# The Extended UTAUT Acceptance Model of Computer-Based Distance Training System Among Public Sector's Employees in Jordan

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By

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# ABSTRACT

The utilization of advanced network technologies and modern computer applications in distance learning raises the importance of distance learning system in the delivery of learning materials and resources to remote trainees. This innovation offers the organizations and their employees an opportunity to solve the problems associated with traditional training methods. In this respect, the acceptance of computer based distance training system (CBDTS) is considered critical in determining the success of its implementation. However, the number of studies that have been conducted to examine the acceptance of distance training system by employees of public sector organizations in the Kingdom of Jordan is very limited. It is also questionable whether the information system acceptance models that have been previously developed can be used to examine the acceptance of CBDTS by public sector employees in Jordan. Questions are also raised to the idea that perhaps there may be other factors that play important roles in this context. The main objectives of this study therefore are to determine the factors that lead to the acceptance of public sector employees on computer-based distance training system and finally to propose a model of technology acceptance of computer-based distance training system by public sector employees. A total of 600 questionnaires were distributed through a survey to public sector employees in Jordan. The study received about 386 responses, which represents 64.3% returned rate. Structural equation model (SEM) was used with AMOS version 16.0 to analyze the data. The findings indicate that six core determinants, namely, performance expectancy, effort expectancy, system flexibility, system enjoyment, social influence, and facilitating conditions significantly influenced employee intention to use distance training system. Five core determinants; system interactivity, system enjoyment, computer anxiety, computer self efficacy, and facilitating conditions significantly determine effort expectancy while only four of them including system interactivity, system enjoyment, computer anxiety, and effort expectancy significantly determine performance expectancy. Consequently, based on these findings, the final research model known as computer-based distance training acceptance model (CBDTAM) is proposed to explain and predict public sector employee's intention in using computer-based distance training system. A comprehensive understanding of this model will assist decision makers to identify the reasons for the acceptance or resistance of computer based distance training system among public sector employees in the future and finally to support them to enhance the system's acceptance and usage.

# ABSTRAK

Penggunaan jaringan teknologi yang maju dan aplikasi komputer dalam pembelajaran jarak jauh membangkitkan isu peri pentingnya penghantaran bahan-bahan dan sumber dalam sistem pembelajaran jarak jauh kepada pelajar di kawasan terpencil. Inovasi teknologi ini menawarkan organisasi dan para pekerja satu peluang untuk menyelesaikan masalah yang berkait dengan kaedah latihan tradisional. Dalam hal ini, penerimaan sistem latihan jarak jauh, sejenis pembelajaran jarak jauh, dianggap kritikal dalam menentukan kejayaan pelaksanaan teknologi berkenaan. Bagaimanapun, bilangan kajian yang telah dibuat untuk meneliti penerimaan sistem e-pembelajaran secara umumnya dan sistem pembelajaran jarak jauh khasnya oleh pekerja di sektor awam di negara Jordan masih kurang. Oleh itu, model dan teori penerimaan teknologi yang telah dibangunkan dan dikembangkan dalam kajian lalu untuk mengkaji penerimaan sistem latihan jarak jauh berasaskan komputer dalam kalangan pekerja di sektor awam di negara Jordan boleh dipersoal. Persoalan juga ditimbulkan tentang kemungkinan terdapat faktor lain yang turut memainkan peranan dalam konteks ini. Oleh itu, objektif utama kajian ini ialah untuk menentukan faktor yang mempengaruhi penerimaan sistem latihan jarak jauh di kalangan pekerja sektor awam dan seterus mencadangkan model penerimaan teknologi sistem latihan jarak jauh oleh pekerja sektor awam. Soal selidik telah digunakan untuk mengutip data daripada 600 orang pekerja sektor awam di negara Jordan. Tinjauan menghasilkan 386 soal selidik, dengan kadar respons sebanyak 64.3%. *Structural equation model* (SEM) telah digunakan dengan versi AMOS 16.0 untuk menganalisis data. Hasil kajian menunjukkan bahawa enam penentu utama iaitu jangkaan prestasi, jangkaan usaha, keanjalan sistem, kegembiraan menggunakan sistem, pengaruh sistem, dan keadah yang memudahkan mempengaruhi secara signifikan niat pekerja. Lima penentu utama iaitu interaktiviti sistem, kegembiraan menggunakan sistem, kebimbangan terhadap komputer, keberkesanan kendiri dengan komputer, dan keadaan yang memudahkan mempengaruhi secara signifikan jangkaan usaha, manakala hanya empat dari penentu utama tersebut iaitu interaktiviti sistem, kegembiraan menggunakan sistem, kebimbangan terhadap komputer, dan jangkaan usaha mempengaruhi secara signifikan jangkaan prestasi. Hasilnya, model akhir yang diubah suai yang dikenali sebagai model penerimaan latihan jarak jauh berasaskan komputer (CBDTAM) telah dicadangkan untuk menjelaskan dan meramal niat pekerja di organisasi sektor awam di negara Jordan. Kefahaman menyeluruh tentang model ini dapat membantu pembuat keputusan untuk mengenal pasti punca penolakan atau penerimaan sistem latihan jarak jauh berasaskan komputer oleh pekerja dan membantu mereka untuk meningkatkan penerimaan dan penggunaan sistem berkenaan.

# TABLE OF CONTENTS

**CHPTER TWO: LITERATURE REVIEW**

# APPENDICES

# LIST OF FIGURES

## LIST OF TABLES

# PUBLICATIONS ASSOCIATED WITH THIS THESIS

Ahmad, T. Ibrahim, H & Affendi, S. M. (2011). Issues and Challenges in Applying Computer-Based Distance Training System. GSTF International Journal on Computing, 2.

Ahmad, T. Ibrahim, H., & Affendi, S. M. (2010). Distance Training System as an Alternative to Traditional Training. International Conference on Infocomm Technologies, Singapore.

Ibrahim, H. & Ahmad, T. (2010). Distance Learning System as an Alternative to Traditional Training: A case of Jordanian Public Sector's Employees. IADIS International Conference on Internet Technologies & society (ITS 2010). 267 – 272, Perth, Australia.

Ahmad, T. & Ibrahim, H & Affendi, S. M (2010). Traditional Training: Challenges and Alternative. The 3rNational Conference Rural ICT development, 70-73. Kedah, Malaysia.

# GLOSSARY OF TERMS

**Acceptance of Information Technology**: The demonstrable willingness within a user group to employ information technology for the tasks it is designed to support.

**Affect**: A persons' negative or positive feeling associated with using a particular system.

**Anxiety:** A persons' emotional reaction he/she uses a particular technology.

**Asynchronous Distance Learning:** A distance learning method in which the learners are geographically separated from the instructor and is based on the learners' access to the learning materials at any time from any place.

**Attitude**: A person's feeling (negative or positive) towards using particular technology.

**Behavioral Controls**: How a person perceives that he/she is able to perform a particular behavior.

**Compatibility**: The degree to which a user perceives that he/she has knowledge and resources to use an innovation.

**Complexity**: The degree of ease associated with an innovation's use.

**Computer-Based Distance Training System**: The use of computer and network to convey the training materials and provide resources to the remote employees.

**Construct Validity:** The degree to which measured items (measured variables) represent their intended constructs (latent variables).

**Content Validity:** The correspondence between the instrument items and the concept. Content validity is also known as face validity.

**Diffusion of Innovation**: A process used to convey an innovation among members of a social system via particular channels over specific time periods.

**Distance Education**: The process in which education occurs when the students are physically separated from the instructors.

**Distance Learning System**: The delivery system that is used to deliver instructions and provides resources to the remote students.

**Distance Training**: The training method that is developed by companies to train or retrain employees to overcome the obstacle of a fast-paced work environment, and it takes place when the trainers and trainees are geographically separated.

**Effort Expectancy:** A person's perception that a particular system will be easy to use.

**E-learning:** The use electronic devices in learning.

**Extrinsic Motivation**: The degree to which a user perceives that using particular information technology will enable him/her to achieve better outcomes.

**Facilitating Conditions**: The environmental infrastructure that makes the accomplishment of the activity easier.

**Image:** The degree to which a user perceives that using a technology will enhance his/her image or status in the social system.

**Information System Architecture**: A structural design of system components, relationships between such components, principles, and directives.

**Innovation:** An idea, practice, or object that is perceived as new by an individual or other unit of adoption.

**Intrinsic Motivation**: Means that the person likes to execute a behavior because he/she does not have other motivation other than executing the activity him/herself.

**Job Fit**: The degree to which a person believes that utilizing a technology will enhance his/her work performance.

**Long Term Consequences**: The degree to which a person believes that he/she would get outcomes by using a particular system in the future.

**Observability**: The degree to which the results of the experience are clear to other social members.

**Outcome Expectations-Personal:** Outcomes of using a particular information technology.

**Outcomes Expectation-Performance**: The expectation of the technology used on the job.

**Perceived Ease of Use:** The degree of complexity of using the technology.

**Perceived Usefulness:** The degree to which the user believes that using the system will improve his/her work outcome.

**Performance Expectancy:** A person's beliefs that using a particular system will enhance his/her work performance.

**Relative Advantage**: The degree to which an individual perceives that an innovation will improve his/her work performance or learning.

**Reliability**: The extent to which an instrument is without prejudice (bias) and provides consistent measurement across time and variety items.

**Self-Efficacy**: A person's ability to use the technology to perform particular work.

**Social Factors**: A user's perception of other people whether or not he/she has to perform a behavior.

**Social Influence:** A user's perception of other people whether or not he/she has to perform a behavior.

**Subjective Norm**: The degree to which the user believes the importance of opinion of other people as to whether or not he/she uses a technology.

**Synchronous Distance Learning:** A distance learning method in which the learners are geographically separated from the instructor and is based on the learning process that takes place in real time.

**System Flexibility:** The degree to which users perceive that they can use the distance learning system from any place at any time.

**Traditional Training** (face to face training): A training process that takes place when the trainees and trainer are at the same time in the same place.

**Trialability**: The opportunity of trying a particular system by users before they use it.

**Validity**: The degree to which the items accurately measure what they are intended to measure.

**Voluntariness of Use**: The degree to which an individual believes that using a particular technology will be free.

# LIST OF ABBREVIATIONS

| | |
|---|---|
| **AGFI** | Adjusted goodness-of-fit index |
| **ANX** | Computer anxiety |
| **ASTD** | American Society for Training and Development |
| **AVE** | Average variance extracted |
| **B-learning** | Blended learning |
| **BI** | Behavioral intention |
| **CA** | Cronbach's alpha |
| **CBDTS** | Computer-based distance training system |
| **CFA** | Confirmatory factor analysis |
| **CFI** | Comparative Fit Index |
| **CMIN** | Minimum sample discrepancy function |
| **cr** | Critical ratio |
| **CR** | Composite reliability |
| **CHEA** | Council for High Education Accreditation |
| **CSE** | Computer self-efficacy |
| **C-TAM-TPB** | Combined TAM and TPB |
| **df** | Degrees of freedom |
| **D-learning** | Distance learning |
| **DOI** | Diffusion of innovation theory |
| **EE** | Effort expectancy |

| | |
|---|---|
| **FC** | Facilitating conditions |
| **GFI** | Group of fit measures |
| **ICDL** | International computer driving license |
| **ICT** | Information and communication technology |
| **ITG** | Information technology group |
| **MM** | Motivational model |
| **MPCU** | Model of PC utilization |
| **NFI** | Normed fit index |
| **PE** | Performance expectancy |
| **PEOU** | Ease of use |
| **PU** | Perceived usefulness |
| **RAMSEA** | Root square error of approximation |
| **SCT** | Social cognitive theory |
| **SE** | System enjoyment |
| **SEM** | Structural equation model |
| **SF** | System flexibility |
| **SI** | Social influence |
| **SIN** | System interactivity |
| **TAM** | Technology acceptance model |
| **TLI** | Tucker-Lewis coefficient |
| **TPB** | Theory of planned behavior |
| **TRA** | Theory of reasoned action |

| | |
|---|---|
| **UTAUT** | Unified theory of acceptance and usage technology |

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# CHAPTER ONE

# INTRODUCTION

## 1.0 Background

The development of Information Technology (IT) has urged employees in organizations all over the world to upgrade their knowledge and skills. One way of doing this is by attending various kinds of training including traditional training or workshop. Behling et al. (2007) defined traditional training (i.e. face-to-face training) as the training process that takes place when the trainees and the trainer are present at the same time in the same place. Even though traditional training provides several benefits such as places a trainee in a stimulating and challenging group environment, and creating and facilitating business networking between one trainee and colleagues who come from different working background (Training Directory, 2007), not every employee has an opportunity to attend it. There are many obstacles for employees to attend traditional training for example employees have family duties, the timing of the training coincide with working time, and irregular work. Despite these obstacles, organizations spend a lot of money to train and retrain their employees through the traditional training method. According to Ruttenbur et al. (2000), organizations over the world have spent about 62.5 billion dollars to train their employees through traditional training methods, mostly on the trainers' fees and outsource providers (for example products and services).

In order for an organization to solve the problems faced by employees in attending traditional training and to create more opportunities for employees, an organization has a choice by providing a different mode of training. This choice can totally become an alternative method or in most situations is developed as a complement to traditional training for an organization to train and retrain their employees. According to Hsia and Tseng (2008), and Quinn et al. (2006), the best and successful way to solve those problems is by applying a distance training system, which is defined by Chatzoglou et al. (2009) as a computer-based distance training that uses computer and network to convey the training materials and training resources to remote employees. In the literatures, e-learning has been widely used instead of distance learning. Additionally, computer-based training (CBT), web based training (WBT), Internet based training (IBT), and other acronyms are also synonymous for e-learning. Furthermore, e-learning is also defined as using electronic device (usually computer) for the people to learn (Liu & Hwang, 2009). Thus, the term e-learning system or distance learning system will be used interchangeably in this study.

Distance training system does not only provide the best way to solve employees' problems they have with traditional training methods, but it also provides many benefits for the organizations and employees. For example, there is no issue of time and place, more economical and can be exploited to enhance organizations' productivity (Grant &

Danziger, 2005), and provides opportunity for the organization to train and re-train their employees without any exception.

An early investigation, which had been conducted on the public sector employees in Jordan in 2009, has indicated that employees have faced many problems that prevent them from attending traditional training methods. The problems include having family duties, staying away from the training institutions, and having time conflict between working times and training time. This traditional training refers to face-to-face training the public sector's employees in Jordan have to attend to get the International Computer Driving License (ICDL). ICDL is a global recognized standard certificate for the individual computer skills for every one who uses the computer in his/her work or at home (ICDL, 2008). The result shows that about 74% of the employees reported that distance training system could overcome their problems with the ICDL traditional training and other types of government's traditional training.

Acceptance of a new technology is considered critical in determining the success of its implementation. According to Venkatesh et al. (2003), the most important key to ensure that a technology will be successful in organizations is the acceptance of such technology by their employees. However, according to Dadayan and Ferro (2005), Venkatesh et al. (2003) and Merchant (2007), the number of studies which have been conducted to examine the acceptance of information technology by employees in public sector organizations is very limited. Furthermore, Burgess and Russell (2003), Chatzoglou et al. (2009), and Walczak and Scott (2009) highlighted that the number of studies to understand the reasons why employees reject or accept e-learning system is very limited. Many prior studies of technology acceptance have focused on students' environment (Burgess & Russell, 2003; Chatzoglou et al., 2009; Dadayan & Ferro, 2005). However, the results of the students' environment cannot be generalized to a different context. Thus, decisions makers and policy implementers in the public sector organizations or environment cannot fully apply the reasons that make implementation of e-learning system successful or unsuccessful in their organizations.

Based on the previous argument, this study intends not only to provide solution for the problems of public sector organizations and employees of traditional training method, but also to fill the gap in the literature by exploring and understanding the factors that influence the acceptance of computer-based distance training system by public sector employees in Jordan, since most of those employees agree that computer-based distance training system will overcome the traditional training methods' problems especially ICDL traditional training's problem.

This chapter is organized as follows: the first section is the background, followed by the statements of the problem, and the research questions. The objectives of research will be described in the fourth section, followed by the scope of the research, the research significance, the research contribution, and the research approach and methodology. Finally, the structure of the thesis will be highlighted.

## 1.1 Problem Statement

Many educational institutions and private and public sector organizations over the world have adopted e-learning system to offer teaching and training materials to the remote students and trainees (Burgess & Russell, 2003; Chatzoglou et al., 2009). Yet, for technologies to be successful in the organizations, they must be accepted by the employees. The acceptance of technology is often described as one of the most important areas in the modern information system (Venkatesh et al., 2003).

Many studies have been conducted to examine the acceptance of e-learning system by students in educational institution and employees in organizations (e.g., Abbad, 2009; Hermans et al., 2009; Hsia & Tseng, 2008; Huang et al., 2006; Lee et al. 2003; Nanayakkara, 2006; Sahin & Shelly, 2008). But, vast proportion of these studies investigated the factors that enhance or inhibit the acceptance of e-learning system by students (Chatzoglou et al., 2009) (Appendix B Table 1.0). According to Dadayan and Ferro (2005) and Nanayakkara (2006), these factors are related to system characteristics, user characteristics and perceptions, and implementation environment and infrastructure characteristics.

Nowadays, with the development of information and communication technology, many organizations all over the world are using e-learning system to train and retraining their employees to overcome the problems associated with traditional training method and gain the benefits of applying such system (Chatzoglou et al., 2009; Quinn et al., 2006). According to Hsia and Tseng, (2008) and Quinn et al. (2006), applying computer-based distance training system can enhance the organization's productivity and improve employees' skills. However, according to Burgess and Russell, (2003), Chatzoglou et al. (2009), and Walclzak and Scott (2009), and based on the comparison made by this study (Appendix B Table 1.0), the number of studies on the reason why employees reject or accept e-learning system is very limited. Additionally, many prior studies were focusing on the acceptance of e-learning system among students and in educational institution management environment (Chatzoglou et al., 2009; Dadayan & Ferro, 2005). It is also a challenge to find information from previous studies on acceptance of computer-based distance training system among public employees in Jordan.

Public sector's employees in Jordan are demanded to sit for one certified IT training, known as International Computer Driving License (ICDL). This training has been implemented in Jordan as standard for end user computer skills across the kingdom since 2001. Most of the Jordanian ministries, for instance the Ministry of Education, Ministry of Health, Ministry of High Education, ministry of water and irrigation and Ministry of Information and Communication Technology (ICT), have adopted this program for their employees since 2003 (Advance Learning, 2008). Approximately 70000 employees of the Ministry of Education must participate in this program (ICDL foundation, 2007). However, according to an initial study results, due to the inappropriateness training time that is continuously unfit with the employees' schedule, the Ministries faced difficulties to conclude the computer skills training (ICDL) for its employees. To employees, this challenge has prevented them from attending the program training and sitting to the certificate exam, which could affect their career.

One of the possible approaches to complement traditional training is by giving an opportunity for the employees to attend training without physically be in the training location. This can be made possible through computer-based training system. This research therefore is going to investigate the acceptance of computer-based distance training system as an alternative training approach to overcome the employees' problem with the traditional training method and to make the organizations obtain the advantages of the way

Computer-based distance training system is not a replacement to traditional training, but it can become either an alternative or a support to the traditional training to help solve other problems of attending traditional method, such as having family duties (especially among the women), having irregular working, and employee working time that coincides with the time of training (Mashhour, 2007), since the number of the studies in this contexts is very limited Dadayan and Ferro, (2005), Merchant (2007), Venkatesh et al. (2003) and (see Appendix B Table 1.0). Additionally, this study will fill the gap in the literature by exploring and understanding the factors that influence the acceptance of computer-based distance training system by public sector employees,

An initial study was conducted in 2009 to gather some information regarding the issues and challenges on the use of computer-based distance training system among 100 public sector employees in Jordan. The findings of this study indicated that two issues regarding traditional training and e-training in Jordan. The first issue is regarding the challenges faced by public sector employees in Jordan in attending traditional training. The initial study found that 82% of the sample subjects could not attend the ICDL training class because their working schedule coincides with the training time or because the family duties prevented them from attending the traditional classroom training (for instance training of International Computer Driving License). In this respect, 74% of the respondents indicate that the flexibility of computer based distance training system will help to overcome such problems. Furthermore, 55% of them reported that, they prefer the multimedia materials for their training than the text books.

The second issue is pertaining to the challenges encountered by employees in using the computer-based distance training system given by organizations for ICDL training. The result of initial study shows that 58% of the employees have problems with computer usage for instance: they reported that they face problem with the computer device maintenance and lack of assistance in using a computer, 44% reported that they feel nervous or do not look forward, toward using the distance training system and 72% do not have very good computer skills. Another interesting finding is about computer usage and Internet usage among the respondents. High proportions of the employees have PC at home or at workplace and have Internet access. About 92% of them have regular computer access, 67% have Internet access, and 81% have an e-mail account.

Overall, the above survey indicates (i) there are some challenges in applying traditional training in Jordan public sectors, (ii) there are also some challenges and issues in using computer based distance training system. It is worth to note that some of these challenges and issues are related to the distance training system characteristics such as system flexibility, system enjoyment and system interactivity, since the employees reported that the they will use the computer-based distance training system because its flexibility will overcome the ICDL traditional training method; they prefer the multimedia training materials and they need assistance during the computer and system usage. According to Hsia and Tseng (2008), Chatzoglou et al. (2009) and Abbad et al. (2009) these characteristics are critical in the context of e-learning system acceptance.

In addition, other challenges are also related to the individual characteristics such as his/her emotion or ability to use the system. In this respect, self-efficacy and anxiety are vital for the acceptance of e-learning system (Rezaei et al., 2008, Raaij and Schepers, 2008 and Chatzoglou et al., 2009). Finally, the rest of issues and challenges are related to the implementation environment (such as technical infrastructure, employees' resources and knowledge). Many scholars found that implementation environment's sub factors including facilitating conditions and social influence are critical success factors for the e-learning system acceptance (Venkatesh et al., 2003, Jong and Wang, 2009 and Sumak et al., 2010).

Based on the previous argument, it can be assumed that there could be some factors that influence the acceptance of computer-based distance training system in public sector organizations. Thus, there is a need to conduct a nation-wide study to understand and examine the acceptance of computer-based distance training system among public employees in Jordan.

UTAUT has been used to examine the acceptance of Internet banking system, MP3, secure biometrics authentication system, etc (Al-Harby et al., 20101 and Im et al., 2010). In the e-learning context, however, the validity of UTAUT needs to be further tested (Sumak et al., 2010) especially in relation to the three main critical success factors in the acceptance of e-learning technology; system characteristics, individual characteristics and implementation environment characteristics (Suma et al., 2010; Chatzoglou et al.,2009; Abbad, 2009 and Venkatesh et al., 2003). With the suitability of UTAUT's characteristics and requirements for this study, and moreover with the needs to test the validity of UTAUT in relation with the additional factors of system characteristics and factors of individual characteristics, thus, the theory was selected and will be extended in this research to include the three main factors (system factor, individual factor, and environment implementation factor), which could influence the public sector employees in Jordan to use the computer based distance training system.

Shortly, the vital way to overcome the traditional training's problem is the usage of computer based distance training system. On the other hand, in order to make sure that usage of the system will be successful in the public sector's organizations it must be accepted by such organizations employees. In this respect, the number of studies on the acceptance of distance training system by the public sectors employees is very limited. An initial study therefore, has been conducted to collect information regarding the computer-based distance training system and traditional training methods. The study found that many factors important to the employees in the usage of computer-based distance training system including system interactivity, system flexibility, system enjoyment, computer anxiety and computer self-efficacy. However, there is no acceptance model cover all of these factors. Thus, beyond the suitability of UTAUT for this study, it has been extended to examine the acceptance of computer-based distance training system among public sector's employees in Jordan.

## 1.2 Research Questions

This study aims to examine the acceptance of computer-based distance training system by the public sector employees. Therefore, the following are the research questions to be solved:

1. What are the issues and challenges in implementing computer-based distance training system in public sector organizations in Jordan?
2. How can computer-based distance training system support the traditional training method in public sector organizations in Jordan?
3. What are the factors that determine the acceptance of public sector employees on computer-based distance training system?

4. What is the proposed model of the acceptance of computer-based distance training system by public sector employees?

## 1.3 Research Objectives

The research objectives are formulated as below:

1. To investigate the issues and challenges in implementing computer-based distance training system.
2. To identify the roles of computer-based distance training system in supporting the traditional training method in public sector organization in Jordan.
3. To determine the factors that lead to the acceptance of public sector employees on computer-based distance training system.
4. To propose a model of technology acceptance of computer-based distance training system by public sector employees.

## 1.4 Scope of the Study

This study has investigated the acceptance of computer-based distance training system by employees of public sector in Jordan. This included examining factors that might have affected the employees' intention to perceive the computer-based distance training system as the alternative way for their training.

This study investigated the acceptance of computer-based distance learning system by looking at three main factors: (i) individual context, (ii) technology context, and (iii) the implementation environment context. The individual context focused on the characteristics of employees (for instance skills and knowledge) and employee perceptions. The technology context includes the characteristic of computer-based distance training system (such as functionality and user-friendliness). Finally, the implementation environment context includes the organization characteristics and technology infrastructure characteristics (for example availability). As argued by Dadayan and Ferro (2005), and Nanayakkara (2006), the acceptance of ICT systems is influenced by those three factors (individual, system, and implementation environment).

This study was conducted using a quantitative research method that involved survey to collect data from the sample of study. The survey scales were adapted from Chatzoglou et al. (2009), Sahin and Shelley (2008), Lime et al. (2008), Abbad et al. (2009) and Venkatesh et al. (2003) (see appendix A). The reason for applying survey is due to the big size of the population of employees in public sectors in Jordan. Additionally, they are staying all around Jordan (Sekaran, 2003).

## 1.5 Research Significant

In terms of practical contribution, this research provides guidelines to organizations that have plans to apply computer based distance training system to train and retrain their employees. Such guideline includes the system characteristics that can be included in the design of CBDTS and issues that will encourage the acceptance of the new training approach. In order to successful applying CBDTS, the organization should assure that the system is easier to use; improves the employees' training (usefulness); can be accessed from any where at any time (flexible); enables trainers to interact each other and with trainees (interactivity) and enjoyable to interact with. Additionally, the organization should take into consideration many issues including: opinion of the managers and opinion of other employees to encourage their colleagues to use the system; employees' resources and their knowledge, emotion and their ability to use the system. Thus, comprehensive plan should be prepare to cover the previous issues.

Additionally, this research contributes in terms of knowledge from a few perspectives. From the review of literatures, the research offers a clear description about the acceptance of e-learning system (especially distance learning system) in general and in Jordan in particular. In this respect this study presents the factors that influence the individual's intention to use e-learning systems, since three main factors found to affect the individual's intention including system characteristics, users' characteristics and implementation environment characteristics. It has also been found that, the number of studies which conducted on the acceptance of e-learning systems among public sector employees is very limited.

In term of theoretical contribution, this research has successfully extended Unified Theory of Acceptance and Usage Technology (UTAUT) in the e-learning system context in general and in distance learning system context in particular. The original UTAUT consists of only four constructs namely performance expectancy, effort expectancy, social influence and facilitating conditions. In this research three factors related to the system characteristics (including system flexibility, system interactivity and system enjoyable) are found to have influence on employee intention, performance expectancy and effort expectancy. Furthermore, two factors related to employee characteristics, namely, computer anxiety and computer self-efficacy, are also have impact on performance expectancy and effort expectancy. Therefore, this research model has overcome the weakness of UTAUT, where earlier does not investigate the impact of individual factor on the behavior intention. Further, it has included most of the critical success factors in the context of e-learning system.

In relation to distance learning system domain, this research provides factors that enhance the acceptance of computer-based distance training system by public sector employees. As there are limited number of studies conducted to examine the acceptance of information technology by the public sector employees (Dadayan & Ferro, 2005; Venkatesh et al., 2003) and studies conducted to investigate the acceptance of e-learning by employees (Burgess & Russell, 2003; Chatzoglou et al., 2009; Walczak & Scott, 2009), the findings from this research have filled the gaps in the literature. Furthermore, this research has majorly contributed knowledge in the area of information technology acceptance in the Kingdom of Jordan as the acceptance of distance learning system by Jordanian employees has not been investigated so far.

Next, this research also adds some high rate items scale to measure the model constructs. These items and the items set by Venkatesh et al. (2003) to measure the UTAUT constructs need to be further tested in the distance learning context (Marchewka et al., 2007; Venkatesh et al., 2003).

## 1.6 Research Framework

The research approach involves four stages including literature review, proposing a research model, testing of the research model, and generating integrated model. In the first stage, the literature in the acceptance of distance learning system and information system was reviewed in order to identify the gap that can initiate a new study.

The review of the literature shows that the acceptance of information systems are influenced by three factors namely individual characteristics factor, system characteristics factor, and implementation environment characteristics factor. According to the e-learning literature and an initial study these factors could affect the employees' intention to use computer-based distance training system. Therefore, in the second stage the proposed model has been developed using the successful factors which generated from the initial study and distance learning literature. The next section presents the proposed model in more details.

Subsequently, this study used a quantitative research method in the third stage, where questionnaires were distributed to collect data from employees of public sectors in Jordan to measure the acceptance of computer-based distance training system by those employees. According to Sekaran (2000), this type of data collection method (questionnaire) is more suitable, if the sample size is large and its subjects stay in a wide geography area. The total number of public sector employees in Jordan is approximately 181,775 employees (CSB, 2009), and they are scattered throughout Jordan. Sekaran

(2003) indicated that the sample of such number of population members must be 384 persons from around all population regions. This study applied structural equation modeling to analyze data collected from the sample of this research

Finally, in order to generate the integrated model, Structural Equation Model (SEM) has been applied, since model fit goodness' measures including $X^2$/ df, GFI, CFI, REMSEA, and TLI were used. The details of the stages are mentioned in Table 1.1.

Table 1.1: Four Stages of the Research Approach

| **Stage** | **Purpose** | **inputs** | **Activities** | **Outputs** |
|---|---|---|---|---|
| Stage1: Literature review | Identify the gap in the literature. | Online Journals, Books, Periodical Journals, Proceedings, Published and Unpublished Papers, Online Documentations, and Online Proceedings<br><br>Websites of distance learning | Review the literature on issues, limitations, measurement items, and successful factors related to acceptance of e-learning system.<br><br>Identify the gap in the literature. | • Issues and problems in acceptance of e-learning system<br>• Critical Success Factors<br>• Limitation in the previous studies<br>• The concepts in acceptance of e-learning |

| | | | | |
|---|---|---|---|---|
| | | | Determine the factors and the strength of acceptance models to fill such gap. | • The strengths and weakness of acceptance models and theories<br><br>• Measurement items |
| Stage2: Framework development | Develop a proposed model (framework development) | • Issues and problems in acceptance of e-learning system<br><br>• Critical Success Factors<br><br>• Limitation in previous studies<br><br>• Concepts in acceptance of | Use suitable acceptance model and successful factors to propose a research model<br><br>Formulate hypotheses<br><br>Develop questionnaire to test the proposed model | • Extended UTAUT as this research framework, since five variables had been added (computer anxiety, computer self-efficacy, system enjoyment), system interactivity, and system flexibility)<br><br>• Measurement items (questionnaire) |

| | | | | |
|---|---|---|---|---|
| | | e-learning<br>• The strengths and weaknesses of acceptance models and theories<br>• Measurement items | | |
| Stage3: Framework testing | Test the proposed model | Proposed model (extended UTAUT) and measurement items (questionnaire) | Distribute the questionnaires to collect the data, due testing of proposed model | The data to test the proposed model |
| Stage 4: Integrated model | Generate the integrated model (CBDTSAM) | The data to test the proposed model | Apply SEM to generate the integrated model | Integrated model of the acceptance of CBDTS |

## 1.7 Theoretical Framework

This research intends to extend the Unified Theory of Acceptance and Use Technology (UTAUT) with the inclusion of these three factors. In this research framework, the individual factor includes the following variables: computer self-efficacy and computer anxiety, while the system factor contains the following variables: effort expectancy, and performance expectancy. To add further to the present study's contribution, this factor is extended to include other strong predictors of employee intention to use the distance learning system including flexibility of distance learning, enjoyably of distance learning (intrinsic motivation) and system interactivity. Finally, the implementation factor is measured by examining the influence of the following variables on the employee intention to use the distance learning: social influence and facilitating conditions.

Overall, the theoretical framework of this research contains nine independent variables: performance expectancy, effort expectancy, system flexibility, system, system interactivity, computer self-efficacy, computer anxiety, social influence, and facilitating conditions, as independents variables. Behavioral intention becomes the dependant variables. Additionally, the relationships between the dependant variables and independents variables are moderated by the following moderators: age, gender, experience. Chapter four will present the details of the selection of these variables.

Subsequently, after the questionnaire was distributed to collect the data form public sector's employees, the proposed model was tested using Structural Equation

Model (SEM). The purpose of this stage is to see which factors affect employee intention to use Computer-Based Distance Training System (CBDTS). The integrated model, which explains the relationships between system factor, implementation environment factor, individual factor, and employee intention, was generated in the final stage. This integrated model will help decision makers in public sector organizations to plan and manage the application of CBDTS for employee training.

## 1.8 Structure of the Thesis

### 1.8.1 Chapter One

This chapter introduces the need to examine acceptance of computer-based distance training system in an employee environment and explains the problem statement in detail. This chapter also presents the research objectives and questions, study scope, research significance, research contributions, research approach and methodology, and research structure.

### 1.8.2 Chapter Two

This chapter includes the background of distance learning and distance learning system including its history of diffusion across the globe; the equipment and tools used to conduct distance learning; definitions of distance learning and its relationship to e-learning; the advantages and disadvantages of distance learning; distance learning in the public and private sector organizations, barriers of distance learning and background of e-learning in Jordan.

This chapter also presents several theories of technology acceptance that have been widely used in previous studies. It also presents the constructs of those models, weaknesses and strengths of each model, and where each model is applied. Additionally, the successful factors of the acceptance of information system (especially distance learning system) are presented.

### 1.8.3 Chapter Three

This chapter details the information of the research framework. It includes the variables used to finally construct the research model and this is followed by the construction of research hypotheses to address all the research questions and objectives. Additionally, this chapter discusses the methodology carried out in this study including the research purpose, research approach, research strategy, population and sample of research, instruments development, and survey administration.

### 1.8.4 Chapter Four

This chapter presents the analysis of this research data using the Structural Equation Model (SEM). It includes the advantages of Structural Equation Model in comparison with other data analysis. The data analysis strategy and respondent information are also presented, followed by a discussion on data management testing. Next, validity and reliability testing are discussed. Finally, the chapter highlights the measurement of fit on the research model and the results of the hypotheses testing.

### 1.8.5 Chapter Five

This final chapter highlights the conclusion of this research and the computer-based distance training system acceptance model. Furthermore, the implications to practice, theory, and methodology of this research are explained along with limitations and future work. The organization of this thesis is shown in Figure 1.0.

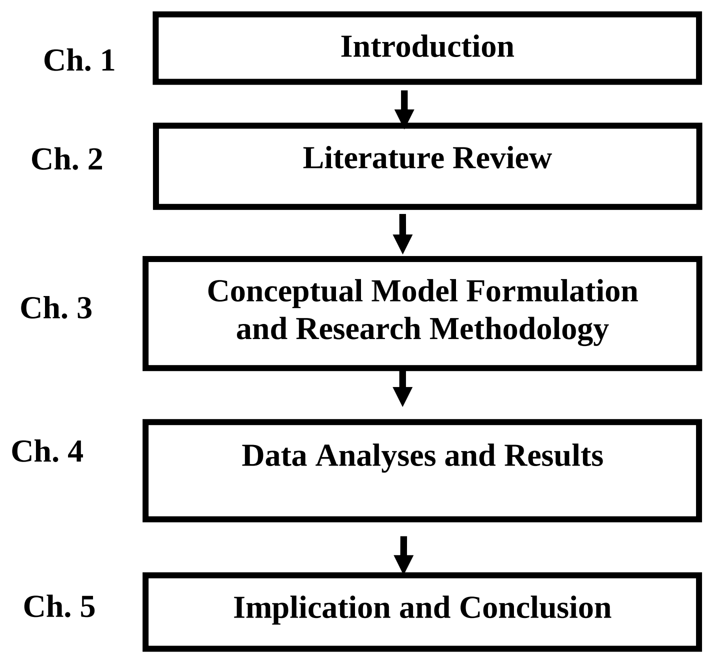


Figure 1.0: Structure of the thesis

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

There is much evidence in the literature that the development of information and communication technology plays a vigorous role in the evolution of e-learning. Nowadays educational institutions offer their courses online and have distance learning as one of their strategic alternatives for reaching big number of students. Similarly, many organizations have taken practical steps to provide training materials to their employees through distance training programs (Burgess & Russell, 2003).

The acceptance of distance training system among employees is important to support their advancement in knowledge and skills. It is a concern for organizations to provide the best facility of training to employees. In order for employees to accept distance training system, organizations need some kind of guidance on such provision. In doing so, organizations will have to depend on previous information regarding acceptance of distance training system.

However, the number of studies been conducted regarding acceptance of e-learning system by employees of organizations is very limited (Burgess & Russell, 2003; Chatzoglou et al., 2009; and Walczak & Scott, 2009). Almost all e-learning studies have been conducted in the educational environment involving students and in organizations involving managers (Chatzoglou et al., 2009; Dadayan & Ferro, 2005). With insufficient information on the acceptance e-learning system among public-sector employees in Jordan and with the need of organizations to increase the support of e-learning in working environment among employees, a study needs to be conducted to understand aspects of the system acceptance. This includes understanding the factors that will influence the acceptance. Thus, this study was conducted to predict the factors that influence employee acceptance of computer-based distance training system in public sector organizations. By doing so, this study will enable decisions makers and administrators in public organizations to better understand why employees accept or reject such technology.

Understanding user acceptance of information system is one of the most important research areas in the information and communication technology literature (Moran, 2006; Venkatesh et al., 2003). This acceptance has been defined in the literature as "the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support" (Dillon & Morris, 1996). This definition focuses on a user's intention to use a technology. In the information systems literatures, users' intention to use an information system is influenced by three factors: (1) individual factor, (2) implementation environment factor, and (3) technology factor (Chau & Hu, 2002; Dadayan & Ferro, 2005; Nanayakkara, 2005).

This chapter describes the situation of distance learning in public and private organizations and educational institutions. It also explains the advantages and disadvantages of distance learning system for employees, organizations, institutions and trainers, and how distance learning has managed to solve problems of employee training. Additionally, this chapter includes a review of literature on the acceptance of information system models, and the dimensions of distance training system acceptance (successful factors), which will be used to develop the acceptance model for this research.

## 2.1 Historical Review of Distance Learning

Works on distance learning began in Britain in the $18^{th}$ century. It was meant to provide courses to everyone who wanted to extend his/her personal knowledge, get education degree or develop his/her career. In the $19^{th}$ century, the United States and many European countries started to apply distance learning. Consequently, distance learning has become a popular practice all over the world (Ruhig, 2002). Given that, it is evident that Great Britain was the first country to conduct distance learning in 1858. The Queensland University offered some courses that led to an external degree through distance learning program in 1890. Today, the Open University in London is one of the largest international universities that offer courses through distance learning programs. About 20,000 students have enrolled in this university’s distance learning programs. It the university is also recognized as the first university that provides courses from distance for full off-campus students in 1988 (Morcos et al., 2001; NMFA, 2008).

Different technologies are used to support the implementation of distance learning programs. For example, about 56 percent of all public higher education institutions in the United States provide courses to their students using online mode (Arafeh, 2004). Additionally, TV is another technology that plays an important role in conveying the materials and programs of distance learning to remote students. For instance, the Public Broadcasting Service offers distance learning courses to remote students in more than 2,000 institutions in the United States. Stanford University, for instance, is the biggest university that conducted television courses in the world. Started in 1964 in the United States, the university had then been broadcasting more than 200 courses to more than 2000 students (Ruhig, 2002). Other university that had been using TV system to conduct distance learning program is Maryland University (Ruhig, 2002). Other than TV system, satellite technology is also being used by educational institutions to deliver distance learning courses in the United States. The National Technological University, which was established in 1984, has broadcasted for several years many engineering courses through satellite television network (Morcos et al., 2001).

With the advancement of information and communication technology, most institutions in the United States have moved to use Internet and Word Wide Web to offer their courses to the remote students (Castro, 2001). According to United States Department of Education, about 80 percent of institutions in United States have been offering their courses online (Dalziel, 2008). High secondary schools have also adopted distance learning technology to provide course materials to their students at distance.

According to National School Board Association,      percent of school students started to receive some online courses by the end of 2006 (Arafeh, 2004).

The computer-based distance training system also started in Russia since 1979. It has received official recognition in the graduate and postgraduate vocational education since 2003 (Elena, 2006). The Far Eastern National University (FENU) is one of the five great universities in Russia that offer a lot of courses such as law, management, Russian and Japanese languages by the distance learning mode. Many of these distance learning programs have been conducted through participation with other international universities such as Maryland University College (UMUC) in United States, University of Southern Queensland in Australia (USQ), and Waseda University (WU) in Japan (Kurilova-Rich and Falaleev, 2003).

Based on the above, the number of educational institutions that use distance learning system has rapidly increased all over the world, due to its advantages. Later, organizations have begun to take the advantages of distance learning program to train their employees, as mentioned later in this chapter. Thus, this research is going to investigate the acceptance of distance learning system by public sector employees, to understand why employees accept or reject such system and to determine the challenges of applying distance learning system for employee training.

## 2.2 Distance Learning Definition

There is no specific definition of distance learning (Arafeh, 2004; Elena, 2006) because it is a mixture of many sciences such as education, business, psychology, information technology, and information technology. As a result, researchers have defined distance learning according to their field (Burgess & Russell, 2003). Whatever differences the meaning they attach to distance learning, these definitions are made based on the philosophy of distance learning, grounded on two concepts: (1) flexibility, and (2) openness. Flexibility means that students or trainees can access any learning materials from any place at any time (Burgess, and Russell, 2003). This accessibility is achieved by the adaptation of electronic media that may include other computer systems like satellite system, television, and radio. Openness refers to the fact that education or training can be accessed by all people apart from their age (Burgess, and Russell, 2003).

In educational context, distance learning is the process in which education occurs when the students are physically separated from the instructors. In such a context, there is a need for designing special methods and electronic tools to connect students with teachers and each other and other managerial and administrative arrangements (Angel et al., 2004). This is to provide flexibility of teaching and learning process to students and instructors. In the context of business and organizations, distance learning can refer to the training method that is developed by companies to train or retrain employees to overcome the obstacle of a fast-paced work environment. Many organizations have used computer, Internet, video, and audio technologies to conduct such training (Burgess & Russell, 2003; and Gagne and Rojas, 1991). In the information technology and information system context, distance learning is defined as a delivery system that is used to deliver instructions and provide resources to remote students (Gordon et al., 2004).

