8.7299	-2.8209
	Monthly	-3.81917*	1.05689	.003	-6.5760	-1.0624
Daily	None	7.47843*	1.30434	.000	4.0762	10.8807
	Weekly	1.70303	1.48695	.662	-2.1755	5.5815
	Monthly	3.65926	1.43004	.057	-.0708	7.3893
Weekly	None	5.77540*	1.13270	.000	2.8209	8.7299
	Daily	-1.70303	1.48695	.662	-5.5815	2.1755
	Monthly	1.95623	1.27543	.421	-1.3706	5.2830
Monthly	None	3.81917*	1.05689	.003	1.0624	6.5760
	Daily	-3.65926	1.43004	.057	-7.3893	.0708
	Weekly	-1.95623	1.27543	.421	-5.2830	1.3706

*. The mean difference is significant at the 0.05 level.

Table 4.36: Multiple comparisons on learners' trust in ICTs and their computer usage

Dependent Variable: TRUST IN ICT SYSTEMS						
Tukey HSD						
(I) Computer Usage		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
None	Daily	-6.53725*	1.50551	.000	-10.4642	-2.6103
	Weekly	-3.56150*	1.30739	.037	-6.9717	-.1513
	Monthly	-1.91503	1.21989	.400	-5.0970	1.2669
Daily	None	6.53725*	1.50551	.000	2.6103	10.4642
	Weekly	2.97576	1.71627	.311	-1.5009	7.4524
	Monthly	4.62222*	1.65059	.030	.3169	8.9276
Weekly	None	3.56150*	1.30739	.037	.1513	6.9717
	Daily	-2.97576	1.71627	.311	-7.4524	1.5009
	Monthly	1.64646	1.47213	.679	-2.1934	5.4863
Monthly	None	1.91503	1.21989	.400	-1.2669	5.0970
	Daily	-4.62222*	1.65059	.030	-8.9276	-.3169
	Weekly	-1.64646	1.47213	.679	-5.4863	2.1934

*. The mean difference is significant at the 0.05 level.

Table 4.37: Descriptive differences between learners' trust in ICTs and their computer usage

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
None	51	30.5294	5.40501	.75685	29.0092	32.0496	19.00	43.00
Daily	15	37.0667	5.77515	1.49114	33.8685	40.2648	26.00	46.00
Weekly	22	34.0909	3.05363	.65104	32.7370	35.4448	29.00	40.00
Monthly	27	32.4444	5.52152	1.06262	30.2602	34.6287	22.00	42.00
Total	115	32.5130	5.52723	.51542	31.4920	33.5341	19.00	46.00

4.3.3 Pearson Correlations Results

The following hypotheses are confirmed by the Pearson correlation tests results from Table 4.38 with a level of confidence of 0.05:

- Hb0: There is a correlation between learners' computer self-efficacy and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.

- Hc0: There is a correlation between learners' level of trust in ICTs and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.
- Hd0: There is a correlation between learners' conscientiousness and their perceptions on the usefulness of ICTs for teaching and learning about IKSs.

Table 4.38 Pearson's correlation excluding demographics

		B	**C**	**D**	**E**
B	Pearson Correlation	1	.401**	-0.026	.228*
	Sig. (2-tailed)		0	0.782	0.014
	N	115	115	115	115
C	Pearson Correlation	.401**	1	0.144	.343**
	Sig. (2-tailed)	0		0.124	0
	N	115	115	115	115
D	Pearson Correlation	-0.026	0.144	1	.510**
	Sig. (2-tailed)	0.782	0.124		0
	N	115	115	115	115
E	Pearson Correlation	.228*	.343**	.510**	1
	Sig. (2-tailed)	0.014	0	0	
	N	115	115	115	115

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The following result can also be found by on Table 4.3.3 with a level of confidence of 0.05 even though it was not hypothesised in chapter 2:

- Rd: There is a direct relationship between learners' computer self-efficacy and their trust in ICT systems.

A summary of all the inferential statistical results of this study can be found on the empirical model represented by Figure 4.9 as a confirmation of the theoretical model from chapter 2.