Overall, all previous definitions seem to agree that distance learning aims to convey courses to remote students and trainees and provide some interaction between students and instructors through electronic tools. Distance learning has many advantages for trainees, students, instructors, institutions, and organizations. However there are many issues that make the implementation of distance learning system a challenging task. The following section presents the advantages and disadvantages of distance learning system for students, trainees, instructors, and institutions.

## 2.3 Advantages and Disadvantage of Distance Learning System

Distance learning system offers opportunity to students and trainees to access the learning materials by any device connected to the Internet. It also enables trainees who stay in the remote regions to access the center of training, and this training method is suitable for trainees who have irregular work or personal schedule. It offers flexibility to trainees who are unable to go to a different place for the training. The distance learning system also enables students or trainees to communicate with their instructors by e-mail when they need help or when they want to submit their assignments. Trainees can also plan the topics they want to study and can access to the updated references (Burgess & Russell, 2003).

Distance learning system offers many advantages for instructors and trainers in terms of using this system to provide course materials to their students. More students could enroll at the same class, while instructors can have enough time to prepare their training material because they can send it any time to their students, and can gain new knowledge and skills (Bodain & Robert 2000; Manning et al., 2003; Pahwa et al., 2005). Distance learning also provides institutions many advantages: they do not need more building and other equipment, they will be able to get international accessibility, and hence could earn more income (Behling et al., 2007; Bodain & Robert, 2000).

Previous studies also highlighted challenges faced by students and trainees when using distance learning system. Among the challenges are lack of direct interaction between the students and instructors (Behling et al., 2007), students cannot send or receive immediate feedback from their instructors, and consequently they will lose their motivation (Bodain & Robert, 2000). Students also encounter some difficulty in managing and organizing their teamwork (Behling et al., 2007), thus making them feel isolated (Bodain & Robert, 2000). Instructors need much time to complete the workload, they also need training because their tasks and roles have now changed and because they have to access to students' information such as their assignments. Whilst institutions may need not extra physical building, they however has to incur more cost in the beginning (software, hardware), and they may also lack Internet specialists. They must face international credit criteria and redefine instructors' roles and tasks (Behling et al., 2007; Bodain & Robert, 2000; Manning et al., 2003).

In this study, the scope is on employees who are working in public sector organizations. In relation to that, the advantages and disadvantages of applying distance learning system will be investigated to determine the factors that drive employees to accept or inhibit computer-based distance training system.

## 2.4 Distance Learning Technologies and Methods

Technologies, such as web-based technologies, computer-based technologies, multimedia technology, satellite and so on, are essential for the development and implementation of distance learning. These technologies have been used by institutions over time to develop distance learning materials, to deliver the distance learning materials to remote students, and to create interaction among students and instructors. This section sheds light on these distance learning technologies and methods.

### 2.4.1 Materials Design Technologies and Methods

Educational institutions deliver learning materials in many formats. The early format used to deliver learning or training materials was the written materials such as textbooks and documents. This format was used since the introduction of distance learning until the end of 1970 (Castro et al., 2001; Jackson, 2002). After 1970s, audio and video documents started to be used. These technologies include speech and video tools like audio cassettes, audio tapes, and video tapes. Educational institutions combined the writing materials with these new technologies to present new materials formats (Campbell, 2007). In 1990, multimedia became the most popular format with the advent of computer that allows different learning and training medium to be combined such as audio, video, pictures, and text in designing the distance learning materials (Jiang et al., 2001). Campbell (2007) agrees that multimedia technology is a great item in the design of distance learning materials because this technology uses computer applications to combine the video, audio and writing materials together.

### 2.4.2 Transmission Technologies and Methods

Transmission technologies refer to the technologies that are used to deliver distance learning materials to remote people. In the early stages of distance learning, the delivery of text materials was conducted by regular postage (Jaing, 2001).When audio and video technology appeared, institutions started to use this new technology to deliver their distance learning materials. These delivery technologies include videotape, cassette tape, television system and satellite system (Castro et al., 2001). At this stage also, some universities began to use other methods to present the courses materials to the remote students. Universities were sending faculty members to present the materials to the remote students, or the universities hired other university equipment and buildings to deliver the materials to distance students (Campbell, 2007).

The development of networks technologies and multimedia technology have enabled educational institutions and international organizations to develop their teaching and training materials to overcome the problems such as interaction problem faced by students or employees in the distance learning system (Zhao et al., 2006). These technologies are computer-based technologies like CD ROM and DVD, and web-based technologies like Blackboard and WebCT (Campbell, 2007). According to Easton

(2004) and Jackson (2002), technological development makes multimedia material transmission easier through the web like WebCT or computer tools like CD ROM. Castro et al. (2001) indicated that with software development users can travel via network with video, pictures, and sound. This encourages institutions to provide education at distance, to provide many advantages like accessibility of student to the library and other resources at distance, and to decrease the cost of the instructional method.

### 2.4.3 Interaction Technologies and Methods

Interaction technologies refer to the technologies that are used to enable interactions between students and the instructors and with other students. Dark et al. (2007) and Gracanin (2003) found four types of interaction: students with instructors, students with other students, students with content, and students or instructor with the technologies. These interactions are facilitated by the application of various types of technologies such as web-based technologies (E-mail, chat room, WebCT) and videoconferencing technology (Dark et al., 2007; Gracanin, 2003). Morly and laMaster (1999) noted in their study that the WebCT provides meaningful and enjoyable interaction between instructors and educators and university professors. Additionally, Castro et al. (2001) indicated that e-mail is an interaction tool that enables students and instructors to interact together through text messages. In addition, emails allow students to gain feedback, send assignments, and other materials.

Additionally, ISDN and XDSL help conduct electronic or remote conferencing service between two or more persons. E-conferencing allows images sound, and other multimedia features to be used. Ho et al. (2005) added that video conferencing method is effective to share ideas and communications between remote people. Many studies were conducted to evaluate the effectiveness of interaction on students' learning. Kwok et al. (2001) have pointed out in their study that collaborative assessment enhances students' satisfaction and learning. In this respect also, Janz (1999) noted that collaborative assessment has a positive relationship to students' learning. The running of synchronous activities on the web base such as live discussion and online session can provide high quality communication between students and teachers (Voinea, et al., 2001).

In general, this section has described the technologies used to deliver many formats of distance learning materials to remote students and trainees, and technologies used to make trainees and trainers interact together. In respect of delivery systems (transmission systems), distance learning materials can be conveyed by many ways including satellite-based distance learning system, TV-based distance learning system, and computer-based distance learning system. This research investigates whether the characteristics of computer-based distance training system affect employee intention to use the computer-based distance learning system.

## 2.5 Distance Learning Generations

The development of information and communication technologies has played a great role in advancing distance learning. The development of technologies in distance learning have take place in four generations. This section presents these generations in detail.

1. The first generation of distance learning started in the eighteenth century. The instructor and adviser play essential role in the teaching process. In this generation distance learning's written materials (for instance written documents and books) are delivered to remote students (Castro, 1998). The correspondence and the communication between students and instructors are conducted by postal service or face to face. The disadvantage of this generation is that students' interaction with the instructors is not strong because the interaction does not take place simultaneously (Campbell et al., 2007).

2. The second generation began at the end of 1970. At this stage, in addition to the books, text and documents some technologies are added, for instance, audio cassette, videocassette, and telephone (Castro, 1998). The appearance of these technologies has enhanced the distance learning materials format, has improved the distance learning delivery methods by the introduction of cassette tape to the distance learning delivery methods, and has improved the interaction between the instructors and students by the introduction of the telephone system (Campbell et al., 2007). However, the interaction technique between students and instructors,

and between students themselves is still weak. This is because the interaction methods available at this generation are just via telephone network and face to face. In order for students to interact with the instructors, they need to go to the institution place or use the telephone network (there is no simultaneously interaction) (Campbell et al., 2007).

3. In the third generation of distance learning, multimedia technology such as audio, video, and text are combined on personal computers to improve the previous distance learning materials format. It is also called computer-aided learning (CAL) (Castro et al., 2001). This generation of distance learning has begun since 1990 (Jiang et al., 2001). One of the benefits of using multimedia is to visualize the distance learning material topics, explained by the multimedia technology (Castro et al., 2001). Further, in this generation, computer-based technologies (such as CD) are used to improve the distance learning material delivery methods (Campbell et al., 2007). However, the interaction methods between the instructors and students have never been developed (Campbell et al., 2007). Students still use face to face or phone network to interact with their instructors and other students.

4. The fourth generation (current generation) is called "telematics" (Castro et al., 2001). In this generation, the telecommunications technologies and IT (information technologies) are applied to distance learning. This enhances the interaction between the students and instructors by having a two-way communications instead of a one-way communication, via computer system. The

trainees can interact with other trainees, or with trainers by e-mail, forum, chat room, or audio technologies. The trainees can contact the trainers with video streaming. Additionally, the techniques of distance learning materials delivery have been developed by adopting new technology like DVD, and web-based technologies (such as webCT, and blackboard) (Castro, 1998; Campbell et al., 2007).

Overall, applying communication technology and information technology for distance learning enhances the interaction between students, instructors and institutions, and improves distance learning material formats. Therefore, in this research, these advantages will be investigated as variables that enhance the acceptance of computer-based distance learning system by public sector employees.

## 2.6 Distance Learning Modes

The first, second, and third generations of distance learning represent one mode of learning. This mode is "one way", or called asynchronous learning network (ALN). Goodwin et al. (2001) defined ALN as a learning environment that allows students to interact with the remote learning resources, instructors and other students, but they are not required to be online at the same time. This mode includes a one-way communication between students and instructors. In this context, instructors send materials to students and receive their individual assignments. There is no two- way communication (like videoconferencing where students receive the materials, send feedback, discussion, and/or submit the assignment at the same time) between students and instructors, or among the students themselves (Behling et al., 2007).

The technological development especially in the information and communication field has made the transfer, storage, and the sharing of information between students and instructors much easier. This process is called synchronous distance learning (Midkiff, 2000), which appears in the fourth generation of distance learning. With this, distance learning includes two modes: (i) asynchronous distance learning, and (ii) synchronous distance learning. While the mode appeared in the first three generations of distance learning, the second mode of distance learning appeared as a result of the information and communication technologies in the fourth generation of distance learning.

### 2.6.1 Asynchronous Distance Learning

Asynchronous distance learning is a distance learning method in which learners are geographically separated from an instructor and is based on the learners' access to the learning materials at any time from any place. In other words, students or trainees can look at CD or website to access to the learning materials at any time (Wag et al., 2005). In spite of the flexibility of choosing the time and place by students themselves, there is little contact between the trainees themselves, trainees with trainers and trainees with the members of the organization (Behling et al., 2007). The following examples explain how the asynchronous distance learning offers the courses and topics to the remote students:

- Course materials are delivered by CD ROM or website.
- Videotapes are used to deliver course materials.
- Course materials are delivered via audiotape/ audio cassettes (Behling et al., 2007).

The students can choose the time and place to access the courses as presented in the previous examples.

### 2.6.2 Synchronous Distance Learning

Within this mode of distance learning, the learning takes place in real time (Behling et al., 2007). Trainees must be enrolled in class and attend this class in a specific time (scheduling time). The contact between the trainees and trainers take place electronically during the class time (Chou, 2002). The following examples explain how asynchronous distance learning offers the courses and topics to the remote students:

- Deliver the distance learning materials to the remote students via television broadcast.
- Use the radio technology to convey the materials to the remote students.
- Using online lectures to conduct the distance learning lectures.
- Courses are offered via videoconferencing lectures.
- Courses are taken via audio conferencing (Behling et al., 2007).

Although the two modes are used by several institutions that offer distance learning courses to their remote students, there are differences between the synchronous, asynchronous distance learning and traditional learning. A few studies have been conducted to compare between the synchronous and asynchronous distance teaching (Chou, 2002). This section introduces the differences between asynchronous distance learning and synchronous distance learning, and traditional learning. In this comparison the researcher considers the following factors namely time of study, place of study, cost of infrastructure, path of study, and the interaction between students and instructors.

### 2.6.3 Characteristics of Asynchronous Distance Learning

As previously mentioned in Section 2.6.1, asynchronous distance learning is a distance learning method in which learners are geographically separated from an instructor and is based on the learners' access to the learning materials at any time from any place. The materials of this type include video, audio, animation, simulation, or online resources (Behling et al., 2007). Another difference is the possibility that students can determine their learning path (Burgess & Russell, 2003). The asynchronous distance learning can also deliver the distance learning materials by CD ROM or web-based learning. This delivery method does not need high bandwidth networks to deliver the distance learning materials to the remote students or trainees (Chou, 2002). According to Wag (2005), the flexibility of asynchronous distance learning becomes more attractive to distance learning students. However, there is no real time interaction between the instructors and students, or between the students and themselves (Ho et al., 2005). Open University of Hong Kong is an example of an institution that offers its courses asynchronously to its students who enrolled in its online courses.

### 2.6.4 Characteristics of Synchronous Distance Learning

In this type of distance learning, the learning process is conducted at the same time but at a different place. This suggests that the learning process takes place when the students and instructors are geographically separated and the materials are delivered immediately to the students. This type includes video or/and audio materials that are conveyed via video conferencing and audio conferencing (Behling et al., 2007). All students also follow the same path of learning plan (Burgess & Russell, 2003). In this distance learning mode, the instruction materials are delivered to the students or trainees in real time. Synchronous distance learning mode needs good infrastructure and high speed networks to deliver high quality materials to the remote audience learners (Chou, 2002). Hosei University Research Institution in USA is an example of an institution that offers MBA courses using this learning mode.

### 2.6.5 Characteristics of Traditional Learning

Traditional learning is where the learning process is conducted at the same place, and at the same time, where the instructor and students are physically present at the same place and at the same time (Midkiff et al., 2000). Text books, presentation slide, and video are included as traditional learning materials. The students also follow the same learning plan and path (Burgess & Russell, 2003). Table 2.1 illustrates the differences between the three modes.

Table 2.1: Comparison of Learning Modes

| Modes | Place of meeting | Time of meeting |
|---|---|---|
| Synchronous distance learning | Different place | Same time |
| Asynchronous distance learning | Different place | Different time |
| Traditional learning | Same place | Same time |

Source: Behling et al. (2007)

### 2.6.6 Advantages of Asynchronous Distance Learning compared with Synchronous Distance Learning

Many problems have prevented employees in an organization to attend traditional training to gain skills and upgrade their knowledge (Pahwa et al., 2005; Quinn et al., 2006; Zhao et al., 2006). The literature suggests that distance learning system is the most proper way to overcome such a problem. In this section, the researcher will discuss the problems associated with traditional training mode and how asynchronous distance learning is more suitable than synchronous distance learning to solve these problems.

Zhao and et al. (2006) argue that IT workers need to update their knowledge because of the constant development of the technology. They contend that employees do not have time to attend the traditional class room because their work time coincides with their learning time. They add that distance learning is the unique solution to solve such problem. Additionally, Quinn et al. (2006) point out that most people who work in

IT field are working as data base administrators, developers, managers, etc. They need training on new technologies, and gain new knowledge about their professional fields. However, many of them cannot take days off to become full time trainees. They can enroll at many institutions as part timers but most of them stay far away from the learning institutions. Many of them find distance learning is the best way to continue their learning.

Additionally, Pahwa et al. (2005) point out the employees cannot leave their jobs to attend the class room. By adopting distance learning, employees do not need to leave their job to attend training sessions. They can choose the place and the time of learning themselves. According to a preliminary study, 82 percent of the sample subjects cannot attend the training class because their work scheduling coincided with the time of the class or because family duties prevented them from attending the traditional classroom training (Figure 2.1).

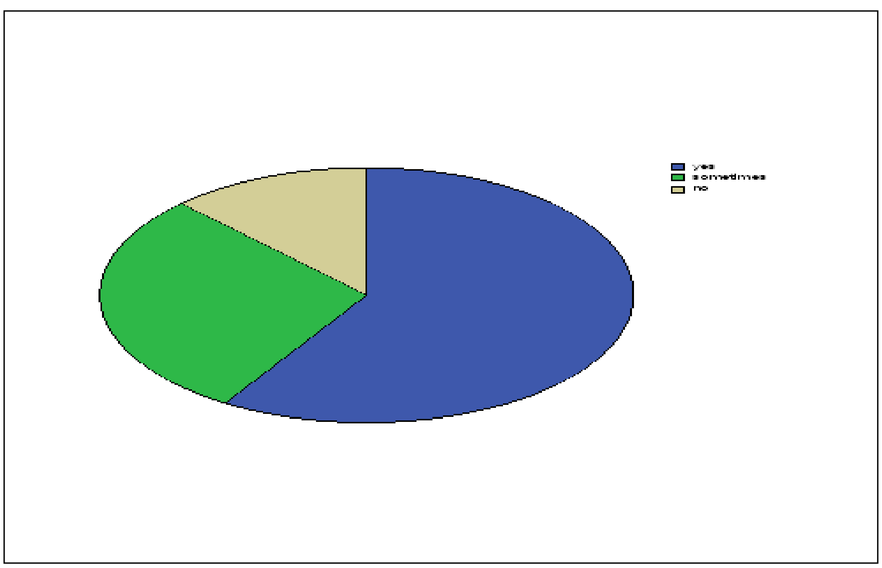


Figure 2.1: Problems of Traditional Training

The initial study further indicated that 74.4% of the study sample subjects are willing to take the courses of training by distance learning program (Figure 2.2).

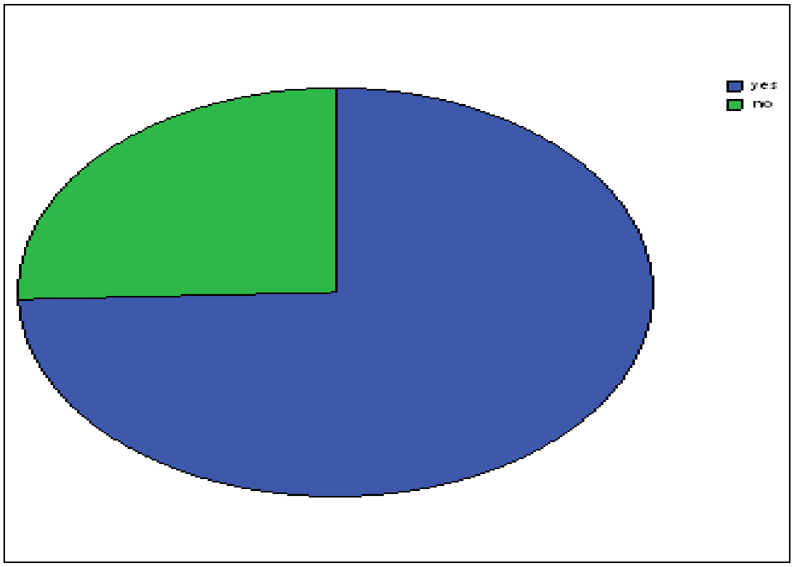


Figure 2.2: Participation

Therefore, according to the literatures (Pahwa et al., 2005; Zhao et al., 2006) and the preliminary study, problems that have prevented employees from getting enrolled in the traditional courses are as follows:

i. Some of the employees have other classes at other institutions (for example employees who study at university to gain higher education degree).
ii. Many of the employees have family duties, especially women.
iii. Many employees have more than one job.
iv. Many employees spend much time commuting to their work place.
v. The employees' work time coincides with the training time.

Pondering over the above problems, the researcher found that the development of networks and computer technologies provide opportunity to employees to gain knowledge, skills, or degree without having to travel to the place of institution or without having to leave their families or work. They can also choose the place and time of lectures (Ashby, 2002; Pahwa et al., 2005). Additionally, distance learning provides organizations the suitable way to train or retrain their employees, enables the organizations to reach a big number of employees without increasing the training cost, and without affecting the organization's productivity (Zhao et al., 2006).

Even though distance learning could overcome many problems employees face, in the synchronous distance learning mode, the time and place of learning is determined by the learning institutions and not by the employees themselves. In this respect, Mahadeo et al. (2007) noted that employees prefer flexible training to cope their learning with work loads, and they prefer to choose the convenient place and time of their learning if the language of materials is easy to follow.

Pahwa et al. (2005) pointed out that asynchronous distance learning is more flexible to employees and students because they can choose the time and place of their study. Arguing in a similar vein, Burgess and Russell (2003) indicated that asynchronous distance learning is more flexible than synchronous distance learning because the trainees in the asynchronous distance learning can choose the place and time of their learning, but in the synchronous distance learning the members of the institution choose the time of lectures because the lectures are conducted live. Wag et al. (2005)

agree that the flexibility of asynchronous distance learning makes it more attractive to many organizers. Additionally, one of the advantages of asynchronous is personalization, which means trainees can determine their own learning path. The time and the title of lectures are determined by the trainees themselves (Burgess & Russell, 2003).

According to prior studies, using videoconferencing and other synchronous distance learning technique in distance learning requires high network bandwidth to convey the materials to remote trainees. On the other hand, asynchronous distance learning does not need high network bandwidth because the trainees can convey the materials to their devices and then they can study them at their own pace (Chou, 2002; Jain et al., 2001).

Based on the previous arguments, there are three advantages that make asynchronous distance learning more appropriate for training employees than synchronous distance learning. They are: (1) flexibility of asynchronous distance learning, (2) personalization, and (3) there is no need for high network bandwidth. In this research the effect of flexibility of distance learning system and availability of technologies on employee intention to use computer-based distance training system will be investigated.

## 2.7 Trends and Issues in the Distance Learning

The Council of High Education Accreditation (2002) pointed that, although the distance learning system is significant in institutions that offer a degree, these institutions face problems pertinent to accreditation. This accreditation focuses at seven areas: learning outcomes, faculty support, institution organization, institution resources, curriculum and instruction, institution mission, and students' support (CHEA, 2002). Thus, the educational institutions and organizations should take in its consideration these criteria when they intend to offer distance learning to the remote learners.

It is worth mentioning that distance learning includes distance education and distance training. Distance education is different from distance training (Elena, 2006). The first difference is related to the learning process itself. Distance education is a method of teaching that aims to convey information and knowledge to the remote students, and to achieve the teaching objectives of some courses like the traditional teaching mode. On the other hand, distance training aims to convey knowledge, skills, and experience of some activities to the remote trainees (Elena, 2006). The second difference is related to motivation: The motivation of students in distance education is a grade of a course. However, trainees' motivation in distance training is the gain of knowledge and skills related to their career (Elena, 2006; Zhuravleva, 2006).

The literature indicates that e-learning has been widely used instead of distance learning. In this respect, e-learning is defined as the way of using electronic device for people to learn. Thus, e-learning includes blended learning (B-learning) and distance learning (D-learning) (Liu & Hwang, 2009). Further, many acronyms such as computer-based training system, Internet-based learning system, online learning system, web-based training system and so on are synonymous of e-learning system (Graziadei, 1993; Karadediz, 2009; Liu & Hwang, 2009). Figure 2.3 represents the structure of e-learning.

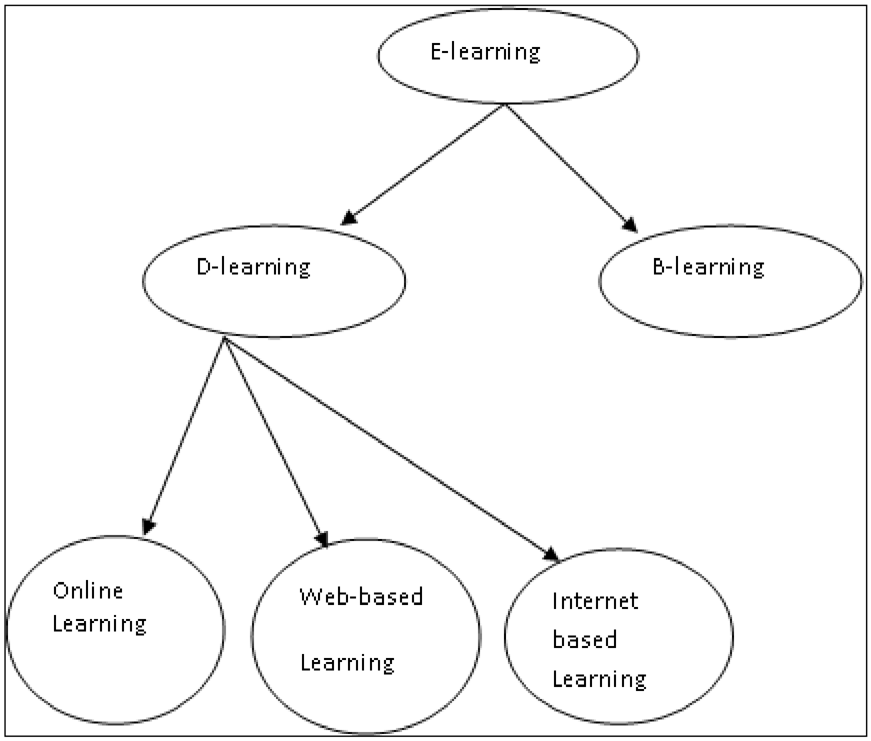


Figure 2.3: Structure of E-learning and D-learning

As previously mentioned in Section 2.4, distance learning system refers to the system used to deliver distance learning materials to the remote people. It was also mentioned there are many systems used to deliver the materials to the remote people. Among them are satellite system, TV system, computer system, and radio system. In terms of computer system, it includes computer-based tools (for instance CD and DVD) and Internet-based technologies, for example, web-based learning, online learning and so on.

Earlier in this section, two kinds of distance learning have been presented i.e. distance education and distance training. Therefore, in this research the acceptance of computer-based distance training system used to deliver the training materials to the remote employees will be investigated.

## 2.8 Distance Training in Public and Private Sector Organizations

The utilization of advanced network technologies and modern computer applications in distance learning raises the importance of distance learning system in the delivery of learning materials to remote trainees. Because advanced network technologies provide interaction between trainees and other trainees, trainees with instructors, and trainees with materials, modern distance learning comes to overtake the place of traditional training in organizations. This innovative method provides opportunity for organizations (especially organizations that have a huge number of employees) to convey training materials to their employees at any place in the world (Zhuravleva et al., 2006). This helps organizations to reduce the cost of the employee training and allow the organizations to train and retrain their employees without any negative effects on the productivity of the organizations (UNSCO, 2006; Zhao et al., 2006). It also solves the problems associated with traditional training method (Pahwa et al., 2005).

Bill (2002) revealed that 42 percent of organizations used e-learning to train their employees. About 92 percent of these organizations plan to use or expand their use of electronic tools to train their employees. According to the ASTDs report, 88 percent of industry training is done by some form of e-learning (American Society for Training and Development, 2002). Many international organizations use web-based training to train and retrain their employees such as Ford, MCI Worldcom, Boeing, and Novell (Hall, 1999). Paul and Hardt (2008) assert that about 109.25 billion USD are spent on employee training, and approximately 39.33 million dollars of them are spent on training that is delivered by electronic tools. This indicates that the percentage of employees who are trained by electronic tools is 36%. About 60 million dollars of them are spent on online training, which means that the percentage of employees who are trained by online method is 60%. About 90% of the online training is in the form of distance training.

Burgess and Russell (2003) indicated that approximately 24 percent of large organizations like insurance companies and banking sectors allocated specific budget for technology training. They also noted that large companies utilize computer-based training more than small companies. The computer-based training includes web site training, CD ROM delivery training, and DVD delivery training. Distance learning is not carried out in the private sector alone but many government sectors are also using e-learning to help their employees update their knowledge. The departments of defense, energy, and environment protection agency in United States use distance learning to train their employees (Chute et al., 1999).

There is much evidence that distance training is an effective and a fast method to train employees, for various reasons: Organizations can employ the best trainers and provide high quality courses to train their employees; this kind of training provides opportunity to organizations to deliver update their information to their employees; each employee is responsible for his/her personal success; it reduces transportation cost, mails, and communication cost, and traveling time.

If the organization has more than one branch, this way of training enables it to conduct training for all branches at the same time. In addition, there is also an opportunity to share foreign and other fields' experts in the training process. Organizations can also consult foreign experts or conduct high quality training to get more quality training materials. Distance training system also provides opportunity to add more trainees without changing the training arrangement or the training cost. This kind of training also enables the organizations to access their employees at work or home, and make use of the available resources and experts (Burgess & Russell, 2003; UNSCO, 2006; Zhuravleva et al., 2006). Since organizations aim to reduce cost and enhance productivity, distance training system is important for many organizations all over the world due to the advantages it offers. Similarly, public sector organizations will gain a lot of advantages if they use computer-based distance training system to train their employees.

## 2.9 Distance Learning Barriers

In spite of the advantages of distance learning to students, employees, organizations, institutions, and instructors, there are many barriers that hinder the spread of distance learning. In this context, Tynjala and Hakkinen (2005) pointed out that many workplaces do not support this mode of learning. Some organizations do not have infrastructure to support virtual learning. Other barriers related to the trainees themselves. For example some people resist using technologies (Howard, 2002), and many virtual learning institutions do not have accreditation. According to the Council for High Education Accreditation, out of 17 virtual institutions, only 5.6 of them are accredited (CHEA, 2002). Other challenges are related to the mode of learning where distance learning cannot support the direct interaction between students and instructors (Pahwa, 2005).

## 2.10 E-learning in Jordan

The private and public sector organizations in Jordan understand the importance of e-learning. As evidence, many organizations in Jordan have started to use the e-learning system to train their employees (such as Association of Bank in Jordan), to offer learning materials online (for example University of al-Hashimia), and to provide services to their employees and students. This section explains e-learning in public sector organizations in Jordan.

The Ministry of Education in Jordan has been working with several foreign companies on many educational projects since 2000 to improve the e-learning infrastructure. For instance, Information Technology Group (ITG) provides IT problems solving and services for companies and governments in Europe, North Africa, and Middle East. The Ministry of Education in Jordan and ITG agreed in 2003 to develop e-learning platform that is called Eduwave. The main aim of this program is Bookzero concept, which involves digitizing textbooks so that students can access their books online at any time and place. Eduwave website enables the teachers to contact and work with their students online. In addition, students can interact o line among themselves, and parents can also monitor their children' grades and can easily contact the school management.

Nowadays, the Eduwave platform is used by over 1.5 million students, 55,000 employees, and students' parents throughout Jordan (Jordan Time, 2002; Reddy, 2004). After this experience in Jordan, ITG applied the Eduwave platform in New Jersey in US in February 2004. Walid Tahabasem, the ITG president, highlighted that they are marketing Eduwave in the US, Europe and the Gulf countries. In 2004, the ITG made a contract with Bahrain's Ministry of Education to implement the Eduwave platform in public schools. In December 2003, Eduwave platform received the UN world summit award. This is an important world recognition with success of the Eduwave platform in Jordan (Integrated Technology Group, 2005).

The Ministry of Education in Jordan has also conducted other projects such as the Education Reform for Knowledge Based Economic (ERFKBE). The aims of this project are to provide all public schools in Jordan with 100,000 personal computers, connect all schools via Internet to train 60,000 employees in computer skills (ICDL), and redesign the educational curriculums (Jordan Time, 2002). In this respect, providing the electronic devices and improving the employees' computer skills help enhance the e-learning infrastructure in Jordan and it is a practical step to apply the e-learning programs.

The International Computer Driving License (ICDL) is a global recognized standard certificate to recognize an individual's computer skills. It is given to anyone who uses the computer in his/her work or at home (ICDL US, 2009). In other words, the International Computer Driving License (ICDL) is an international program that offers an opportunity for an individual to obtain computer skills training with international certificate (ICDL US, 2009). This program was designed by the European International Computer Driving License (EDCL) in 1999. Nowadays, approximately 15 million persons are ICDL candidates in over 148 countries around the world (ICDL US, 2009).

The ICDL program improves people's knowledge and skills in seven modules. These modules discuss the following topics: (i) basic concept of IT, which includes computer components, daily usages of computer, definitions of computer terms, and computer viruses, (ii) using and managing files, which includes printing applications, desktop working, files managing, windows setting, and other windows applications, (iii) word processing (Microsoft Word) that improves user's skills and knowledge about many topics including creating a document, printing documents, documents operations, editing documents, and other documents setting, (iv) spread sheet (Microsoft Excel) that helps the computer user to create spread sheet, enter data, apply the function on the data, printing, present the data as a chart, and basic excel sheet operation, (v) databases (Microsoft Access), which includes creating data base, storing data, information queries, reporting, and other database basic operations, (vi) presentation (Microsoft Power Point), which includes opening presentation, entering text/image, printing, adding, moving, and other presentation basic operations (for instance save, open… etc), and (vii) information and communication (Microsoft Internet Explorer), which includes the following activities: organizing the message, web navigation, open Internet explorer, e-mail operations, and other Internet applications (ICDL US, 2009).

The International Computer Driving License (ICDL) has been implemented in Jordan as a standard for end user computer skills across the Kingdom since 2001. Many ministries have adopted this program for their staff since 2003. For instance, the Ministry of Education has adopted the ICDL program for its employees. Approximately 70,000 employees of the Ministry must participate in this program (ICDL foundation, 2007). However, the Ministry of Education is unable to complete the computer skills training (ICDL) for its employees because the training time is consistently unfit with their employees' scheduling. Furthermore many employees cannot pass the certificate exam because of the problems in the training itself.

The Ministry of High Education and the Ministry of Information and Communication Technology (ICT) have also been implementing ICDL program for their employees since 2003. About 6,000 people in these ministries would be trained by

2005. Other companies and ministries also begin to apply ICDL program for their employees to raise their productivity. Other ministries and companies are looking to adopt this program to their employees (Advance Learning, 2008).

Public sector organizations in Jordan have thousands of employees who need training to improve their knowledge and skills. Although these organizations have spent a lot of money, time and effort to train their employees using traditional training methods, many employees still face obstacles associated with traditional training methods. Based on the initial study, employees agreed that applying computer-based distance training system will solve the traditional training problems. However, there is a need to conduct a nationwide study to understand the factors that make employees accept computer-based distance training system to make sure that implementing computer-based distance training system will be successful. Therefore, this research investigates the acceptance of computer-based distance training system as an alternative training to overcome the problem with the traditional training method and to ensure the organizations capitalize on the advantages.

## 2.11 Information System Acceptance Models and Theories

The literature presented many acceptance models and theories used to investigate acceptance of information technology and information system. Among these models and theories are: (1) Technology Acceptance Model (TAM), (2) an extension of TAM or known as (TAM2), (3) Diffusion of Innovation Theory (DIT), (4) Theory of Reasoned Action (TRA), (5) Theory of Planning Behavior (TPB), (6) Combined TAM and TPB

(C-TAM-TPB), (7) Motivational Model (MM), (8) Model of PC Utilization (MPCU), (9) Social Cognitive Theory (SCT), and (10) Unified Theory of Acceptance and Use Technology Model (UTAUT).

### 2.11.1 Technology Acceptance Model (TAM)

TAM is an instrument to predict and measure user's acceptance and use of information technology and other computer applications. It was developed by Fred Davis (Davis, 1989), and was presented as one of the most important acceptance and usage of information technology and information system models. It has been widely applied by the researchers to examine information technology acceptance, which has been proved to be a strong predictor of computer technology use (Lai & Li, 2005; Venkatesh & Davis, 2000). Many studies, such as Masrom (2007), and Saade et al. (2007), have been conducted to test the validity of the TAM in the e-learning context. The results of these studies suggest that TAM is a strong theoretical model in e-learning context.

TAM's examination of user's intention to use particular information technology depends on four stages (George et al., 2007). The first stage examines the impact of external variables on perceived usefulness (PU) and ease of use (PEOU) of information technology. Perceived usefulness is the degree to which the user believes that using the system will improve his/her work outcomes, while perceived ease of use refers to the degree of complexity of using the technology (Saade et al., 2007). The second stage is when the PEOU and PU impact the user attitude towards using a particular system (Wolk, 2007). In the third stage, the attitude and perceived usefulness determine the usage intention. The last stage is making decisions to use or reject the technology (Wolk, 2007). Figure 2.4 illustrates the components of TAM.

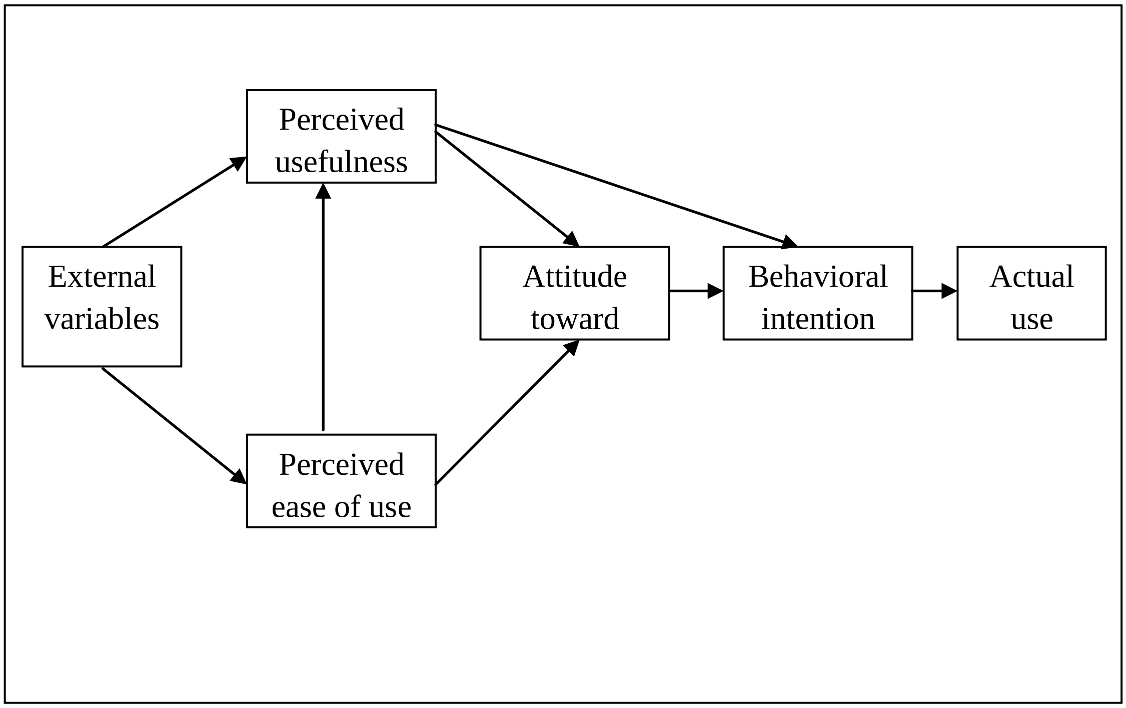


Figure 2.4: Technology Acceptance Model (TAM)

Source: (Davis, 1989)

TAM was applied to examine user acceptance of information technology and information system in many studies. In the context of e-learning acceptance, Saade et al. (2007) conducted a study to test the validity of TAM in the multimedia and e-learning contexts. They found that TAM is a strong predictor of acceptance of e-learning and multimedia technologies. Masrom (2007) also applied TAM to study the acceptance of e-learning system by students of universities in Malaysia. In addition, Halawi and McCarthy (2008) used TAM to investigate students' adoption of blackboard technology.

Despite TAM's popularity, many researchers have indicated that one of the weaknesses of this model is that a person's attitude is not only determined by perceived ease of use and perceived usefulness. But there are other factors (such as social influence factor) that influence attitudes of users towards use of an information system (Malhotra & Galetta, 1999; Mathieson et al., 2001; Miller et al., 2003; Venkatesh & Davis, 2000). Other researchers noted that TAM just focuses only on extrinsic motivation, not intrinsic motivation (Davis et al., 1989). This means that TAM model just focuses on the outcomes of using an information system; it does not consider the processes of the usage itself (such as some people want to use information technology because it is interesting or because they want to have experience).

In TAM model, two constructs namely, perceived usefulness and perceived ease to use, are argued to determine behavioral intention through individual attitude. These two constructs have been used in this research indirectly because they are derived from effort expectancy and performance expectancy, which are used in this research to predict employee intention to use computer-based distance training system.

### 2.11.2 Extension of the TAM (TAM2)

In 2000 Davis and Venkatesh developed an extended TAM or TAM2 to explain user intention and perceived usefulness in the cognitive instrument process and social influence process. The social influence process has three interrelated factors that influence individual behavior (to reject or accept the technology). The first factor is subjective norm that refers to a user who believes in the importance of opinion of other people as to whether or not he/she uses a technology (Lee et al., 2003). The second factor is image. This factor refers to the degree to which a person perceives that the particular system's usage will improve his/her image or status. The last factor is voluntariness (Moor & Benbasat, 1991). This factor is defined as the degree to which the user believes that the use of a particular system is voluntary (Moor & Benbasat, 1991). In short, this model was developed to cover TAM's weakness (i.e. the earlier TAM model does not consider the social influence factor), by adding the subjective norm to the original TAM constructs as a determinant of user attitude and intention to use an information system. TAM2 has been applied as a framework in many studies, such as, Nanayakkara (2005), who used the model to investigate the adoption of e-learning in New Zealand universities. TAM2 has also been applied by Lee et al. (2003) to examine students' attitude towards using distance learning system, and students' acceptance of the courses delivery system (Shen et al., 2006).

In TAM2, three constructs, namely, perceived usefulness, perceived ease of use, and subjective norm have been argued to determine behavioral intention. These three constructs have used in this research indirectly. As previously mentioned, perceived usefulness and ease of use were derived from performance and effort expectancy. Additionally, subjective norm was used to reflect social influence.

### 2.11.3 Diffusion of Innovation Theory (DOI)

An innovation is defined in the literature as "an idea, practice, or object that is perceived as new by an individual or other units of adoption" (Rogers, 1995). It need not to be new but perceived as new by people. In addition, diffusion of innovation is defined as a process that has been used to convey an innovation among members of a social system via particular channels over specific time periods (Rogers, 1995). Diffusion of Innovation Theory (DOI) has been used to examine acceptance of innovations in many fields such as agricultural tools and organizational innovations since 1960 (Rogers, 2003). Moore and Benbasat (1991) refined seven constructs to adapt the DOI in the information system context.

The first construct is relative advantage. This construct is defined as the degree to which an individual perceives that an innovation will improve his/her work performance or learning (Moore & Benbasat, 1991). The next construct is compatibility that refers to the degree to which a user perceives that he/she has knowledge and resources to use an innovation (Moore and Benbasat, 1991). The third is complexity (ease of use). This construct refers to the degree of ease associated with an innovation's use. The fourth is trialability. This construct refers to the opportunity of trying a particular system by users before they use it. The fifth is observability (result demonstrability). It means the degree to which the results of the experience are clear to the other social members. The sixth is image. This construct refers to the degree to which a user perceives that using a technology will enhance his/her image or status in the social system. The last construct is voluntariness of use that refers to the degree to which an individual believes that using a particular technology will be free (i.e. is not mandatory).

DOI theory is suitable to examine user's acceptance of computer programs (such as computer games) and other widely used technologies because it uses communication and media channels to deliver innovation to society (Robinson, 2009). However, similar to other theories and models, DOI is not without its disadvantages. According to Robinson (2009) and Rogers (2003), DOI just focuses on the attribute of the innovations. It does not consider other factors that influence the acceptance of innovations like the characteristics of individuals and social characteristics. According to Dadayan and Ferro (2005), the individual factor has a significant influence on the acceptance of information technology.

Mahony and Wozniak (2005) in Sydney University used diffusion of innovation theory as a framework to examine the strategies of e-learning projects. They found that DOI is a strong theory to evaluate e-learning strategies in universities. Schott et al. (2003) applied DOI to examine the use of technology to deliver the learner-based lecture. Henry and Motet (2006) also used DIT as a framework to predict the acceptance of Internet-based distance learning in Hawaiian schools.

In this study, four constructs from DOI were used to derive four research constructs in which performance expectancy reflects relative advantage, effort expectancy reflects complexity, social influence reflects image, and facilitating condition reflects compatibility.

### 2.11.4 Theory of Reasoned Action (TRA)

Ajzen and Fishbein developed theory of reasoned action (TRA) in 1975. This model focuses on the behavioral intention instead of actual usage. According to Sheppard et al. (1988), TRA is one of the widely used models to determine behavioral intention. It has four determinants: (i) attitude, (ii) behavioral intention, (iii) actual use, and (iv) subjective norms. In TRA, the actual use is determined by behavioral intention instead of attitude towards usage behavior (Norman & Smith, 1995), and behavioral intention is determined by user's attitude and subjective norms (Ajzen & Fishbein, 1975). Furthermore, attitude is determined by the person's belief about the consequences of the behavior. Figure 2.5 shows the diagram of the model with its components. Attitude refers to the person's feeling towards performing a behavior, while subjective norm is defined as the user's belief about the importance of opinion of other people as to whether or not he/she performs a behavior (Ok & Shon, 2006).

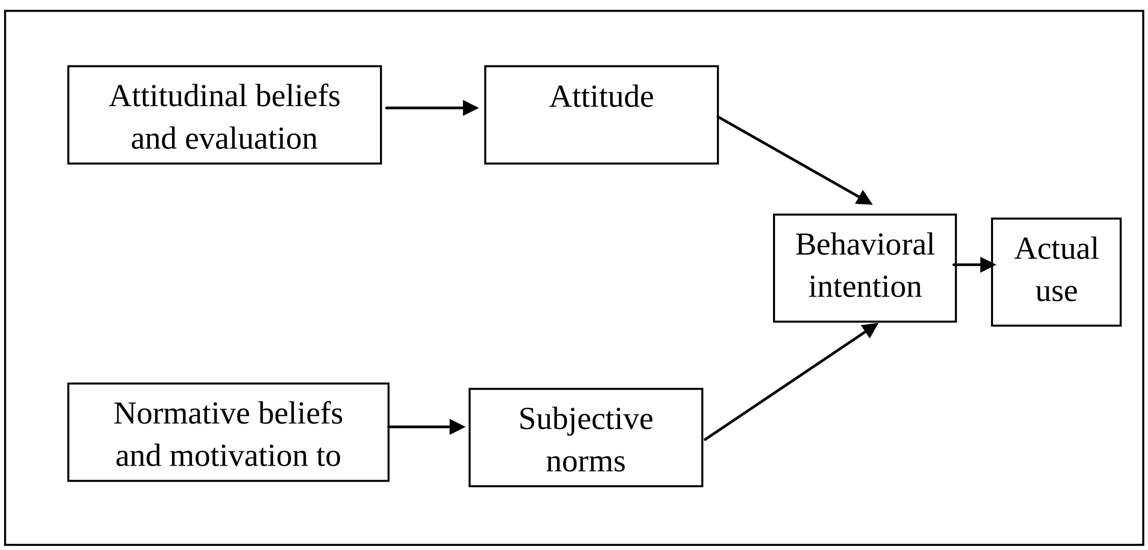


Figure 2.5: Theory of Reasoned Action

Source: Ajzen (1991)

This theory has been used as a framework in several social issues studies. Ok and Shon (2006) used TRA to examine the acceptance of Internet banking in Korea to help the banking enterprise obtain competitive advantage. They found that TRA is a good predictor of a person's intention to use Internet banking. However, when they compared between TRA and theory of planned behavior (TPB), they found that TPB is stronger than TRA in the prediction of an individual's intention to use Internet banking.

Additionally, Barki and Benbasat (1996) applied TRA to examine the acceptance of information systems. They found that TRA is a strong predictor of acceptance of information system in academic organizations. It was also presented as one of the most important user acceptance models that has been used to examine the acceptance of information technology in business organizations (Maria & Ataide, 2007). Furthermore, Ramayah et al. (2009) used TRA to study the factors that impact the intention of investors in Malaysia to use the Internet stock trading.

The literature on information systems has also presented a number of disadvantages of TRA. It is argued that subjective norms and attitude are not the only constructs that have an impact on behavioral intention. There are many other factors that influence a person's intention to use information technology such as system characteristics like usefulness (Davis, 1989). The second disadvantage is, in TRA, the user's behavioral intention is not a good predictor of actual use because it is not under voluntary control (according to Ajzen, 1991, the availability of facilitations, resources, and opportunities that help a person to have control over his/her behavior) (Ajzen & Fishbein, 1975; Liska, 1984; Netemeyer et al, 1991).

Theory of reasoned action has one construct (subjective norms) that is used to derive social influence, which is used in this research as one of the determinants of public sector employees' intention to use computer-based distance training system. In this research, subjective norms are indirectly used to determine employee intention to use computer-based distance training system.

### 2.11.5 Theory of Planned Behavior (TPB)

One of the weaknesses of TRA is that it does not predict voluntary behaviors. Theory of planned behavior (TPB) is an extension of TRA, which helps to explain prediction of volitional behaviors. This model adds other factor i.e. behavioral controls in order to reflect the prediction of volitional behaviors. The behavioral control construct is defined as how a person perceives that he/she is able to perform a particular behavior. The availability of facilities and resources helps a person to have control over his/her behavior. For instance, if the user has a personal computer that makes using of a technology easier, this will encourage the individual to accept a technology (Ajzen, 1991). Figure 2.6 displays the components of TPB.

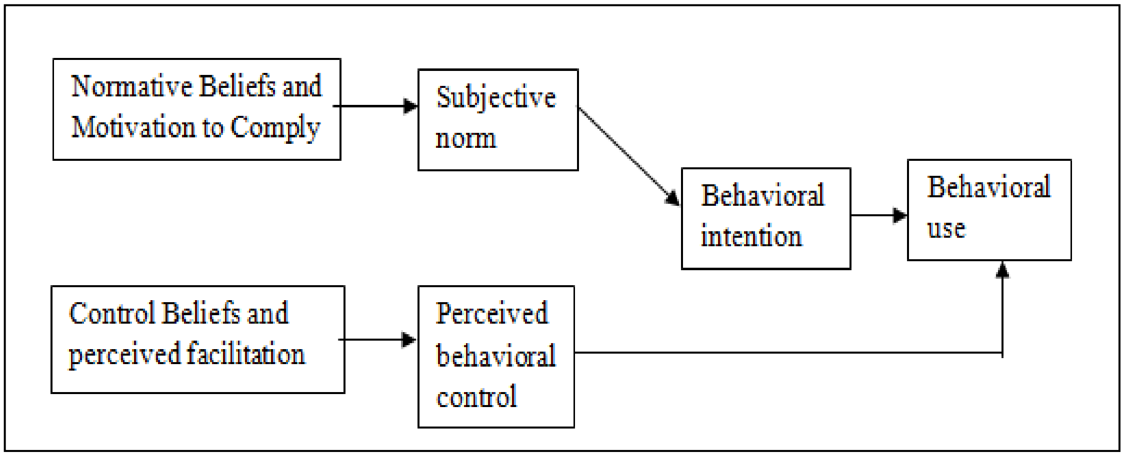


Figure 2.6: Theory of planned behavior

Source: Taylor and Todd (1995)

According to Ok and Shon (2006), there are many forms of behavioral controls, i.e. (i) context opportunity, (ii) facilitating factors, and (iii) resources. Through this model (TPB), a person has a complete control over his/her behavior. Theory of planned behavior was widely applied in information and communication technology context to evaluate a variety of behaviors. Ok and Shon (2006) conducted a study to examine the acceptance of Internet banking in Korea. They found that TPB has the ability to predict such acceptance, which is stronger than TRA. Song and Zahedi (2001), in examining shoppers' adoption of e-commerce website, also applied theory of planned behavior. They found that TPB is a better fit for the data collected from shoppers about e-commerce websites. However, like TRA, this model does not consider all factors that influence behavioral intention in using information technology. System characteristics, for example, ease of use and usefulness in TAM and other acceptance models are widely used in information system context. TPB also has no clear definition of the perception of behavioral control (Ajzen, 1991).

In addition to subjective norms, which were explained in TRA section, theory of planned behavior has other determinant of behavioral intention that is perceived behavioral control. This construct is used to reflect facilitating conditions used in this research model to predict the intention of public sector employees to use computer-based distance training system.

### 2.11.6 A Combination of TAM and TPB

Taylor and Todd (1995) combined TPB constructs with usefulness construct from TAM to produce a Combined TAM and TPB (C-TAM-TPB) in order to make it stronger to predict a user's intention to use information technology. This model includes four behavioral intention determinants, namely (i) user's attitude to use a technology, (ii) subjective norms, (iii) perceived behavioral control, and (iv) perceived usefulness (these constructs have been explained above in the TAM and TPB sections). This hybrid model has been examined in many contexts. Said (2006) applied C-TAM-TPB to examine the acceptance of information technology (roadmap) in developing countries. Schape and Pervan (2007) also applied C-TAM-TPB to improve the acceptance of ICT (especially e-health technology) by Australian occupational therapists. Yayla and Qing (2007) investigated the acceptance of Internet for purchases in America. They applied three models, i.e. TAM, TPB, and C-TAM-TPB, to explore which one is stronger for this purpose. They found that the original TAM and original TPB are a better fit than the combined model (C-TAM-TPB) for this type of data.

In this hybrid model, three constructs including subjective norms, perceived behavioral control, and perceived usefulness, are used to derive three constructs for this research model constructs. Interestingly, social influence was picked up from subjective norms, performance expectancy from perceived usefulness, and facilitating condition from perceived behavioral control.

### 2.11.7 Motivational Model (MM)

Davis et al. (1992) adapted the motivational model in information technology context. The purpose of this model is to evaluate the psychological motivations of individuals to perceive a particular behavior (Davis et al., 1992). This model determines a user behavior by perceiving the extrinsic motivation and intrinsic motivation. Extrinsic motivation refers to the degree to which a user perceives that using particular information technology will enable him/her to achieve better outcomes (Korth, 2007). Intrinsic motivation means that the person likes to execute a behavior because he/she does not have other motivation other than executing the activity him/herself (for example a user will use a system if he/ she perceives that using that system will be enjoyable or he/she has the experience in using a system) (Venkatesh et al., 2003).

Motivational model (MM) has been used as a research framework for many studies in different contexts. Sevin and Thalmann (2005) used MM to investigate the factors that influence the design of virtual humans. They found that MM is a strong theory in the virtual human context.  Korth (2007) applied MM to detect the motivational factors that motivate a leader or teacher to perceive organizational citizenship behavior. He noted that the teacher's or supervisor's support leads employees to perceive this behavior. Ramayah et al. (2003) also adapted MM to examine the effect of intrinsic and extrinsic constructs on the usage of the Internet in Malaysia. They suggested that although perceived enjoyment has significantly influenced adoption of the Internet, perceived usefulness (extrinsic) is stronger than perceived intrinsic motivation to influence Internet usage.

Although MM is evaluated and adopted by many researchers for specific areas (such as information system and business contexts), this model has some weaknesses. For example, extrinsic motivation and intrinsic motivation are not the only factors that determine a user's intention to use information technology. Furthermore, this model just focuses on characteristics of technology. According to Davis and Venkatesh (2000), the sub-factors that are related to the social influence factor (such as image, subjective norm, and voluntariness of use) are critical successful factors for acceptance of information technology. That is why most authors combine this model with other models as a framework of their studies.

Motivational Model has two determinants of behavioral intention. These two constructs were used in this research model. Extrinsic motivation was used indirectly because it was used to reflect performance expectancy. Additionally, intrinsic motivation (enjoyment) was used in this research as one of employee intention determinants. This will be explained with more detail in Chapter Four.

### 2.11.8 Model of PC Utilization

The model of PC utilization (MPCU) has been used to predict actual behavioral usage instead of behavioral intention. Thompson et al. (1991) developed this model from the theory of human behavior. They presented six factors to determine the actual behavioral usage. The first factor is job fit, which refers to the degree to which a person believes that utilizing a technology will enhance his/her work performance. The next factor is complexity, i.e. the degree to which the person believes that he/she would not need much effort to use a particular technology. The third factor is the long term consequences, which refers to the degree to which a person believes that he/she would get outcomes by using a particular system in the future. The fourth factor is affect towards usage, which refers to a persons' negative or positive feeling associated with using a particular system. The fifth factor is social factors. It refers to user's perception of the opinion of other people of whether or not he/she performs a behavior. The last factor is facilitating conditions. It refers to the environmental infrastructure that makes the accomplishment of the activity easier.

Like other information technology acceptance models, MPCU has also been applied in many contexts. For instance, it was used by Igbaria (1992) to examine the acceptance of microcomputers and personal computers. In addition, Seyal et al. (2007) used some constructs of MPCU (long term consequence) with the TAM constructs to examine the constructs that influence Internet users' behavior.

Based on previous arguments, this model covers system factors by job fit, complexity, and long term consequences, implementation environment factor by social factor and facilitating conditions, and individual factor by affect toward usage. This model is much suitable to predict user's intention to use an information and communication technology because it covers all the main factors that have been presented in the ICT literature as the critical successful factors for acceptance of ICT. However, there are many sub-factors that are not covered by this model (MPCU). These sub-factors have been presented in the ICT literature under the individual factors as critical for ICT acceptance such as computer self-efficacy and computer anxiety (Dadayan & Ferro, 2005; Nanayakkara, 2005).

In this model (MPCU), four constructs were used to derive factors to predict employees intention to use computer-based distance training system in this research i.e. job fit was used to derive performance expectancy, complexity to derive effort expectancy, social factor to derive social influence, and facilitating conditions to derive facilitating conditions.

### 2.11.9 Social Cognitive Theory (SCT)

Social cognitive theory (SCT) is derived from social learning theory (Compeau & Higgins, 1995). This theory was extended later to predict behavior of computer users (Compeau & Higgins, 1995). It has adopted five constructs to determine user's behavior. The first one is outcome expectation-performance. This construct refers to the expectation of the technology used on the job (Compeau & Higgins, 1995). The second is outcome expectations-personal, which refers to outcomes of using particular information technology (Compeau & Higgins, 1995). The third factor is anxiety, which refers to a person's emotional reaction when they use particular technology (Compeau & Higgins, 1995). The fourth one is self-efficacy, which refers to a person's ability to use the technology to perform particular work (Compeau & Higgins, 1995). This construct is used to measure the influence of an individual factor on employee intention to use the computer-based distance training system in this research model. The last construct is affect (like attitude), which refers to a person's feeling (negative or positive) towards using particular technology (Compeau & Higgins, 1995).

Social cognitive model has been used as a framework in many studies. Partridge (2007) used SCT to explore the factors that influenced members of a community to use information and communication technology. His study suggested that the factors of social cognitive theory significantly affected Internet use in the community. Pauli et al. (2007) conducted a study by applying SCT as a framework to examine the influence of computer anxiety on the use of computer intention. This study found that the relationship between computer anxiety and computer using intention is mediated by computer self-efficacy. SCT was also adapted by Soh and Subramanian (2008) to examine the impact of self-efficacy and anxiety on technology usage in learning.

This theory proposes that self-efficacy and anxiety have a direct significant influence on user's behavior, but the information system literature indicates that anxiety and self-efficacy constructs do not have a direct influence on user's behavioral intention (Dadayan & Ferro, 2005; Rezaei et al., 2008; Venkatesh et al., 2003).

In this theory (SCT), three constructs including outcomes expectation–performance, computer self-efficacy, and computer anxiety, were used in this research model. Whereby outcome expectation-performance was used to derive performance expectancy, and computer self-efficacy and computer anxiety were directly used to examine employee intention to use computer-based distance training system.

### 2.11.10 Unified Theory Acceptance and Use Technology (UTAUT)

Venkatesh et al. (2003) conducted a study to compare the similarities and differences between prior theories and models of user acceptance to formulate Unified Theory of Acceptance and Use Technology (UTAUT). This comparison included the following models and theories: technology acceptance model (TAM) (Davis et al., 1989), theory of planned behavior (TPB) (Ajzen, 1991), theory of reasoned action (TRA) (Ajzen & Fishbein, 1975), the combination of TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995), model of PC utilization (MPCU) (Thompson et al., 1991), diffusion of innovation theory (DOI) (Moore & Benbasat 1991), social cognitive theory (SCT) (Compeau & Higgins, 1995), and motivational model (MM) (Davis et al., 1992). This work (formulated UTAUT) tried to overcome the difficulties faced by information technology researchers to develop their studies' framework (Venkatesh et al., 2003) in an attempt to understand users' acceptance of technology.

According to Davis et al. (1989), the prior acceptance models could successfully predict the adoption of information technology in approximately 40 percent of the cases. On the other hand, Venkatesh et al. (2003) indicated that UTAUT could successfully predict the adoption of information technology in approximately 70 percent of the cases (70 percent of the variance in user's intention). Furthermore, according to Venkatesh et al. (2003), this model is fit to predict employee acceptance of information technology in large organizations. They also combined the scales used in prior technology acceptance models and theories to develop new scales, which have been used in their model, but which need to be further tested for further improvement (Marchewka et al., 2007; Venkatesh et al., 2003).

Unified Theory Acceptance and Use Technology (UTAUT) has four constructs to predict user's behavioral intention and behavior of use, i.e. (i) performance expectancy, (ii) effort expectancy, (iii) social influence, and (iv) facilitating conditions (Grant & Danziger, 2005; Payne & Curtis, 2008; Venkatesh et al., 2003). In addition, according to Venkatesh et al. (2003), the relationships between these constructs, behavior intention and behavior of use are moderated by four key factors i.e. age, gender, voluntariness, and experience (Venkatesh et al., 2003). The following figure (Figure 2.7) shows UTAUT diagram.

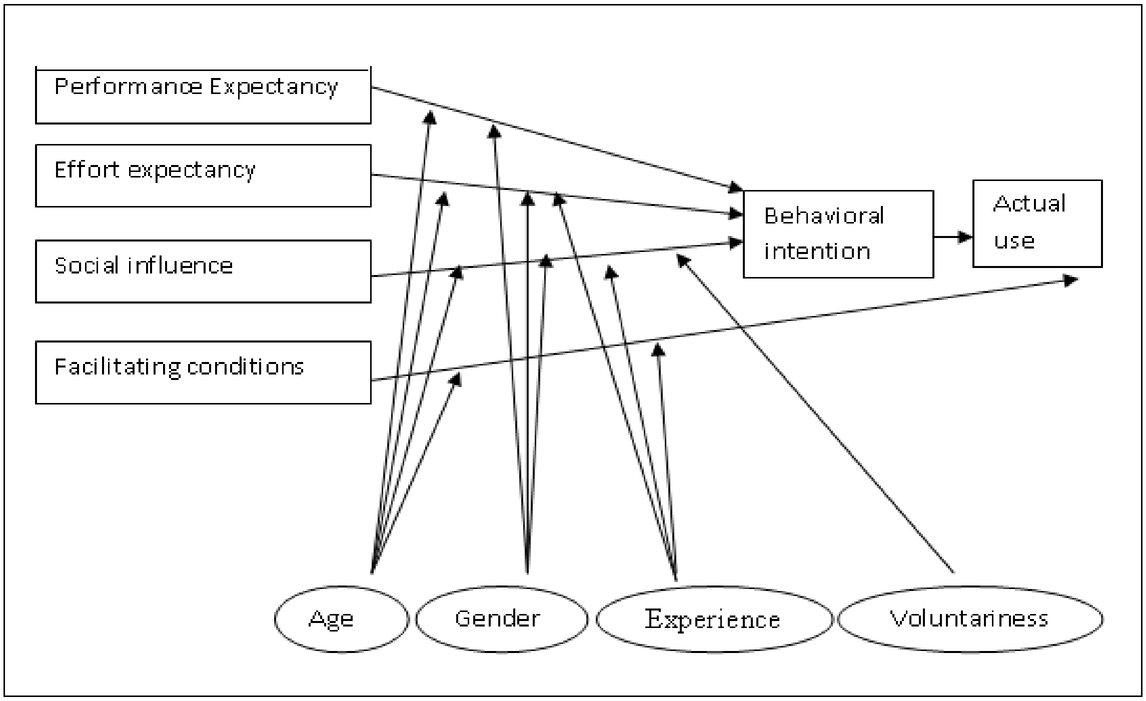


Figure 2.7: UTAUT

Source: Venkatesh et al. (2003)

**(i) Performance expectancy** refers to a person's belief that using a particular system will enhance his/her work performance (Payne & Curtis, 2008). Venkatesh et al. (2003) derived performance expectance from five constructs from prior information technology acceptance models, as follows: (a) outcomes expectations in SCT, (b) perceived usefulness in TAM, (c) relative advantage in DOI, (d) extrinsic motivation in MM, and (e) job fit in MPCU (Hung et al., 2007; Venkatesh et al., 2003).

According to Venkatesh et al. (2003), performance expectancy is a strong predictor of behavioral intention in both voluntary and mandatory settings in information technology context. Furthermore, they added that the relation between performance expectance and behavior intention may be moderated by age and gender.

**(ii) Effort expectancy** is about a person perceiving that a particular system will be easy to use. Similar to performance expectancy, this construct is derived from three constructs, taken from other existing models (Payne & Curtis, 2008). The constructs are (a) complexity in DOI, (b) complexity in MPCU, and (c) ease of use in TAM (Hung et al., 2007; Venkatesh et al., 2003). Venkatesh et al. 2003 indicated that effort expectancy has a significant influence on behavioral intention of a user to use information technology. They added that the relationship between behavioral intention and effort expectancy may be moderated by gender, experience and age (Venkatesh & Davis, 2000; Venkatesh et al., 2003).

**(iii) Social influence** refers to a user's perception of the opinion of other people of whether or not he/she performs a behavior (Payne & Curtis, 2008). This construct pertains to (a) subjective norms in TAM2 and TRA, (b) social factors in MPCU, and (c) image in DOI. According to Venkatesh et al. (2003), social influence and behavioral intention relation is moderated by three factors, i.e. age, gender, and experience (Hung et al., 2007; Venkatesh et al., 2003).

**(iv) Facilitating conditions refers** to a person's perception that the organization and technical infrastructure will help him/her to use the system (Payne & Curtis, 2008). This construct is also captured from three constructs in other models: (a) perceived behavior control in TPB, (b) facilitating conditions in MPCU, and (c) compatibility in DOI (Hung et al., 2007; Venkatesh et al., 2003). Venkatesh et al. (2003) indicated that the facilitating conditions construct is a good predictor of use of information technology. However, the relation between facilitating conditions and use behavior is moderated by two variables, i.e. age and experience. As such, the system will affect older users who have a lot of experience (Venkatesh et al., 2003). Table 2.2 shows the UTAUT constructs and their extensions.

Unified theory acceptance and use technology (UTAUT) has been applied as a framework in many areas. Marchewka et al. (2007) adopted UTAUT to test students' acceptance of blackboard technology. They found that UTAUT is not a strong predictor of this technology. Dadayan and Ferro (2005) used some constructs of UTAUT to examine the acceptance of technology in the public and private sectors. Anderson and Schwager (2004) also applied UTAUT to examine the acceptance of wireless network by employees in business organizations.

Dadayan and Ferro (2005), and Nanayakkara (2006) listed the following weaknesses of UTAUT models. They argued that the model does not consider the individual factor. In the literature of information technology and user's acceptance models, many constructs have been used to measure the individual factor. They are anxiety, self-efficacy and user attitude. Unified theory acceptance and use technology (UTAUT) model does not include these constructs.

Table 2.2: UTAUT Constructs from Other Combination Models

| UTAUT constructs | Combination from other models | |
|---|---|---|
| Performance expectancy | **Construct** | **Model** |
| | Perceived usefulness | TAM |
| | Relative advantage | DOI |
| | Extrinsic motivation | MM |
| | Job fit | MPCU |
| | Outcomes expectations | SCT |
| Effort expectancy | Complexity | DOI |
| | Complexity | MPCU |
| | Ease of use | TAM |
| Social influence | Subjective norms | TAM2 and TRA |
| | Social factors | MPCU |
| | Image | DOI |
| Facilitating conditions | Perceived Behavior Control | TPB |
| | Facilitating conditions | MPCU |
| | Compatibility | DOI |

However, Venkatesh et al. (2003) indicated that these constructs have indirect significant influence on user's intention to use information and communication technology. Additionally, the initial empirical study and e-learning literature indicated that there are many sub critical factors that influence the employees' intention, relate to the system characteristic factor including system flexibility, system interactivity and system enjoyment, which are not covered by the UTAUT. In this respect the initial study has indicated that the employees will use the system because its flexibility will overcome their obstacles with the traditional training methods. Some of the employees prefer the multimedia materials for their training and some of them need to interact with other employees or with an expert for a help. Additionally, according to Sumak et al. (2010) and Jong and Wang (2009) the validity of UTAUT needs to be further tested in the e-learning context.

## 2.12 Studies on E-learning System Acceptance

Many studies have adapted the previous acceptance of IT/IS models to examine the acceptance of e-learning system. According to Chatzoglou et al. (2009) and a comparison made by this study (see Appendix B Table 1.0), vast proportion of these studies were conducted in the educational institution environment. This section focuses on the many studies related to the acceptance of e-learning system and on the variables that have been tested to investigate such acceptance. These studies and other 25 studies were briefed in Appendix B Table 1.0. Additionally, chapter three has elaborated many such studies.

**Study 1: An enhanced technology acceptance model for e-learning systems in high-tech companies in Taiwan**

TAM was adopted by Hsia and Tseng (2008) to examine the acceptance of e-learning system by employees in high-tech companies in Taiwan. They found that flexibility of distance learning system and computer self-efficacy has a significant effect on employee intention to use the e-learning system.

**Study 2: The acceptance and use of a virtual learning environment in China**

Raaij and Schepers (2008) conducted a study to extend TAM2 to examine the acceptance of virtual learning environment by 45 educational institution managers in china. They found that perceived usefulness has a direct effect on the use of technology in the virtual learning environment, perceived ease of use and subjective norm have only an indirect effect through perceived usefulness and individual innovativeness, and computer anxiety has a direct effect on perceived ease of use.

**Study 3: A model of user acceptance of learning management systems: A study within tertiary institutions in New Zealand**

Nanayakkara (2005) conducted a study to identify the factors that influence or inhibit the acceptance of e-learning management system in New Zealand institutions and universities. Three factors were studied to achieve this goal. They were divided into (i) individual factors that included individual characteristics, and individual perception, (ii) organization factor that included organization characteristics, and organization support, and (iii) system factors that included system characteristic, and external system characteristics. The findings of this study revealed that the individual factors had a significant influence on the acceptance of e-learning management system (LMS). As far as the organization factors and the system factors are concerned, the study also revealed that these factors were critical in the acceptance of LMS. Additionally, the study revealed that perceived usefulness, perceived ease of use, staff time, reliability of infrastructure, and training on online content were essential factors in the adoption of LMS.

**Study 4: Technology acceptance and social networking in distance learning**

In order to examine students' attitude toward the use distance learning technology, Lee et al. (2003) used the technology acceptance model (TAM) to investigate how the attitude is formed. They also used the social information process model to investigate how the attitude changes over time. Given that, Lee et al. (2003) used two models. The findings of this study revealed that attitude was an important factor that had impact on the acceptance and use of distance learning technology. The study also suggested that attitude was much affected by perceived usefulness and opinions of other people.

**Study 5: Viability of the "technology acceptance model" in multimedia learning environments: A comparative study**

In another study  that aimed to discuss the validity of technology acceptance model to assess the satisfaction of students toward the multimedia learning system, Saade et al. (2007)  found out that the relationship among the variables such as perceived usefulness (PU), perceived ease of use (PEOU), behavioral intention (BI), and user's attitude (ATT) was statistically significant. They also found out that PU had a significant influence on students' attitude toward the adoption of multimedia learning system (MMLS). Additionally, the results revealed that attitude had a significant effect on user's behavior intention to adopt (MMLS). Similarly, in a study that aimed to explore the factors that affect distance learner acceptance of e-learning system at the Open University of Malaysia, Lim et al. (2008) found that the distance learning students' attitude and their behavior were influenced by the technology and system, instructors' characteristics, and interaction applications.

**Study 6: Predictors of engagement and participation in an on-line course**

Miller et al. (2003) examined the constructs of TAM model, and computer self-efficacy (CSE) to predict the use of the computer a medium to deliver online contents. The authors contended that understanding these constructs could help trainers, educators and content designers to implement more effective online training programs and online learning programs. They also found out that perceived ease of use and perceived usefulness had a significant impact on the time spent on online course. This result was influenced by students' training, perceived computer and social influence. Additionally, this study indicated that self efficacy and subjective norms did not have a significant influence on students' engagement in online courses.

**Study 7: Considering students' perceptions: The distance education student satisfaction model**

In order to explore students' satisfaction with the distance learning environment, Sahin and Shelley (2008) applied technology acceptance model (TAM). They employed the following factors to achieve the study goal. These factors are flexibility of distance learning, computer experience, and usefulness. This study indicated that computer experience and user's attitude have a significant effect on adoption of distance learning technology by students. They also demonstrated that perceived usefulness and flexibility of distance learning influenced satisfaction of distance learning students.

**Study 8: A tale of two cities: A study on the satisfaction of asynchronous e learning systems in two Australian universities**

Hisham et al. (2004) proposed that variables such as user interface, system accessibility, learning community, feedback, and content can determine students' satisfaction with synchronous e-learning system. The findings revealed that the proposed factors had a significant influence on students' satisfaction with the synchronous e-learning system. The results might help lecturers and designers utilize the e-learning system for university students.

**Study 9: Using the technology acceptance model for outcomes assessment in higher education**

Wolk (2007) also employed technology acceptance model (TAM) constructs that included perceived usefulness, perceived ease of use, attitude toward use, and behavior intention to use to assess the adoption of Internet usage by students. The study revealed that Internet use is influenced by the TAM constructs. The researcher also found that external variables such as technology literacy, period of study, gender, full time mode, part time mode, and course had influence on the adoption of Internet usage.

**Study 10: Social influence for perceived usefulness and ease-of-use of course delivery systems**

Shen et al. (2006) explored the effect of social influence on perceived usefulness and perceived ease of use of the courses delivery system used by learners. The findings of this study revealed that instructors and monitors had a significant effect on perceived usefulness of the delivery system, but only the monitors had a significant effect on perceived ease of use of delivery system. Additionally, this study indicated that the subjective norms construct had influence on behavioral intention.

### 2.12.1 Summary

According to the previous studies and other information and communication technology studies, there are various factors that have been studied and have significant effect on the acceptance of e-learning and distance learning technologies. This section has listed the factors as follows (1) ease of use or effort expectancy (Suma et al., 2010; Raaij and Schepers, 2008 and Marchewka et al., 2007), (2) usefulness or performance expectancy (Davis, 1989; Raaij and Schepers, 2008; Hermans et al., 2009 and Sahin & Shelley, 2008), (3) facilitating conditions such as Internet access, PC accessibility (Hermans et al., 2009; Marchewka et al., 2007 and Jong and Wang, 2009), (4) attitude toward using computer (Hsia and Tseng, 2008 and Marchewka et al., 2007), (5) users' experience with Internet use (Rezaei et al., 2008 and Abbad, 2009), (6) computer self-efficacy (Jong and Wang, 2009; Friedrich and Hron, 2010; and Sahin & Shelley, 2008), (7) flexibility of distance learning (Lim et al., 2008; Sahin & Shelley, 2008 and Hsia and Tseng, 2008), (8) organization support (Lim et al., 2008 and Abbad, 2009), (9) learning community and interactivity (Abbad, 2009), (10) system personality (Hisham et al., 2004), (11) general satisfaction (Hermans et al., 2009), (12) social influence (Abbad, 2009, Raaij and Schepers, 2008 and Suma et al., 2010), (13) computer anxiety (Raaij and Schepers, 2008; Rezaei et al., 2008 and Venkatesh, 2003), and (14) System Enjoyment (Chesney, 2006; Conci et al., 2009 and Sheng et al., 2008). The summary of studies and factors studied are shown in Appendix B, Table 1.0.

The above factor can be classified into three main factors. The first group is system factor, which includes all sub-factors that are related to the system characteristics such as perceived effort expectancy of use and perceived performance expectancy. The second factor is implementation environment factor, which includes all sub-factors related to the organization infrastructure, technical infrastructure and organization characteristics such as social influence, and facilitating conditions. The third main factor is individual factor, which includes all sub-factors that are related to individual characteristics and individual's perception such as computer user attitude, computer self-efficacy, and computer anxiety (Chau & Hu, 2002; Dadayan & Ferro, 2005; Hu et al., 1999; Nanayakkara, 2005).

As regards to UTAUT, it covers only two factors namely system factor and implementation environment factor. Interestingly, the impact of system factor on the behavior intention has been investigated using two sub factors including effort expectancy (easy to use) and performance expectancy (usefulness). Additionally, two other sub factors including social influence and facilitating condition have been used to investigate the impact of implementation environment factor on the behavior intention.

According to Sahin & Shelley (2008), Hsia and Tseng (2008), Abbad (2009), Conci et al. (2009), and Sheng et al. (2008), there are many sub critical success factors in the e-learning system acceptance context related to the system factor including system flexibility, system interactivity and system enjoyment. Other sub critical success factors related to the individual factor, are computer self-efficacy and computer anxiety (Rezaei et al., 2008; Jong and Wang, 2009; Friedrich and Hron, 2010). Even though these factors have used in information systems and in e-learning system acceptance but, these factors have not been tested using UTAUT. With the decision to use UTAUT because of its suitability, this research therefore decided on extending UTAUT to cover all of these sub critical success factors.

## 2.13 Conclusion

This chapter has explained the history of distance learning around the world. It highlights that there is no specific definition of distance learning because it is a mixture of many sciences such as education, business, psychology, computer science, information system. The chapter has also addressed the advantages, disadvantages, technologies, methods, generations, modes and the constraints of distance learning for organizations and employees.

In terms of e-learning, this chapter has highlighted that e-learning is widely used instead of distance learning. There are two kinds of e-learning, namely, blended learning and distance learning. Thus, e-learning, e-learning system, distance learning and distance learning system will be used interchangeably in this research. Additionally, this chapter has provided evidence of three factors that make asynchronous distance learning better than synchronous distance learning for training employees. These factors are flexibility and personalization. Furthermore, asynchronous distance learning does not need high network bandwidth.

This chapter has also presented number of studies (Appendix B, Table 1.0.) that have been conducted on the acceptance of distance learning system. It can be seen that the individual's intention to use a distance learning system is influenced by three main factors including system factor, individual factor and implementation environment factor. While there are a few studies have been focused on investigating the acceptance of distance learning system in education environment, it is a challenge for this study to search similar studies in the context of public organization or among public sector employees. Additionally, the study also found that there is limited studies been conducted to examine distance learning system in Jordan.

In this chapter all the common acceptance models, theories and their constructs such as UTAUT, TAM, MM, TRA, TPB, etc had also been explained in details (Appendix C Table 1.0). It is worth mentioning that the latest one among them is UTAUT. The theory has been formulated based on the previous acceptance models and theories. Additionally, UTAUT could successfully predict the acceptance of information system in approximately 70% of the cases, whereas other models could successfully predict the acceptance in approximately only 40%. Further, UTAUT is more suitable to investigate the acceptance of information system in the large organizations.

Though UTAUT is suitable to use in this study that involved large organizations with a big number of population, the theory however does not cover all three main critical success factors that could have influenced the acceptance of distance learning system among public employees in Jordan. As UTAUT is considered to be used in this study the validity of the theory need to be further tested in the distance learning context. Additionally, there are many scales that had been adapted from the previous studies, in order to examine the UTAUT constructs and these scales also must be tested. Consequently, in this research, UTAUT was being extended to cover the three main factors (system factor, individual factor and implementation environment factor) in order to formulate the research proposed model. The detail description of the proposed model is provided in the next chapter.

# CHAPTER THREE

# CONCEPTUAL MODEL FORMULATION AND RESEARCH METHODOLOGY

## 3.0 Introduction

This chapter explains how the extended UTAUT include the successful factors of e-learning system acceptance and how these factors were chosen. Additionally, it discusses the research hypotheses formulated to answer the research questions. Furthermore, in this chapter, the methodology of this research is presented. It distinguishes among exploratory, descriptive and explanatory researches. The chapter also highlights the differences between quantitative and qualitative researches and describes the research strategy. Finally, sampling method, data collection method, validity and reliability of the instruments and data analysis method used in this research will be explained.

## 3.1 Research Model and Research Dimensions

### 3.1.1 Research Model

Review of the literatures pertinent to information system shows that the acceptance of information system, especially e-learning system, is influenced by three factors, namely, (1) individual factor, (2) system factor, and (3) implementation environment factor (Chau & Hu, 2002; Dadayan & Ferro, 2005; Hu et al., 1999; Nanayakkara, 2005). In this study Unified Theory of Acceptance and Use Technology (UTAUT) is adapted as a framework to investigate the acceptance of computer-based distance training system by employees in public sector organizations.

There are many advantages that can be obtained from UTAUT. Reflecting on the model, the researcher believes that UTAUT is more suitable to large organizations than other models of acceptance technology because the design of this model is based on the data collected from employees' environment (Venkatesh et al., 2003). Additionally, it could successfully predict the adoption of information technology in approximately 70 percent of the cases, but other user adoption models could do so in about 40 percent of the cases (Davis et al., 1989; Venkatesh et al., 2003). Furthermore, the constructs of UTAUT have been adopted from eight other user acceptance models (Venkatesh et al., 2003). Moreover, the prior scales used to measure the constructs can be combined to come up with new scales that can be applied to the distance learning context. Last but not least, this model covers almost the main factors that influence user acceptance of technology such as technology factor and organization factor (Marchewka et al., 2007; Venkatesh et al., 2003). However, although UTAUT was developed by taking into account the similarities across nine previous technology acceptance models, it does not include the constructs used to measure individual factors (anxiety, self-efficacy, and attitude) (Nanayakkara, 2005). On the other hand, Venkatesh et al. (2003) found that anxiety and self-efficacy had indirect influence on behavioral intentions.

The proposed model of this study therefore includes employee intention to use computer-based distance training system as the dependant variable. Because individual factor is a critical successful factor in the e-learning and information technology contexts (see next section 4.1.2) and UTAUT does not consider it, this study decided to add a new factor (that is individual factor) in UTAUT. The model also covers two factors i.e. (i) system factor, and (ii) implementation environment factor.

The first factor included in the proposed research model is system factor that includes five sub-factors: (a) performance expectancy, (b) effort expectancy, (c) system enjoyment, (d) system interactivity, and (e) system flexibility. According to Venkatesh et al. (2003), performance expectancy and effort expectancy have a significant influence on the behavioral intention to use an information technology. Additionally, there is strong evidence that system enjoyment, system interactivity and system flexibility are important in the e-learning context because they have significant influence on employee intention to use e-learning system (Abbad et al., 2009; Chatzoglou et al., 2009; Chesney, 2006; Conci et al., 2009; Hsia & Tseng, 2008; Nanayakkara, 2005; Ramayah et al., 2003; Sahin & Shelley, 2008). Therefore, the system factor in this study will include (i) performance expectancy (PE), (ii) effort expectancy (EE), (iii) system flexibility of distance learning, (iv) system enjoyment, and (v) system interactivity. Figure 3.1 presents the possible relationship between system factor, behavioral intention and usage behavior.

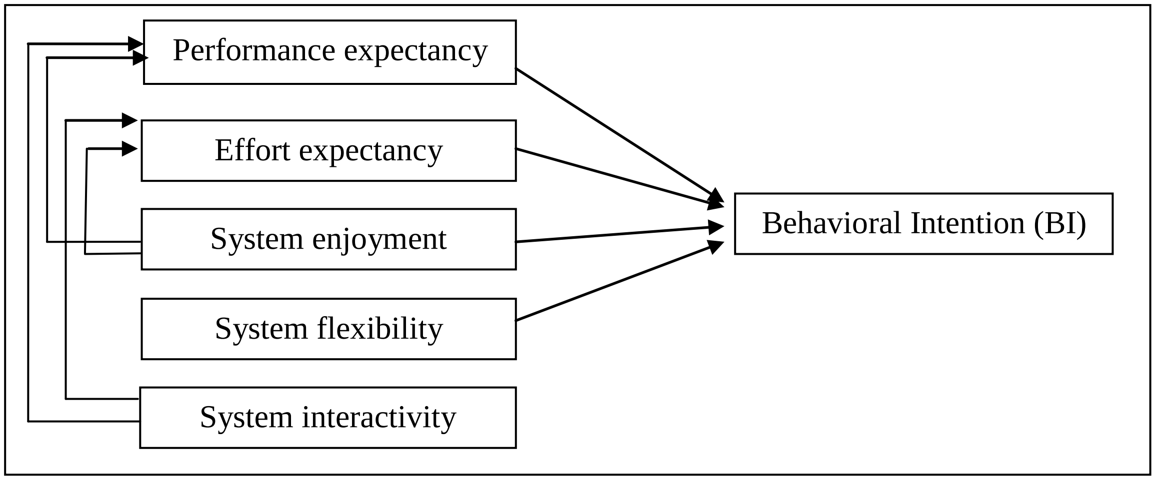

Figure 3.1: System factor and BI

The second factor included in the proposed model is the environment implementation factor. In this study, the environment implementation factor includes (a) facilitating conditions (FC) and (b) social influence (SI). According to Venkatesh et al. (2003), the facilitating conditions construct has a positive and direct influence on the actual use an information technology. Additionally, there is a significant relationship between the social influence construct and behavioral intention (Venkatesh et al., 2003). Figure 3.2 presents the possible relationship between FC, SI (items of implementation environment factor), BI, and Actual Use.