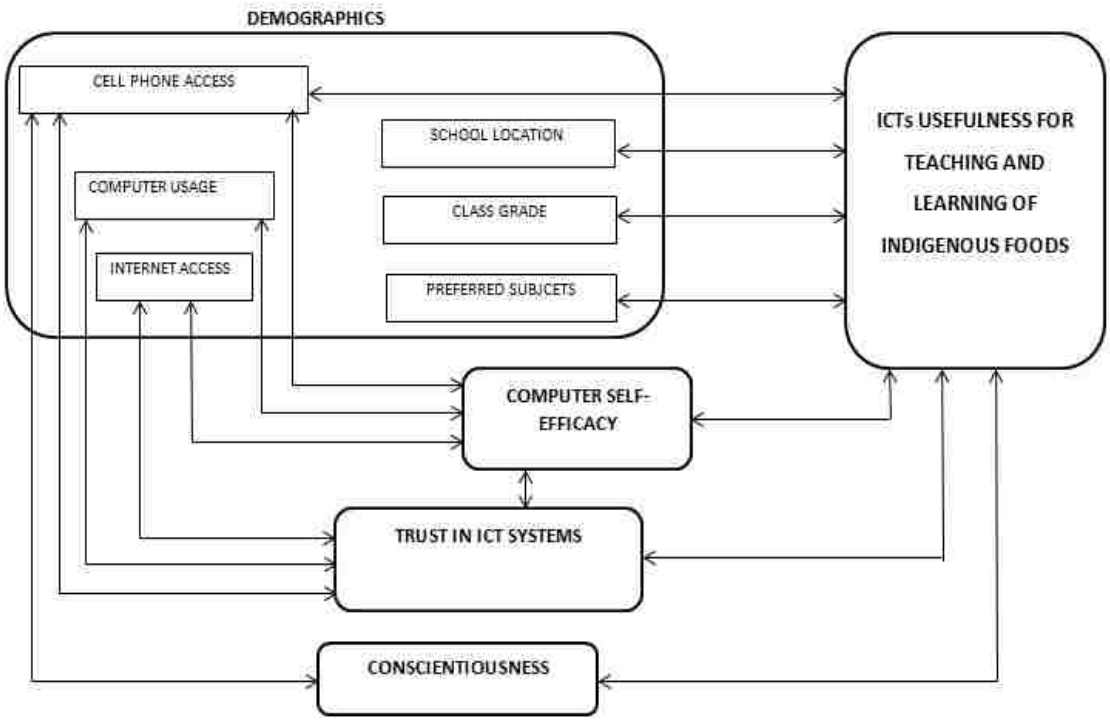

Figure 4.9: Validated research model

4.3.4 Linear Regression Test

Trust in ICTs and conscientiousness are the only two variables that were found to be linked to ICT usefulness through linear regression as indicated by Table 4.39 and by Equation 4.1.

Table 4.39: Linear regression results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	8.212	3.963		2.072	.041
	Trust in ICTs	.269	.076	.276	3.538	.001
	Conscientiousness	.557	.092	.470	6.039	.000

a. Dependent Variable: ICT USEFULNESS

$$Usefulness = .269Trust + .577Conscientiousness + 8.212 \quad \text{Equation 4.1}$$

4.3.5 Expansion of the results

The purpose of this section is to attempt to provide more explanations on the rationale behind the empirically findings of this study, especially with regards to the dependant variable, Perceived usefulness of ICT. The most perceptible finding of this survey is that almost all the relationships of the theoretical model of this study have been empirically confirmed. This shows that the theoretical model of this study is in line with existing technology adoption theories and models reviewed by this study. Only three demographic factors: Age, Gender, computer usage, Internet access

4.4 Conclusion

The descriptive statistics of this study indicate that the PE teachers who participated in the survey were predominantly female, African and qualified. They mostly came from primary urban schools and almost half of them were using computers regularly. Their age and their teaching experiences were almost equally distributed amongst the different groups. However, only a third of them indicated that they were in charge of a class of less than 30 learners. It was also found that computer usage, gender, age group and performance expectancy all had a direct relationship with PE teachers' awareness of the ICTs to be used for physical education.

The overwhelming majority of the participants of this survey were female learners evenly spread between grades 10, 11 and 12, both from urban and from rural schools. They were usually older than 16 years and most of them had access to a cell phone with Internet rather than to a computer.

They consumed indigenous foods at home at least once a month and their computer self-efficacy was generally low despite the popularity of Internet search tools. The participants indicated trust in ICTs, they considered themselves as conscientious beings and they perceived ICTs as highly useful for teaching and learning, especially when learning about indigenous foods.