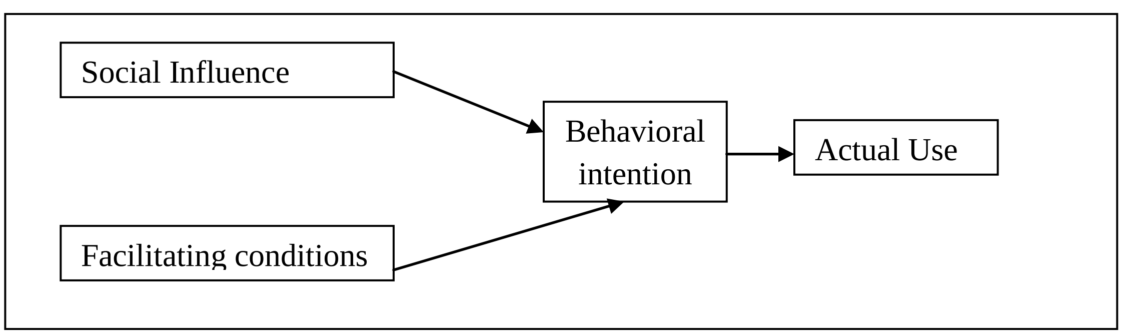

Figure 3.2 Implementation environment factor, BI, and actual use

The third factor proposed in this study is individual factor that includes (a) computer anxiety and (b) computer self-efficacy. In this respect, Venkatesh et al. (2003) have supported that self-efficacy and anxiety constructs have indirect influence on behavioral intention to use an information technology. Furthermore, several studies found that computer self-efficacy and computer anxiety have indirect significant influence on user intention to use e-learning system through perceived usefulness (performance expectancy) and ease of use (effort expectancy) (Gefen, et al., 2003; Gefen & Straub, 1997; Pedersen & Nysveen, 2003; Saade & Kira, 2006). Therefore, in this study the individual factor will include items such as computer self-efficacy and computer anxiety. Figure 3.3 presents the possible relationship between the individual factor, BI, and actual use.

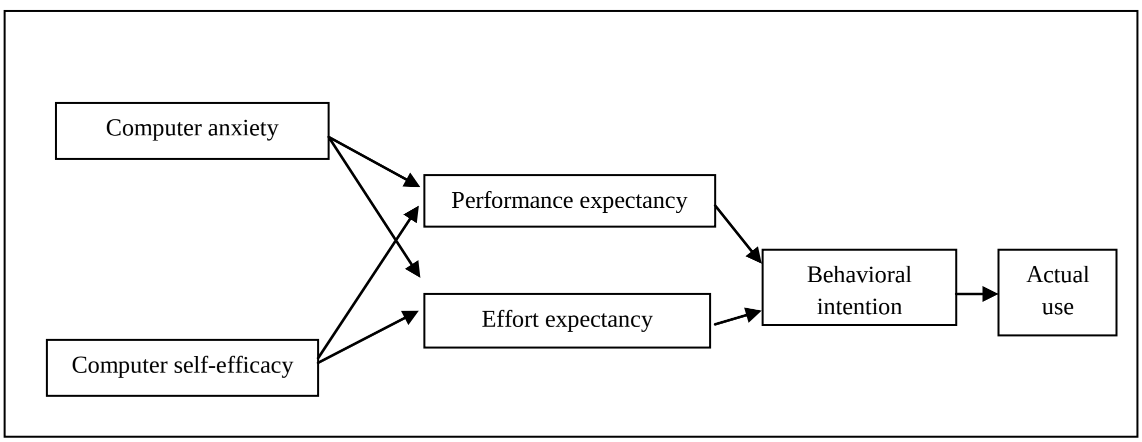


Figure 3.3: Individual factor, BI, and actual use

In this proposed model the relationship between the dependent variable and independent variables are affected by moderator variables. They are age, gender, and

Internet experience (Venkatesh et al., 2003). Figure 3.5 present this research proposed model.

### 3.1.2 Conceptualization of Factors

A review on the literatures of information and communication technology has shown that the number of studies conducted to examine employee acceptance of an information technology is very limited (Burgess & Russell, 2003; Jeyaraj et al., 2006: Venkatesh et al., 2003). Majority of previous studies have focused on students and learning environment (see Appendix B, Table 1.0). But there is an increasing need of public sector organizations to advance employee knowledge and skills with the support of ICT, and hence public sector organizations need to be assisted in terms of better facilities and accessibility for employees to go for training. To do so they need to improve three aspects: implementation environment, individual factor, and system factor. Therefore, this study will help to understand the factors that influence the acceptance of computer-based distance training system by employees of public sector organizations such as the case in Jordan.

Many researchers noted that the examination of user acceptance of information and communication technologies is based on three factors that include individual factor, implementation environment factor, and system factor (Chau & Hu, 2002; Dadayan & Ferro, 2005; Geri & Elaiza, 2008; Hu et al., 1999: Nanayakkara, 2005; Nanayakkara & Widdett, 2005). The individual factor includes the characteristics of individual such as skills and knowledge and his/her perception such as his/her ability to use distance learning system. The factor was measured by determinants such as computer anxiety and computer self-efficacy (Chau & Hu, 2002; Dadayan & Ferro, 2005; Nanayakkara, 2005).

The aspects that are related to the system factor are system characteristics. The characteristics of a system refer to the functionality, friendliness, flexibility of the system, system interactivity, and enjoyment of a system. These characteristics were measured by usefulness, ease of use, system flexibility, system interactivity and system enjoyment to reflect computer acceptance and information and communication technology (Dadayan & Ferro, 2005; Nanayakkara, 2005; Venkatesh et al., 2003). In this study, this factor was measured by performance expectancy, effort expectancy, system flexibility, system interactivity, and system enjoyment.

The implementation environment factor includes the technical and electronic infrastructure (for instance capacity and availability) and organization characteristics (Dadayan & Ferro, 2005; Nanayakkara, 2005). In this study, the implementation environment factor was tested by two variables i.e. social influence and facilitating conditions. The next section will discuss in details all the constructs proposed.

#### 3.1.2.1 Behavioral Intention

Behavioral intention has long been used in the literature as a dependent variable in order to examine the acceptance of information technology (for example Compeau & Higgins 1995; Davis et al., 1989; Venkatesh et al., 2003). Literature also indicates that behavioral intention is a strong predictor of actual usage (Davis et al., 1989; Taylor & Todd, 1995; Venkatash et al., 2003). Figure 3.4 has been used by researchers as a framework for their studies to explain user acceptance of information technology based on behavioral intention (Venkatesh et al., 2003). This construct was employed to this research to suggest that employees intend to use the computer-based distance training system.

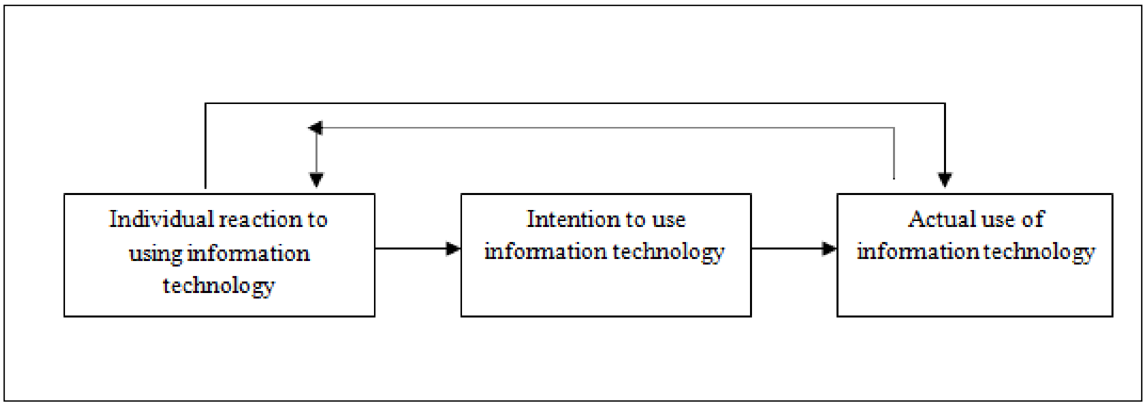


Figure 3.4: Basic concept underlying user acceptance models

Source: Venkatesh et al. (2003)

In the original UTAUT model (Figure 2.7, Section 2.11.10), behavioral intention is influenced by three variables for example social influence, effort expectancy, and performance expectancy. This study has extended UTAUT by adding five related determinants of behavioral intention to use e-learning system. They are computer self-efficacy, computer anxiety, system flexibility, system interactivity, and system enjoyment. They are added to reflect the individual factor as mentioned in Section 3.1.1 and to extend the system factor because they have significant influence on intention to use e-learning. The following section details each of the factors.

3.1.1.2 Performance Expectancy (PE)

Performance Expectancy (PE) refers to the degree to which an individual believes that using a particular system will enhance his/her work performance (Hung et al., 2007; Venkatesh et al., 2003). According to literatures, PE is a strong predictor of user intention in the information and communication technology context (Davis et al., 1992; 2003; Naor & Geri, 2008; Taylor & Todd, 2001; Venkatesh & Davis, 2000; Venkatesh et al., 2003).

Additionally, according to Venkatesh et al. (2003), the relationship between performance expectancy and behavioral intention to use an information technology is also affected by two moderators such as age and gender. In e-learning context, there are many studies that suggest that PE has a direct influence on user intention to use an e-learning system (Goussal et al., 2003; Nanayakkara, 2005; Sahin & Shelley, 2008). Adapting this construct (performance expectancy) to computer-based distance training system suggests that public sector employees think that using computer-based distance learning system will enhance their training and consequently this will be reflected on their productivity. Regarding to the gender and age moderating, this study presents whether gender and age of the employees will moderate the relationship between performance expectancy and employees intention to use computer-based distance training system.

#### 3.1.1.3 Effort Expectancy (EE)

Effort expectancy refers to the degree of ease felt by individuals when they use the information system (Hung et al., 2007; Venkatesh et al., 2003). Several studies have indicated that the effort expectancy construct has a significant influence on behavioral intention to use an e-learning technology (Marchewk et al., 2007; Naor & Geri, 2008; Nanayakkara, 2005). Additionally, according to Venkatesh et al. (2003), the relationship between effort expectancy and behavioral intention is also influenced by three key moderators; that are age, gender and user experience. So, adapting this construct (effort expectancy) to examine the acceptance of computer-based distance training system by public sector employees suggests that they will accept computer-based distance training system if they believe that the system is easy to use. It is the interest of the study to find out whether the relationship between effort expectancy and employees intention to use computer-based distance training system is moderated by age, gender and employees' experience.

#### 3.1.1.4 System Flexibility (SF)

Flexibility of distance learning system has been defined in the literatures as the degree to which users perceived that they can use the distance learning system from any place at any time (Hsia & Tseng, 2008). Flexibility of distance learning will provide opportunity to employees to be trained and get a degree without any spatial and time constraints.

Many studies have indicated that flexibility of distance learning is a critical success factor for the acceptance of e-learning systems. Hsia and Tseng (2008) have conducted a study to examine employee acceptance of e-learning system in Taiwan. They extended TAM to include self efficacy and flexibility constructs to investigate the employee acceptance of e-learning system. The empirical study revealed that self efficacy construct significantly influenced perceived ease of use and usefulness. Additionally, self efficacy has a strong effect on perceived flexibility of e-learning. This study concluded that flexibility has a significant impact on behavioral intention.

Additionally, Hermans et al. (2008) explored the variables that influenced student satisfaction with online courses. They found that flexibility plays an important role in such satisfaction. This result is also supported by Sahin and Shelley (2008) who conducted a study to predict user satisfaction in the e-learning environment. E-learning literatures have also provided many studies that indicated the predictive ability of flexibility of distance learning in determining behavioral intention (Nanayakkara, 2005). In this research public sector employees will adopt the computer-based distance training system if they perceive that they can use the system at any time from any place.

#### 3.1.1.5 System Enjoyment (SE)

Motivational model (MM) proposes that extrinsic motivation and intrinsic motivation as strong predictors of user intention to use particular information technology (Davis et al., 1992). Extrinsic motivation refers to the extent to which the user believes that using a system will enhance his/her job performance (similar to performance expectancy in the UTAUT). Almost all information and communication technology studies indicated intrinsic motivation as enjoyment (Sheng et al., 2008). Intrinsic motivation has been defined as the degree to which a user believes that using particular system will be enjoyable (Conci et al., 2009).

According to the information and communication technology literature, system enjoyment has a significant impact on user intention to use e-learning system. For example, Sheng et al. (2008) conducted a study to understand a person's behavioral intention toward adoption of e-learning system. They found perceived enjoyment has a significant effect on user behavioral intention to use e-learning system. Chesney (2006) conducted a study to investigate the adoption of dual system. They found a significant relationship between perceived enjoyment and intention to use the system. Additionally, information technology literature has presented many studies that support the relationship between system enjoyment construct and behavioral intention to use an information and communication technology (Chesney, 2006; Conci et al., 2009; Moon & Kim, 2000; Ramayah et al., 2003). In relation to this study, employees will adopt computer-based distance training system if they perceive that using the system and the courses will be enjoyable.

3.1.1.6 System Interactivity (SIN)

The interactions between instructors and learners, learners themselves, and learners with organization are key elements of learning process (Abbad et al., 2009).

Development of technologies used in the e-learning context increases the ability of individuals to interact anywhere at any time.

Although, few studies have paid attention to system interactivity, Abbad et al. (2009) suggested that this factor has an indirect impact on user intention to use e-learning system through perceived usefulness and perceived ease of use. Additionally, Davis (1989) found that perceived usefulness and perceived ease of use fully mediate the effect of system characteristics on user intention to use e-mail technology. Consequently, because many scholars agree that perceived performance expectancy and perceived effort expectancy are similar to perceived usefulness and perceived ease of use (Marchewka et al. 2007; Venkatesh et al. 2003; Wang & Jong, 2009) this construct was therefore adapted in this study. Adapting this factor suggests that public sector employees think that using computer-based distance learning system will allow them to interact with other members in the organization.

#### 3.1.1.7 Social Influence (SI)

Social influence refers to the effect of people's points of view on individuals' use of technology (Hung et al., 2007; Venkatesh et al., 2003). The social influence construct is adapted from three prior constructs for instance (a) subjective norms in the extended technology acceptance model (TAM2), and theory of reason action (TRA), (b) social factors in model of PC utilization (MPCU), and (c) image in diffusion of innovation theory (DOI).

Social influence is a strong predictor of behavioral intention to use an information and communication technology (Dadayan & Ferro, 2004; Venkatesh & Davis, 2000; Venkatesh et al., 2003). More specifically, many literatures indicate that the social influence construct has a significant influence on user intention to use e-learning system (Abbad et al., 2009; Marchewka et al., 2007; Shen et al., 2006). According to Venkatesh et al. (2003), the relationship between social influence and user intention to use an information technology is moderated by three variables; age, gender and experience. The construct was adapted in this study to suggest that the acceptance of computer-based distance training is determined by employees' positive or negative opinions on the use of the system. It is worth to find that whether the relationship between social influence and the employees' intention to use computer-based distance training system will be moderated by gender, age and experience.

#### 3.1.1.8 Facilitating Conditions (FC)

This construct is derived from three prior constructs i.e. (a) perceived behavior control in theory of planned behavior (TPB), (b) facilitating conditions in model of PC utilization (MPCU), and (c) compatibility in diffusion of innovation theory (DIT). According to Venkatesh et al. (2003), the facilitating condition construct refers to the extent a user believes that the organizational infrastructure and electronic infrastructure will support the use of information technology system.

Taylor and Todd (1995) also stated that facilitating condition resources such as money and time will motivate a person to use a particular system. Several studies in the information technology context have indicated that the facilitating condition construct has a direct significant influence on user behavior (Folorunso et al., 2006; Selim, 2005 and Jong and Wang, 2009). Adapting this construct to computer-based distance training system suggests that employees perceive that technology infrastructure, organization infrastructure, and organization support will enable them to use the computer-based distance training system without any problem, and to interact with other employees and trainers.

#### 3.1.1.9 Computer Self-efficacy (CSE)

A number of researchers (for example Agarwal et al., 2000; Miller et al., 2003) defined computer self-efficacy as the ability to use the computer or information technology. Other researchers divide computer self-efficacy into two sub-constructs i.e. (a) general computer self-efficacy (GCSE), which refers to the ability of a person to use a computer in general, and (b) task specific computer self-efficacy (TSCSF), which refers to the ability of a person to use a computer in order to perform a specific task (Marakas et al., 1998). Therefore, any person who wants to participate in online courses will be able to use the technology of the courses (computer), and to have control over those courses (Chau et al., 2001; Young et al., 2000).

Previous studies have used computer self-efficacy to predict computer usage behavior. The studies found that computer self-efficacy construct is a strong predictor of user intention to use an information and communication technology (Grandon et al., 2005; Hussein et al., 2007; Miller et al., 2003). Agarwal et al. (2000) stated that computer self-efficacy has an indirect effect on the adoption of many packages of software through ease of use and usefulness. Hussein et al. (2007) reported that several studies have found that computer self-efficacy has an indirect and significant influence on user intention to use e-learning system through the performance expectancy and effort expectancy (Goussal et al., 2003; Mitchell et al., 2005; Sahin & Shelley, 2008).

In this study computer self-efficacy refers to employees' ability to use the computer for their training, manage training materials and interact with other trainees and trainers.

3.1.1.10 Computer Anxiety (ANX)

Computer anxiety has been defined as a user's feeling when he/she uses a computer (Saade & Kira, 2006). According to literatures, anxiety has an indirect impact on user behavioral intention to use an e-learning system through ease of use (effort expectancy) and usefulness (performance expectancy) constructs (Chatzoglou et al., 2009; Gefen & Straub, 1997; Gefen et al., 2003; Pedersen & Nysveen, 2003; Rezaei et al., 2008; Saade & Kira, 2006). In this study, computer anxiety refers to the employees' feeling when they use the computer-based distance training system for their training. Table 3.1 shows some of the main previous studies that have investigated the constructs of the proposed model.

### 3.1.11 Moderator Keys

In terms of the moderator keys, there are many evidences in the literature have indicated that the relationships between performance expectancy, effort expectancy, social influence and behavioral intention are moderated by the individual's age, gender and experience (Venkatesh et al., 2003; Marchewka et al., 2007 and Elaiza and Geri, 2008). Adapting these moderator keys for this research suggests that the effect of performance expectancy, effort expectancy and social influence on the employees' intention to use computer-based distance training system will be moderated by the employees' age, gender and experience.

Table 3.1: Previous Studies that Investigated the Proposed Model Constructs

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PE | x | x | x | x | x | x | x | x | x | x | x | x | | x | x | x | x | x | | x | x | x | x | x | x | x | x | x | x | | | x |
| EE | x | x | x | x | x | x | | x | x | x | x | x | | x | x | x | | x | | x | x | x | x | x | x | x | x | x | x | | | x |
| SI | x | x | x | | | x | | | | x | x | x | | | x | | | x | x | | | x | x | x | x | | | | | | x | |
| FC | x | x | x | | | | | | | x | | x | x | x | x | | | x | x | | | | | x | x | | | x | x | | x | |
| SE | | | | | | | | | | | | | | | | | | | | x | | | | x | | x | | x | | x | x | x |
| CA | x | x | x | x | | | | | x | | | x | | | x | | | | x | | | x | x | x | | | | | | | x | |
| SF | | | | | | | x | | | | | | x | | | x | x | | | | | | | | | | | | | | | |
| SIN | | | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | |
| CS | x | | x | | | | | | x | | | x | | x | x | x | | | | | | | | x | | | x | x | x | x | | |
| BI | x | x | x | x | x | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |

*note:* the numbers 1-32, studies; X, the variable is investigated in the study; PE, performance Expectancy; EE, Effort Expectance; SI, Social Influence; FC, Facilitating Conditions; SE, System Enjoyment; CA, Computer Anxiety; SF, System flexibility; SIN; System Interactivity; CS, Computer Self-efficacy; and BI, Behavior Intention.

Overall, in this research framework nine constructs have impacted employee intention to use computer-based distance training system. Interestingly, five constructs have a direct effect on employee intention: effort expectancy, performance expectancy, system flexibility, system enjoyment, and social influence. Further, three constructs have an indirect effect on employee intention through effort expectancy and performance expectancy namely: system interactivity, computer anxiety, and computer self-efficacy. On the contrary, facilitating conditions do not have any effect on employee intention, but has an effect on actual use in the future. The following section presents the hypotheses that represent the relationships between the proposed model's constructs.

## 3.2 Research Hypotheses

This section discusses the hypotheses (Figure 3.5) to be used to study employee acceptance of computer-based distance training system in public sector organizations. Additionally, Table 3.2 presents these hypotheses' resources.

H1: The model presented in this research will be valid for explaining the data related to public sector employee intention to use computer-based distance training system.

### 3.2.1 Technology Factor Hypotheses

H2: There is a significant relationship between performance expectancy and employee intention to use computer-based distance training system.

H3: There is a significant relationship between effort expectancy and employee intention to use computer-based distance training system.

H4a: The impact of performance expectancy on employee intention will be moderated by gender.

H4b: The impact of performance expectancy on employee intention will be moderated by age.

H5a: The effect of effort expectance on employee intention will be moderated by age.

H5b: The effect of effort expectance on employee intention will be moderated by gender.

H5c: The effect of effort expectance on employee intention will be moderated by experience.

H6: There is a significant relationship between flexibility of computer-based distance learning and employee intention to use computer-based distance training system.

H7: There is a significant relationship between system interactivity and performance expectancy.

H8: There is a significant relationship between system interactivity and effort expectancy.

H9: There is a significant relationship between system enjoyment and performance expectancy.

H10: There is a significant relationship between system enjoyment and effort expectancy.

H11: There is a significant relationship between system enjoyment and employee intention to use computer-based distance training system.

### 3.2.2 Implementation Environment Factor Hypotheses

H12: There is a significant relationship between facilitating conditions and employee intention to use computer-based distance training system.

H13: There is a significant relationship between social influence and employee intention to use computer-based distance training system.

H14a: The relationship between social influence and employee intention will be moderated by age.

H14b: The relationship between social influence and employee intention will be moderated by gender.

H14c: The relationship between social influence and employee intention will be moderated by experience.

### 3.2.3 Individual Factor Hypotheses

H15: Computer self-efficacy will have a significant influence on performance expectancy.

H16: Computer self-efficacy will have a significant influence on effort expectancy.

H17: Computer anxiety will have a significant negative effect on performance expectancy.

H18: Computer anxiety will have a significant negative effect on effort expectancy.

Table 3.2: Hypotheses' Resources

| Hypothesis | Resources |
|---|---|
| H2: There is a significant relationship between performance expectancy and employee intention to use computer-based distance training system | Davis et al. (1989), Taylor & Todd (1995), Compeau & Higgins (1995), Venkatesh & Davis, (2000 ), Venkatesh et al. (2003), Nanayakkara (2005), Sahin & Shelley (2008) Friedrich and Hron, (2010), Marchewka et al., (2007), Christina, (2005), Naor & Geri (2008), Jong and Wang, (2009) and Sumak et al. (2010). |
| H3: There is a significant relationship between effort expectancy and employee intention to use computer-based distance training system. | Davis (1989), Taylor & Todd (1995), Compeau & Higgins (1995), Venkatesh & Davis, (2000 ), Venkatesh et al. (2003), Nanayakkara (2005), Marchewk et al. (2007), Hung et al. (2007), Naor & Geri (2008), Sheng et al., (2008), Jong and Wang, (2009) and Sumak et al. (2010) |
| H4: The impact of performance expectancy on employee intention will be moderated by age and gender | Venkatesh et al. (2003), Christina, (2005), Elaiza and Geri, (2008), Marchewka et al., (2007) and Friedrich and Hron, (2010) |
| H5: The effect of effort expectance on employee intention will be moderated by age | Venkatesh et al. (2003), Christina, (2005), Elaiza and Geri, (2008), Marchewka et al., (2007) and Friedrich and Hron, (2010) |
| H6: There is a significant relationship between flexibility of computer-based distance learning and employee intention to use computer-based distance training system. | Sahin and Shelley(2008), Lim et al. (2008), Hsia & Tseng, (2008) and Hermans et al. (2009) |
| H7: There is a significant relationship between system interactivity and | Davis (1989), Abbad, (2009) and Lim et al. (2008) |

| | |
|---|---|
| performance expectancy | |
| H8: There is a significant relationship between system interactivity and effort expectancy. | Davis (1989), Abbad, (2009) and Lim et al. (2008) |
| H9: There is a significant relationship between system enjoyment and performance expectancy. | Davis et al. (1992), Moon & Kim (2000), Ramayah et al. (2003), Chesney (2006), Sheng et al., (2008), Chatzoglou et al. (2009), Conci et al. (2009) and Friedrich and Hron, (2010) |
| H10: There is a significant relationship between system enjoyment and effort expectancy. | Davis et al. (1992), Moon & Kim (2000), Ramayah et al. (2003), Chesney (2006), Sheng et al., (2008), Chatzoglou et al. (2009), Conci et al. (2009) and Friedrich and Hron, (2010) |
| H11: There is a significant relationship between system enjoyment and employee intention to use computer-based distance training system. | Davis et al. (1992), Moon & Kim (2000), Ramayah et al. (2003), Chesney (2006), Sheng et al., (2008), Chatzoglou et al. (2009), Conci et al. (2009) and Friedrich and Hron, (2010) |
| H12: There is a significant relationship between facilitating conditions and employee intention to use computer-based distance training system | Thompson et al. (1991), Taylor and Todd (1995), Dadayan and Ferro, (2005), Marchewka et al., (2007), Lim et al., (2008) and Abbad, (2009), Folorunso et al. (2006); Selim (2005), Payne & Curtis (2008) and Jong & Wang (2009) |
| H13: There is a significant relationship between social influence and employee intention to use computer-based distance training system | Taylor & Todd (1995), Compeau & Higgins (1995), Venkatesh & Davis, (2000 ), Venkatesh et al. (2003), Dadayan & Ferro (2005), Hung et al. (2007), Marchewka et al. (2007); Shen et al. (2006), Elaiza and Geri, (2008), Raaij and Schepers, (2008) and Jong and Wang, (2009) and Abbad et al. (2009), |

| | |
|---|---|
| H14: The relationship between social influence and employee intention will be moderated by age, gender and experience. | Venkatesh et al. (2003), Christina, (2005), Elaiza and Geri, (2008) and Marchewka et al., (2007) |
| H15: Computer self-efficacy will have a significant influence on performance expectancy | Venkatesh & Davis, (2003), Rezaei et al., (2008), Hussein et al., (2007), Hsia and Tseng, (2008) and Jong and Wang, (2009), Friedrich and Hron, (2010) |
| H16: Computer self-efficacy will have a significant influence on effort expectancy. | Chau et al. (2001), Young et al. (2000), Venkatesh (2003), Rezaei et al., (2008), Hussein et al., (2007), Hsia and Tseng, (2008) and Jong and Wang, (2009), Friedrich and Hron, (2010) |
| H17: Computer anxiety will have a significant negative effect on performance expectancy. | Compeau and Higgins (1995), Dadayan and Ferro, (2005), Rezaei et al., (2008), Raaij and Schepers, (2008) and Jong and Wang, (2009) |
| H18: Computer anxiety will have a significant negative effect on effort expectancy. | Compeau and Higgins (1995), Dadayan and Ferro, (2005), Rezaei et al., (2008), Raaij and Schepers, (2008) and Jong and Wang, (2009) |

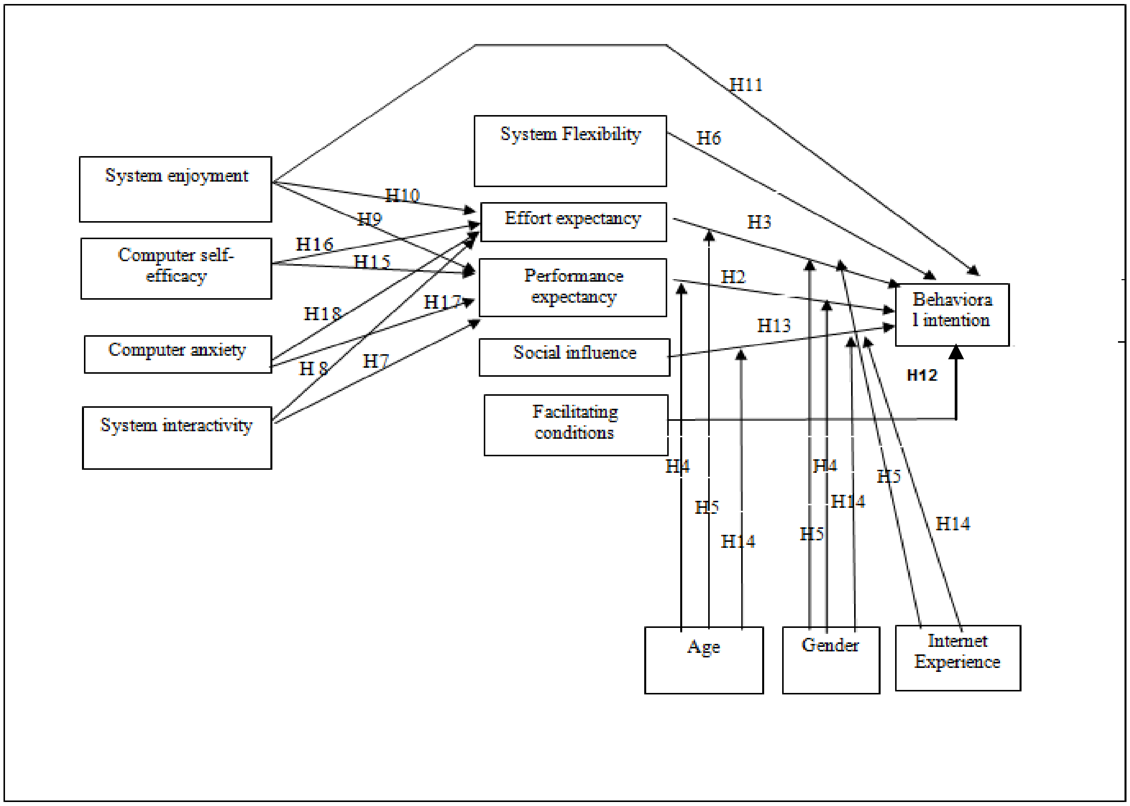


Figure 3.5: The proposed research model

## 3.3 Purpose of Research

According to Yin (1994), the purpose of research can be categorized into exploratory research, descriptive research and explanatory research. Every researcher can use any one of these kinds and apply his/her own personal motivation to conduct an academic study.

### 3.3.1 Exploratory research

This type of research is conducted when the problem is not well known or is not defined clearly, or the real scope of this problem is not clear yet. Exploratory research allows gaining much information regarding a specific problem. Additionally, it helps a researcher to determine data collection method, research design and possibly concludes that the problem does not exist. The information used in exploratory research comes from pilot study, interview, case study, focus group, and projective methods (Khan, 2007; Yin, 1994).

### 3.3.2 Descriptive Research

This type of research is used to gather information regarding a current phenomenon. Such information is related to variables or conditions in a situation. The main goal of a descriptive research is to offer systematic description of a problem that is clear and when a researcher does not need to investigate causal relationship between two variables. This type of research is not suitable to determine the variables that affect or determine a special behavior (Khan, 2007).

### 3.3.3 Explanatory research

Explanatory research is also known as causal research. The main goal of this type of research is to explain the relationships between independent variables and dependent variables. Explanatory research is necessary to show that one variable determines other variable’s value (Zikmund, 1994). Our research purpose and questions reveal that this research is an explanatory research because it collected data from public sector employees in order to investigate the factors that influence employee intention to use computer-based distance training system.

## 3.4 Research Approach

There are two research approaches that used in a scientific research, namely, quantitative research approach and qualitative research approach. Qualitative research uses non-numerical examination to discover the relationships among a phenomenon under observation in order to predict or explain the status of the phenomenon. It uses words, images, or categories to describe the events, while quantitative research uses numbers and statistics presented in figures to explain a phenomenon (Baron & Kenny, 1986; Neuman, 2003). The main building blocks in a quantitative research include dependant variables, which are influenced by other variables, independent variables, which are presumed to cause change on other variables; mediating variables, which explain the mechanism that underlies an observed relationship between an independent variable and a dependent variable and moderating variables, which have contingent effect on the relationship between a dependent and an independent variable (Baron & Kenny, 1986; Neuman, 2003).

This study is a quantitative type as it intends to investigate the relationship of several independent variables and the acceptance of computer-based distance training system by employees of public sector. The dependent variables of the study are behavioral intention and actual use (usage behavior), while the independent variables are facilitating conditions, social influence, anxiety, self-efficacy, flexibility of distance learning, system enjoyment and system interactivity. The mediating variables are performance expectancy and effort expectancy and the moderating variables are gender, age, and experience.

As a quantitative research type, the result will be presented as numbers, statistics, and figures. A quantitative research uses questionnaire and structured interview to collect data from the sample of study (Wozencroft, 2005). A questionnaire is efficient to collect data if the researcher knows how to test his/her study's variables (Sekaran, 2007). Moreover, it covers a big number of respondents and a wide geographical area. Furthermore, respondents can freely respond to the items of the questionnaire at their convenience. Last but not least, distributing questionnaires is not time consuming and the data can be possibly collected in a short period of time (Sekaran, 2007; Wozencroft, 2005). Because the sample of the research is quite big and the respondents are staying in different parts of Jordan, the researcher used questionnaires to examine the acceptance of computer-based distance training system among public sector employees in Jordan.

## 3.5 Research Strategy

A research strategy is a plan that shows how researchers will answer their research questions. This plan includes research objectives derived from the research questions, sources of data, and the constraints that a researcher possibly faces during the study (for example access of data, time, ethical issues, and so on). According to Yin (1994), researchers have to choose any one of five different kinds of research strategies, namely, history, experiment, survey, case study, and archival analysis. The choice of method depends on the research questions.

Yin (1994) used three dimensions to compare five kinds of research strategies. These dimensions are (a) the form of research questions, (b) focus on contemporary versus historical phenomena, and (c) the control an investigator has over actual behavioral events. Table 3.3 shows the comparison among the research strategies based on these dimensions.

Table 3.3: Relevant Situations for Different Research Strategies

| **Strategy** | **Forms of research questions** | **Required control over behavioral system** | **Focus on contemporary events** |
|---|---|---|---|
| Experiment | How, why | Yes | Yes |
| Survey | Who, what, where, how many, how much | No | Yes |
| Archival analysis | Who, what, where, how many, how much | No | Yes/ No |
| History | How, why | No | No |
| Case Study | How, why | No | No |

Source: (Yin, 1994)

The main purpose of this research is to investigate the factors that influence the acceptance of computer-based distance training system by public sector employees. The main question of this study is in the form of what, and it focuses on contemporary event.

Additionally, it does not require control over behavioral events. Thus, the suitable strategy of this study is survey.

## 3.6 Sampling Technique

Many challenges due to time, money and access prevent a researcher to collect data from the entire population of study. Sampling thus gives higher accuracy and faster results. According to Sekaran (2003), there are two techniques of sampling, namely, probability sampling and non-probability sampling.

In contrast to the probability sampling method, the probability of choosing each element from a population as a sample subject is not known. Additionally, when the generalizability is not matter, the non-probability technique is generally used (Samuel et al., 2003). On the other hand, the researchers resort to the non-probability technique when they would obtain preliminary information than generalize their study's findings Sekaran (2003).

In this research, due to some limitations in selecting a random sample of the public employees, for instance with inability to obtain the listing of all public sector employees' names and address, the employees scattered all around the country, a high cost to conduct the study at every ministry, and a hard time to access to certain groups or classes of employees, the researcher has decided to apply a non-probability sampling with convenience sampling technique. This technique is considered fast and easy where public employees can be selected because of their convenient accessibility and proximity to the researcher (Sekaran, 2003).

## 3.7 Population and Sample of Research

The focus of this study is on employees who are working in public sector organizations in Jordan. The total number of public sector's employees in Jordan is approximately 181,775 (CSB, 2009). This number includes 413 employees from the Ministry of Foreign Affairs (MOFA), 8237 employees from the Ministry of Finance (MOF), 3113 employees from Ministry of Industry and Trade (MOIT), 869 employees from the Ministry of Planning and International Cooperation (MPIC), 1678 employees from the Ministry of Tourism and Antiquities (MOTA), 799 employees from Ministry of Municipal Affairs (MOMA), 91237 employees from the Ministry of Education (MOE), 188 employees from Ministry of Public Sector Development (MOPSD), 1426 employees from the Ministry of Energy and Mineral Resources (MOMR), 6965 employees from the Ministry of Public Works (MOPW), 6767 employees from the Ministry of Agriculture (MOA), 8301 employees Ministry of Water and Irrigation (MOWI), 211 employees from the Ministry of Environment (MOEN), 500 employees from the Ministry of High Education (MOHE), 3672 employees from the Ministry of Labour (MOL), 7118 employees from the Ministry of Awqaf and Islamic Affairs (MOAIA), 3155 employees from the Ministry of Social Development (MOSD), 1961 employees from the Ministry of Transport (MOT), 26740 employees from the Ministry of Health (MOH), 2120 employees from the Ministry of Interior (MOI), 3963 employees from the Ministry of Justice (MOJ), 59 employees from the Ministry of

Political Development (MOPD), 379 employees from the Ministry of Culture (MOC), and 1905 from the Ministry of Information and Communication Technology (MOICT).

It would be ideal to conduct the study on the entire population of public employees in Jordan. However, since the population is very large, it is impossible to include every member of the population. A sample of such population was used, which was based on the Yamanes' (1967) equation which reveals that $n = \frac{N}{1 + N(e)^2}$ where n = sample of study, N = population of study, and e (precision) = 0.05. The sample size of this research population, where N is 181,775 employees is therefore determined to be 384.

## 3.8 Data Collection

This survey was conducted on the employees who have worked for 24 Jordanian ministries and stay in different places throughout Jordan and must attend ICDL's traditional training class room. The study was conducted within the period of three months starting from 25 January 2010 to 27 April 2010.

As part of data collection process, it is necessary to visit the public sector departments and ask the employees to fill in the questionnaire. In this stage some challenges had been faced, for instance some managers did agree to offer the list of their employees' name but refused to let their employees spend some time to answer the questionnaires. Similarly, some employees also refused to spend their time to answer the questions; and other reject to answer the questions because they do not know what distance training system is. The response rate was not very impressive. Out of 400 questionnaires being distributed, about 50% of them (200 questionnaires) had been returned. In order to improve the previous response rate, the study gave a chance for the employees who did not return the questionnaire in the first time, to answer the questionnaire at home or during their free time. In other words, about 200 questionnaires had been re-distributed to those employees. This was performed once the researcher has received the employees' telephone numbers, e-mails address, and the department telephone numbers. A follow up was made where the respondents were called to inform them the detail of the study. Consequently, there was an increment in the response rate. Many employees did sent back the questionnaire or submitted by hand.

With the total of 600 questionnaires distributed, only 386 questionnaires were returned, with only 351 questionnaires were usable (64.3%). 21 respondents returned the questionnaire with missing data of more than 30% for each questionnaire. According to Sekaran (2003) the questionnaires that have missing data of more than 25% should be omitted. Additionally, 14 of the respondents returned empty questionnaire. Therefore, only 351 cases have been used for the study analysis.

## 3.9 Instrument Development

The development of an instrument is important to achieve the research questions. In developing the research instrument, the literature provides the basis for instrument development. In this part, the steps followed in instrument development to achieve the research questions will be elaborated.

### 3.9.1 Instrument Development Steps

A scale is a tool or mechanism applied to measure different variables (Sekaran, 2003). In this respect, according to Sekaran (2000), there are four major steps to develop a scale. The first one is to define the constructs and the content domain. The second step includes testing content validity of measurement instrument while the third step involves testing validity and reliability of the instrument items. Finally, after the data has been collected, analysis procedures are applied on the data. This section presents some issues related to scales items, procedures and validation of the study scale development.

The instrument developed for this study began with the review of the literature (step one). The literature reviews provided initial information about the acceptance of distance learning system and acceptance of information system models. In addition to the results of the initial study, which was conducted to support the research problem, the researcher depended on this information to create the research model that reflected the constructs and relationships of interest. Additionally, the literatures also provide information related to the questionnaire items used to measure such constructs (the questionnaire is included in Appendix A), since many studies have investigated the constructs of this research model (see Table 3.4).

Table 3.4: Studies of The Research Model's Constructs

| Factor | Previous Studies |
|---|---|
| Performance Expectancy | Venkatesh et al. (2003), Friedrich and Hron, (2010), Marchewka et al., (2007), Christina, (2005), Jong and Wang, (2009) and Suma et al. (2010) |
| Effort Expectancy | Venkatesh et al. (2003), Marchewka et al., (2007), Christina, (2005), Sheng et al., (2008), Jong and Wang, (2009) and Suma et al. (2010) |
| System Enjoyment | Sheng et al., (2008), Chatzoglou et al. (2009) and Friedrich and Hron, (2010) |
| System Flexibility | Sahin and Shelley(2008), Lim et al., (2008), Hsia and Tseng, (2008), Hermans et al. (2009) |
| System Interactivity | Davis (1989), Abbad, (2009) and Lim et al. (2008) |
| Social Influence | Elaiza and Geri, (2008), Marchewka et al., (2007), Abbad, (2009), Raaij and Schepers, (2008) and Jong and Wang, (2009) |
| Facilitating Conditions | Venkatesh et al. (2003), Dadayan and Ferro, (2005), Marchewka et al., (2007), Lim et al., (2008) and Abbad, (2009) |
| Computer Self-efficacy | Friedrich and Hron, (2010), Rezaei et al., (2008), Hussein et al., (2007), Hsia and Tseng, (2008) and Jong and Wang, (2009) |
| Computer Anxiety | Dadayan and Ferro, (2005), Rezaei et al., (2008), Raaij and Schepers, (2008) and Jong and Wang, (2009) |
| Behavioral Intention | Friedrich and Hron, (2010), Elaiza and Geri, (2008), Marchewka et al., (2007) and Suma et al. (2010) |

Consequently, The questionnaire items of this research were adapted form many studies including Abbad et al. (2009), Chatzoglou et al. (2009), Lime et al. (2008), Sahin and Shelley (2008) and Venkatesh et al. (2003) (see Table 3.5).

Table 3.5: Measures' Resources

| Measure | Survey questions | Source |
|---|---|---|
| PE1 | Using computer based distance learning system (CBDTS) in training will enable me to accomplish my training more quickly | Venkatesh et al. (2003). |
| PE2 | Using CBDTS will improve my training performance. | |
| PE3 | I would find CBDTS useful in my training. | |
| PE4 | Using CBDTS would increase my job productivity. | |
| PE5 | If I use CBDTS, I would increase my chances of getting a raise. | |
| PE6 | Using CBDTS would enhance my job effectiveness | |
| EE1 | Learning to operate CBDTS would be easy for me. | Venkatesh et al. (2003). |
| EE2 | My interaction with CBDTS would be clear and understandable. | |
| EE3 | It would be easy for me to become skillful at using CBDTS. | |
| EE4 | I would find CBDTS easy to be use. | |
| EE5 | I would find it easy to get CBDTS to do what I want to do. | |
| EE6 | I would find CBDTS to be flexible to interact with. | |
| SIN1 | CBDTS will enable me interact with trainers. | Abbad et al. (2009) and Lim et al. (2008) |
| SIN2 | CBDTS will enable me to interact with other trainees. | |
| SIN3 | The communication tools (e-mails, chat room, forum, etc) in the CBDTS are active. | |
| SIN4 | Using communication tools will be beneficial for me. | |
| SIN5 | CBDTS will enable me to send questions and receive answers. | |
| SEN1 | I would find CBDTS to be fun to interact with. | |

| | | |
|---|---|---|
| SEN2 | I would find using of CBDTS to be enjoyable. | Chatzoglou et al. (2009) |
| SEN3 | The actual process of using CBDTS would be pleasant. | |
| SEN4 | The actual process of using CBDTS would be wise. | |
| SEN5 | Using of CBDTS would make the training more interesting. | |
| SF1 | CBDTS allows me to be trained according to my available time. | Sahin and Shelley (2008). |
| SF2 | CBDTS allows me to be trained at home comfortably. | |
| SF3 | In terms of use of time and location, CBDTS is flexible. | |
| SF4 | CBDTS is fit to trainees with different learning capacities. | |
| SI1 | I will use CBDTS if the people who are important to me think I should use it. | Venkatesh et al. (2003). |
| SI2 | I will use CBDTS if the people who influence my behavior think I should use it. | |
| SI3 | I will use CBDTS if the senior management of my business helpful in the use of such system. | |
| SI4 | People in my organization who use such system have more prestige than those do not. | |
| SI5 | In general, I would find my organization has supported using CBDTS. | |
| FC1 | I will use CBDTS if a specific person (group) is available for assistance with CBDTS difficulties. | Venkatesh et al. (2003). |
| FC2 | I have the resources necessary to use CBDTS. | |
| FC3 | I have knowledge necessary to use CBDTS. | |
| FC4 | The CBDTS is not compatible with other system I am using. | |
| FC5 | Given the resources, opportunities and knowledge it takes to use CBDTS, it would be easy for me to use CBDTS. | |
| CSE1 | I am confident to use the CBDTS If I have a lot of time to accomplish the tasks for which the system is provided. | Chatzoglou et al. (2009) |
| CSE2 | I am confident to use the CBDTS if there is no one around to show me how to do it. | |
| CSE3 | I am confident to use the CBDTS as long as someone shows me how to do it | |
| CSE4 | I had used similar packages before this one to do the same job. | |
| CSE5 | I am confident to use the CBDTS if I have just built-in help facility for assistance. | |
| ANX1 | I feel apprehensive about CBDTS using. | Chatzoglou et al. (2009) |

| | | |
|---|---|---|
| ANX2 | I am scared that I cannot access all the training material content with CBDTS. | |
| ANX3 | CBDTS is intimidating me. | |
| ANX4 | I hesitate to use CBDTS for fear of making mistake I cannot correct. | |
| BI1 | I intend to use the CBDTS to improve my training. | Chatzoglou et al. (2009) and Venkatesh et al. (2003). |
| BI5 | I would strongly recommend my colleagues to use CBDTS. | |
| BI3 | I plan to use the CBDTS when it will be implemented. | |
| BI4 | I expect to use the CBDTS when it will be implemented. | |
| BI2 | I predict I would use the CBDTS when it will be implemented. | |

Briefly, the main dimensions for each set of items include performance expectancy, effort expectancy, flexibility of distance learning system, system interactivity, system enjoyment, social influence, facilitating conditions, computer anxiety, computer self-efficacy, and behavioral intention.

Based on the analysis of experts, the initial questionnaire was modified (step two). The next step involves a collection and examining of the data from the research sample to examine the reliability and validity of the questionnaire items (step 3). The results of the data analysis (step 4) are presented in Chapter 5.

In conclusion, the research approach consists of three stages: the first is the literature review as a basis for identifying the research problem, determining the research variables and developing the initial research model. This stage is followed by data collection process where a survey was carried out to examine the proposed model variables determined in the previous stage. The research proceeds with a structured typed of data analysis based on Structural Equation Modeling (SEM). This involves a development and examining a structural model based on the applying SEM.

### 3.9.2 Validity Test

Validity and reliability are concerned with reducing the possibility of getting incorrect answers during the data collection stage. Validity refers to a degree to which the data collection method accurately measures what it is intended to measure (Sekaran, 2003). The common types of validity test to measure the goodness of measures are content validity and construct validity.

#### 3.9.2.1 Content Validity

Content validity refers to the correspondence between the instrument items and the concept. In other word this test is known as face validity. This type of validity is tested by the use of expert judgment and pre-test (Hair et al., 2006). In this research, both tests were carried out to assess the content validity of the research instrument. The first draft of the questionnaire was reviewed by a number of experts and people in the public sector in Jordan. Their comments were later used to improve the questionnaire. A person who has expertise in the Arabic language was sought to help edit the questionnaire after it was translated into the Arabic language from the English language. The experts' comments and the employees' feedback were used to modify the questionnaire.

#### 3.9.2.2 Construct Validity

Construct validity refers to a degree to which measured items (measured variables) represent its intended constructs (latent variables). In this research two kinds of validity test were carried out, to assess the construct validity. They are convergent validity and discriminant validity (Hair et al., 2006). The result of these tests is mentioned in Chapter six, Section 6.5.2 because the tests were carried out using SEM.

### 3.9.3 Reliability Test

Reliability is the extent to which an instrument is without prejudice (bias) and provides consistent measurement across time and variety of items. This research used the common consistency reliability test that is the Cronbach's Alpha (Peter, 1979; Sekaran, 2000. This test was carried out in the pilot study (Section 3.7.3.1).

#### 3.9.3.1 Pilot Test

The pilot test supports the reliability of instrument. The questionnaire of this study was pilot tested with 50 public sector employees who are currently working with several government agencies in Jordan. The simple data set collected from the sample was analyzed using SPSS by executing the Cronbach's Alpha test to examine the reliability of the items in the measurement. Normally, the Cronbach's Alpha values range from 0 to 1. George and Mallery (2003) recommend the following rules regarding the Cronbach's Alpha value. It is excellent if the value is greater than 0.9, good if greater than 0.8, acceptable if greater than 0.7, questionable if greater than 0.6, and poor less than 0.5. Furthermore, the value of the Cronbach's Alpha depends on the number of items in the scales. Thus, high value of Cronbach's Alpha means the internal consistency of the items in the scale is good (Gliem & Gliem, 2003).

Table 3.6 includes the SPSS output that provides item analysis for the performance expectancy factor. This table includes five important columns:

i. First column is Scale Mean if Item Deleted, which describes the average score of the scale after removing an item.
ii. The second column is Scale Variance if Item Deleted. This part shows the scale variance if the item is excluded.
iii. The third column is Corrected Item-Total Correlation provides the correlation coefficient between score of the item and sum of scores of the rest items.
iv. The fourth one is Square Multiple Correlation presents the result of multiple regression equation with concerned items as dependent variable and other items as independent variables.
v. The last column is Cronbach's Alpha if item deleted that shows the value of Cronbach's Alpha if the concerned item is deleted.

Table 3.6 shows that item 5 (PE5) has the lowest corrected item total correlation. If this item is deleted, the overall reliability will rise to .881 (see column 5). Therefore, removing this item will be considered appropriate. The examination of the items of performance expectancy (PE) scale indicates that the reliability (Cronbach's alpa) of the overall scale is 0.874 (Table 3.8).

Table 3.6: Cronbach's Alpha Test for Performance Expectancy

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .874 | .873 | 6 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| PE1 | 16.7400 | 62.931 | .805 | .667 | .829 |
| PE2 | 16.7200 | 64.491 | .783 | .635 | .834 |
| PE3 | 16.6800 | 66.018 | .737 | .562 | .842 |
| PE4 | 16.5800 | 67.514 | .609 | .449 | .865 |
| PE5 | 16.9800 | 74.551 | .484 | .285 | .882 |
| PE6 | 16.8000 | 68.000 | .653 | .462 | .856 |

Table 3.7 shows that the Cronbach's Alpha for effort expectancy (EE) scale is 0.808. It can also be seen that by removing items EE4 the reliability of the scale is enhanced.

Table 3.7: Cronbach's Alpha Test for Effort Expectancy

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .808 | .787 | 6 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| EE1 | 21.1000 | 56.133 | .832 | .933 | .710 |
| EE2 | 20.9200 | 57.463 | .862 | .934 | .706 |
| EE3 | 21.2000 | 59.918 | .768 | .829 | .729 |
| EE4 | 21.7800 | 85.114 | .081 | .597 | .865 |
| EE5 | 21.5400 | 83.723 | .717 | .805 | .712 |
| EE6 | 20.9600 | 55.427 | .812 | .891 | .713 |

The Cronbach's Alpha values for all factors are mentioned in Table 3.8 and in Appendix D. In summary, the Cronbach's Alpha of all constructs are greater than 0.8 (good). Thus, all variables are considered reliable for the whole study.

Table 3.8: Summary of Reliability Values of All Constructs

| Constructs | Cronbach's Alpha |
|---|---|
| Performance expectancy | .874 |
| Effort expectancy | .808 |
| System Enjoyment | .906 |
| Flexibility of distance learning | .920 |
| Social influence | .891 |
| Facilitating conditions | .934 |
| Computer self-efficacy | .932 |
| Computer anxiety | .931 |
| System interactivity | .936 |
| Behavioral intention | .943 |

## 3.10 Final Instrument

The final questionnaire used to collect data from the sample of study consists of 11 sections:

**Section 1** consists of employee background and comprised seven questions related to employee gender, age, regular use of computer, Internet accessibility, Internet usability and distance learning system usability.

**Second 2** includes Seven-point Likert Scale with six questions regarding performance expectancy of computer-based distance training system, for example, "using computer-based distance learning system (CBDTS) in training will enable me to accomplish my training more quickly".

**Section 3** contains Seven-point Likert Scale with six questions regarding effort expectancy of computer-based distance training system, for example, "I would find CBDTS easy to be used".

**Section 4** comprises Seven-point Likert Scale with five questions regarding interactivity of computer-based distance training system, such as, "CBDTS will enable me to interact with trainers".

**Section 5** includes Seven-point Likert Scale with five questions regarding enjoyment computer-based distance training system, such as, "I would find CBDTS to be fun to interact with".

**Section 6** comprises Seven-point Likert Scale with four questions regarding flexibility of computer-based distance training system, such as, "CBDTS allows me to be trained according to my available time".

**Section 7** has Seven-point Likert Scale with five questions regarding social influence of computer-based distance training system, such as, "I will use CBDTS if the people who are important to me think I should use it".

**Section 8** includes Seven-point Likert Scale with five questions regarding facilitating conditions of computer-based distance training system, for example, "I have the resources necessary to use CBDTS".

**Section 9** contains Seven-point Likert Scale with five questions regarding computer self-efficacy of computer-based distance training system, such as, "I am confident to use the CBDTS if I have just built-in help facility for assistance".

**Section 10** includes Seven-point Likert Scale with four questions regarding computer anxiety such as "I feel apprehensive about CBDTS using".

**Section 11** has Seven-point Likert Scale with five questions regarding user intention to use the computer-based distance training system, for example, "I predict I would use the CBDTS when it will be implemented".

## 3.11 Survey Administration

The researcher administrated the questionnaire himself to obtain high response rate. The questionnaires were made available on a paper form and were sent and received through email. As mentioned in Chapter Three, personal administration of the questionnaires provides a researcher with many advantages, for instance, it allows the researchers to collect data in a short period of time. Based on the pilot test, employees need an average of 15 minutes to fill the questionnaire.

## 3.12 Conclusion

This chapter presents the research's decision to extend UTAUT to cover three factors; system factor, individual factor and implementation environment factor, to investigate the acceptance of computer-based distance training system by employees of public sector. Computer anxiety and computer self-efficacy have been added to measure the individual factor. In addition to the effort expectancy and performance expectancy this study also has added other three critical success variables for e-learning acceptance by the employees under the system factor. These variables are flexibility of distance learning, system enjoyment, and system interactivity. Finally, social influence and facilitating conditions have been used to examine the implementation environment factor. Therefore, eighteen hypotheses were formulated in achieving the research's objectives.

This chapter furthermore discusses the research methodology applied to achieve the research objectives. It presents the research as an explanatory and quantitative research with a survey as a suitable approach for data collection to achieve the research objective. Consequently, the instrument for data collection was prepared as a questionnaire was provided in Appendix A. The validity and reliability of the instrument and its items were tested through the pre- and pilot tests. The items of instrument were improved based on the tests, and the modifications were made including rewording and adding some items. The result of data analysis and the result of hypotheses testing will be presented in the next chapter.

# CHAPTER FOUR

# DATA ANALYSIS AND RESULTS

This chapter presents the results of data analysis which was carried out by applying AMOS 16.0 and SPSS 16.0. It starts with description of the analysis associated with respondents' profile, followed by the results of data quality tests, including the results of missing data test, outlier test and data normality test. Additionally, the chapter provides the results of the test of the proposed research model and how the research model fits with the data. Finally, the chapter discusses the results of the hypotheses testing, with the impact of the moderators.

## 4.1 Data Analysis Method

One of the research objectives is to propose an acceptance model of computer-based distance training system that best describes public sector employee intention to use such technology (Section 1.3). In achieving this objective, Structural Equation Model (SEM) was considered a suitable data analysis method toward the end. According to Byrne (2006), a proposed model should be substantively meaningful and statistically well fitting. In addition, SEM has potential to analyze multiple relationships between independent and dependent variables simultaneously, in contrast to other generation regression models (such as liner regression, ANOVA, and MANOVA), which, can analyze only one causal relationship at a time (Gerbing & Anderson, 1988). The model generated from SEM is also known as a model of relationships because it figures all the relationships between the exogenous (dependant variables) and endogenous (independent variables) variables (Sharma, 1996).

Furthermore, one of the most advantages of SEM is the use of confirmatory factor analysis that can examine measurement error by using multiple indicators per latent variable, model mediating variables, examine the model overall as a one unit, handle difficult data such as incomplete data and non-normal data, and examine models with multiple endogenous variables.

With regards to the acceptance of e-learning system literatures, several recent studies had adopted SEM techniques to examine the acceptance of e-leaning system including Abbad et al. (2009), Chatzoglou et al. (2009), Saade et al. (2007), and Walclzak and Scott (2009). Finally, there are six steps in the SEM analysis including input data in SPSS, screening and cleaning data, confirmatory factor analysis (CFA), developing structural model, modification of structural model, and producing model fit (Hair et al., 2010).

## 4.2 Data Analysis Strategy

Data analysis strategy is a general plan of how the researcher will analyze the data that he/she has collected. In this study, the data analysis was carried out in five stages. The first stage focused on the analysis of the demographic information. The second stage presented the data quality (data management) by conducting three tests including missing data test, outliers test, and normality test. The third stage focused on the reliability and validity of measurement (goodness of data) by examining the composite reliability, convergent validity, and discriminant validity. Subsequently, measurements of model fit were applied in stage four to measure the fit of proposed model with the collected data. Finally, path coefficient (not equal to zero), critical ratio (recommended value is > 1.96) and P-value (recommended value is < 0.05) had been used to test the study's hypotheses in stage five (Hair et al., 2010).

## 4.3 Respondents' Profile

This section presents demographic information of all respondents. In total, the study has distributed 600 questionnaires to public sector employees from 24 ministries. After the given time frame, however only 351 respondents have correctly returned the valid questionnaires, giving a response rate of 58.5%. Table 4.1 shows the demographic information of all respondents. The majority of the respondents are women (64%) a large proportion of them (43%) are between 26 and 35 old years, while the rest are distributed among 36-45 old years (25 %), under 25 (24%), and above 45 (8%). In terms of having a computer, 85.5% of the participants have computer for a regular use, while 14.5% do not have. Additionally, 68% of those respondents indicated that they have Internet access, in which 59.2 % of them have high speed network and 9.1% have low speed network. In terms of Internet usage, 37% indicated that they frequently use the Internet and approximately 30% have never used the Internet. About 33% of the participants reported that they spend many hours daily being connected to the Internet.

Regarding to e-learning system usage, 35.6% noted that they have experience on the e-learning systems, since they used some e-learning systems before, especially in the education field.

Table 4.1: Respondents Profile Summary

| **Items** | | **Frequency** | **percent** | **Cumulative percent** |
|---|---|---|---|---|
| **Gender** | | | | |
| | Male | 126 | 35.90 | 35.9 |
| | Female | 225 | 64.10 | 100 |
| | Total | 351 | 100 | |
| **Age** | | | | |
| | Under 25 | 84 | 23.93 | 23.9 |
| | 26-35 | 152 | 43.30 | 67.2 |
| | 36-45 | 87 | 24.79 | 92 |
| | Over 45 | 28 | 7.98 | 100 |
| | Total | 351 | 100 | |
| **Having a computer** | | | | |
| | Yes | 300 | 85.470 | 85.5 |
| | No | 51 | 14.53 | 100 |
| | Total | 351 | 100 | |
| **Internet access** | | | | |
| | Yes | 240 | 68.38 | 68.4 |
| | No | 111 | 31.62 | 100 |
| | Total | 351 | 100 | |

| | | | | |
|---|---|---|---|---|
| **Internet type** | | | | |
| | Dial up | 32 | 9.10 | 9.1 |
| | High speed | 216 | 61.50 | 70.7 |
| | No link | 103 | 29.40 | 100 |
| | Total | 351 | 100 | |
| **Internet use** | | | | |
| | Spent many hours | 117 | 33.37 | 33.3 |
| | Frequently | 130 | 37.00 | 70.4 |
| | Never | 104 | 29.63 | 100 |
| | Total | 351 | 100 | |
| **e-learning system use** | | | | |
| | Yes | 125 | 35.6 | 35.6 |
| | No | 226 | 64.4 | 100 |
| | Total | 351 | 100 | |

## 4.4 Data Management

The collected data must be accepted during the data management procedures before proceeding for further analysis. With regards to data management, the collected data should be examined for the errors (Pallant, 2005). Therefore, in this step of data analysis, the collected data were examined to assure that they are suitable for further analysis by using missing data analysis, outlier detection and multivariate normality test (Hair et al., 2006).

### 4.4.1 Missing Data Analysis

Two types of missing data analysis were carried out. Firstly, missing data were examined by reviewing the data of each employee two cases had missing data for four items (8%) and two items (4%), but these were below the cutoff rate, and they were retained.

The second type of missing data analysis was carried out by reviewing the missing data across each variable. During this analysis, five variables found to have missing data. The first one had missing data in two cases, and each one of the other variables had missing data in one cases. Overall, for 351 cases across 50 variables, there are six missing items (Appendix E). These items were addressed by calculating the average (mean) of the data from the cases where the complete data is available (Sekaran, 2003).

### 4.4.2 Outliers

The second step after the data missing analysis is examining the multivariate outliers, which means that ensuring that the extreme answers of respondents on a set of variables will not distort the overall results (Tabachinck & Fidell, 2007). The data were examined for multivariate outliers using SPSS by calculating Mahalanobis distance for each respondent. In this regard, according to Tabachinck and Fidell (2007), the Mahalanobis distance is the distance of one observation from the centroid of the rest of observations, where the centroid is the means of all the variables.

In this study, after Mahalanobis distance ($D^2$) was calculated for each case, it was compared with chi-square value ($X^2$), where chi-square value = $X^2(50, 0.001)$ = 86.66 (see Appendix F, Table 1.0) (Hair et al., 2006). As the result of this test, all the cases were found without multivariate outlier, since $D^2$ of each case < $X^2$ (86.66). Therefore, 351 cases are still for further analysis (see Appendix L, Table 2.0).

### 4.4.3 Normality Assessment

The last data management step is associated with examining data normality i.e. whether a set of data is normally distributed. The data collected from this research sample were tested for normality by applying univariate and multivariate normality tests. Z skewness and Z kurtosis are two normal tests for univariate analysis, where it is recommended that the value of Z skewness is less than 2 (-2) (preferable) or 3 (-3), while Z skewness = critical ratio (cr) = skewness stat/ std error, and the recommended value of Z kurtosis (cr) is less than 7 (-7), while, Z kurtosis = kurtosis stat/ std error (Coakes & Steed 2003). Appendix F presents the results of the univariate normality test for each respondent. A negative value for skewness means a negative skew, while a positive one means a positive skew. A negative kurtosis means flatter distribution, while a positive value means that the distribution is peaked (Coakes & Steed 2003). With regards to multivariate normality that depends on Structural Equation Model (SEM), a value of Mardia's coefficient must be greater than 1.96 and P-value equal or greater than 0.05.

The statistical results mentioned in Appendix F show that the minimum value is 1 (column 2), which means that some of respondents disagreed with this item, and the maximum value is 7 (column 3), which indicates that some respondents agreed with this item. Additionally, these results mentioned in column 2 and 3 indicate that no out-of-range responses had been entered since all items are seven-point scaled. Furthermore, column 4 shows that the range of mean for all variables fall between 3.45 and 4.69. The response above the average indicates that the respondents agreed with computer-based distance training system items. With regards to univariate normality test, the values of Z skewness for all the variables are less than 2 (-2) or 3(-3) (column 9) and Z kurtosis less than 7 (-7) (column 12), which means that the set of data was normally distributed.

## 4.5 Validity and Reliability

As previously mentioned, the **v**alidity and reliability of the instrument are concerned with reducing the possibility of getting incorrect answers during the data collection stage, and testing goodness of data. Validity refers to a degree to which the data collection method accurately measures what it is intended to measure (Sekaran, 2003), whereas reliability refers to the degree to which the instrument is free from error and therefore yields consistent results.

In this research, many steps had been carried out to measure the reliability, content validity and construct validity of the research instrument. In the first step, the reliability of the instrument items was tested using composite reliability. Then, convergent validity test was carried out to measure construct validity. Lastly, discriminant validity was also conducted to establish construct validity test. In the flowing sections all of these tests will be described in more detail. With regards to content validity, the procedure is detailed in Chapter three, Section 3.9.2.1 using pre-test and expert judge.

### 4.5.1 Reliability Analysis

Reliability is the extent to which an instrument is without prejudice (bias) and provides consistent measurement across time and in variety of items. In the other words, it is the extent to which the research offers the same findings, if it will be repeated at a later time, or with different sample members. The consistency reliabilities of the measurement items were examined using the most common tests including Composite Reliability (CR) and Cronbach's Alpha (CA) (George & Mallery, 2003; Hair et al., 2006; Sekaran, 2003).

Cronbach's Alpha was used in the pilot test to measure the reliability of the measurement items with 50 cases. Composite reliabilities were tested later to examine the reliability of the measurement items with 351 cases during the procedures of data analysis. Table 4.2 presents the values of composite reliabilities for all measurement items (Appendix H contains all the data used to calculate the composite reliabilities, where the composite reliability CR = $(\sum \text{standardized loading})^2 / (\sum \text{standardized loading})^2 + \sum \epsilon j$, where $\epsilon$ is errors ). With respect of composite reliability and Cronbach's Alpha value, George and Mallery (2003) indicated that reliability greater than 0.9 is considered to be excellent, greater than 0.8 is good, greater than 0.7 is acceptable, greater than 0.6 is questionable, and less than 0.5 is poor. Additionally, Sekaran (2000) indicated that the closer the reliability gets to one the better it is. The results indicated that all reliabilities based on the composite reliability test are greater than 0.9, which is considered to be excellent. Therefore, the research measure is good and accurate.

Table 4.2: Summary of Composite Reliability

| **Observed variables** | **Std loading** | **Std loading2** | **Error** | **Composite reliability** |
|---|---|---|---|---|
| PE2 | 0.954 | 0.910 | 0.022 | |
| PE3 | 0.961 | 0.924 | 0.025 | |
| PE4 | 0.958 | 0.918 | 0.022 | |
| Performance expectancy | 2.873 | 2.752 | 0.069 | 0.97 |
| EE5 | 0.962 | 0.925 | 0.022 | |
| EE6 | 0.969 | 0.939 | 0.024 | |
| Effort expectancy | 1.931 | 1.864 | 0.046 | 0.976 |
| FC1 | 0.935 | 0.874 | 0.029 | |
| FC2 | 0.957 | 0.916 | 0.029 | |
| FC3 | 0.948 | 0.899 | 0.031 | |
| FC5 | 0.928 | 0.861 | 0.032 | |
| Facilitating conditions | 3.768 | 3.550 | 0.121 | 0.96 |
| SI3 | 0.981 | 0.962 | 0.078 | |
| SI4 | 0.884 | 0.781 | 0.065 | |
| Social influence | 1.865 | 1.743 | 0.143 | 0.9 |
| SE1 | 0.961 | 0.924 | 0.027 | |
| SE2 | 0.950 | 0.903 | 0.025 | |
| System enjoyment | 1.911 | 1.827 | 0.052 | 0.972 |

| | | | | |
|---|---|---|---|---|
| SF1 | 0.972 | 0.945 | 0.022 | |
| SF2 | 0.960 | 0.921 | 0.022 | |
| SF4 | 0.901 | 0.812 | 0.025 | |
| System flexibility | 2.833 | 2.678 | 0.069 | 0.975 |
| CSE1 | 0.980 | 0.960 | 0.026 | |
| CSE3 | 0.944 | 0.891 | 0.025 | |
| Computer self-efficacy | 1.924 | 1.851 | 0.051 | 0.973 |
| ANX1 | 0.977 | 0.955 | 0.015 | |
| ANX2 | 0.987 | 0.974 | 0.015 | |
| ANX3 | 0.984 | 0.968 | 0.015 | |
| ANX4 | 0.957 | 0.916 | 0.020 | |
| Computer anxiety | 3.905 | 3.813 | 0.065 | 0.983 |
| SIN1 | 0.937 | 0.878 | 0.031 | |
| SIN2 | 0.927 | 0.859 | 0.028 | |
| SIN3 | 0.955 | 0.912 | 0.029 | |
| System interactivity | 1.864 | 1.737 | 0.088 | 0.95 |
| BI1 | 0.943 | 0.889 | 0.023 | |
| BI2 | 0.961 | 0.924 | 0.022 | |
| BI3 | 0.966 | 0.933 | 0.025 | |
| Behavioral intention | 2.870 | 2.746 | 0.070 | 0.975 |

### 4.5.2 Validity Analysis

The second step to measure the goodness of data is validity test, where validity refers to the extent to which the data collected from the sample of study reflect the phenomenon under consideration. In the second step of examining the goodness of measures, two most popular validity tests were run i.e. content validity and construct validity. Content validity is presented in Chapter 3 (Section 3.9.2.1). Typically, this section will address two types of construct validity, which refers to a degree to which measured items (measured variables) represent their intended constructs (latent variables). They are convergent validity and discriminant validity (Hair et al., 2010).

#### 4.5.2.1 Convergent Validity

Convergent validity refers to the degree to which a measure of a specific construct converges or shares a high proportion of variance in common (Hair et al., 2010). This type of validity is carried out for this research not only by Confirmatory Factor Analysis (CFA) and Composite Reliability, but also by Average Variance Extracted (AVE). The values of Composite Reliability (CR) for each construct were quite high because all values exceeded 0.9 (Table 4.2). Furthermore, factor loading for each observed variable (item) was greater than 0.8 (Table 4.2), while the recommended value of it is above 0.5 (ideally > 0.7). With regards to AVE test, the value of AVE was 0.97 (Appendix D), while the recommended value for AVE is greater than 0.5. The results from the three tests indicate that the instrument has high convergent validity.

#### 4.5.2.2 Discriminant Validity

As previously mentioned, discriminant validity is one way of examining construct validity other than convergent validity**.** Discriminant validity refers to a specific variable (construct) that is truly distinct from other variables (constructs) (Hair et al., 2010). The discriminant validity test is carried out when exogenous constructs have large correlation. But although the exogenous variables in this research have relative low correlation values (less than 0.8 or 0.9) (Holmes et al., 2006) (see Table 4.3), the discriminant validity was carried out any way by calculating Average Variance Extracted (AVE) for each pair of constructs and comparing its value with square of correlation between such constructs. The results of this test indicated that all AVE values are less than the correlation square values for all pairs of variables (Fornell & Lacker, 1981) (see Appendix G, generated from AMOS analysis). Thus, it can be said that all the research constructs are different from one another.

Table 4.3: Exogenous Correlations

| | | | Estimate |
|---|---|---|---|
| ANX | <--> | CSE | -.797 |
| CSE | <--> | FC | .750 |
| ANX | <--> | FC | -.737 |
| FC | <--> | SF | .789 |
| CSE | <--> | SF | .770 |
| ANX | <--> | SF | -.781 |
| SF | <--> | SI | .333 |
| FC | <--> | SI | .349 |
| CSE | <--> | SI | .338 |
| ANX | <--> | SI | -.317 |
| ANX | <--> | SIN | -.576 |
| CSE | <--> | SIN | .617 |

| | | | Estimate |
|---|---|---|---|
| FC | <--> | SIN | .581 |
| SF | <--> | SIN | .584 |
| SI | <--> | SIN | .343 |
| SIN | <--> | SEN | .567 |
| ANX | <--> | SEN | -.791 |
| CSE | <--> | SEN | .795 |
| FC | <--> | SEN | .765 |
| SF | <--> | SEN | .793 |
| SI | <--> | SEN | .300 |

Additionally, the measures of fit mentioned under the model in Figure 4.1 indicated that the exogenous model fits the data very well, since $X^2$ (chi-square)/ df (degrees of freedom) is less than 3, GFI $> 0.9$; CFI $> 0.9$, RAMSEA $< 0.8$ (Bollen, 1998; Bollen & Liang, 1988; Browne & Cudeck, 1993; Smith & McMillan, 2001). Consequently, five items were deleted to make this model fit the data.

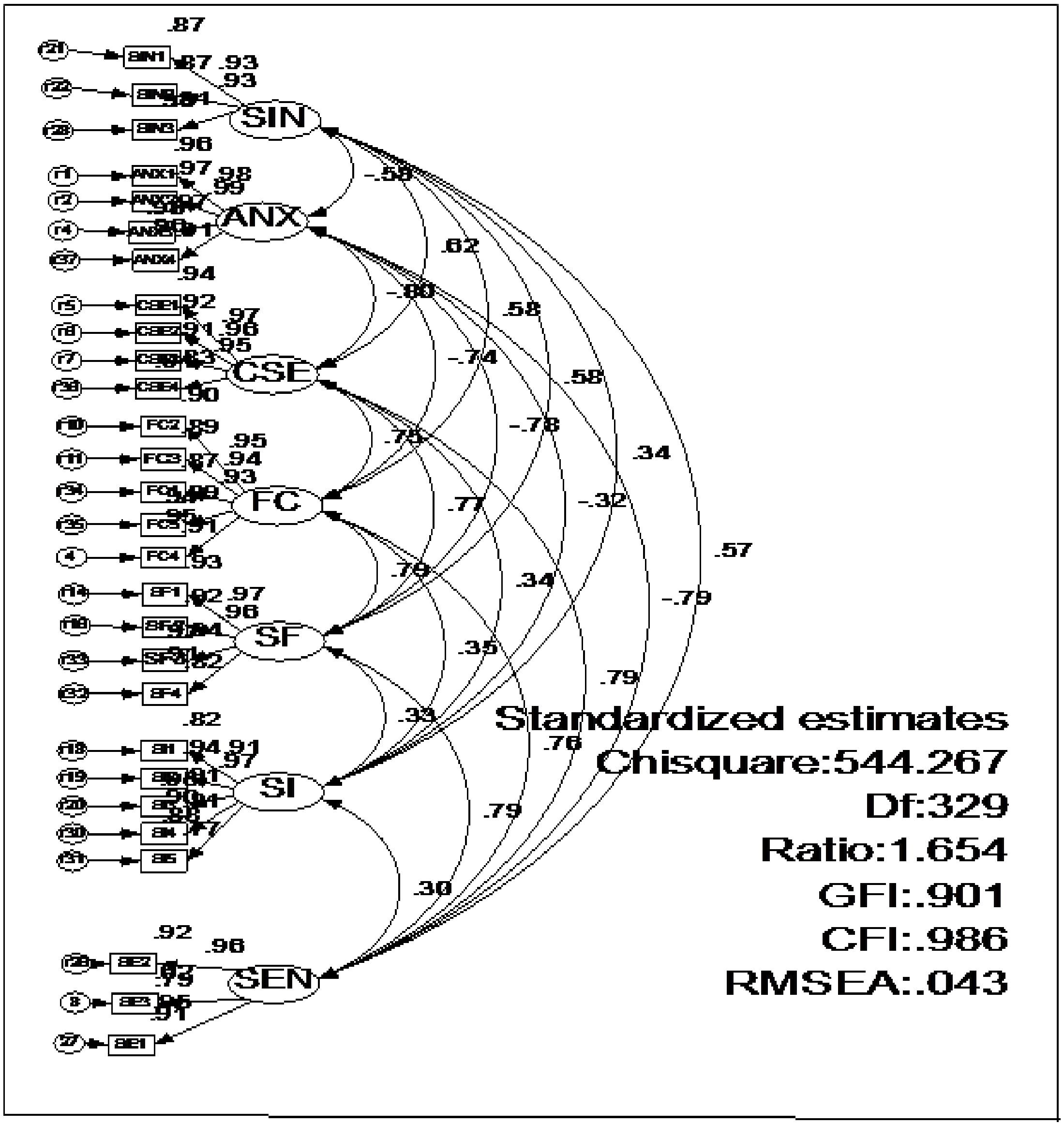


Figure 4.1: Exogenous correlations

## 4.6 Measure of Research Model Fit

To measure how fit is the research model with the collected data, and to test the first hypothesis in this research, many fit measures have been applied before structural model analysis.

Such measures are grouped into various kinds namely (i) measures of parsimony, in which the number of parameters must balance with degrees of freedom or else many parameters and few degrees of freedom indicate lacking of parsimony. When this happens, degrees of freedom (df) is used to measure parsimony; (ii) minimum sample discrepancy function, which is known as CMIN. It includes chi-square because chi-square is used to measure how many of the implied moments and sample moments are discerned; (iii) measures based on population discrepancy. This kind of measure uses population root square error of approximation (RAMSEA) in a model evaluation; (iv) comparison to baseline model that includes three indicators, normed fit index (NFI), Tucker-Lewis coefficient (TLI) and comparative fit index (CFI); (v) GFI and related measures that include goodness-of fit index (GFI) and adjusted goodness-of-fit index (AGFI) (Arbukle, 2005; Bollen & Stine, 1992; Browne & Cudeck, 1993; Byrne, 2006). Table 4.4 presents the values of the fit measures in this research and their indications.

Five common measures were used for models analysis including $X^2$/ df, GFI, CFI, REMSEA, and TLI (Holmes-smith, 2006). Table 4.4 reveals that this research model is a very fit model because all measures fit are within the ranges of the recommended values (all the test results were generated from Amos 16.0, and mentioned in Appendix H Section 2).

Table 4.4: Fit Measures

| **Measures** | **Research value** | **Recommended values** |
|---|---|---|
| Chi-square ($X^2$) | 348.9 | P > 0.05 indicates an acceptable fit. |
| P-Value | 0.074 | A value > 0.05 |
| $X^2$ / df | 1.118 | A value < 3 indicates a good fit |
| | | A value < 1 indicates over fit model. |
| CFI | 0.998 | A value >0.9 indicates a very good fit. |
| TLI | 0.997 | Close to one indicates a very good fit |
| | | Greater than one indicates over fit model |
| NFI | 0.978 | 0< value < 1 indicates fit model. |
| GFI | 0.937 | A value > 0.9 indicates a very good fit. |
| AGFI | 0.918 | A value > 0.9 indicates a good fit. |
| RAMSEA | 0.018 | A value <0.08 indicates fit of the model. |

Table 4.5 shows the chronologies of examining the goodness of the research integrated model fit. Five items were deleted to make the exogenous model fit and eight items were deleted to make the endogenous model fit, while eight items were deleted to make the generated model (includes endogenous and exogenous models) fit. In total, 21 items were excluded due to model fit and 29 items were still remained for further analysis.

Table 4.5: Chronologies to Goodness of Exogenous, Endogenous and Integrated Model

| **Models** | | **$X^2$/df** | **GFI** | **CFI** | **RMSEA** | **P-Value** |
|---|---|---|---|---|---|---|
| Exogenous model | | | | | | |
| Deleted | SIN4 | 3.589 | 0.785 | 0.938 | 0.086 | 0 |
| Deleted | CSE5 | 3.438 | 0.802 | 0.944 | 0.083 | 0 |
| Deleted | SIN5 | 3.045 | 0.82 | 0.955 | 0.076 | 0 |
| Deleted | SE5 | 2.407 | 0.861 | 0.969 | 0.063 | 0 |
| Deleted | SE4 | 1.654 | 0.901 | 0.986 | 0.043 | 0 |
| Generated model | | | | | | |
| Deleted | FC4 | 1.579 | 0.883 | 0.985 | 0.041 | 0 |
| Deleted | BI4 | 1.484 | 0.891 | 0.988 | 0.037 | 0 |
| Deleted | SE3 | 1.426 | 0.899 | 0.99 | 0.035 | 0 |
| Deleted | SI5 | 1.351 | 0.907 | 0.992 | 0.032 | 0 |
| Deleted | SF3 | 1.326 | 0.911 | 0.992 | 0.031 | 0 |
| Deleted | SI1 | 1.338 | 0.914 | 0.993 | 0.031 | 0 |
| Deleted | CSE4 | 1.309 | 0.92 | 0.993 | 0.03 | 0.014 |
| Deleted | CSE2 | 1.118 | 0.937 | 0.998 | 0.022 | 0.074 |
| Endogenous | | | | | | |
| Deleted | PE1 | 9.296 | 0.737 | 0.915 | 0.154 | 0 |
| Deleted | PE6 | 7.387 | 0.821 | 0.939 | 0.135 | 0 |
| Deleted | PE5 | 5.741 | 0.861 | 0.959 | 0.116 | 0 |
| Deleted | BI5 | 5.621 | 0.879 | 0.953 | 0.115 | 0 |
| Deleted | EE2 | 5.88 | 0.885 | 0.964 | 0.118 | 0 |
| Deleted | EE3 | 5.73 | 0.889 | 0.965 | 0.117 | 0 |
| Deleted | EE1 | 5.683 | 0.906 | 0.974 | 0.116 | 0 |
| Deleted | EE4 | 1.605 | 0.977 | 0.997 | 0.042 | 0.031 |

## 4.7 Computer-based Distance Training System Acceptance Model (CBDTSAM)

The research proposed a model of acceptance was adapted from Unified Theory of Acceptance and Use Technology (UTAUT), which includes seven exogenous variables (system interactivity, system enjoyment, system flexibility, computer anxiety, computer self-efficacy, social influence and facilitating conditions), and three endogenous variables (performance expectancy, effort expectancy and employee intention to use computer-based distance training system). The endogenous variables (dependant variables) are influenced by exogenous variables (independent variables). But the exogenous variables are not influenced by other variables (Arbuckle, 2005).

It has been mentioned earlier that that the research proposed model fits the collected data very well. Therefore, it will be called computer-based distance training system acceptance model. Analysis of the generated model includes two steps. In the first step, the impact of exogenous variables on endogenous variables was tested. Fourteen hypotheses were tested without consideration of effect of the moderator variables. The effect of moderator variables on the relationships between endogenous and exogenous variables was considered in the next step.

In the first step, fourteen hypotheses were tested for the generated model. Although all sample correlations were less than eight, the initial proposed model did not fit the data well because GFI is less than 0.9, RMSEA greater than .08 and P-value equal to 0.00 (P-value is significant at 0.05 level) (Bollen & Stine, 1992). Therefore, the modification indices that help to enhance the model fit indicated that three new paths should be included within the model. They are between system flexibility and performance expectancy; between facilitating conditions and effort expectancy; and between performance expectancy and effort expectancy (Table 4.6). To make the model fit further, many items were removed (Table 4.5). Consequently, as a result of the previous SEM analysis, the integrated model was produced. This model is called the Computer-based Distance Training Acceptance Model (Figure 4.2) that will have the power to demonstrate the usage behavior and predict employee intention to use computer-based distance training system.

Table 4.6: New Paths

| Paths | | | M.I. | Par Change |
|---|---|---|---|---|
| EE | <--- | FC | 34.952 | 0.128 |
| PE | <--- | SF | 11.361 | 0.081 |
| PE | <--- | EE | 20.433 | 0.123 |

The final generated model presents 16 paths between employee intention and the indicators (Figure 4.2). The 16 paths were statistically significant at 0.01, 0.001 and 0.05 levels of significance (the path coefficient is statistically significant only when P-value $< 0.05$, 0.01 or 0.001) (see Table 4.8 and Figure 4.2). The model also reveals varying explanations for employee intention. The squared multiple correlations of a variable represent the variance that is accounted for by its predictors (Arbukle, 2005).

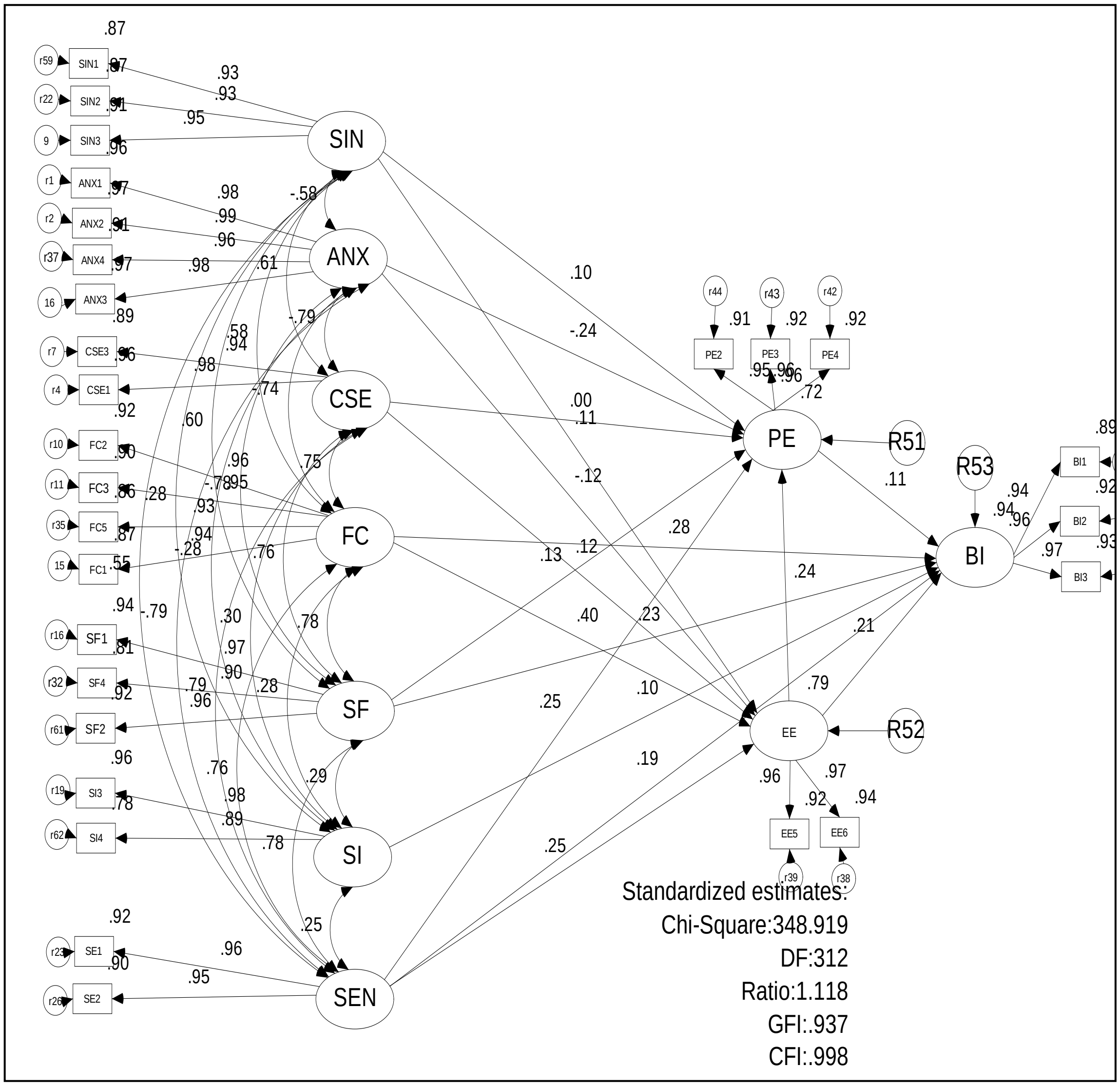

Figure 4.2: Computer-based distance training system acceptance model

The indicators including system interactivity, system enjoyment, system flexibility, social influence, facilitating conditions, computer anxiety and computer self-efficacy account for a significant variance in the dependant variables, with high degree of explanation for performance expectancy, effort expectancy and employee intention. This is because the statistical results indicated that (i) the variance of effort expectancy is 0.795 (Table 4.7); (ii) the variance of performance expectancy is 0.724 (Table 4.7); and (iii) the variance of employee intention is 0.835 (Table 4.7).