It is important to note that inferential statistics of this study indicate that, six out of ten demographic items were found to have a direct relationship with other variables of this study. Amongst those six demographic items; school location, grade, cell

phone access and preferred subject of a learner were found to have a correlation with the learner's perception of ICT usefulness for the teaching and learning about indigenous foods. Moreover, the results of this study also indicate that learners' computer self-efficacy, level of trust in ICTs and their conscientiousness has a direct relationship with learners' perceptions on the usefulness of ICTs for the teaching and learning, especially for indigenous foods.

CHAPTER FIVE

DISCUSSION OF THE RESULTS IN COMPARISON TO EXISTING LITERATURE

The initial aim of this chapter was to analyse existing research on e-learning adoption factors for primary and secondary education learners. However, most of the papers reviewed were found to cover e-learning adoption factors for higher education students, mainly because of the scarcity of literature on e-learning adoption factors for primary and secondary education learners. These factors will then be compared against the findings of the current research.

5.1 Existing studies on E-learning Adoption Factors for students and learners

This section firstly presents the method used for the choice of the papers selected for this literature review. A structured presentation of these papers is then conducted in the form of three tables.

5.1.1 Review Methodology

This literature review was performed in March 2016 and after relevant papers was collected from the Google Scholar website. The following keywords were provided to the search engine: Literature review on e-learning adoption factors by primary and secondary education learners, Determinants of e-learning adoption for primary and secondary education learners, Learners' technology adoption factors in primary and secondary education and Learners' trust on e-learning. There were no restrictions on the selection of the types of papers as long as they were freely available and they covered the research variables of the current research (i.e. Demographics, Computer self-efficacy, Trust in ICTs, Conscientiousness and Perceived usefulness). However, papers with a research population different from students or learners were not considered as well as the ones with an age older than ten years.

5.1.2 Review Results

The outcomes of this literature review can be found in Table 5.1, Table 5.2, Table 5.3 and Table 5.4. The relationship between learners' demographics and the Likert Scale variables of this study are presented in Table 5.1 and Table 5.2 as found from existing literature. Table 5.3 shows the relationship between the Likert Scale variables of this study, as found from existing literature. Table 5.2 identifies the papers presented in Table 5.1. All these papers are furthermore described by Table 5.4 in terms of their authors, publication year, methodology and theory.

5.1.2.1 Demographics

Table 5.1 and Table 5.2 indicate that the relationship between learners' demographics and their conscientiousness has not been so far researched, according to accessed literature. This is also true for the relationship between the following demographic items and the Likert Scale variables of this study: learners' school location, their preferred subjects, Indigenous food consumption frequency, and their place of indigenous food consumption. There is only one located paper on the relationship between learners' demographics and their trust in ICTs. However, there appears to be more literature on the relationship between learners' demographics and their perceived ICT usefulness and the relationship between learners' demographics and their computer self-efficacy.

The following relationships seem to apply as to which demographics are more studied on the existing literature as compared to other demographics: gender and computer self-efficacy, gender and perceived usefulness, age and perceived usefulness, computer usage and perceived usefulness, computer usage and computer self-efficacy, grade and perceived usefulness, Internet access and perceived usefulness, age and computer self-efficacy, gender and trust, age and trust, Internet access and trust and computer usage and trust. The relationship between gender and computer self-efficacy, gender and perceived usefulness, age and perceived usefulness and computer usage and perceived usefulness deserve more attention because of their prevalence in the existing literature. Therefore, the other relationships will not be commented upon here.

From seven studies found in the accessed literature on the relationship between gender and computer self-efficacy, five studies concur on the existence of a significant relationship while two did not find significance in gender and computer self-efficacy. Out of nine studies on the relationship between gender and perceived usefulness found from located literature, only three studies agree on the existence of the significance in gender and perceived usefulness. As for the relationship between age and perceived usefulness, out of seven studies only two studies indicated significant relationship between age and perceived usefulness. From six studies on the relationship between computer usage and perceived usefulness, it is interesting to note that almost half of them did not find a significant relationship between computer usage and perceived usefulness.