Table 4.7: Squared Multiple Correlation

| Dependent variables | Estimate |
|---|---|
| EE | .795 |
| PE | .724 |
| BI | .835 |

## 4.8 Hypotheses Discussion

As previously mentioned, estimation coefficient for each path, critical ratio and significant level (alpha) were used to explain the research hypotheses, since the estimate coefficient must be different from zero, critical ratio greater than 1.96 and the level of significant must be less than 0.05, 0.01 or 0.001 (Hair et al., 2010). In this research the first hypothesis (H1) indicates that the proposed model will be valid for explaining the data related to employee intention to use computer-based distance training system. This hypothesis was supported because all measures of it were achieved (see Table 4.4).

### 4.8.1 System Factor Hypotheses

The second hypothesis (H2), which states that performance expectancy will have a significant effect on employee intention to use computer-based distance training system, is accepted because the statistical result showed that there is significant relationship at 0.001 level ($.113^{***}$, $P< 0.001$) (Table 4.8 and Figure 4.3).

The third hypothesis (H3) testing revealed that effort expectancy has a significant effect on employee intention to use computer-based distance training system. This hypothesis is accepted because the statistical result indicated that such hypothesis is significant (.212$^{***}$, $P< 0.001$) (Table 4.8 and Figure 4.3). In relation to H4 and H5 the explanation of these two hypotheses will be explained in the next section (multiple group analysis), since they are related to moderator variables.

The sixth hypothesis (H6) claims that there is a significant relationship between flexibility of computer-based distance learning and employee intention to use computer-based distance training system. This hypothesis is accepted because the statistical result has supported this relationship (.23$^{***}$, $P< 0.001$) (Table 4.8 and Figure 4.3).

The seventh hypothesis (H7) testing indicated that system enjoyment has a significant impact on employee intention to use computer-based distance training system. This hypothesis was supported by statistical result because the path (0.187$^{***}$, $P< 0.001$) is significant at 0.001 level. The eighth hypothesis (H8), which states that system enjoyment has a significant impact on perceived performance expectancy, was also supported by the result (see Table 4.8) because the path (0.251$^{***}$, $P< 0.001$) is significant at 0.001 level. Further, the statistical result supported the relationship between system enjoyment and effort expectancy (H9) since the path (0.25$^{***}$, $P< 0.001$) is significant at 0.001level (Table 4.8 and Figure 4.3).

System interactivity refers to the degree to which employees believe that computer-based distance training system can provide interactive communication between members of organizations and trainees and between trainees themselves. This study provide evidence that there is a significant relationship ($.100^{*}$, $P< 0.05$) (Table 4.8 and Figure 4.3) between system interactivity and performance expectancy (H10), and between system interactivity and effort expectancy (H11) since the path ($0.113^{**}$, $P< 0.01$) is significant at 0.01level (Table 4.8 and Figure 4.3).

### 4.8.2 Implementation Environment Factor Hypotheses

The twelfth hypothesis (H12) testing revealed that facilitating conditions have a significant effect on employee intention to use computer-based distance training system. This hypothesis was accepted because the statistical result showed that there is a significant relationship ($0.284^{***}$, $P< 0.001$) at 0.001 level (Table 4.8 and Figure 4.3). The thirteenth hypothesis (H13) indicates that there is a significant relationship between social influence and employee intention to use computer-based distance training system. Statistical result found that a significant relationship exist ($.096^{***}$, $P< 0.001$) (Table 4.8 and Figure 4.3). The next hypothesis H14 will be explained in the multiple group analysis section since it relates to moderator variables.

### 4.8.3 Individual Factor Hypotheses

The fifteenth hypothesis (H15), which states that computer self-efficacy has a significant relationship with performance expectancy, was rejected due to insignificant result (Table 4.8 and Figure 4.3). The sixteenth hypothesis (H16) however is accepted since the path coefficient of this relationship ($0.121^{*}$, $P< 0.05$) is significant at 0.05 level (Table 4.8 and Figure 4.3)

Table 4.8: Hypotheses Testing Results

| Hypotheses | Paths | | | Estimate | C.R. | P | Remarks |
|---|---|---|---|---|---|---|---|
| H2 | BI | <--- | PE | 0.113 | 3.346 | *** | Acceptable |
| H3 | BI | <--- | EE | 0.212 | 5.121 | *** | Acceptable |
| H6 | BI | <--- | SF | 0.23 | 6.642 | *** | Acceptable |
| H7 | BI | <--- | SEN | 0.187 | 5.002 | *** | Acceptable |
| H8 | PE | <--- | SEN | 0.251 | 3.753 | *** | Acceptable |
| H9 | EE | <--- | SEN | 0.25 | 4.439 | *** | Acceptable |
| H10 | PE | <--- | SIN | 0.1 | 2.39 | 0.017 | Acceptable |
| H11 | EE | <--- | SIN | 0.113 | 3.098 | 0.002 | Acceptable |
| H12 | BI | <--- | FC | 0.284 | 7.467 | *** | Acceptable |
| H13 | BI | <--- | SI | 0.096 | 5.03 | *** | Acceptable |
| H15 | PE | <--- | CSE | 0.001 | 0.011 | 0.991 | Rejected |
| H16 | EE | <--- | CSE | 0.121 | 2.203 | 0.028 | Acceptable |
| H17 | PE | <--- | ANX | -0.24 | -3.983 | *** | Acceptable |
| H18 | EE | <--- | ANX | -0.12 | -2.288 | 0.022 | Acceptable |
| | EE | <--- | FC | 0.4 | 8.003 | *** | Acceptable |
| | PE | <--- | SF | 0.126 | 2.086 | 0.037 | Acceptable |
| | PE | <--- | EE | 0.236 | 3.594 | *** | Acceptable |

Note: a *hypothesis is accepted when* C.R > 1.96, ($P^{*} < 0.05$, $P^{**} < 0.01$ or $P^{***} < 0.001$) and Estimate not equal to zero

The seventeenth hypothesis (H17) is proven accepted since the result of the study indicates that computer anxiety has a negative relationship on performance expectancy ($-0.24^{***}$, $P< 0.001$) (Table 4.8 and Figure 4.3). Similarly, the study has also confirmed that the eighteenth hypothesis (H18); which states that computer anxiety has a negative impact on the effort expectancy, is recognized since the path coefficient ($-.12^{*}$, $P< 0.05$) is significant at 0.05 level (Table 4.8 and Figure 4.3).

## 4.9 Multiple Group Analysis

The second step in the generated model analysis is applying multiple group analysis to find out about the effect of moderators on the influence of determinants on employee intention to use computer-based distance training system. In order to find any significant differences among moderators (such as gender, age, and experience), three hypotheses were tested using multiple group analysis including the impact of performance expectancy on behavioral intention, which were moderated by employee's age and gender; the impact of effort expectancy on behavioral intention moderated by employee's gender, age, and experience; and the impact of social influence on employee intention moderated by employee's gender, age, and Internet experience (Section 3.2).

### 4.9.1 Gender

As mentioned earlier (refer to Section 3.2), the impact of performance expectancy, effort expectancy, and social influence on employee's intention to use computer-based distance training system is moderated by employee's gender. In other words, the path between three constructs and employee intention could differ between male and female.

This influence was investigated in this study by conducting a test on three hypotheses; H4b: the impact of performance expectancy on employee intention will be moderated by employee's gender; H5b: the impact of effort expectancy on employee intention will be moderated by employee's gender; and H14b: the impact of social influence on employee intention will be moderated by employee's gender. Table 4.9 shows the regression weights of baseline model and significant difference between paths across men and women groups. It can be seen that although five paths differ across two groups, only H4b is accepted. This hypothesis states that the impact of performance expectancy on employee intention is moderated by employee's gender where the effect is strong for men ($0.126^{***}$). Additionally, this study found that new five paths are moderated by gender including the paths between effort expectancy and system interactivity, effort expectancy and computer anxiety, performance expectancy and system interactivity, performance expectancy and system enjoyment and the path between behavioral intention and system enjoyment.

Table 4.9: Regression Weight and Significant Difference between Path across Men and Women Groups

| Paths | | | Men estimate | Women estimate | Men p-value | Women p-value | Sig.diff |
|---|---|---|---|---|---|---|---|
| EE | <--- | SIN | 0.157 | 0.059 | 0.004 | 0.271 | Yes |
| EE | <--- | ANX | -0.16 | -0.148 | 0.016 | 0.106 | Yes |
| EE | <--- | CSE | 0.104 | 0.105 | 0.147 | 0.179 | No |
| EE | <--- | SEN | 0.244 | 0.256 | 0.001 | 0.008 | No |
| EE | <--- | FC | 0.414 | 0.401 | *** | *** | No |
| PE | <--- | CSE | -0.001 | 0.018 | 0.991 | 0.844 | No |
| PE | <--- | SEN | 0.251 | 0.237 | 0.008 | 0.052 | Yes |
| PE | <--- | SF | 0.129 | -0.003 | 0.099 | 0.979 | No |
| PE | <--- | EE | 0.196 | 0.347 | 0.03 | 0.003 | No |
| PE | <--- | SIN | 0.186 | 0.044 | 0.006 | 0.488 | Yes |
| PE | <--- | ANX | -0.249 | -0.278 | 0.003 | 0.021 | No |
| BI | <--- | FC | 0.453 | 0.154 | *** | 0.046 | No |
| BI | <--- | SF | 0.174 | 0.299 | *** | *** | No |
| **BI** | **<---** | **SI** | **0.019** | **0.096** | **0.389** | **0.055** | **No** |
| BI | <--- | SEN | 0.143 | 0.12 | 0.002 | 0.144 | Yes |
| **BI** | **<---** | **PE** | **0.126** | **0.101** | ******* | **0.155** | **Yes** |
| **BI** | **<---** | **EE** | **0.157** | **0.4** | ******* | ******* | **No** |

Note: a *hypothesis is accepted when (*C.R > 1.96, $P^{*} < 0.05$, $P^{**} < 0.01$, $P^{***} < 0.001$) and Estimate not equal to zero

### 4.9.2 Age

There is also a question in the study whether the age of an employee has an effect on his or her intention to use computer-based distance training system. In order to answer this question, the sample of study was divided into two groups. The first group includes employees who are under 25 and 35 years old, and the second group ages between 36 and over 45 years old. Hypothesis (H4a) states that the impact of performance expectancy on employee intention will be moderated by the age; H5a: the impact of effort expectancy on employee intention will be moderated by employee's

Table 4.10: Regression Weight and Significant Difference between Paths across Older and Younger Group

| Paths | | | Older estimate | Younger estimate | Older p-value | Younger p-value | Sig. dif |
|---|---|---|---|---|---|---|---|
| EE | <--- | SIN | 0.008 | 0.058 | 0.271 | 0.89 | No |
| EE | <--- | ANX | 0.037 | -0.126 | 0.106 | 0.623 | No |
| EE | <--- | CSE | 0.588 | 0.039 | 0.179 | *** | Yes |
| EE | <--- | SEN | 0.222 | 0.219 | 0.008 | *** | Yes |
| EE | <--- | FC | 0.241 | 0.478 | *** | *** | No |
| PE | <--- | CSE | -0.166 | 0.01 | 0.844 | 0.654 | No |
| PE | <--- | SEN | 0.06 | 0.293 | 0.052 | 0.711 | No |
| PE | <--- | SF | -0.108 | 0.254 | 0.979 | 0.347 | No |
| PE | <--- | EE | 0.546 | 0.177 | 0.003 | 0.144 | Yes |
| PE | <--- | SIN | 0.384 | 0.042 | 0.488 | 0.039 | Yes |
| PE | <--- | ANX | -0.351 | -0.165 | 0.021 | 0.036 | No |
| BI | <--- | FC | 0.105 | 0.389 | 0.046 | 0.205 | Yes |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BI | <--- | SF | 0.148 | 0.2 | *** | 0.006 | No |
| **BI** | **<---** | **SI** | **-0.055** | **0.109** | **0.055** | **0.027** | **Yes** |
| BI | <--- | SEN | 0.069 | 0.155 | 0.144 | 0.379 | No |
| BI | <--- | PE | 0.013 | 0.107 | 0.155 | 0.773 | No |
| BI | <--- | EE | 0.507 | 0.118 | *** | *** | No |

Note: a *hypothesis is accepted when* C.R > 1.96, ($P^{*} < 0.05$, $P^{**} < 0.01$, $P^{***} < 0.001$) and Estimate not equal to zero

ages; and H14a: the impact of social influence on employee intention will be moderated by employee's ages. The results of this testing revealed that six paths differ between the two groups. However, only H14a, which states that the impact of social influence on employee intention is moderated by employee's age, was accepted. Furthermore, the study found that new five paths differ across the two groups. These paths are the paths between effort expectancy and computer self-efficacy, effort expectancy and system enjoyment, performance expectancy and effort expectancy, performance expectancy and system interactivity and the path between behavioral intention and facilitating conditions (Table 4.10).

### 4.9.3 Experience

In order to investigate the impact of experience on employee intention to use computer-based distance training system, the sample was separated into two groups. The first group includes employees who have experience and the second group refers to those who do not have experience. Two hypotheses were tested namely H5c: the impact of effort expectancy on employee intention will be moderated by experience, and H14c: the impact of social influence on employee intention will be moderated by experience.

Table 4.11 reveals that both hypotheses are accepted. In terms of new paths, the statistical results indicate that new five paths are moderated by employees' experience including the paths between effort expectancy and system enjoyment, performance expectancy and system interactivity, behavioral intention and facilitating conditions, behavioral intention and system enjoyment and the path between behavioral intention and performance expectancy.

Table 4.11: Regression Weight and Significant Difference between Paths across Expert and Inexpert Group

| | Paths | | Expert estimate | Inexpert estimate | Expert p-value | Inexpert p-value | Sig dif |
|---|---|---|---|---|---|---|---|
| EE | <--- | SIN | -0.062 | 0.096 | 0.679 | 0.259 | No |
| EE | <--- | ANX | 0.074 | -0.097 | 0.673 | 0.286 | No |
| EE | <--- | CSE | 0.602 | 0.026 | 0.225 | 0.633 | No |
| EE | <--- | SEN | 0.007 | 0.281 | 0.971 | *** | Yes |
| EE | <--- | FC | 0.341 | 0.168 | 0.032 | 0.044 | No |
| PE | <--- | CSE | 0.794 | -0.012 | 0.129 | 0.678 | No |
| PE | <--- | SEN | 0.058 | -0.096 | 0.778 | 0.574 | No |
| PE | <--- | SF | 0.057 | -0.124 | 0.793 | 0.246 | No |
| PE | <--- | EE | 0.084 | 0.493 | 0.31 | 0.068 | No |
| PE | <--- | SIN | -0.159 | 0.526 | 0.257 | 0.011 | Yes |
| PE | <--- | ANX | 0.061 | -0.146 | 0.714 | 0.398 | No |
| BI | <--- | FC | 0.408 | 0.082 | *** | 0.211 | Yes |
| BI | <--- | SF | 0.28 | 0.167 | *** | *** | No |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **BI** | **<---** | **SI** | **0.118** | **-0.039** | ******* | **0.061** | **Yes** |
| BI | <--- | SEN | 0.166 | 0.124 | *** | 0.065 | Yes |
| BI | <--- | PE | 0.1 | 0.015 | 0.042 | 0.71 | Yes |
| **BI** | **<---** | **EE** | **0.136** | **0.206** | **0.003** | **0.059** | **Yes** |

Overall, the results reveal that the fourth hypothesis (H4a and H4b) was partially supported when only one hypothesis is proven accepted for instance performance expectancy will be moderated by employee's gender, but not by employee's age. Performance expectancy and employee intention differs between male and female but does not between older and younger employees (Table 4.9 and Table 4.10). Similarly, the fifth hypothesis (H5a, H5b and H5c) was also partially supported when effort expectancy is moderated by employees who have Internet experience, but not by employee's age and gender (Table 4.9, Table 4.10, and Table 4.11).

The fourteenth hypothesis (H14a, H14b and H14c), which indicates that the relationship among social influence and user intention will be moderated by age, gender, and experience, was statistically supported only between older and younger employees and between employees who have Internet experience and who do not (Table 4.9, Table 4.10 and Table 4.11).

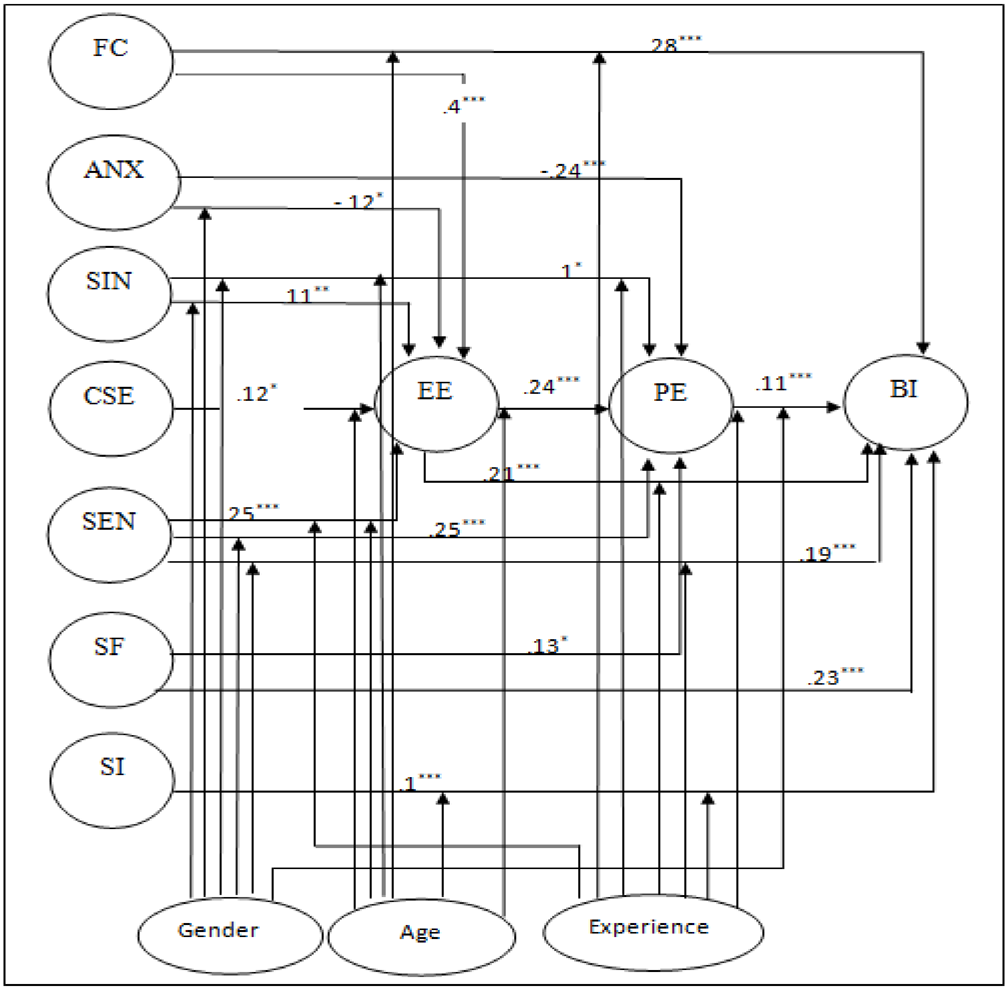


Figure 4.3: Revised Model

Note: ***P < 0.001, **P < 0.01 and *P < 0.001

## 4.10 Conclusion

The study has distributed 600 questionnaires to public sector employees from 24 ministries of the Jordanian Government. From the total, only 351 respondents have returned the questionnaires, giving a response rate of 58.5%. A large proportion of the respondents are between 26 and 35 old years (43%). In terms of gender, the majority of the respondents are women (64%). About 85.5% of the whole respondents have computer for a regular use, 68% have Internet access, in which 59.2 % of them have high speed network and 9.1% have low speed network. In terms of Internet usage, 37% indicate that they frequently use the Internet and approximately 30% have never used the Internet.

A total of eighteenth hypotheses have been tested in achieving the objectives of the study (Figure 4.3). From the total, six direct relationships have been found to be statistically significant to employee intention to use computer-based distance training system, since the study indicates that the first relationship found between facilitating conditions and the employees intention (.28). The second significant relationship found from the study is a relationship between system flexibility and employee intention to use computer-based distance training system (0.23). The study furthermore identified that the third significant relationship is between effort expectancy and employee intention (0.212). Additionally, the statistical result found that such relation is stronger for employees who have Internet experience. The fourth significant relationship is discovered between system enjoyment and employee intention (0.187), followed with a relationship between performance expectancy and employee intention (0.113). Furthermore, this relationship is moderated by employee's gender because the relationship is stronger for men). The last significant relationship is between social influence and employee intention (0.096). The statistical results found that such relationship was stronger for employees who have Internet experience.

When taking into consideration the indirect relationship, three relationships were proposed to statistically affect employee intention to use computer-based distance training system. In addition to the direct effect found between system enjoyment and employee intention, the first indirect relationship exists with a total effect of .275. The second important indirect relationship was proposed between system interactivity and employee intention with a total effect of 0.038. The third important indirect relationship is between computer self-efficacy and employee intention (0.029). Furthermore, there is an indirect negative relationship between computer anxiety and employee intention (-0.056).

With regards to the new paths provided by modification indices (AMOS software), three relations exist. The first relation is between facilitating conditions and effort expectancy (0.4). This relation is supported by Venkatesh (2000), who indicated that there is a relationship between facilitating conditions and effort expectancy. Furthermore, similar to other studies (Davis, 1989; Masrom, 2007; Raaij & Schepers, 2008; and Sheng et al., 2008), the relation between effort expectancy and performance expectancy is identified in this study (0.126). Finally, there is evidence in the literature (Hsia and Tseng, 2008 and Sahin and Shelley, 2008) that there is significant relationship between system flexibility and performance expectancy. Similarly, this study found that there is significant relationship between system flexibility and performance expectancy (0.236).

In terms of new moderating keys, this study found that, many paths differ across men and women groups including the paths among effort expectancy and system interactivity, effort expectancy and computer anxiety and between performance expectancy and system enjoyment. Additionally, the path between effort expectancy and computer self efficacy and the path between performance expectancy and effort expectancy are moderated by age. In term of experience moderator, statistical results indicate that the path between behavioral intention and performance expectancy is moderated by the experience.

Finally, many paths found to be moderated by more than one moderator such as, the path between performance expectancy and system interactivity is moderated by gender and age. Further, the path between behavioral intention and system enjoyment is moderated by gender and experience. The path between effort expectancy and system enjoyment found to be moderated by gender, age and experience. Additionally, age and experience moderate two paths including one between performance expectancy and system interactivity and another between behavioral intention and facilitating conditions.

# CHAPTER FIVE

# IMPLICATIONS AND CONCLUSION

## 5.0 Introduction

The last chapter aims to summarize the findings of the study, especially the computer-based distance training system model. Further, the theoretical, methodological and practical implications are discussed, together with the limitations of the study, and suggestions for future research.

## 5.1 Answers to Research Questions

This research includes five research questions introduced to overcome the research problem statement. In order to answer these questions, statistical tests were run to test the research hypotheses, as implied by the following research questions:

**Research Question 1:**

What are the issues and challenges in implementing computer-based distance training system in the public sector's organization?

**Research Objective 1:**

To investigate the issues and challenges in implementing computer-based distance training system.

In this respect, this study found that many issues have impacted employee intention to use computer-based distance training system. Firstly, in terms of facilitating conditions, this study found that the organization's electronic infrastructure and employees' electronic resources and their knowledge are critical to successful acceptance of the computer-based distance learning system. Secondly, opinions of other people such as peers and managers have also an important role in the acceptance of computer-based distance training system. Thirdly, the study revealed that the employees' self confidence and their ability to use computer-based distance training system are also critical to acceptance of computer-based distance training system. Thus, leaders in the organization should facilitate the infrastructure and offer training for their employees once the system is implemented. In other words, the organizations should invest a strategic plan for e-training development including the improvement of electronic infrastructure and training of employees.

**Research Question 2:**

How can computer-based distance training system support the traditional training method in the public sector's organization in Jordan?

**Research Objective 2:**

To identify the roles of computer-based distance training system in supporting the traditional training method in the public sector's organization in Jordan.

In answering this question and achieving the objective, the study found that computer-based distance training system can be an alternative to support the traditional training methods. Three factors are found significant to impact employee intention to use computer-based distance training system. They are performance expectancy, system enjoyment, and system flexibility.

Compared with traditional training method, computer-based distance training system would be much enjoyable because the system will offer the training materials in many forms (such as video, audio, animation and so on). In this respect, Castro et al. (2001), and Liu and Hoi (2007) have indicated that the multimedia technology can make a system enjoyable and useful and make users enjoy interacting with it. Furthermore, the system will enhance employee training by providing more knowledge resources in addition to the material forms and system flexibility, since this research has found that system enjoyment and system flexibility and other system characteristics (for instance system usability and system interactivity) impact system performance significantly.

With flexibility and enjoyment, the computer-based distance training system will overcome the problems associated with the traditional training method, such as problems of unsuitability of the training time as it coincides with employees work time, family duties that hinder employees (especially women) from attending traditional training, and time limitation as many employees spend much time commuting to their work place. In solving these and other training traditional problems, the system will allow the employees to access such system at anytime and anywhere (flexibility of the system).

**Research Question 3:**

What are the factors that determine the acceptance of public sector employees on computer-based distance training system?

**Research Objective 3:**

To determine the factors that lead to the acceptance of public sector employees on the computer-based distance training system.

The study explored e-learning development trend in public sector organizations and found that there are many factors that influence employee intention to use computer-based distance training system. Some of these factors are related to the system characteristics such as system interactivity, system enjoyment, performance expectancy, effort expectancy and system flexibility. Other factors are related to the individual's characteristics namely computer anxiety, and computer self-efficacy. The rest of the factors are related to the implementation environment including social influence and facilitating conditions.

Interestingly, six factors have direct effect on employee intention to use computer-based distance training system such as system enjoyment, system flexibility, effort expectancy, performance expectancy, social influence, and facilitating conditions. Additionally, computer self-efficacy, computer anxiety, facilitating conditions, system enjoyment, system flexibility and system interactivity are found to have an indirect effect on employee intention to use computer-based distance training system through the effort expectancy and performance expectancy.

**Research Question 4:**

What is the proposed model of the acceptance of computer-based distance training system by public sector employees?

**Research Objective 4:**

To propose a model of technology acceptance of computer-based distance training system by public sector employees.

This research aimed to extend UTAUT to generate the proposed model. Toward this end, many steps were followed: Firstly, ten theories and models used to examine the acceptance of information technology were identified and discussed. Secondly, the literature about the acceptance of e-learning technology was reviewed within three fields namely individual, organizations and technology. Thirdly, the proposed model was generated with nine constructs of system flexibility, system enjoyment, system interactivity, performance expectancy, effort expectancy, social influence, facilitating conditions, computer anxiety, and computer self-efficacy, and three user characteristics of employee's age, gender, and experience.

Fourthly, the proposed model was examined and modified based on the data collected from the 351 employees within public sector organizations. Finally, the computer-based distance training system model was generated with and without the moderators' influence after applying the SEM as statistical technique to test the proposed model.

## 5.2 Research Implications

This section discusses the implications of the research including theoretical implication, methodological implication, and practical implication.

### 5.2.1 Theoretical Implications

This research has successfully extended UTAUT in the context of technology acceptance/ with the addition of five constructs of system flexibility, system enjoyment, system interactivity, computer anxiety, and computer self-efficacy. A new model was tested and modified using SEM to generate the computer-based distance training system acceptance model. The model offers an understanding about the relationships between the constructs and the intention of public sector employees to use computer-based distance training system. It posits six significant determinants of employee intention including performance expectancy, effort expectancy, social influence, facilitating conditions, system flexibility, and system enjoyment. Additionally, this model also reveals that performance expectancy is determined by effort expectancy, system flexibility, system enjoyment, system interactivity, and computer anxiety. Further, effort expectancy is determined by computer anxiety, system interactivity, computer self-efficacy, facilitating conditions, and system enjoyment.

In addition to the above constructs and to increase the explanatory power of the model in explaining behavior intention, the effects of the moderators on the relationships of determinants and employee intention have been considered. Three key moderators such as employee's age, gender and experience, are found to have effect on the relationships between performance expectancy, effort expectancy, social influence, and employee intention. Additionally, this study found that there are many new relationships are moderated by such moderators (age, gender and experience) including the relation between effort expectancy and system enjoyment, effort expectancy and computer anxiety, effort expectancy and system interactivity, effort expectancy and computer self efficacy, performance expectancy and system interactivity, performance expectancy and system interactivity, performance expectancy and system enjoyment, performance expectancy and effort expectancy, behavioral intention and performance expectancy, behavioral intention and system enjoyment, and the relation between behavioral intention and facilitating conditions.

This study has also succeeded in extending UTAUT by including the sub-factors of individual factor (computer self-efficacy and computer anxiety) and other critical sub-factors of system factor (system enjoyment, system interactivity and system flexibility), to investigate the acceptance of computer-based distance training system by public sector employees. It should be noted that the integrated model of this research (computer-based distance training system acceptance model) can explain the variance of behavioral intention more specific than the original model (UTAUT). This is because the original UTAUT can explain behavioral intention approximately 7% (Venketash et al., 2003) but the integrated model can explain approximately 8% (refer to table 5.6). This research model and the relationships between its constructs will be explained in more details in the next section.

5.2.1.1 Key Determinants

In the proposed model, nine determinants had been theorized according to information technology acceptance models, theories, and literature. The following explains the results of the determinants as theorized.

In this study, performance expectancy and effort expectancy are proven as important determinants of behavioral intention. Effort expectancy, moreover, also do affect performance expectancy in , which is consistent with many prior studies such as Davis (1989), Jong and Wang (2009), Marchewka et al. (2007), and Venkatesh et al. (2003). When the moderators were taken into consideration, it was found that the effect of performance expectancy on behavioral intention is moderated by employee's gender and the effect of effort expectancy on behavioral intention is moderated by employee's experience.

It is also found that system flexibility does not only have a significant impact on behavioral intention, but it also on performance expectancy. These findings are consistent with findings of Hsia and Tseng (2008), which indicated that e-learning system's flexibility has an effect on employee intention to use such system and on their learning performance.

Similar to the other studies (Abbad et al., 2009; Davis, 1989), which indicated that system interactivity has a significant relationship with perceived usefulness (performance expectancy) and perceived ease of use (effort expectancy), this study also found that system interactivity has a significant relationship with performance expectancy and effort expectancy. These findings have revealed that the interaction between employees and other members in the organization improve their learning performance and system usability. In the other words, the computer based distance training system's interactivity will improve the employees training and make the system easer to use.

Next, there is evidence in the literature (Abbad et al., 2009; Chatzoglou et al., 2009) that system enjoyment has a significant effect on performance expectancy, effort expectancy and behavioral intention. Similarly, this research found that system enjoyment has a significant impact on employee intention, performance expectancy, and effort expectancy.

This research also found that social influence has a significant effect on employee intention. Additionally this research found that the effect of social influence on behavioral intention is moderated by employee's gender and experience. These findings lend support to the findings of Venkatesh et al. (2003) and Venkatesh and Davis (2000), who argued that the effect of social influence on individual's intention to use an information technology is more salient to women and decreases with experience.

This study has proven that facilitating conditions not only has a significant effect on behavioral intention, but also has a significant effect on effort expectancy. This result has also been confirmed by Ajzen (1991), and Thompson et al. (1991). However, it is in contradiction from Venkatesh et al. (2003), who argued that facilitating conditions do not have an effect on the individual's intention to use an information system, but it has a direct effect on the actual use beyond that explained by behavioral intention.

As far as computer anxiety is concerned, this study has discovered that it has a negative effect on effort expectancy and performance expectancy. These findings are consistent with those reported by Chatzoglou et al. (2009), Igbaria and Livari (1995), and Venkatesh (2000).

Finally, this research also found that there is significant relationship between computer self-efficacy and effort expectancy, and found that computer self-efficacy does not have any effect on performance expectancy. This is supported by Chatzoglou et al. (2009), who demonstrated that computer self-efficacy does not have any effect on the performance expectancy. This finding implies that employees' ability to use a computer device will improve their learning performance, and this subsequently will affect their usage of e-learning system.

### 5.2.2 Methodological implications

The methodology used in the present research offers guidelines for further research including (i) the way of surveying employees in the public sector as in Jordan, (ii) the questionnaire design, and (iii) the use of SEM analysis with AMOS 16.0 to examine discriminant validity and analysis of the research proposed model.

From the survey perspective, because Jordanian employees stay over all around Jordan, the distribution of questionnaires by mail or in person is recommended. Initial contact by mail was done to a small group of employees who are working in Jordanian public sector to distribute and collect the questionnaires and mail the responses back to the researcher. Additionally, the researcher followed up the progress of the survey by telephone rather than mail to ensure a higher responses rate. Furthermore the questionnaires were carefully designed to elicit better responses by having clear instructions and an accompanied introductory letter.

It is also recommended that the data collected through survey should go through three tests i.e. reliability, content validity, and construct validity tests (Hair et al., 2006; Sekaran, 2003).

Additionally, it is strongly recommended the use of Structural Equation Model (SEM0, to the test the research model because of the many benefits offered by SEM (Byrne, 2006). In contrast to traditional multivariate technique, SEM can estimate error variance parameters, can incorporate unobserved and observed variables *together*, and easily can analyse indirect relations (modeling multivariate relations).

### 5.2.3 Practical Implication

The findings of the present study provide significant benefits not only for employees in public sector in Jordan but also those who work in public sector organizations outside Jordan. Many practical implications have been identified, such as promoting employees to make full use of the computer-based distance training system, improving learning (training) quality, and increasing the rate of training practice. Significantly, the implications of using computer-based distance training system acceptance model without and with the effect of moderators will to promote e-training in public sector organizations or all organizations in Jordan other than just public sector organizations.

It has been found that many things motivate employees to use computer-based distance training system for their training including flexibility of the system, system interactivity, system enjoyment, good facilities, opinions of important people (for instance managers and peers), and employees' knowledge and abilities. Thus, public sector organizations and government should pay more attention to all these factors when they intend to conduct distance training program. Furthermore, decision makers in public sector organizations should assure that the computer-based distance training system is accessible by trainees wherever they are at any time (system flexibility). Further, the system enables the trainees interact together and with other members in the organization from any place in case they need help (system interactivity). In the system enjoyment respect, decision makers should assure that the system can offer the training materials in many formats (multimedia, text, video, and so on), and has also enjoyable user interface. Additionally, they should pay attention to the ease of the system use to enhance interaction and understanding.

In regards to employees' abilities, computer anxiety and facilitating conditions, leaders in the organization should prepare a comprehensive plan for improving the employees' abilities to use a computer device in general and the computer-based distance training system in specific, and improving their emotional reaction by training them during the implementation process; and providing efficient facilities such as helpdesk service, high speed network, up-to-date server device, and support systems to meet the implementation of the distance learning system needs etc. Additionally, in terms of social influence, administrators in the organization should advice employees to use the distance training system and make sure that they know about the advantages of the system.

## 5.3 Limitation of the Study

This research has been designed based on wide literatures and included a large sample size, which covered employees within all public sector organizations within all regions in Jordan. Despite the insightful results obtained, the study has some limitations.

The most important limitation in this study is the inability to apply probability sampling techniques, due to the cost of conducting the study at all the ministries, getting the names and address listing of all employees and hard time and effort to access some groups of employees.

This study is the first research being conducted in exploring the acceptance of distance training system among public sector employees in Jordan. Thus, its results need to be confirmed by other studies by focusing on the factors that influence employee intention. In this respect, to formulating any theoretical research model, all of such model constructs' relationship should be supported by the literature. In the other words, confirming this research results will strongly help formulating future research model in the acceptance of distance training system context.

The next limitation is regarding the supporting literatures for this study. The previous studies do not support this research very well because studies conducted on the acceptance of distance training system among public sector around the world are limited.

In term of instrument's items, the number of items used to measure the constructs is not quite big i.e. five or six items per each construct. More items should have been used per construct because some of them will be excluded during analysis so that the research model fits the data. In this research, only two items remain to test the some of constructs after measuring of model fit, since many items were removed in order to make the model fits the data.

Apart from the main variables, this study also examined the impact of a few moderators (age, gender, and experience) on the relationships between behavioral intention and other constructs (performance expectancy, effort expectancy and social influence). In the future, other moderators should also be taken into consideration for instance education level and language.

Finally, this research did not investigate the change of employee behavior over time because in order to do so, it requires a comprehensive plan that includes a design of a comprehensive distance learning system, employee and organizational resource, employees' level of computer literacy, and employees' ability to use a computer device. Later, in additional to measure the actual usage of computer based distance training system, this research model should be applied to investigate the change of employees' intention to use computer based distance training system over the time.

## 5.4 Suggestions for Future Research

The results of this study provide opportunities for future research in relation to using a computer-based distance training system. As the model tested in this study is produced from the perspective of public sector employees, a future study can explored with a focus to measure the intention to use the distance learning system among the private sector employees, either in and outside Jordan. A similar study can also be conducted to investigate such a phenomenon in educational environment such as higher institution education, and schools.

This study concerns on the impact of three moderators namely age, gender and experience. In future, more research can be carried out to explore more on the possibilities of identifying significant relationship between other moderators on the acceptance of information technology within computer-based distance training system in the organizations context. Among other moderators could include language, education level. The moderator such as age, gender and experience can also be further tested on other dependant variables such as actual usage.

Most importantly, system characteristics such as system enjoyment, system flexibility, and system interactivity are verified to have a direct relationship on performance expectancy, effort expectancy and behavioral intention. Such finding is very useful that become a starting point for a future work in learning more about system characteristics and intention of using computer based training system. One aspect that is opened out for future study is associated with using measurement items, which have low Cronbach's Alpha in the information technology acceptance context, in order to measure the constructs of this research model.

The second aspect in relation to system characteristics is about applying the findings of this study to design and implement a distance training system in an organizational environment. Such a system can be developed and tested in public sector organization in determining changes and patterns of employee behavior toward using distance training system over time. In this respect, this study on the acceptance of computer-based distance training system has suggested five important system characteristics as follows:

1) System Enjoyment

System enjoyment is crucial for the acceptance of computer-based distance training system (CBDTS). It refers to the degree to which employees believe that using computer-based distance training system will be enjoyable, apart from the effect of the system on his/her training performance (Conci et al., 2009). This feature can be implemented in the design of CBDTS by providing training materials in several interesting and enjoyable multimedia formats, for example, in the forms of audio, video, text, and animation. Multimedia technology makes the system enjoyable and useful (Castro et al., 2001; Liu & Wah, 2007).

2) System Flexibility

It refers to the degree to which employees believe they can access the system anywhere at any time (Hsia & Tseng, 2008). The results of this study have proven that system flexibility gives a very strong influence for the acceptance of the computer-based distance training system. Further, system flexibility can overcome many traditional training obstacles and increase the system's usefulness. Therefore, the system should be accessible by the employees from any device connected on the Internet and at any time. Thus, the organizations that want to apply CBDTS for their employees training have many ways to offer the training materials to the remote employees including: synchronous web based training which allow moving the training materials immediately from the trainers to the remote trainees. Interestingly, this way allows the remote employees interact immediately with other trainees and trainers. However, in such way the trainers and trainees must be online at the same time. In other words such way does not provide any flexibility with the time. Additionally, the organizations can provide the training materials to remote employees using asynchronous web based training. In contrast with synchronous web based training, this way provides flexibility with the time and place, since it allows the remote employees access the training materials at any time and from any place. Finally, the training's materials might be provided on CD or DVD, in order to make it accessible from any where at any time.

3) System Interactivity

As mentioned in the literature review, system interactivity is related to the system ability to enable the employees to interact together and with organization members (Abbad et al., 2009). This study found that system interactivity strongly affects employee intention to use computer-based distance training system. Therefore, in the distance training system, system interactivity can be proposed by allowing employees to send and receive messages immediately using interactivity tools such as e-mail, chat room, forums, etc (Castro, 1998; Campbell et al., 2007). By doing so, employees will be able to discuss any troubles faced while using the system or with the training materials. Additionally, system interactivity will provide the employees an opportunity to share their knowledge with others employees, trainers or experts.

4) Effort Expectancy

Effort expectancy is related to the degree of ease which associates with the use the computer-based distance training system. This research found that effort expectancy strongly relates to employee intention to use the distance learning system. This research also found that the ease of the system is affected by the facilitating conditions (availability of the technology such as computer device, Internet, and so on), system enjoyment (which means that if the system is enjoyable during use, it will be easier), and system interactivity.  Other scholars indicated that the ease of the system is related to the user interface, which uses the interaction between the user and the system (Instone, 2004). The system should provide helps when the user has trouble during the system's usage. Additionally, labeling the system's screens with parameters of current scenario can help employees can to understand how the system works.

5) System Performance Expectancy

Performance expectancy is related to the degree of training enhancement which associates with applying of computer-based distance training system (Venkatesh et al., 2003). This study has proved that performance expectancy is very influential in employee acceptance of computer-based distance training system, which leads us to emphasize it in the system. Additionally, this research found that performance expectancy is affected by many factors namely system flexibility, system enjoyment, system interactivity, and effort expectancy. Therefore, the system can be built in a way that ensures all previous characteristics are embedded within the architecture.

## 5.5 Summary

This chapter concludes the findings of this study, as well as the theoretical implications, methodological implications, and practical implication of the acceptance of computer-based distance training system by employees. Further, the answers to research questions and objectives have also been presented.

In answering the first research question, the study has found that a computer-based distance training system can be an alternative to support the traditional training methods. Three factors are found to be significant to impact employee intention to use computer-based distance training system. These factors are performance expectancy, system enjoyment, and system flexibility. For the second research question, many issues are found to have an impact on employee intention to use computer-based distance training system including organizational resources, employee resources and knowledge, employee self-confidence and their ability to use a computer device, and the opinion of other people (for example managers and peers). Regarding to the third research question, this study has shown that there are many factors influencing employee intention to use computer-based distance training system such as system enjoyment, performance expectancy, effort expectancy system flexibility, computer anxiety, computer self-efficacy, social influence and facilitating conditions.  For the fourth research question, this study has successfully extended UTAUT by proposing a computer-based distance training system acceptance model. For the last research question, the study has found that the system should be useful, easy to use, flexible, enjoyable, and interactive.

The computer-based distance training system acceptance model has a strong capability to explain the variance of performance expectancy, effort expectancy, and employee intention. System flexibility, system enjoyment, social influence, performance expectancy, effort expectancy and facilitating conditions play important roles in determining employee intention.  At the same time, computer anxiety, computer self-efficacy, facilitating conditions, system flexibility, system enjoyment and system interactivity play important roles in determining performance expectancy and effort expectancy. When the moderators are taken into consideration, the effect of effort expectancy on employee intention is moderated by employee's experience. Further, the impact of performance expectancy on employee intention is moderated by employee's age. Additionally, this research found that the effect of social influence on employee intention is moderated by employee's gender and experience.

since this study provides clear description about the constructs that influence the employees intention to use the computer based distance training system and the its measured items, regarding the information system acceptance models and theories and wide picture regarding the analysis's technique (SEM) and steps, the findings of this research together with the computer-based distance training system acceptance model can provide valuable information not only to public sector organizations and employees in Jordan but also to other researchers who are interested in a study area related to the acceptance of e-learning system by public sector employees. Additionally, this research provides guideline to the public sector's organizations which are planning to apply computer based distance training system for their employees training. This guideline shows how the applying of computer-based distance training system to train public sector employees will improve the training quality, overcome the traditional training problems, enable the employees interact together, with trainers and experts, make computer based distance training system enjoyable and increase the number of candidates in the training.

Some limitations for the research have been mentioned regarding the limited number of studies on the acceptance of e-learning system by public sector employees in Jordan and all over the world and regarding the number of moderators. Finally, this chapter has offered some recommendations for future research including taking into consideration the items that have low Cronbach's alpha, more system characteristics, and applying this research model in exploring the similar situation the private sector organization.

# REFERENCES


Abbad, M. M., Morris, D., & Nahlik, C. (2009). Looking under the bonnet: Factors affecting student adoption of e-learning systems in Jordan. *International Review of Research in Open and Distance Learning, 10*(2), 1492-383.

Advancelearning (2008). ICDL in the Middle East. Retrieved May 20, 2009, from:eu.advancelearning.com/solutions/icdl/middle-east/

Agarwal, R., Sambamurthy, V., & Stair, R. (2000). Research report: The evolving relationship between general and specific computer self-efficacy - An empirical assessment. *Information Systems Research, 11*(4), 418-430.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human Decision Processes. 50(2),* 179-211.

Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin, 84*(5), 888- 918.

Ajzen, I., & Fishbein, M. A. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Addison-Wesley: Addison-Wesley publishing.

Al-ammari, J., & Hamad, S. (2008). Factor influencing the adoption of e-learning at UOB. Retrieved on June 20, 2009, fom: http://www.uqu.edu.sa/page/ar/2643#E-Commerce_&_E-Learning.

Alavi, M.A., & Yoo, Y. (1997). Using information technology to add value to management education. *Academy of Management Journal, 40*(6), 1310-1333.

Al-Harby, F., Qahwaji, R., & Kamala, M. (2010). Users' acceptance of secure biometrics authentication system: Reliability and validate of an extended UTAUT model. *Communications in Computer and Information Science, 87*(1), 254-258.

Anderson, J. E., & Schwager, P. H. (2004). SME adoption of wireless LAN technology: Applying the UTAUT model. *Proceedings of the 7th Annual Conference of the Southern Association for Information Systems*.

Angel, D., Scott, D., Gail, D., & Olga, N. (2004). Distance learning in postsecondary career and technical education: Comparison of achievement in online VS - On campus CTE courses. *National Research Center for Career and Technical Education,* USA.

Arafeh, S. (2004). The implications of information and communications technologies for distance education: Looking toward the future. *American Institutes for Research under Subcontract to SRI International*.

Arbuckle, J. L. (2005). *AMOS 6.0 guide*. SPSS: Chicago.

Ashby, C. (2002). Distance education, growth in distance education programs and implications for federal education policy. *Statement by the director of education, workforce and income security issues to the US senate committee on health, education, labor and pensions*.

Asif, A. (2004). Multimedia and cooperative learning in signal processing techniques in communications. *IEEE Signal Processing Letters, 11*(2), 278-28.

Barki, H., & Benbasat, I. (1996). Contribution of the theory of reasoned action prove to study of information system foundation, empirical research, and extension. *4th European conference on information system*.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182.

Behling, K., Orczyk, J., & Jenkins, J. (2007). Live distance learning delivery of Master of Science courses in building construction management. *37th ASEE/IEEE Frontiers in Education Conference.*

Bill, L. (2002). Growing number of employers jump on e-learning bandwagon. Retrieved on April 10, 2009, from: http://www.allbusiness.com/human-resources/careers-job-training/639116-1.html

Bodain, Y., & Robert, J. (2000). Investigating distance learning on the internet. *INET 2000 Conference*.

Bollen, K. A., & Laing, J. (1988). Some properties of Hoelter's CN. *Sociological Methods and Research, 16*, 492-503.

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping goodness-of-fit in structural equation models. *Sociological Methods and Research, 21*(2), 205-229.

Bollen, P. M. (1998). *Structural equations with latent variables*. New York: Wiley.

Bouras, C., Destounis, P., Garofalakis, J., Gkamas, A., Sakalis, G., Sakkopoulos, E., Tsaknakis, J. and Tsiatsos, Th. (2000). Efficient web-based open and distance learning services. *Telematics and informatics, 17*(3), 213-237.

Bouras, C., Gkamas, A., Kapoulas, V., Lampsas, P., & Tsiatsos, T. (1998). A platform for the implementation of the services of an educational network. *15th IFIP World Computer Congress TELETEACHING'98 in Vienna and Budapest.*

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In A. Kenneth, & J. Bollen. *Testing structural equation models (* pp.136–162). California: SAGE Publication, Inc.

Burgess, J. R. D., & Russell, J.E.A. (2003). The effectiveness of distance learning initiatives in organizations. *Journal of Vocational Behavior, 63*(2), 289–303.

Byrne, B. M. (2006). *Structural equation modeling with EQS: Basic concepts, applications and programming.* New Jersey: Lawrence Erlbaum.

Cairncross, F. (2003). *The company of the future: Meeting the management challenges of the communications revolution.* London: Profile Books.

Campbell, R., Eisenbarth, S., Skurla, C. (2007). Electronic content development for engineering distance learning. *37th ASEE/IEEE Frontiers in Education Conference*, 18-22.

Castro, M. (1998). Technology innovation and integration in distance education. *Electro technical Conference, 1,*164-168.

Castro, M., Clara, M., & John, S. (2001). Examples of distance learning projects in the european community. *IEEE Transactions on Education, 44(4*), 406 - 411.

Chatzoglou, P. D., Sarigiannidis, L., Vraimaki, E., & Diamantidis, E. (2009). Investigating Greek employees’ intention to use web-based training. *Computers & Education, 53*(3), 877–889.

Chau, P. (2001). Influence of computer attitudes and self-efficacy on IT usage behavior. *Journal of End User Computing, 13*(1), 26-34.

Chau, P. Y. K., & Hu, P. J. H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information & Management, 39*(4), 297-311.

Chau, P., & Hu, P. (2002). Examining a model of information technology acceptance by individual professionals: An exploratory study. *Journal of Management Information Systems, 18*, 191-229.

CHEA (Council for Higher Education Accreditation) (2002). *Accreditation and assuring quality in distance learning*. Retrieved on May, 18, 2009, from: http://www.chea.org/pdf/mono_1_accred_distance_02.pdf.

Chesney, T. (2008). An acceptance model for useful and fun information system. *An Interdisciplinary Journal on Humans in ICT Environments, 2*(2), 225–235.

Chou, C. (2002). A comparative content analysis of student interaction in synchronous and asynchronous learning networks. *Proceedings of the 35th Hawaii International Conference on System Sciences, 5*, 134.

Christina, K. (2007). Technology acceptance in academic organizations: implementation of virtual learning environments. *14th European Conference on Information Systems*.

Chute, A., Thompson, M., & Hancock, B. (1999). *The McGraw-Hill handbook of distance learning*. New York: McGraw-Hill.

Clark, T. (2001). *Virtual Schools: Trends and issues - A study of virtual schools in the United States.* Retrieved on May, 30, 2009, from: http://www.wested.org/online_pubs/virtualschools.pdf.

Cleary, Y. (2005). Technical communication at the University of Limerick: Comparison of available data for distance learning and full-time students. *2005 IEEE International Professional Communication Conference Proceedings,* 689- 697.

Coakes, S. J., & Steed, L. G. (2003). *SPSS analysis without anguish*. Sydney: John Wiley & Sons.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189-211.

Conci, M., Pianesi, F., & Zancanaro, M. (2009). Useful, social and enjoyable: Mobile phone adoption by older people. *12th IFIP TC13 Conference on Human-Computer Interaction*, 63-76.

CSB (2009). *Civil Service Bureau.* Retrieved on December, 15, 2009, from: http://www.csb.gov.jo.

Dadayan, L., & Ferro, E. (2005). When technology meets the mind: A comparative study of the technology acceptance model. *International conference on electronic government*, *35 (91)*, 137-144.

Dalziel, C. (2008). *Online in the United States*. Retrieved on April, 3, 2009 from: www.studyoverseas .com /distance / onlineus .html

Dark, M., York, C., Popescu, V., & Nita-Rotaru, C. (2007). Evaluating interactivity and presence in an online distance learning system. *37th ASEE/IEEE Frontiers in Education Conference*, 24-29.

Davis F., Bagozzi R., & Warshaw P. (1992). Extrinsic and intrinsic motivation to use computer in the workplace. *Journal of Applied Social Psychology*, *22*(14), 1111-1132.

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance. *MIS Quarterly*, *13*(3), 319-340.

Dillon, A., & Morris, M. G. (1996). User acceptance of information technology: Theories and models. *Annual Review of Information Science and Technology*, *31*(1), 3-32.

Easton, R., & Stratton, J. (2004). Distance learning: Facts, failures, foibles, and the future. *Engineering Education Annual Conference.*

ECDL Foundation Programmes (2009). ECDL / ICDL. Retrieved on February, 4, 2009 from: http://www.ecdl.com.

Elaiza, O. N., & Geri, N. (2008). Easy as e-mail? Probing the slow adoption of an online assignment submission system. *Proceedings of the Chais conference on instructional technologies research 2008*, 94-101.

Elena, A. (2006). Theoretical basics of adult vocational training by means distance learning technologies. *International Siberian workshop and tutorial EDM'2006*, 201-206.

Folorunso, O., Ogunseye, O.S., & Sharma, S.K. (2006). An exploratory study of the critical factors affecting the acceptability of e-learning in Nigerian universities. *Information Management and Computer Security*, *14*(5), 496-505.

Fornell, C. & David F.L. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39-50.

Friedrich, H.F., & Hron, A. (2010). Factors influencing pupils' acceptance of an e-learning system for secondary schools. *Journal of Educational Computing Research, 42*, 63-78.

Gagne, R., & Rojas, A. (1991). Planning and authoring computer assisted instruction lessons. *Educational Technology, 21*(9), 17-21.

Galvin, T. (2002). 2002 industry report: Training magazine’s 21st annual comprehensive

Gefen, D. & Straub, D. W. (1997). Gender difference in the perception and use of e-mail: An extension to the technology acceptance model. *MIS Quarterly, 21*(4), 389-400.

Gefen, D., Karahanna, E. & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51-90

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference 12.0 update*. Needham Heights, MA, USA: Allyn & Bacon, Inc.

Gerbing, D. W., & Anderson, J. C. (1988). An update paradigm for scale development incorporation unidimensionality and its assessment. *Journal of Marketing Research, 25,* 186-192.

Geri, N., & Elaiza, O. N. (2008). Beyond adoption: Barriers to an online assignment submission system continued use. *Interdisciplinary Journal of E-Learning and Learning Objects, 4*(1), 225-241.

Ghaemi, P., Swift, J., Sisterb, C., Wilson, J. P., & Wolch, J. (2009). Design and implementation of a web-based platform to support interactive environmental planning. *Computers, Environment and Urban Systems, 33*(1), 482-491.

Gliem, J. A, & Gliem, R.R. (2003). Calculating, interpreting, and reporting Cronbach’s alpha reliability coefficient for Likert-type scales. *2003 Midwest Research to Practice Conference in Adult, continuing, and community education*.

Goodwin, C., Graham, M., & Scarborough. (2001). Developing an asynchronous learning network. *Educational Technology & Society, 4*(4), 1436-4522.

Gordon, P., & Yefalvi Z. (2004). Distance learning: How to use this new didactic method in education of electronics engineering. *2004 Electronic Components and Technology Conference, 2(1).*

Goussal, D. M., & Udrízar Lezcano, M. S. (2003). Synchronous distance learning and virtual classrooms: A case study on student expectations and conditioning factors. *Australian Journal of Educational Technology, 19*(3), 388- 404.

Gracanin, D. (2003). Combining traditional and web-based distance learning in information technology education. *Information Technology: Research and Education, 2003. Proceedings. ITRE2003. International Conference on,* 595- 599.

Grandon, E. E., Alshare, K., & Kwun, O. (2005). Factors influencing student intention to adopt online classes: A cross cultural study. *Journal of Computing Science in College*, *20*(4), 46-56.

Grant, R., & Danziger, J. (2005). Exploring the corporate benefits and employee adoption of corporate e learning. *Center for Research on Information Technology and Organizations. I.T. in Business.*

Graziadei, W. D. (1993). Virtual instructional classroom environment in science (VICES) in research. *Education, Service & Teaching (REST)*.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* ($7^{th}$ ed.). New Jersey: Pearson Education, Inc.

Hair, J., Black, W., Babin, B., Anderson, R., & Tatham, R. (2006). *Multivariate data analysis* ($6^{th}$ ed.). New Jersey: Upper Saddle River.

Halawi, L., & McCarthy, R. (2008). Measuring students perceptions of blackboard using the technology acceptance model: A PLS approach. *Issues in Information Systems, 9*(2), 95-102.

Hall, B. (1999). Five common questions and the answers. *Inside Technology Training, 3*(2), 42-43.

Hartwick, J., & Barki, H. (1994). Explaining the role of user participation in information system use. *Management Science, 40*(4), 440-465.

Henry, P. D., & Motet, A. (2006). Bridging great divides: Innovation diffusion in Hawaiian distance learning. *TCC worldwide online conference 2006 Proceedings*.

Hermans, C. M., Haytko, D. L., & Stenerson, M.B. (2009) Student satisfaction in web enhanced learning environments. *Journal of Instructional Pedagogies, 1*, 296-304.

Hisham, N. Campton, P., & FitzGerald, F. (2004). A tale of two cities: A study on the satisfaction of asynchronous e learning systems in two Australian universities. *Proceedings of the 21st ASCILITE Conference*, 395-402.

Ho, I., Kiyohara, H., Sugimoto, A., & Yana, K. (2005). Enhancing global and synchronous distance learning and teaching by using instant transcript and translation. *Proceedings of the 2005 International Conference, 377, 23-25.*

Holmes-smith, C. E., & Coote, L. (2006). Structural equation modeling: From the fundamentals to advanced topics, school research, evaluation and measurement services, education and statistics consultancy. Statsline.

Holmes-Smith, P. (2000). Introduction to structural equation modeling using AMOS 4.0 and LISREL. *Paper presented at the ACSPRI 2000 summer program, Elsternwick.*

Howard, D. (2002). *Enhanced by technology, not diminished: A practical guide to effective distance communication.* New York: McGraw-Hill.

Hoyle, R. H., Panter, A. T. (1995). Writing about structural equation models. In R. H. Hoyle (Ed.), *Structural Equation Modeling* (pp. 158-176). Washington, DC: American Psychological Association.

Hsia, J. W., & Tseng, A. H. (2008). An enhanced technology acceptance model for e-learning systems in high-tech companies in Taiwan: Analyzed by structural equation modeling. *International Conference on Cyberworlds 2008*, 39-44.

Hu, P., Chau, P., Liu Sheng, O. R., & Tam, K. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems, 16*(2), 91-112.

Huang, Y. H, Wag, Y. S., & Chou, S.C. (2007). User acceptance of e-government services. *11th Pacific-Asia Conference on Information Systems,* 97.

Hussein, R., Aditiawarman, U., & Mohamed, N. (2007). E-learning acceptance in a developing country: A case of the Indonesian Open University. *German e-Science Conference*.

ICDL US (2009). *ICDL foundation*. Retrieved on March, 20, 2009, from: http://www.icdlus.com.

Igbaria, M. (1992). An examination of microcomputer usage in Taiwan. *Information & Management*, *22*(1), 19-28.

IM, I., Hong, S., & Soo, M. K. (2010). An international comparison of technology adoption: Testing the UTAUT model. *Information & Management 48*(1), 1-8.

Instone, K. (2004). An information architecture perspective on personalization. In: Karat, C. (Ed$_s$), *Designing personalized user experiences in eCommerce* (pp. 75-93). Netherlands: Kluwer Academic Publishers.

Integrated Technology Group (2005). The ultimate Middle East business resource. Retrieved on May 30, 2009, from http://www.ameinfo.com/news/Company_News/I/Integrated_Technology_Group__ITG_/.

Jackson, A. (2002). Learning on-line: A virtual education. *Engineering Education Annual Conference* .

Janz, B. (1999). Self-directed teams in IS: Correlates for improved systems development work outcomes. *Information & Management*, *35*(3), 171-192.

Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in I innovation adoption research. *Journal of Information Technology*, *21*(1), 1-23.

Jian, G., Lan, J., & Zhuang, X. (2001). Distance learning technologies and an interactive multimedia educational system. Advanced Learning Technologies, 2001. *Proceedings. IEEE International Conference***,** 405-408.

John, O. (1999). Students' perceptions of distance learning, online learning and the traditional classroom. *Online Journal of Distance Learning Administration, 2*(4), 1-16.

Jong, D., & Wang, T.S. (2009). Student acceptance of Web based learning system. *2009 International Symposium on Web information system and application (WISA'09)*, 533-536.

Jordan Time (2002). *ICDL in Jordan*. Retrieved on March, 12, 2009, from: http://www.writefix.com/ICDL/icdljordan.htm

Karadediz, S. (2009). Flexible design for the future of distance learning. *Procedia-Social and Behavioral Science, 1*, 358-363.

Khan, S. (2007). *Adoption issues of internet banking in Pakistani' firms.* Unpublished dissertation. Lulea University of technology.

Koifman, I., Shimshoni, I., & Tal, A. (2002). MAVIS: A multi-level algorithm visualization system within a collaborative distance learning environment. *Journal of Visual Language and Computing, 19*(2), 182-202.

Kroth, M. (2007). Maslow—Move Aside! A heuristical motivation model for leaders in career and technical education. *Journal of Industrial Teacher Education, 44*(2), 5-36.

Kurilova-Rich, L. V., & Falaleev, A. G. (2003). Russian distance learning projects within Far Eastern National University and beyond. *Distance Learning and the Internet Conference 2003.*

Kwok, R., Ma, J., Vogel, D., & Zhou, D. (2001). Collaborative assessment in education: An application of a fuzzy GSS. *Information & Management, 39*(3), 243-253.

Lai, V., & Li, H. (2005). Technology acceptance model for internet banking: An invariance analysis. *Information and Management A*rchive, *42*(2), 373-386.

Lee, J. S., Cho, H., Gay, G., Davidson, B., & Ingraffea, A. (2003). Technology acceptance and social networking in distance learning. *Educational Technology & Society*, *6*(2), 50-61.

Lim, B. C., Kian, H. S., & Kock, T.W. (2008). Acceptance of e-learning among distance learners: A Malaysian perspective. *Proceedings ascilite Melbourne 2008*, 541-551.

Liska, A. E. (1984). A critical examination of the causal structure of the Fishbein/Ajzen attitude model. *Social Psychology Quarterly, 4* (1), 61-74.

Liu, G. Z., & Hwang, G. J. (2009). A key step to understanding paradigm shifts in e-learning: Towards context-aware ubiquitous learning. *British Journal of Educational Technology*, *41*(2), 1-9.

Liu, H., Liao, H., & Pratt, J.A. (2009). Impact of media richness and flow on e-learning technology acceptance. *Journal of Computers & Education*, *52*(3), 599-607.

Liu, Y., & Wah, Y. H. (2007). Human-centered multimedia e-learning system for real-time interactive distance education. *Multimedia and Expo, 2007 IEEE International Conference on*, 2042 – 2045

Mahadeo, D., Munhurrun, R., & Bhiwajee, L. (2007). An evaluation of learners' perceptions of e-courses. *Computer Science and IT Education Conference*.

Mahony, M. J., & Wozniak, H. (2005). Diffusion of innovation and professional development in eLearning: The CHS eLearning resource case study. *Conference on the International Experience in Open, Distance and Flexible Education,* 9-11. Adelaide.

Malhotra, Y., & Galletta, D.F. (1999). Extending the technology acceptance model to account for social influence: theoretical bases and empirical validation. *In proceedings of the thirty- second annual Hawaii international conference on system sciences, 1*, 14

Manning, R., Cohen, M., & DeMichiell, R. (2003). Distance learning: Step by step. *Journal of Information Technology Education, 2*, 115-130.

Marakas, G., Yi, M., & Johnson, R. (1998). The multilevel and multifaceted character of computer self-efficacy: Toward clarification of the construct and an integrative framework for research. *Information Systems Research, 9(2)*, 126-163.

Marchewka, J., Liu, C., & Kostiwa, K. (2007). An application of the UTAUT model for understanding student perceptions using course management software. *Communications of the IIMA, 7*(2), 93-104.

Maria, P. S., & Ataide, G.D. (2007). Theories about technology acceptance: Why the users accept or reject the information technology? *Brazilian Journal in Information Science, 1*(2), 69-86.

Mashhour, A. S. (2007). A distance education model for Jordanian students based on an empirical study. *Turkish Online Journal of Distance Education-TOJDE, 8*(2), 1302–6488.

Masrom, M. (2007). Technology acceptance model and e-learning. International *Conference on Education, Sultan Hassanal Bolkiah Institute of Education Universiti Brunei Darussalam 21-24 May 2007*. Malaysia.

Mathieson, K., Peacock, E., & Chin, W. (2001). Extending the technology acceptance model: The influence of perceived user resources. *Database for Advances in Information Systems, 32*(3), 86-112.

Merchant, S. (2007). Exploring the influence of cultural values on the acceptance of information technology: An application of the technology acceptance model. *Issues in Informing Science and Information Technology, 4*, 431-443.

Midkiff, S., & DaSilva, L. (2000). Leveraging the web for synchronous versus asynchronous distance learning. *International Conference on Engineering Education*.

Miller, M. D., Kelly, R. R., & Ken, J. C. (2003). Predictors of engagement and participation in an on-line course. *Online Journal of Distance Learning Administration, 6*(1). Retrieved June 3, 2009 from the World Wide Web: http://www.westga.edu/~distance/ojdla/spring61/miller61.htm.

Mitchell, T. J. F., Chen, S. Y., & Macredie, R. D. (2005). The relationship between web enjoyment and student perceptions and learning using a web-based tutorial. *Learning, Media and Technology, 30*(1), 27-40.

Mofleh, S., Wanous, M., & Strachan, P. (2008). Developing countries and ICT initiatives: Lessons learning from Jordan's experience. *The Electronic Journal on Information System in the Developing Countries, 34*(5), 1-17.

Monolescu, D., Schifter, C., & Greenwood, L. (2004). The distance education evolution: Issues and case studies. *Turkish Online Journal of Distance Education-TOJDE, 5*, 163-184.

Moon, J., & Kim, Y. (2001). Extending the technology acceptance model for the World Wide Web context: Playfulness salient belief. *Information & Management, 38*(4), 217-230.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(2), 192-222.

Moore, G. C., & Benbasat, I. (1996). Integrating diffusion of innovations and theory of reasoned action models to predict utilization of information technology by end-users. In K. Kautz, & J. Pries-Heje. *Diffusion and Adoption of Information Technology* (pp. 132-146). London: Chapman and Hall Publishers.

Moran, M. (2006). *College students' acceptance of tablet PCs: An application of the UTAUT model*. Ph.D. Thesis Papella University. Mennesota, USA.

Morcos, M., & Soldan, D. (2001). Supporting distance engineering education is greatly needed. *Large Engineering Systems Conference*, 69-72.

Morley, L., & LaMaster, K. (1999). Using WebCT bulletin board option to extend transitional classroom walls. *ERIC Database, accession No. ED440922.*

Nanayakkara, C. (2005). A model of user acceptance of learning management systems: a study within tertiary institutions in New Zealand. *International Journal of Learning, 13*(12), 223-232.

Nanayakkara, C., & Widdett, D. (2005). A model of user acceptance of e-learning technology: A case study of a polytechnic in New Zealand. *The fourth international conference on information system technology and applications***.** New Zealand**,** 180-189.

Naor, O., & Geri, N. (2008). Easy as e-mail? Probing the slow adoption of an online assignment submission system. *Proceedings of the Chais conference on instructional technologies research 2008, 5,* 94-101.

National Military Family Association (NMFA) (2008). *Distance learning*. Retrieved on March, 22, 2009, from: http://www.nmfa.org/site/PageServer?pagename=choosing_school.

Netemeyer, R. G., Burton, S., & Johnston, M. (1991). A comparison of two models for the prediction of volitional and goal directed behaviors: A confirmatory analysis approach. *Social Psychology Quarterly, 54*(2), 87-100.

Neuman, W. L. (2003). *Social research methods: Qualitative and Quantitative approaches*. Boston: Pearson Education.

Norman, P., & Smith, L. (1995). The theory of planned behavior and exercise: An investigation into the role of prior behavior, behavioral intentions and attitude variability. *European Journal of Social Psychology, 25,* 403-415.

Ok, S., & Shon, J. (2006).The determinant of internet banking usage behavior in Korea: A comparison of two theoretical models. *CollECTeR '06, 9 December.* Adelaide.

Pahwa, A., Gruenbacher, D., Starrett, S., & Morcos, M. (2005). Distance learning for power professional. *IEEE Power and Energy Magazine, 3*(1), 53-58.

Pallant, J. (2005). *SPSS survival manual: A step by step guide to data analysis using SPSS* (2nd ed.). Crows Nest: Allen @ Unwin.

Pange, J., Leontitsis, A., & Siogka, E. (2004). Are the Greek preschool teachers able to use distance learning technologies? Information Technology Based Higher Education and Training, 2004. *Proceedings of the FIfth International Conference on*, *672- 673*.

Partridge, H. L. (2007). Redefining the digital divide: attitudes do matter. *Proceedings 70th American Society for Information Science and Technology (ASIS&T), 44(1)*. Milwaukee, Wisconsin, USA.

Paul, O., & Hardt, Ed.D. (2008). How do executives really evaluate distance training? *ASTD 2008 International Conference & Exposition, pp 1-6.*

Pauli, K. P., Gilson, R. L., & May, D. R. (2007). Anxiety and avoidance: The mediating effects of computer self-efficacy on computer anxiety and intention to use computers. *Review of Business Information Systems, 11*, 57-64.

Payne, E.A., & Curtis, M. B. (2008). Can the unified theory of acceptance and use of technology help us? Retrieved on June 14, 2009, from: http://aaahq.org/meetings/AUD2009/CanTheUnifiedTheory.pdf

Peak Group (2002). Virtual schools across America: Trends in K–12 online education. *Software Industry & Information Association. USA*

Pedersen, P., & Nysveen, H. (2003). Usefulness and self-expressiveness: Extending TAM to explain the Adoption of a mobile parking Services. *In the proceeding of the 16th Bled eCommerce Conference*, Bled, Slovenia, June 9-11.

Peter, J. P. (1979). Reliability: A review of psychometric basics and recent marketing practices. *Journal of Marketing Research*, *16*, 6-7.

Poon, W. C., Low, L. T., & Yong, G. F. (2004). A study of Web-based learning (WBL) environment in Malaysia. *The International Journal of Educational Management*, *18*(6), 374-385.

Pratikakis, I., Karahaliou, A., Vassiou, K., Virvilis, V., Kosmopoulos, D., & Perantonis, S. (2009). eMedI: Web-Based E-Training for Multimodal Breast Imaging. *International Journal of Biological and Medical Sciences*, *4*(2), 82-88.

Quinn, B., Barroca, L., Nuseibeh, B., Fernández, J., Rapanotti, L., Thomas, P., & Wermelinger, M. (2006). Learning software engineering at a distance. *IEEE Computer Society*, *23*(6), 36-43.

Raaij, M. R., & Schepers, J. J. L. (2008). The acceptance and use of a virtual learning environment in China. *Computer and Education*, *50*, 838-852.

Ramayah, T., Jantan, M., & Ismail, N. (2003). Impact of intrinsic and extrinsic motivation on internet usage in MALAYSIA. *The 12th International Conference on Management of Technology*, 13-15 May 2003, Nancy, France.

Ramayah, T., Rouibah, K., Gopi, M. & John, G. (2009). A decomposed theory of reasoned action to explain intention to use Internet stock trading among Malaysian investors. *Computers in Human Behavior, 25*, 1222–1230.

Reddy, M. (2004). *Jordan learns on Linux*. Retrieved on March, 24, 2009, from: http://www.arabianbusiness.com/480789.

Rezaei, M., Movahed, H. M., Asadi, A., & Kalantary, K. (2008). Predicting e-learning application in agricultural higher education using technology acceptance model. *Turkish Online Journal of Distance Education*, *98*(1), 85-95.

Robinson, L. (2009). *A summary of diffusion of innovations*. Retrieved on May, 30, 2009, from: www.enablingchange.com.au

Rogers, E. (1995). *Diffusion of innovations.* New York: Free Press.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Ruhig, R. (2002). *Distance learning: A systems view an assessment and review of the literature*. Retrieved on May, 10, 2009, from: http://www.rcet.org/research/ATT-OLN/Dumont-finalreport.pdf

Ruttenbur, B. W., Spickler, G. C., & Lurie, S. (2000). *E-learning the engine of the knowledge economy*. Retrieved on July, 20, 2009, from: http://www.fondazionecrui.it/elearning/data/allegati/links/1193/2000%20Morgan%20Keegan.pdf

Saade, R. G, & Kira, D. (2006). The emotional state of technology acceptance. *Issues in Informing Science and Information Technology, 3*(1), 529-540.

Saade, R. G., Nebebe, F., & Tan, W. (2007). Viability of the technology acceptance model in multimedia learning environments: A comparative study. *Interdisciplinary Journal of Knowledge and Learning Objects, 3*(2), 175-184.

Sahin, I., & Shelley, M. (2008). Considering students' perceptions: The distance education student satisfaction model. *Educational Technology & Society, 11*(3), 216–223.

Said, S. A. (2006). Information technology adoption, the roadmap to sustainable development: Examining three models. *18th National Computer Conference 2006.* Saudi Arabia.

Samuel, M. D., Joly, D. O., Wild, M. A., Wright, S. D., Otis, D. L., Werge, R. W., & Miller, M. W. (2003). Surveillance strategies for detecting chronic wasting disease in free-ranging deer and elk. *Result of a CWD surveillance workshop USGS-National WILDLIFE HEALTH CENTER*, Madison, Wisconsin.

Schape, L., & Pervan, G. (2007). A model of information and communication technology acceptance and utilization by occupational therapists. *International Journal of Medical Informatics, 76*(1), 212-221.

Schott, M., Chernish, W., Dooley, K., & Lindner, J.R. (2003). Innovations in distance learning program development and delivery. *Online Journal of Distance Learning Administration, 6*(2), 1-27.

Sekaran, U. (2000). *Research methods for business: a skill-building approach.* NYC: John Wiley & Sons, Inc.

Sekaran, U. (2003). *Research methods for business.* United States of America: John Wiley &Sons, Ltd.

Sekaran, U. (2007). *Research methods for business*. New Delhi: Wiley India.

Selim, H. M. (2005). Critical success factors for e-learning acceptance: Confirmatory factor models. *Computers & Education, 49*(2), 396-413.

Sevin, E., & Thalmann, D. (2005). The complexity of testing a motivational model of action selection for virtual humans. *Computer Graphical International*, 540-543.

Seyal, F. H., Rahman, M. A., & Tajuddin, S. T. (2007). Internet users' behavior model: A structural equation approach. *Proceedings of the 13th Asia Pacific Management Conference*, 210-221. Melbourne, Australia, 2007.

Sharma, S. (1996). *Applied multivariate technique*. New York: John Wiley& Sons, Inc.

Shen, D., Laffey, J., Lin, Y., & Huang, X. (2006). Social influence for perceived usefulness and ease-of-use of course delivery systems. *Journal of Interactive Online Learning, 5*(3), 163-177.

Sheng, Z., Jue, Z., & Weiwei, T. (2008). Extending TAM for online learning systems: An intrinsic motivation perspective. *Tsinghua Science and Technology*, *13*(3), 312-317.

Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). Theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Research, 15*, 325-343.

Smith, T. D., & McMillan, B. F. (2001). A primer of model fit indices in structural equation model. *Annual meeting of the southwest educational research association*, 1-3. New Orleans.

Soh, P., & Subramanian, A. M. (2008). Is usage a missing link in explaining the perceived learning outcome of technology mediated learning? *IEEE Transactions on Engineering Management, 55*, 393-408.

Song, J., & Zahedi, F. (2001). Web design in e-commerce: A theory and empirical analysis. *Twenty-Second International Conference on Information Systems*, 205-219. New Orleans, LA.

Stoyanov, S., Ganchev, I., Popchev, I., & O'Droma, M. (2008). Service-oriented and agent-based approach for the development of InfoStation eLearning intelligent system architectures. *Paper presented at the 4th International IEEE Conference "Intelligent Systems"*.

Sumak, B., Hericko, M., Polancic, G., & Pusnik, M. (2010). Investigation of e-learning system acceptance using UTAUT. *International Journal of Engineering Education 26*(6), 1327-1342.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn and Bacon.

Taylor, S., & Todd, P. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(2), 144-176.

Thomas, K., & Allen, S. (2006). The learning organization: A meta-analysis of themes in literature. *Journal of Learning Organization, 13*(2), *123*- 139.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly, 15*, 124-143.

Training Directory. (2007). Face to Face Training. Retrieved on March 5, 2011, from: http://www.cii.co.uk/documents/face-to-face-training.pdf.

Tynjala, P., & Hakkinen, P. (2005). E-Learning at work: Theoretical underpinnings and pedagogical challenges. *The Journal of Workplace Learning*, *17,* 318-336.

UNSCO (2006). *Distance learning: Bureau of Public Information*. Retrieved on May, 20, 2009, from: *www.unesco.org/bpi/pdf/memobpi38_distancelearning_en.pdf.*

Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management and Science, 46*(2), 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F., D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425-478.

Voinea, L., Dima, G., & Profirescu, M. (2001). Pilot Implementation of a web-based microelectronics laboratory within EDIT distance learning network. *24th International Spring Seminar on Electronics Technology*, pp.18 - 19.

Volery, T., & Lord, D. (2000). Critical success factors in online education. *International Journal of Educational Management*, *14*(5), 216-223.

Wag, H., Lin, Chang, W., & Shih, T. (2005). Applying Petri Nets to model learning sequence with SCORM specification in collaborative learning. *Proceedings of the 2005 International Conference,* pp.181- 186.Taiwan.

Walclzak, S., & Scott, J.E. (2009). Cognitive engagement with a multimedia ERP training tool: Assessing computer self-efficacy and technology acceptance. *Information and Management*, *46*, 221-232.

Weihua, L. (1997). The research and development of multimedia software. *Proceeding of the EuroChinatel conference (Telematics Multimedia Application, Education and Healthcare),* pp. 126–129. Beijing, China.

Wolk, M. (2007). Using the technology acceptance model for outcomes assessment in higher education. *Information Systems Education Journal, 7*(43), 86-112.

Wozencroft, S. (2005). *Discuss the relative strengths and weaknesses of qualitative and quantitative approaches to the socio-cultural study of sport.* Retrieved August 14, 2009, from: www.seanwozencroft.com/oldportfolio/uni/research.doc

Xie, K., Debacker, T. K., & Ferguson, C. (2006). Extending the traditional classroom through online discussion: The role of student motivation. *Journal of Educational Computing Research, 34*(1), 67- 89.

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). New York: Harper and Row.

Yayla, A., & Qing, H. (2007). *User acceptance of e-commerce technology: A meta-analytic comparison of competing models.* Retrieved on June, 2, 2009, from http://is2.lse.ac.uk/asp/aspecis/20070192.pdf

Yin, R. K. (1994). *Case study research: Design and methods*. Thousand Oaks: Sage.

Young-Ju Joo, Mimi Bong, & Ha-Jeen Choi. (2000). Self-efficacy for self-regulated learning, academic self efficacy, and Internet self-efficacy in web-based instruction. *Educational Technology, Research and Development, 48*(2), 5-13.

Zachman, J. A. (1999). A framework for information systems architecture. *IBM Systems Journal, 38*(2/3), 454-470.

Zhang, W., Perris, K., & Yeung, L. (2005). Online tutorial support in open and distance learning: Students' perceptions. *British Journal of Educational Technology, 36*(5), 789-804.

Zhao, X., Zhong, Y., Matsumoto,M. (2006). A real-time interactive shared system for distance learning. *Multi Media Modelling Conference Proceedings, pp.6.*

Zhuravleva, O., Krouk, B., & Solomina, E. (2006). System of corporate distance learning. *7th Annual 2006 International Workshop and Tutorials,* Pp.172-176. Erlagol.

Zikmund, W. G. (1994). *Business research method* (4th ed.). Orlando: The Dryden press.