Table 5.1 Literature results on the relationships between teachers' demographics and the Likert Scale variables

Variable items	Computer self- efficacy (B)	Trust in ICTs (C)	Conscientiousness (D)	Usefulness (E)
Gender	N,Y,N,YYYY	N		N,N,N,Y,N,Y,N,Y,N
School Location				
Age group	N,Y,Y,Y	Y		N,N,Y,Y,N,N,N
Class grade				N,Y
Cell phone access				
Internet access on computer	Y	Y		N,Y
Preferred subjects				
Computer usage	Y,Y,Y,Y,N	Y		Y,Y,Y,Y,N,N
Frequency of consumption of indigenous foods				
Place of indigenous food consumption				

Table 5.2 Literature studies on the relationships between teachers' demographics and the Likert Scale variables

	Computer self- efficacy (B)	Trust in ICTs (C)	Conscientiousness (D)	Usefulness (E)
Gender	12,31,32,38,40,41,45	21		1,11,25,35,37,39,43,45,48
School Location				
Age group	12,31,33,37,	21		11,23,31,33,34,43,48
Class grade				1,35
Cell phone access				
Internet access on computer	16	21		13,23
Preferred subjects				
Computer usage	12,17,38,41,43	21		1,7,11,27,37,47
Frequency of consumption of indigenous foods				
Place of indigenous food consumption				

5.1.2.2 Likert scale variables

According Table 5.3, the relationship between learners' trust in ICTs and their perceived usefulness of ICTs, and between learners' conscientiousness and perceived usefulness has not so far been studied enough in existing literature. Only three papers were located on the relationship between conscientiousness and perceived usefulness, and only one paper found was on the relationship between trust and perceived usefulness. Yet, there seems to be more literature on the relationship between learners' computer self-efficacy and perceived usefulness. Out of twenty seven studies accessed on the relationship between computer self-efficacy and perceived usefulness of ICTs, eighteen concur on the existence of a significant relationship between computer self-efficacy and perceived usefulness.

Table 5.3 Literature results on the relationship between Likert Scale variables

	Computer self- Efficacy (B)	Trust in ICTs (C)	Conscientiousness (D)	Usefulness (E)
Computer self-efficacy				Y,Y,N,Y,N,Y,N,Y,Y,N, N,Y,Y,N,N,Y,Y,Y,N,Y, Y,Y,Y,Y,N,Y,N
Trust in ICTs				Y
conscientiousness				N,Y,Y
ICT usefulness	2,3,4,5,8,9,10,14,15,18,19,20 ,25,26,27,28,29,30,33,36,37, 38,42,44,46,48,50	50	6,22,24	

Table 5.4 Context of Reviewed Existing Literature

		Methodology			
	Author	Country	Subject	Participants	Theory/s
1	Shan et.al 2015	Luo et al., 2009	Digital text book learning system	Primary school learners	TAM
2	Park 2005	South Korea	E-learning course	students	TAM
3	Liaw 2008	Tiawan	Blackboard	students	
4	Govendor and Garang 2015	South Africa	Moodle SUNLearn	students	TAM
5	Liaw and Huang 2013	TAIWAN	iCAN e-learning system	students	TAM
6	Terzis *et.al* 2012	Greece	Introductory informatics (Assessment)	students	TAM, BFI
7	Kim and Jang 2015	South Korea	tablet based interactive classroom	Primary school learners	TAM
8	Fargan *et al*. 2004	Jordan	Business studies	students	SCT/ TIB
9	Hsu et.al 2009	United State	Business statistics	students	TAM
10	Lee 2006	Taiwan	Not specified	Students	TAM
11	Tan *et.al* 2012	Malaysia	Not specified	students	TAM
12	Aesaet and Braak 2014	Belgium	Not specified	Primary school learners	
13	Hunderson 2005	NORTH CAROLINA	Business course	students	TAM
14	Ifinedo 2006	Estonia	Various subjects- Moodle	students	TAM
15	Lee and Lehto, 2013	Korea	Not specified	students	TAM
16	Zhao *et a*l 2010	Luo et al., 2009	Not specified	Learners	
17	Mcilroy 2007	United Kingdom	Various subjects	students	Not specified
18	Meleka and Cyberjaya 2008	Malaysia	Digital Systems	students	TAM
19	Lai and Lei 2012	Hong Kong	Various subjects	students	TRA, TPB
20	Zogheib and Rabaa 2015	Kuwait	Mathematics (Remedial and Agebra)	students	TAM
21	Sousa 2011	Cape Verde	ODL	University students	None
22	Punnoose 2012	Thailand	e-learning	students	TAM, BIG FIVE Traits
23	Tanghave 2006	Mississipi	Not specified	students	Not specified
24	Khalid 2013	Malaysia	e-book	University students	TAM, BIG FIVE P
25	Azawei and Lundvist year	IRAQ	Web design course	University students	TAM

26	Bhatiavesi 2011	Thailand	Various courses	University students	TAM
27	Abbad *et.al* year	Arabia	Basic Computer	University students	TAM
28	Ammari and Hamad 2008	Bahrai	Various subjects	University students	TAM
29	Ammary *et.al* 2014	Bahrain	Information systems	University students	TAM
30	Ramayah and Aafaqi 2004	Malaysia	Various subjects	University students	TAM
31	Abad et.al	Jordan	Basic computer literacy	University students	TAM
32	Tsai and Tsai 2010	Taiwan	Not specified	learners	TAM
33	McFarland 2001	Philadephia, Pennslyvania	Not specified	Learners	TAM and Self efficacy theory
34	Cigdem 2015	Turkey	Computer Networks	Students	TAM
35	Ghoran et.al 2014	Turkey	Not specified	Learners	Not specified
36	Chen 2014	Taiwan	English language	University students	Not specified
37	Teo and Luan 2011	Thailand	Bchelor of education	University students	Not specified
38	Liaw and Huang 2011	TAIWAN	Not specified	Uiversity students	Not specified
39	Evangelos 2007	GREEK	Not specified	students	Not specified
40	Ann and Janson 2013	United State	Psychology	students	Not specified
41	Wu & Tsai 2005	Taiwan	Not specified	students	Not specified
42	Nabeel 2013	South Arabia	Not specified	students	TAM
43	Rugayah 2010	Malaysia	Not specified	students	Not specified
44	Mohamad and Peyane 2012	Iran	Not specified	students	TAM, TPB, TRA
45	Yae and Keenan 2012	Taiwan	Computer skills (LMS)	students	TAM, DOI
46	Noshuda 2012	Malaysia	Not specified	students	TAM
47	Stoel and Hye 2003	Not specified	Not specified	students	TAM
48	Poom Tantiponganant, 2014	Thailand	Not specified (e-class)	students	TAM
49	Abbad and Albarghouthi 2011	Paisley	Information management course	students	Not specified
50	Veera Bhatiasevii 2015	Thailand	Business administration	students	TAM

5.1.4 Comparisons

The majority of the studies from existing literature indicate a significant relationship between gender and computer self-efficacy, whereas the findings of the current research do not validate that relationship. This difference may be due to the fact that the majority of those studies from Table 5.4 were conducted in Asia using university students, while the current study was based in Africa and using high school learners. Such differences on methodologies are also assumed to be the reason behind the different findings on the relationship between age and computer self-efficacy, whereby existing literature found a significant relationship and the results of the current study are not in agreement with these findings. As for the relationship between gender and perceived usefulness, irrespective of different methodologies used by existing literature and the current study, both results do not find a significant relationship between these two variables. The same applies to the significant relationship found between the following variables by existing literature and as well as by the current study, even though they used different methodologies findings are similar: computer usage and computer self-efficacy and computer self-efficacy and perceived usefulness. It is worth noting that even though the accessed literature did not reveal any study on the following relationship, findings of the current study found significance between them: Preferred subjects and perceived usefulness, school location and perceived usefulness, and cell phone access and all Likert Scale variables.

5.2 Summary

This chapter reviewed fifty studies on the factors affecting the adoption of e-learning by teachers and the following five relationships were found to have a considerable amount of literature: gender and computer self-efficacy, gender and perceived usefulness, age and perceived usefulness, computer usage and perceived usefulness and computer self-efficacy and perceived usefulness. It is interesting to note that, with regards to the first four relationships, papers found from the existing literature could not even reach more than fifteen studies.

However, as for the relationship between computer self-efficacy and perceived usefulness, twenty seven papers were found, but still this research regarded that number as insufficient. This confirms the scarcity of research that has been done towards the factors affecting learners' perceived usefulness of ICTs for teaching and learning. Therefore, these points to the recognition of the value that comes with the current study to the existing literature on the factors affecting learners perceived usefulness of ICTs. Moreover, most of the studies found from the reviewed literature were conducted in Asia, mostly using university students as participants, did not specify their subject matter, as opposed to the current study that was conducted in Africa on hospitality studies among high school learners. It is important to note that this study could not find enough studies from the existing literature; hence, comparing the actual result of the current study with that of the existing literature is worthless.

CHAPTER SIX

CONCLUSIONS

This chapter intends to conclude this study by showing how each of its research objectives and questions has been addressed, by highlighting its limitations as well as its areas for future research.

6.1 Overview of the study in line with its objectives and research questions

Readers are kindly reminded of the hereby listed objectives and research questions of the study so that they can clearly be shown how these objectives and questions have been addressed by this study.

6.1.1 List of research questions and objectives

Research question 1: Which theories are suitable for the examination of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research question 2: How can one design a hypothetical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research question 3: What is the empirical validation of the above announced hypothetical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research question 4: Which IKSs teaching and learning strategies can be suggested from the assessment of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs?

Research Objectives:

Research Objectives 1: To identify appropriate technology diffusion theories for the investigation of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs.

Research Objectives 2: To construct a theoretical model of the factors shaping learners' perceptions on the usefulness of ICTs for the teaching and learning of IKSs;

Research Objectives 3: To perform an empirical confirmation of the above announced theoretical model of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs; and

Research Objectives 4: To suggest new IKSs teaching and learning strategies based on the assessment of the factors shaping the perceptions of learners on the usefulness of ICTs for the teaching and learning of IKSs.

6.1.2 Summary of study according to the above listed research questions and objectives

The purpose of this section is to briefly highlight how each of above listed research questions and objectives was addressed by this study.

First research question and objective. This objective was achieved in chapter two by reviewing a number of technology adoption theories, both from the precursors of the field and from subsequent researchers with the aim of identifying constructs to be used as the hypothetical factors shaping learners' perceptions on the usefulness of ICTs for teaching and learning of IKSs. Some of the well-known technology adoption theories are the Technology Adoption Model (TAM), the Theory of Planned Behaviour (TPB), and the Theory of Reasoned Action (TRA). The next section summarises how these theories and models were found to be appropriate for the design of a theoretical model of the factors shaping learners' perceptions on the usefulness of ICTs for teaching and learning of IKSs.

Second research question and objective. The second objective of the study was achieved in the final section of chapter two by proposing a theoretical model of the

factors shaping learners' perceptions on the usefulness of ICTs for teaching and learning IKSs. This model is made up of constructs selected from technology adoption models and theories presented in chapter two. The selected variables were identified from the antecedents of the perceived usefulness construct in accordance with the aim of this study which is to develop a model of the factors shaping learners' perceptions on the usefulness of Information and Communication Technologies (ICTs) for the teaching of IKSs. Ultimately, this theoretical model was reduced to the following interrelated five constructs: Demographics, Computer self-efficacy, Trust, Conscientiousness, and Perceived Usefulness.

Third research question and objective. The third objective was met in chapter three of this study through the survey of Hospitality Studies learners selected from eight secondary schools of the ILembe and UMgungundlovu districts of the KwaZulu-Natal province in the Republic of South Africa. The collected data was found reliable and valid. The statistical analysis of this data mainly through ANOVA and ANCOVA empirically confirmed most of the relationships between Demographics, Computer self-efficacy, Trust, Conscientiousness, and Perceived Usefulness. The only few relationships that were not confirmed are the relationship between Perceived Usefulness and the following demographics: Gender, Age, Computer usage, and Internet access.

Fourth research question and objective. The fourth objective is addressed in the next section of this chapter on the areas for future research identified by the study.

6.2 Areas for future research

This section intends to present the recommendation for future research based on the result from the literature reviewed and the results from the current study.

6.1.3.1 Demographics

Further research is recommended on the relationship between students and learners' demographics and the following Likert Scale variables, mainly because of the lack of studies from existing literature on them: conscientiousness and trust in ICTs. Similarly, further research is also recommended on the relationship between the

Likert Scale variables of this study and the following students' and learners' demographic factors: school location, preferred subjects, cell phone access, indigenous food consumption frequency and place of indigenous food consumption. One must recall that the Likert Scale variables of this study are computer self-efficacy, trust in ICTs, conscientiousness and perceived usefulness.

Continent. Reviewed literature indicates that most of the studies on the demographic factors affecting learners' perceived usefulness of ICTs were conducted in Asia. From twenty four studies found, sixteen were conducted in Asia, three were conducted in Europe, another four were conducted in North America, and only one study was conducted in Africa. This clearly points to the need for more research from different continents on the factors shaping learners' perceived usefulness of ICTs for teaching and learning. Even though the current study increases African studies, it only makes a total of two studies.

Subject Matters. The subject enrolled for by students is mostly not specified by the majority of the studies found on the demographic factors affecting learners' perceived usefulness of ICTs for teaching and learning. Out of these twenty four studies, fourteen do not specify their subject matter, three studies are on computer skills and the remaining seven studies are individually on different subjects such as web design, computer networks, business studies, psychology and others. The current study seems to be the first one on hospitality studies learners. This point to the need for further research on e-learning and IKS subjects

Level of education. Reviewed literature indicates that an overwhelming majority of the studies on the demographic factors affecting learners' perceived usefulness of ICTs for teaching and learning, were conducted using university students. From twenty four located studies, eighteen were on university students while only three were on high school learners and another three were on primary school learners. This clearly points out the need for further research on learners from primary education, both primary school and high school. However, the current study increases studies on primary education learners by one.

Theories. Technology Acceptance Model (TAM) seems to be the most underlying theory adopted by the majority of the studies located on the demographic factors affecting the learners' perceived usefulness of ICTs for teaching and learning. From these twenty four studies, twelve used TAM, ten did not specify underlining theories, one study used TAM in conjunction with Diffusion of Innovation theory (DOI) and another one study used TAM in conjunction with Self-Efficacy Theory. The current study adopts TAM and Big Five Personality traits as underlying theories. Therefore, further research from different theories on the factors affecting learners' perceived usefulness of ICTs for teaching and learning is recommended.

6.1.3.2 Likert scale

Reviewed existing literature on e-learning indicates insufficient number of studies on the relationship between conscientiousness and learner's perceived usefulness of ICTs and the relationship between trust in ICTs and perceived usefulness of ICTs. Hence, further research in these areas is recommended.

Continent. According to the reviewed literature on the non-demographic factors shaping learners' perceived usefulness of ICTs in teaching and learning, Asia seems to be the continent where the majority of the studies were conducted. From the total of thirty studies found, twenty six were conducted in Asia, two were conducted in Europe and another two were conducted in North America. This clearly points out the need for further research from different continents on the factors affecting the learners' perceived usefulness of ICTs for teaching and learning. The reported study seems to have added one to number of Africa studies.

Subject Matter. Almost half of the studies reviewed on non-demographic factors affecting learners' perceived usefulness on ICTs did not specify the subject enrolled by the students. In fact, from thirty studies, fourteen studies did not specify the subject and the remaining sixteen studies were on different subjects such as web design, Mathematics, computer skills and digital systems. This therefore points to the need for more research from different subject matters on the factors affecting learners' perceived usefulness of ICTs for teaching and learning, especially in

primary and secondary education. The current study seems to be the first one on the use of e-learning in hospitality studies.

Level of Education. An overwhelming majority of the reviewed studies seems to use university students as participants. From thirty studies found on the non-demographic factors affecting learners' perceived usefulness of ICTs for teaching and learning, twenty eight used university students, one used primary school learners and the other one study used high school learners. Even though the current study increased high school learners based studies by one, still there is a need for more research in this regard.

Theories. TAM seems to be adopted by a huge number of studies on the non-demographic factors affecting learners' usefulness of ICTs for teaching and learning. In fact, out of thirty studies, twenty two used TAM, three studies did not specify their underlying theories and each of the five remaining studies used the following theories respectively: TAM and Self-Efficacy theory, TAM, TPB, and TRA, TAM and BFT, TRA and TPB and SCT and TIB. Clearly more research is needed from different theories.

6.3 Limitations of the study

Although the research objectives were achieved successfully, but there were some inevitable limitations.

- Firstly, the scarcity of the literature on the adoption of e-learning by primary and high school learners in formal education left this research with no option but to embrace and review relevant literature on higher education level. Therefore this points to the need for further research on adoption of e-learning by primary and high school learners.
- Secondly, because of the time constraint, this research was conducted on a small size of population from only eight schools. Therefore, to generalise the results to larger group, the study should invited more participants from other provinces and even form other countries.

- Another limitation was that, the fact that the study was conducted on Hospitality Studies only, it is not recommended to generalize its results to other IKS subjects.

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Appendix

QUESTIONNAIRE ON THE FACTORS AFFECTING THE USE OF ICT ON THE TEACHING AND LEARNING OF INDIGENOUS FOOD KNOWLEDGE

Dear participant,

This questionnaire will only be used for research purposes and information provided by you will always remain anonymous. Please tick the box that best describes your answer for each item.

A. Demographics

A1.	Gender	Male ☐	Female ☐			
A2.	School Location	Urban ☐	Rural ☐			
A3.	Age Group	Below than 13 ☐	14 - 15 ☐	16 - 17 ☐	18 and Above ☐	
A4.	Grade (Class)	9 ☐	10 ☐	11 ☐	12 ☐	
A5.	Cellphone access	none ☐	Cellphone with Internet ☐	Cellphone with no Internet ☐	Other ☐	
A6.	Internet access on computer	none ☐	Home computer ☐	School computers ☐	Home and School computer ☐	
A7.	Preferred Subject	Languages ☐	Mathematics ☐	Science and Technology ☐	Social Sciences ☐	
A8.	Computer Usage	None ☐	Daily ☐	Weekly ☐	Monthly ☐	
A9.	Frequency of	Almost everyday	Almost every week	Almost once a	Hardly once a	On Traditional

	consumption of indigenous food			month	year	occasions only
		☐	☐	☐	☐	☐
A10.	Place of indigenous food consumption	In traditional ceremonies	At home only	In restaurants only	Both at home and restaurants	
		☐	☐	☐	☐	

Thank you.

B. Self-efficacy for ICT systems I am able to use		Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree
B1	Internet to search for information and resources.					
B2	Word processors (e.g. Microsoft Word) create, edit and format documents.					
B3	Presentation Software (e.g. Microsoft PowerPoint) for school work.					
B4	Spreadsheets Software (e.g. Microsoft Excel) to compute data.					
B5	E-mailing Software (e.g., Hotmail, Outlook, Yahoo, and Gmail) for communication.					
B6	Learning management systems (e.g. Blackboard, WebCT) for my school work.					
B7	Video editing software (e.g. MovieMaker, Ulead VideoStudio) for my school work.					
B8	Graphic Editors (e.g. Adobe Photoshop) for my school work.					
B9	Animation software (e.g., Macromedia Flash) for my school work.					
B10	Blogging for personal use.					

C. Trust on using ICTs that promotes Indigenous food knowledge. The following statements are a true reflection of my level of trust both in general and towards computers.		Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree
C1	In general, people really do care about the well-being of others.					
C2	Most people are honest in their dealings with others.					
C3	I usually trust people until they give me a reason not to trust them.					
C4	Most computer professionals do a very good job at their work.					
C5	Most vendors of computer systems are interested in customers' well-being, not just their own wellbeing.					
C6	Legal and technological structures adequately protect me from problems arising from the use of computers.					
C7	Computer systems are working in my best interest.					
C8	When an important problem arises, I can depend on the information provided by computers.					
C9	I feel secure in using the information provided by computers.					
C10	I am willing to provide my confidential information to computer systems.					

D: CONSCIENTIOUSNESS. I consider myself as a person who is		Strongly Disagree	Disagree	Moderately agree	Agree	Strongly Agree
D1	Thorough.					
D2	Careful					
D3	Reliable					
D4	Organized.					
D5	Not lazy.					
D6	Perseverant.					
D7	Efficient					
D8	Systematic					
D9	Perfectionist					
D10	Tidy.					

E. Usefulness of ICTs to improve indigenous food knowledge. **ICTs can be useful to me for learning about**		Strongly Disagree	Disagree	Moderately agree	Agree	Strongly Agree
E1	Sectors in the hospitality industry and career possibilities in the different sectors in relation to Indigenous foods.					
E2	Kitchen and restaurant operations in relation to Indigenous foods.					
E3	Cultural and other influences on South African cuisine in relation to indigenous foods.					
E4	Nutrition, menu planning and costing in relation indigenous foods.					
E5	Food commodities in relation to indigenous foods.					
E6	Food purchasing, storage and control in relation to indigenous foods.					
E7	Food preparation and cooking techniques in relation to Indigenous foods.					
E8	Managing resources in relation to indigenous foods.					
E9	Food and beverage service and customer care indigenous foods.					
E10	Hygiene, safety and security in a hospitality industry environment in relation to indigenous foods.					