# APPENDICES

**Appendix A:** Table 1.0 research questionnaire

| **1.0 Demographic information** |
|---|
| What is your gender? ☐ Male ☐ Female |
| What is your age? ☐ Under 25 ☐ 26-35 ☐ 36-45 ☐ over 46 |
| Do you have computer for regular use? ☐ Yes ☐ No |
| If yes, does this computer have Internet access? ☐ Yes ☐ No |
| What type of Internet access do you have? ☐ Dial-up / modem Internet Access<br>☐ High-Speed Internet Access (e.g. ADSL)<br>☐ Other kind (e.g. wireless) |
| Which of the following best describes your Internet using? ☐ I spend many hours using the Internet daily<br>☐ I frequently use the Internet<br>☐ I never get on the intenet |
| Have you used any distance learning system before? ☐ Yes ☐ No<br>If yes, describe the course you attended and where<br>________________________________________<br>________________________________________ |

The following set of sections relates to your thought about the computer based distance training system (CBDTS). Please follow the numbers which denote the following answers to Circle one answer for each question.

| Strongly disagree 1 | Disagree 2 | Slightly Disagree 3 | Neither agree or disagree 4 | Slightly agree 5 | Agree 6 | Strongly agree 7 |
|---|---|---|---|---|---|---|

| **2.0 Performance expectancy** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. Using computer based distance learning system (CBDTS) in training will enable me to accomplish my training more quickly. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Using CBDTS will improve my training performance. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I would find CBDTS useful in my training. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. Using CBDTS would increase my job productivity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **5.** If I use CBDTS, I would increase my chances of getting a raise. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. Using CBDTS would enhance my job effectiveness | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please, follow the numbers which denote the following answers to Circle one answer for each question

| Strongly disagree 1 | Disagree 2 | Slightly Disagree 3 | Neither agree or disagree 4 | Slightly agree 5 | Agree 6 | Strongly agree 7 |
|---|---|---|---|---|---|---|

| **3.0 Effort expectancy** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7. Learning to operate CBDTS would be easy for me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. My interaction with CBDTS would be clear and understandable. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. It would be easy for me to become skillful at using CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. I would find CBDTS easy to be use. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. I would find it easy to get CBDTS to do what I want to do. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. I would find CBDTS to be flexible to interact with. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| **4.0 System interactivity** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13. CBDTS will enable me interact with trainers. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. CBDTS will enable me to interact with other trainees. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. The communication tools (e-mails, chat room, forum, etc) in the CBDTS are active. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16. Using communication tools will be beneficial for me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. CBDTS will enable me to send questions and receive answers. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| **5.0 System enjoyment** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 18. I would find CBDTS to be fun to interact with. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. I would find using of CBDTS to be enjoyable. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. The actual process of using CBDTS would be pleasant. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 21. The actual process of using CBDTS would be wise. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 22. Using of CBDTS would make the training more interesting. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| **6.0 System Flexibility** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 23. CBDTS allows me to be trained according to my available time. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 24. CBDTS allows me to be trained at home comfortably. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 25. In terms of use of time and location, CBDTS is flexible. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 26. CBDTS is fit to trainees with different learning capacities. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| **7.0 Social influence** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 27. I will use CBDTS if the people who are important to me think I should use it. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 28. I will use CBDTS if the people who influence my behavior think I should use it. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 29. I will use CBDTS if the senior management of my business helpful | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| in the use of such system. | | | | | | | |
| 30. People in my organization who use such system have more prestige than those do not. | | | | | | | |
| 31. In general, I would find my organization has supported using CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please follow the numbers which denote the following answers to Circle one answer for each question

| Strongly disagree 1 | Disagree 2 | Slightly Disagree 3 | Neither agree or disagree 4 | Slightly agree 5 | Agree 6 | Strongly agree 7 |
|---|---|---|---|---|---|---|

| **8.0 Facilitating conditions** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 32. I will use CBDTS if a specific person (group) is available for assistance with CBDTS difficulties. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 33. I have the resources necessary to use CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 34. I have knowledge necessary to use CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 35. The CBDTS is not compatible with other system I am using. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 36. Given the resources, opportunities and knowledge it takes to use CBDTS, it would be easy for me to use CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please follow the numbers which denote the following answers to Circle one answer for each question

| Strongly disagree 1 | Disagree 2 | Slightly Disagree 3 | Neither agree or disagree 4 | Slightly agree 5 | Agree 6 | Strongly agree 7 |
|---|---|---|---|---|---|---|

| **10.0 Anxiety** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 42. I feel apprehensive about CBDTS using. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 43. I am scared that I cannot access all the training material content with CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 44. CBDTS is intimidating me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 45. I hesitate to use CBDTS for fear of making mistake I cannot correct. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| **9.0 Self-efficacy** | | | | | | | |
|---|---|---|---|---|---|---|---|
| 37. I am confident to use the CBDTS if I have just built-in help facility for assistance. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 38. I am confident to use the CBDTS If I have a lot of time to accomplish the tasks for which the system is provided. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 39. I am confident to use the CBDTS if there is no one around to show me how to do it. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 40. I am confident to use the CBDTS as long as someone shows me how to do it | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 41. I had used similar packages before this one to do the same job. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| 11.0 Behavioral intention to use CBDLS | | | | | | | |
|---|---|---|---|---|---|---|---|
| 46. I intend to use the CBDTS to improve my training. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 47. I predict I would use the CBDTS when it will be implemented. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 48. I plan to use the CBDTS when it will be implemented. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 49. I expect to use the CBDTS when it will be implemented. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 50. I would strongly recommend my colleagues to use CBDTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Appendix B:**

Table 1.0

The studies that examined the acceptance of e-learning system

| Author | IV | DV | Moderator/ mediating | theory | findings | instrument | Future research |
|---|---|---|---|---|---|---|---|
| Venkatesh et al. (2003) | Performance Expectancy(PE), Effort Expectancy(EE), Social Influence(SI), and Facilitating Conditions(FC) | Behavioral Intention(BI) and Use Behavior(UB) | Behavioral intention, Age, Gender, Experience, Voluntariness | UTAUT | 1-There are significant relations between PE & BI, EE & BI, SI & BI, FC & UB BI & UB 2-The relations between IV and DV to acceptance of IT are moderated by Age, Gender, Experience, and Voluntariness | Questionnaire | 1- Examining other scales. 2- Examining the acceptance of IT by the public sector's employees |
| Dadayan and Ferro, (2005) | Computer Enxiety(CA), EE, PE, Compatibility, SI and Organizational Facilitation(OF) and User's Attitude(UT) | Acceptance Motivation(AM), BI and UB | EE, AM and BI | UTAUT and TAM | The system, individual and organization factors have significant effect on the ICT acceptance | Questionnaire and interview | Focusing on the other type of the information technology and examine IT in the whole public sector organizations |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nanayakkara, (2005) | Individual Factor, System Factor and Organization Factor | Students Behavioral Intention to use e-learning system BI | | TAM, TAM2 and UTAUT | The system, individual and organization factors have significant effect on the e-learning system acceptance by universities' students | Questionnaire | |
| Saade & Kira, (2006) | Affect, computer Anxiety (CA), Perceived Usefulness(PU), perceived easy of use(PEOU) | Students Behavioral Intention to use e-learning system | PU, PEOU | TAM | Affect and CA have indirect significant impact on the acceptance of e-learning system by universities' students. | Questionnaire | Focus on the designing controlled online learning environment. |
| Saade et al., (2007) | PU, PEOU | Students Behavioral Intention to use e-learning system | UT | TAM | There are significant relation between PEOU & PU, PU & students' attitude PEU & students attitude UT & students' intention to use e-learning system. | questionnaire | |
| Friedrich and Hron, (2010) | PU, attitude, self-efficacy | Students' intention | Gender | | Just PU has significant effect on the intention | Questionnaire | Educational environment |
| Lee et al., (2003) | Social Expectation, PU, PEOU | Students Behavioral Intention to use e-learning system | PU, PEOU | TAM | All the TAM hypotheses were supported. There is significant relation between PEOU & PU, PU & students' attitude students' attitude & DLS PE & PEOU | questionnaire | Examine the effect of the communication channel on the social influence. |
| Sahin and Shelley | Flexibility, Computer Experience(CE), PU | Students' satisfaction | PU | TAM | There are significant relations between | questionnaire | Applying the proposed |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (2008) | | toward distance learning system. | | | CE & flexibility<br>CE & PU<br>Flexibility & PU<br>CE & students satisfaction<br>Flexibility & students satisfaction | | model in the other areas. |
| Wolk, (2007) | Gender, students status, family status, computer literacy, college major PU, PEOU, UA | Students intention to use e-assessment system | UA | TAM | -Gender hasn't impact on the system usage.<br>-Other external variables have significant effect on the system usage.<br>-PU and PEOU have significant influence on the system usage. | questionnaire | Centralizing on the variables which are related to the educational institutions |
| Rezaei et al., (2008) | Internet Experience(IE), Computer Anxiety(CA), Age, Computer Self-efficacy(CS), Affect, PU, and PEOU | Students' intention to use e-learning system | PU and PEOU | TAM | -IE, CA, CS, PU and PEOU have significant relations with user's intention to use e-learning system.<br>- age has negative effect on the user's intention. | questionnaire | |
| Elaiza and Geri, (2008) | PU, PEOU, Social Influence(SI), Compatibility, support, Institution Influence(II) and User Attitude(UA) | Students Intention to use E-learning system(Behavioral Intention (BI)) | Age, Gender, learning framework and Experience | TAM and Innovation diffusion theory | -There are significant relations between<br>PU & BI<br>PEOU & BI<br>UA & BI<br>-Compatibility and II, have indirect effect on the BI. | questionnaire | Conducting study to examine the intention to continue use of such system in the future. |
| Huang et al., | Subject norms | Students intention | PEOU and | TRA and | -There is significant | questionnaire | examine other |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (2006) | (instructor influence , mentor influence and peer influence), PEOU and PU | to use course delivery system (BI) | PU | TAM | relation between subject norms and PU.<br>- there is only significant relation between instructor influence and PEOU | | type of social influence such as friends, colleague |
| Marchewka et al., (2007) | Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI) ,User Attitude (UA),Facilitating Conditions (FC), Computer Anxiety(CA) and Computer Self-efficacy(CS) | Student's intention to use distance learning system | Age, Gender, Experience and voluntariness | UTAUT | -There are significant relations between<br>PE & BI<br>SI & BI<br>EE & BI<br>-there are no significant relations between Gender and Age with PE, EE, SI and FC<br>-UTAUT is not for the data which collected from the distance learning students. | questionnaire | Including older people to test fitness of UTAUT |
| Lim et al., (2008) | Students' Characteristics(SC), Instructors' Characteristics(IC), Technology Support(TS), Institution Support(IS), Flexibility of Distance Learning(FDL) AND Course Content(CC) | Students intentions to use e-learning system | | | All the factors have significant effect of the students' intention to use e-learning system. | questionnaire | |
| Hussein et al., (2007) | Computer Self-efficacy (CS), Convenience, Instructional Design (ID), Technological Factor(TF) and Instructor's | Students intention to use e-learning system | PU and PEOU | TAM | There are significant relations between<br>ID & PEOU<br>TF & PEOU<br>CS & PU<br>PEOU & PU<br>PU & BI | questionnaire | Looking to other factors that were not included in this research model. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Characteristics (IC) | | | | PEOU & BI<br>ID & PU | | |
| Nanayakkara and Whiddett, (2005) | Individual Characteristics(IC), Individual perceptions(IP), E-learning System Characteristics(ELSC), External System Characteristics(ESC), Organization Support(OS) and Organization Characteristics(OC) | Academic staff intention to use e-learning system | | TAM and UTAUT | Individual factor, system factor and organization factor have significant effect on the user intention to use e-learning system | Structural interview | Conduct large scale study to confirm this study findings |
| Hsia and Tseng, (2008) | Flexibility of Distance Learning(FDL) and Computer Self-efficacy(CS) | Employees Intention to use distance learning system (EA) | PEOU, FDL and PU | TAM | There are significant relations between<br>CS & PEOU<br>CS & PU<br>CS & FDL<br>PEOU & PU<br>PEOU & BI<br>PU & BI<br>FDL & BI<br>FLD & PU | questionnaire | applying this study for the employees of other organizations |
| Hermans et al.,(2009) | Acceptance of Technology (AoT), Flexibility of Distance learning (FDL), PEOU, Satisfaction Instructor(SI), Commitment and Satisfaction School(SS) | students Satisfaction(US) | PEOU, FDL, SS and SI | TAM | There are significant relations between<br>AoT & FDL<br>AoT & PEOU<br>AoT & commitment<br>FDL & US<br>PEOU & US<br>SS & US<br>SI & US<br>Commitment & SS<br>Commitment & IS | Case study | |
| Christina, (2005) | Performance Expectancy (PE), | Students Behavioral | Age, Gender, Experience | IDT and UTAUT | All the relation are significant | Case study | Examine the factors which |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Effort Expectancy(EE), Social Influence(SI) and Facilitating Conditions | Intention and Actual Use | and Voluntariness | | | | influence the acceptance of educational technology among students |
| Abbad, (2009) | Subject Norms(SN), Internet Experience(IE), System Interactivity(SI), Self-Efficacy(SE) and Technology Support(TS) | Students Behavioral Intention | PEOU and PU | TAM | There are significant relations between SN & PEOU SN& BI IE & PEOU IE & PU SI & PEOU SI & PU SE & PU SE & PEOU ST & PU ST & PEOU | questionnaire | Focusing on the moderating keys such as Internet experience |
| Sheng et al., (2008) | PEOU, PU and System Enjoyment | Students' Behavioral Intention and Actual Use | PU | TAM | There are significant relations between PU & BI PEOU & BI BI & AU Enjoyment & BI | questionnaire | |
| Masrom, (2007) | PEOU and PU | Students' Behavioral Intention | User Attitude(UA) | TAM and TRA | There are significant relations between PEOU & UA PU & UA PU & BI PEOU & PU | questionnaire | Using TAM to examine the acceptance other technology in the other environment |
| Raaij and Schepers, (2008) | Personal Innovativeness in the domain of IT(PIIT), Subject Norms(SN), Computer Anxiety(CA), PU and PEOU | Managers' Behavioral Intention to use e-learning system (BI) | PEOU and PU | TAM, TAM2 AND UTAUT | There are significant relations between PU & BI PEOU & PU SN & PU PIIT & PEOU CA & PEOU | questionnaire | -Conducting the study with large size of sample. -Focus on the PIIT and CA over the time. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | - examine other variables regarding pedagogy of learning. |
| Al-ammari and Hamad, (2008) | Content Quality(CQ), Computer Self-efficacy(CS), PEOU, PU, Subject Norms(SN), Individualism vs. Collectivism (IC), Power Distance(PD), Long term vs. Short term Orientation(LSO), Masculinity vs. Femininity (MF) and Uncertainty Avoidance(UV) | Students' Behavioral Intention to use e-learning system (BI) | PEOU and PU | TAM | There are significant relations between<br>PEOU & BI<br>PU & BI<br>PEOU & PU<br>SN &PU<br>SN & BI<br>CQ & PU<br>CQ & PEOU<br>CS & PEOU<br>CS & PU<br>PD & BI<br>UA & BI<br>LSO & BI | questionnaire | |
| Jong and Wang, (2009) | Performance expectancy(PE), effort expectancy(EE), facilitating conditions(FC), social influence(SI), self efficacy(SE), computer anxiety(CA), and user's attitude(UATT) | Students' intention to use web based learning system(BI)<br>And system usage (SU) | Students' intention | UTAUT | There are significant relationships between<br>PE & BI<br>UATT & BI<br>FC & BI<br>SI & BI<br>SE & BI<br>CA & BI<br>UATT & SU<br>SI & SU<br>BI & SU | questionnaire | Examining the effect of Gender, Internet experience and computer skills on the model |
| Geri and Elaiza, (2008) | PEOU, PU, compatibility, Social influence(SI), institution influence(II), voluntariness, support, trust, attitude towards | Students' intention to use e-learning system (BI) | PU | TAM and Diffusion of innovation theory | There are significant relations between<br>PEOU & BI<br>PU & BI<br>Real Value & BI<br>UTTTNT & BI<br>II & BI | questionnaire | Conducting the study in the organization environment |

| | | | | | | | |
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| | change and attitude towards new technologies (UTTNT) | | | | SI & BI | | |
| Suma, Hericko, Polancic, & Pusnik, (2010) | Performance expectancy, effort expectancy, social influence and facilitating condition | Students' intention and actual use | Students' intention | UTAUT | There are significant relationships between PE, SI, FC and students' intention | Questionnaire | Conducting the study in the education environment |

**Appendix C:**

Table 3.0

Information Technology Acceptance Models and theories

| Model name<br><br>Author name | Constructs of model | Definition | Scales |
|---|---|---|---|
| Theory of Reasoned Action (TRA)<br><br>(Fishbein and Ajzen, 1975) | Attitude toward behavior | It has been defined as the person's feeling toward performing a behavior (he/she will acceptance or reject perform the behavior), | 1. Using the system is a bad/good idea.<br>2. Using the system is a foolish/wise idea.<br>3. I dislike/like the idea of using the system.<br>4. Using the system is unpleasant/ pleasant. |
| | Subjective norm | It refers to user perceives that the opinion of other people of whether or not he/ she performs a behavior | 1. People who influence my behavior think that I should use the system.<br>2. People who are important to me think that I should use |

| | | | |
|---|---|---|---|
| | | | the system. |
| Technology Acceptance Model(TAM)<br><br>(Davis, 1989) | Perceived usefulness | This construct was presented as the degree to which the user believes that the using system will improve her or his job performance. | 1. Using the system in my job would enable me to accomplish tasks more quickly.<br>2. Using the system would improve my job performance.<br>3. Using the system in my job would increase my productivity.<br>4. Using the system would enhance my effectiveness on the job.<br>5. Using the system would make it easier to do my job.<br>6. I would find the system useful in my job. |
| | Perceived easy of use | Refers to the complexity degree of use technology. | 1. My interaction with the system is clear and understandable.<br>2. I believe that it is easy to get the system to do what I want it to do.<br>3. Overall, I believe that the |

| | | | |
|---|---|---|---|
| | | | system is easy to use.<br>4. Learning to operate the system is easy for me. |
| Extended of TAM (TAM2)<br><br>(Venkatesh, and Davis, 2000) | Perceived usefulness | TAM | |
| | Perceived easy of use | TAM | |
| | Subjective norm | TRA | |
| Motivational Model (MM)<br><br>Davis et al, (1992) | Extrinsic motivation | It was defined as the degree of which person perceives that using a technology will improve his/her work outcomes | The same items of perceived usefulness. |
| | Intrinsic motivation | Refers to the person will like to execute an behavior, because he/ she does not have other motivation than executing of activity itself, (e.g. an user will use a system if he/ she perceived that system using will be enjoyable) | 1. I find using the system to be enjoyable<br>2. The actual process of using the system is pleasant.<br>3. I have fun using the system. |
| Theory of Planned Behavior (TPB)<br><br>Ajzen, (1991) | Attitude toward behavior | TRA | |
| | Subjective norm | TRA | |
| | Perceived behavioral control | Refers to a person perceive that he/she able to perform a particular behavior. | 1. I have control over using the system.<br>2. I have the resources necessary to use the system. |

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| | | | 3. I have the knowledge necessary to use the system.<br>4. Given the resources, opportunities and knowledge it takes to use the system, it would be easy for me to use the system.<br>5. The system is not compatible with other systems I use. |
| Social Cognitive Theory (SCT)<br><br>(Compeau and Higgins, 1995) | Outcomes expectations performance | This construct refers to the expectation of the technology using on the job's performance. | 1. I will increase my effectiveness on the job.<br>2. I will spend less time on routine job tasks.<br>3. I will increase the quality of output of my job.<br>4. I will increase the quantity of output from the same amount of effort.<br>5. My coworkers will perceive me as competent.<br>6. I will increase my chances of obtaining a promotion.<br>7. I will increase my chances of getting a raise. |
| | Outcomes expectations | It has been defined as the degree to | |

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| | personal | which outcomes of a technology using will be as a personal expectations. | |
| | Self-efficacy | Refer to the person's ability to use the technology to perform particular work. | I could complete a job or task using the system…<br>1. If there was no one around to tell me what to do as I go.<br>2. If I could call someone for help if I got stuck.<br>3. If I had a lot of time to complete the job for which the software was provided.<br>4. If I had just the built-in help facility for assistance. |
| | affect | Refers to person's feeling (negative or positive) toward using of particular technology. | 1. I like working with the system.<br>2. I look forward to those aspects of my job that require me to use the system.<br>3. Using the system is frustrating for me.<br>4. Once I start working on the system, I find it hard to stop.<br>5. I get bored quickly when using the system. |

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| | anxiety | It refers to persons' emotional reaction when they use particular technology | 1. I feel apprehensive about using the system.<br>2. It scares me to think that I could lose a lot of information using the system by hitting the wrong key.<br>3. I hesitate to use the system for fear of making mistakes I cannot correct.<br>4. The system is somewhat intimidating to me. |
| Model of PC utilization<br><br>Thompson et al, (1991) | Job-fit | This construct was defined as the degree to which a person believes that utilize a technology will enhance his/her work performance. | 1. Use of the system will have no effect on the performance of my job (reverse scored).<br>2. Use of the system can decrease the time needed for my important job responsibilities.<br>3. Use of the system can significantly increase the quality of output on my job.<br>4. Use of the system can increase the effectiveness of performing job tasks.<br>5. Use can increase the quantity |

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| | | | of output for the same amount of effort.<br>6. Considering all tasks, the general extent to which use of the system could assist on the job. (different scale used for this item). |
| | Complexity | It refers to degree to which a person believes that he/she would not need much effort to use particular technology. | 1. Using the system takes too much time from my normal duties.<br>2. Working with the system is so complicated, it is difficult to understand what is going on.<br>3. Using the system involves too much time doing mechanical operations (e.g., data input).<br>4. It takes too long to learn how to use the system to make it worth the effort. |
| | Long-term consequences | It was presented as the degree to which the person believes that they would get outcomes by using a particular system in the future | 1. I would have no difficulty telling others about the results of using a technology.<br>2. I believe I could |

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| | | | communicate to others the consequences of using a technology.<br>3. The results of using a technology are apparent to me.<br>4. I would have difficulty explaining why using a technology may or may not be beneficial. |
| | Affect towards use | Refer to persons' negative or positive feeling which associated with a particular system using. | 1. The system makes work more interesting.<br>2. Working with the system is fun.<br>3. The system is okay for some jobs, but not the kind of job I want. |
| | Social factors | It refers to user's perception of the opinion of other people of whether or he/ she does not perform a behavior. | 1. I use the system because of the proportion of coworkers who use the system.<br>2. The senior management of this business has been helpful in the use of the system. |

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| | | | 3. My supervisor is very supportive of the use of the system for my job.<br>4. In general, the organization has supported the use of the system. |
| | Facilitating conditions | It refers to the environment infrastructure which makes the accomplishment of the activity much easy | 1. Guidance was available to me in the selection of the system.<br>2. Specialized instruction concerning the system was available to me.<br>3. A specific person (or group) is available for assistance with system difficulties. |
| Combined TAM and TPB<br><br>Taylor and Todd, (1995) | Attitude toward behavior | TPB | |
| | Subjective norm | TPB | |
| | Perceived behavioral control | TPB | |
| | Perceived usefulness | TAM | |
| Diffusion of Innovation Theory(DIT) | Relative advantage | Defined as the degree to which individual perceives that an innovation will improve their work performance or learning. | 1. Using the system enables me to accomplish tasks more quickly.<br>2. Using the system improves |

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|---|---|---|---|
| Moore and Benbasat, (1991) | | | the quality of the work I do.<br>3. Using the system makes it easier to do my job.<br>4. Using the system enhances my effectiveness on the job.<br>5. Using the system increases my productivity. |
| | compatibility | It refers to the degree to which an individual perceived that he/ she have knowledge and recourses to use particular technology | 1. Using the system is compatible with all aspects of my work.<br>2. I think that using the system fits well with the way I like to work.<br>3. Using the system fits into my work style. |
| | Complexity | This construct refers to the degree of the easy which associated with the innovation use | The same items of complexity in Model of PC Utilization. |
| | trialability | It refers to the opportunity of trying a particular system by users before they use it | 1. I have had a great deal of opportunity to try a system.<br>2. I know where I can go to satisfactorily try out various uses of a system.<br>3. A system is available to me |

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| | | | adequately test run various applications. |
| | observability | It was presented as the degree to which the results of the experience are clear to the other social's members. | 1. I have seen what others do using a system<br>2. In my organization, one sees a system on many desks.<br>3. I have seen a system in use outside my firm.<br>4. It is easy for me to observe other using a system in my firm.<br>5. A system is not very visible in my firm. |
| | Voluntariness of use | The degree to which the user perceives that use particular technology will be free. | 1. My boss expects me to use a system.<br>2. My use of a system is voluntary.<br>3. My supervisor does not require me to use a system.<br>4. Although it may be helpful, |

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|---|---|---|---|
| | | | using a system certainly no compulsory in my job. |
| | Image | It refers to the degree to which an user perceives that use particular system will enhance his/ her image or status | 1. People in my organization who use the system have more prestige than those who do not.<br>2. People in my organization who use the system have a high profile.<br>3. Having the system is a status symbol in my organization. |
| Unified Theory Acceptance and Use Technology (UTAUT)<br><br>Venkatesh et al, (2003) | Performance Expectancy (PE) | This construct is derived from five prior constructs including, out comes expectations in social cognitive theory (SCT), perceived usefulness in technology acceptance model (TAM), relative advantage in innovation diffusion theory (DIT), extrinsic motivation in motivation model (MM), and job fit in mode of PC utilization (MPCU).<br><br>PE was defined as the degree to which the person believes that use particular technology will enhance his/her work | 1. I would find the system useful in my job.<br>2. Using the system enables me to accomplish tasks more quickly.<br>3. Using the system increases my productivity.<br>4. If I use the system, I will increase my chances of getting a raise. |

| | | | |
|---|---|---|---|
| | | performance. | |
| | Effort Expectancy(EE) | This construct was derived from three prior constructs including, easy of use in Diffusion of Innovation theory (DIT), Complexity in Model PC Utilization (MPCU), and ease of use in Technology Acceptance Model (TAM).<br><br>EE has been defined as the degree of easy which associated with use particular technology. | 1. My interaction with the system would be clear and understandable.<br>2. It would be easy for me to become skillful at using the system.<br>3. I would find the system easy to use.<br>4. Learning to operate the system is easy for me. |
| | Social Influence (SI) | This construct Refers to user's perception of the opinion of other people of whether or not he/ she perform a behavior. This construct pertains to, the Subject Norms in the Extended Technology Acceptance Model (TAM2), Theory of Reason Action (TRA), Social factors in Model of PC Utilization (MPCU), and Image in Diffusion of Innovation Theory (DIT). | 1. People who influence my behavior think that I should use the system.<br>2. People who are important to me think that I should use the system.<br>3. The senior management of this business has been helpful in the use of the system.<br>4. In general, the organization has supported the use of the system. |

| | | | |
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| | Facilitating conditions(FC) | FC construct refers to the person perceives that the organization and technical infrastructure will help her/ him to use the system. Also this construct is captured from three constructs in other models including perceived Behavior Control in Theory of Planned Behavior (TPB), Facilitating Conditions in Model of PC Utilization (MPCU), and Compatibility in Diffusion of Innovation Theory (DIT) | 1. I have the resources necessary to use the system.<br>2. I have the knowledge necessary to use the system.<br>3. The system is not compatible with other systems I use.<br>4. A specific person (or group) is available for assistance with system difficulties. |

**Appendix D:** This appendix presents the Cronbach's Alpha values for all factors in the pilot test

Table 1: Cronbach's Alpha value for system

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .906 | .906 | 5 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| SEN1 | 15.6000 | 62.816 | .837 | .731 | .869 |
| SEN2 | 16.1000 | 65.602 | .736 | .576 | .890 |
| SEN3 | 16.1600 | 61.974 | .797 | .661 | .877 |
| SEN4 | 16.4000 | 62.694 | .782 | .615 | .881 |
| SEN5 | 16.4600 | 67.070 | .669 | .457 | .904 |

Table 2: Cronbach's Alpha value for System Flexibility (SF)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .920 | .923 | 4 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| SF1 | 12.3200 | 37.283 | .836 | .747 | .889 |
| SF2 | 12.3800 | 35.587 | .825 | .758 | .895 |
| SF3 | 12.3200 | 37.242 | .806 | .719 | .900 |
| SF4 | 12.9000 | 42.133 | .822 | .750 | .900 |

Table 3: Cronbach's Alpha value for Social Influence (SI)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .891 | .892 | 5 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| SI1 | 14.6000 | 45.755 | .749 | .633 | .865 |
| SI2 | 14.8400 | 47.933 | .776 | .706 | .858 |
| SI3 | 14.6600 | 46.678 | .790 | .751 | .854 |
| SI4 | 14.4200 | 51.432 | .682 | .531 | .879 |
| SI5 | 14.2000 | 48.857 | .682 | .575 | .879 |

Table 4: Cronbach's Alpha value for Facilitating Conditions (FC)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .934 | .939 | 5 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| FC1 | 16.4600 | 66.866 | .781 | .668 | .929 |
| FC2 | 16.4200 | 55.351 | .863 | .787 | .913 |
| FC3 | 16.3400 | 53.821 | .881 | .848 | .910 |
| FC4 | 16.7200 | 59.185 | .906 | .873 | .904 |
| FC5 | 16.5400 | 67.600 | .743 | .565 | .934 |

Table 5: Cronbach's Alpha value for Self Efficacy (FC)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .932 | .933 | 5 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| CSE1 | 17.4600 | 59.192 | .854 | .793 | .909 |
| CSE2 | 17.3600 | 63.704 | .774 | .638 | .924 |
| CSE3 | 17.3800 | 59.996 | .891 | .832 | .902 |
| CSE4 | 17.1200 | 63.536 | .801 | .676 | .919 |
| CSE5 | 17.2400 | 68.921 | .792 | .652 | .923 |

Table 6: Cronbach's Alpha value for computer anxiety (ANX)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .931 | .932 | 4 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| ANX1 | 10.0600 | 38.833 | .869 | .848 | .900 |
| ANX2 | 10.0000 | 40.286 | .755 | .649 | .938 |
| ANX3 | 10.1600 | 37.362 | .940 | .905 | .876 |
| ANX4 | 9.9200 | 40.116 | .797 | .665 | .924 |

Table 7: Cronbach's Alpha value for System Interactivity (SI)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .936 | .936 | 5 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| SIN1 | 16.7200 | 62.247 | .885 | .941 | .911 |
| SIN2 | 16.5800 | 60.861 | .886 | .944 | .910 |
| SIN3 | 16.9600 | 61.753 | .825 | .760 | .921 |
| SIN4 | 16.7800 | 59.236 | .863 | .788 | .914 |
| SIN5 | 16.5600 | 66.088 | .692 | .550 | .945 |

Table 8: Cronbach's Alpha value for Behavioral Intention (BI)

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .943 | .943 | 5 |

**Item-Total Statistics**

| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|---|
| BI1 | 16.2200 | 65.440 | .851 | .790 | .928 |
| BI2 | 16.0600 | 64.833 | .858 | .825 | .927 |
| BI3 | 16.4400 | 63.802 | .879 | .798 | .923 |
| BI4 | 16.3000 | 65.276 | .836 | .788 | .931 |
| BI5 | 16.5000 | 65.888 | .798 | .736 | .938 |

## Appendix E:

**Missing data**

| | Cases | | | | | |
|---|---|---|---|---|---|---|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| PE1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| PE2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| PE3 | 349 | 99.4% | 2 | .6% | 351 | 100.0% |
| PE4 | 350 | 99.7% | 1 | .3% | 351 | 100.0% |
| PE5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| PE6 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| EE1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| EE2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| EE3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| EE4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| EE5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| EE6 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SE1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SE2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SE3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SE4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SE5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SF1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SF2 | 350 | 99.7% | 1 | .3% | 351 | 100.0% |
| SF3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SF4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SI1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SI2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SI3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SI4 | 350 | 99.7% | 1 | .3% | 351 | 100.0% |

| | | | | | | |
|---|---|---|---|---|---|---|
| SI5 | 350 | 99.7% | 1 | .3% | 351 | 100.0% |
| FC1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| FC2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| FC3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| FC4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| FC5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SIN1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SIN2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SIN3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SIN4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| SIN5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| CSE1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| CSE2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| CSE3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| CSE4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| CSE5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| ANX1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| ANX2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| ANX3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| ANX4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| BI1 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| BI2 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| BI3 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| BI4 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |
| BI5 | 351 | 100.0% | 0 | .0% | 351 | 100.0% |

**Appendix F: Normality Test**

| Descriptive Statistics | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N Statistic | Minimum Statistic | Maximum Statistic | Mean Statistic | Std. Deviation Statistic | Skewness Statistic | Std. Error | Z-Skewness | Kurtosis Statistic | Std. Error | Z-kurtosis |
| PE1 | 351.00 | 1.00 | 7.00 | 4.35 | 2.22 | -0.28 | 0.13 | -2.16 | -1.52 | 0.26 | -5.84 |
| PE2 | 351.00 | 1.00 | 7.00 | 4.44 | 2.18 | -0.35 | 0.13 | -2.69 | -1.44 | 0.26 | -5.56 |
| PE3 | 351.00 | 1.00 | 7.00 | 4.43 | 2.28 | -0.36 | 0.13 | -2.76 | -1.51 | 0.26 | -5.80 |
| PE4 | 351.00 | 1.00 | 7.00 | 4.35 | 2.14 | -0.32 | 0.13 | -2.47 | -1.45 | 0.26 | -5.57 |
| PE5 | 351.00 | 1.00 | 7.00 | 4.43 | 1.97 | -0.16 | 0.13 | -1.26 | -1.47 | 0.26 | -5.66 |
| PE6 | 351.00 | 1.00 | 7.00 | 4.23 | 2.23 | -0.27 | 0.13 | -2.07 | -1.53 | 0.26 | -5.89 |
| EE1 | 351.00 | 1.00 | 7.00 | 4.28 | 2.11 | -0.24 | 0.13 | -1.85 | -1.43 | 0.26 | -5.48 |
| EE2 | 351.00 | 1.00 | 7.00 | 4.33 | 2.06 | -0.25 | 0.13 | -1.91 | -1.37 | 0.26 | -5.28 |
| EE3 | 351.00 | 1.00 | 7.00 | 4.36 | 2.01 | -0.26 | 0.13 | -2.02 | -1.43 | 0.26 | -5.50 |
| EE4 | 351.00 | 1.00 | 7.00 | 4.42 | 2.27 | -0.30 | 0.13 | -2.32 | -1.54 | 0.26 | -5.91 |
| EE5 | 351.00 | 1.00 | 7.00 | 4.34 | 2.03 | -0.32 | 0.13 | -2.45 | -1.46 | 0.26 | -5.61 |
| EE6 | 351.00 | 1.00 | 7.00 | 4.44 | 2.10 | -0.33 | 0.13 | -2.50 | -1.44 | 0.26 | -5.54 |
| SE1 | 351.00 | 1.00 | 7.00 | 4.52 | 2.05 | -0.37 | 0.13 | -2.84 | -1.39 | 0.26 | -5.33 |
| SE2 | 351.00 | 1.00 | 7.00 | 4.47 | 2.02 | -0.36 | 0.13 | -2.79 | -1.35 | 0.26 | -5.17 |
| SE3 | 351.00 | 1.00 | 7.00 | 4.49 | 2.11 | -0.35 | 0.13 | -2.71 | -1.50 | 0.26 | -5.77 |
| SE4 | 351.00 | 1.00 | 7.00 | 4.24 | 2.12 | -0.25 | 0.13 | -1.89 | -1.49 | 0.26 | -5.73 |
| SE5 | 351.00 | 1.00 | 7.00 | 4.29 | 2.10 | -0.31 | 0.13 | -2.38 | -1.43 | 0.26 | -5.49 |
| SF1 | 351.00 | 1.00 | 7.00 | 4.43 | 2.17 | -0.35 | 0.13 | -2.72 | -1.46 | 0.26 | -5.60 |
| SF2 | 351.00 | 1.00 | 7.00 | 4.57 | 2.21 | -0.36 | 0.13 | -2.77 | -1.48 | 0.26 | -5.68 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SF3 | 351.00 | 1.00 | 7.00 | 4.57 | 2.26 | -0.34 | 0.13 | -2.63 | -1.56 | 0.26 | -5.99 |
| SF4 | 351.00 | 1.00 | 7.00 | 4.09 | 1.88 | -0.26 | 0.13 | -2.01 | -1.23 | 0.26 | -4.75 |
| SI1 | 351.00 | 1.00 | 7.00 | 3.57 | 1.90 | 0.34 | 0.13 | 2.63 | -1.08 | 0.26 | -4.17 |
| SI2 | 351.00 | 1.00 | 7.00 | 3.49 | 1.87 | 0.38 | 0.13 | 2.95 | -1.05 | 0.26 | -4.03 |
| SI3 | 351.00 | 1.00 | 7.00 | 3.58 | 1.95 | 0.35 | 0.13 | 2.69 | -1.19 | 0.26 | -4.59 |
| SI4 | 351.00 | 1.00 | 7.00 | 3.58 | 1.97 | 0.37 | 0.13 | 2.86 | -1.39 | 0.26 | -5.36 |
| SI5 | 351.00 | 1.00 | 7.00 | 3.53 | 1.84 | 0.34 | 0.13 | 2.62 | -1.15 | 0.26 | -4.42 |
| FC1 | 351.00 | 1.00 | 7.00 | 4.30 | 1.93 | -0.22 | 0.13 | -1.65 | -1.35 | 0.26 | -5.18 |
| FC2 | 351.00 | 1.00 | 7.00 | 4.50 | 2.10 | -0.31 | 0.13 | -2.36 | -1.44 | 0.26 | -5.53 |
| FC3 | 351.00 | 1.00 | 7.00 | 4.45 | 2.15 | -0.26 | 0.13 | -1.97 | -1.46 | 0.26 | -5.62 |
| FC4 | 351.00 | 1.00 | 7.00 | 4.40 | 2.09 | -0.30 | 0.13 | -2.34 | -1.39 | 0.26 | -5.34 |
| FC5 | 351.00 | 1.00 | 7.00 | 4.44 | 2.04 | -0.30 | 0.13 | -2.33 | -1.43 | 0.26 | -5.51 |
| SIN1 | 351.00 | 1.00 | 7.00 | 4.25 | 1.98 | -0.35 | 0.13 | -2.68 | -1.36 | 0.26 | -5.22 |
| SIN2 | 351.00 | 1.00 | 7.00 | 4.32 | 1.94 | -0.29 | 0.13 | -2.23 | -1.32 | 0.26 | -5.09 |
| SIN3 | 351.00 | 1.00 | 7.00 | 4.36 | 1.94 | -0.37 | 0.13 | -2.84 | -1.34 | 0.26 | -5.15 |
| SIN4 | 351.00 | 1.00 | 7.00 | 4.38 | 2.05 | -0.35 | 0.13 | -2.66 | -1.41 | 0.26 | -5.41 |
| SIN5 | 351.00 | 1.00 | 7.00 | 4.35 | 2.04 | -0.28 | 0.13 | -2.16 | -1.40 | 0.26 | -5.38 |
| CSE1 | 351.00 | 1.00 | 7.00 | 4.00 | 2.12 | -0.09 | 0.13 | -0.72 | -1.52 | 0.26 | -5.86 |
| CSE2 | 351.00 | 1.00 | 7.00 | 4.10 | 2.13 | -0.10 | 0.13 | -0.74 | -1.54 | 0.26 | -5.92 |
| CSE3 | 351.00 | 1.00 | 7.00 | 3.93 | 2.16 | -0.01 | 0.13 | -0.11 | -1.54 | 0.26 | -5.94 |
| CSE4 | 351.00 | 1.00 | 7.00 | 4.35 | 2.02 | -0.11 | 0.13 | -0.83 | -1.47 | 0.26 | -5.64 |
| CSE5 | 351.00 | 1.00 | 7.00 | 4.28 | 2.04 | -0.12 | 0.13 | -0.90 | -1.49 | 0.26 | -5.74 |
| ANX1 | 351.00 | 1.00 | 7.00 | 3.67 | 2.09 | 0.13 | 0.13 | 1.02 | -1.51 | 0.26 | -5.80 |
| ANX2 | 351.00 | 1.00 | 7.00 | 3.73 | 2.12 | 0.15 | 0.13 | 1.15 | -1.53 | 0.26 | -5.87 |
| ANX3 | 351.00 | 1.00 | 7.00 | 3.73 | 2.10 | 0.13 | 0.13 | 0.98 | -1.52 | 0.26 | -5.83 |
| ANX4 | 351.00 | 1.00 | 7.00 | 3.83 | 2.16 | 0.15 | 0.13 | 1.14 | -1.55 | 0.26 | -5.96 |
| BI1 | 351.00 | 1.00 | 7.00 | 4.39 | 2.13 | -0.36 | 0.13 | -2.78 | -1.47 | 0.26 | -5.64 |
| BI2 | 351.00 | 1.00 | 7.00 | 4.28 | 2.11 | -0.34 | 0.13 | -2.58 | -1.43 | 0.26 | -5.50 |
| BI3 | 351.00 | 1.00 | 7.00 | 4.26 | 2.09 | -0.36 | 0.13 | -2.77 | -1.40 | 0.26 | -5.37 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BI4 | 351.00 | 1.00 | 7.00 | 4.25 | 2.04 | -0.29 | 0.13 | -2.20 | -1.42 | 0.26 | -5.46 |
| BI5 | 351.00 | 1.00 | 7.00 | 4.31 | 2.07 | -0.29 | 0.13 | -2.23 | -1.41 | 0.26 | -5.44 |
| Valid N (listwise) | 351.00 | | | | | | | | | | |

**Appendix G:**

**Discriminant validity**

Discriminant validity was tested by using average of variance extracted (AVE) and square of correlation. This testing had been carried out in two steps:

(i) In order to calculate average of variance extracted (AVE) the variance extracted was calculated by applying the following equation $\sum (SMC^2) / \sum (SMC^2) + \sum ej$, while SMC is short of squared square correlation and e is the short of error (tables 1.0)

(ii) Calculate square of correlation table 3.0

(iii) Compare value of AVE of each pair of constructs with the square of correlation of such constructs, since value of AVE must be greater than value of correlation square.

The results of this testing revealed that the discriminant was supported, since the value of AVE for each pair of constructs was greater than the correlation square for such constructs (tables 2 and 3).

Table 1: Variance extracted for latent variables

| observed variables | SMC | SMC2 | error | variance extracted (VE) |
|---|---|---|---|---|
| PE2 | 0.91 | 0.83 | 0.02 | |
| PE3 | 0.92 | 0.85 | 0.03 | |
| PE4 | 0.92 | 0.84 | 0.02 | |
| performance expectancy | 2.75 | 2.52 | 0.07 | 0.97 |
| EE5 | 0.93 | 0.86 | 0.02 | |
| EE6 | 0.94 | 0.88 | 0.02 | |
| effort expectancy | 1.86 | 1.74 | 0.05 | 0.97 |
| SIN1 | 0.87 | 0.76 | 0.03 | |
| SIN2 | 0.87 | 0.76 | 0.03 | |
| SIN3 | 0.91 | 0.83 | 0.03 | |
| system interactivity | 2.65 | 2.35 | 0.09 | 0.97 |
| ANX1 | 0.96 | 0.91 | 0.02 | |
| ANX2 | 0.97 | 0.95 | 0.02 | |
| ANX3 | 0.97 | 0.94 | 0.02 | |
| ANX4 | 0.92 | 0.84 | 0.02 | |
| computer anxiety | 3.81 | 3.63 | 0.08 | 0.98 |
| CSE1 | 0.96 | 0.93 | 0.03 | |
| CSE3 | 0.89 | 0.79 | 0.03 | |
| computer efficacy | 1.85 | 1.72 | 0.06 | 0.97 |
| FC1 | 0.88 | 0.77 | 0.03 | |
| FC2 | 0.92 | 0.84 | 0.03 | |
| FC3 | 0.90 | 0.81 | 0.03 | |

| | | | | |
|---|---|---|---|---|
| FC5 | 0.86 | 0.74 | 0.03 | |
| facilitating conditions | 3.55 | 3.15 | 0.12 | 0.96 |
| SF1 | 0.94 | 0.89 | 0.02 | |
| SF2 | 0.92 | 0.85 | 0.02 | |
| SF4 | 0.81 | 0.66 | 0.03 | |
| system flexibility | 2.68 | 2.40 | 0.07 | 0.97 |
| SI3 | 0.96 | 0.92 | 0.03 | |
| SI4 | 0.79 | 0.62 | 0.03 | |
| social influence | 1.74 | 1.53 | 0.06 | 0.97 |
| SE1 | 0.92 | 0.85 | 0.03 | |
| SE2 | 0.90 | 0.82 | 0.03 | |
| system enjoyment | 1.83 | 1.67 | 0.06 | 0.94 |

**Table 2: Matrix correlation**

| | SEN | SIN | SI | SF | FC | CSE | ANX | EE | PE |
|---|---|---|---|---|---|---|---|---|---|
| SEN | 1 | | | | | | | | |
| SIN | 0.554 | 1 | | | | | | | |
| SI | 0.254 | 0.275 | 1 | | | | | | |
| SF | 0.78 | 0.599 | 0.288 | 1 | | | | | |
| FC | 0.763 | 0.583 | 0.279 | 0.785 | 1 | | | | |
| CSE | 0.787 | 0.61 | 0.298 | 0.761 | 0.747 | 1 | | | |
| ANX | -0.789 | -0.576 | -0.279 | -0.779 | -0.741 | -0.792 | 1 | | |
| EE | 0.808 | 0.628 | 0.276 | 0.762 | 0.836 | 0.781 | -0.775 | 1 | |
| PE | 0.785 | 0.602 | 0.26 | 0.749 | 0.724 | 0.73 | -0.777 | 0.784 | 1 |

**Table 3: Correlation square**

| | SEN | SIN | SI | SF | FC | CSE | ANX | EE | PE |
|---|---|---|---|---|---|---|---|---|---|
| SEN | 1 | | | | | | | | |
| SIN | 0.306916 | 1 | | | | | | | |
| SI | 0.064516 | 0.075625 | 1 | | | | | | |
| SF | 0.6084 | 0.358801 | 0.082944 | 1 | | | | | |
| FC | 0.582169 | 0.339889 | 0.077841 | 0.616225 | 1 | | | | |
| CSE | 0.619369 | 0.3721 | 0.088804 | 0.579121 | 0.558009 | 1 | | | |
| ANX | 0.622521 | 0.331776 | 0.077841 | 0.606841 | 0.549081 | 0.627264 | 1 | | |
| EE | 0.652864 | 0.394384 | 0.076176 | 0.580644 | 0.698896 | 0.609961 | 0.600625 | 1 | |
| PE | 0.616225 | 0.362404 | 0.0676 | 0.561001 | 0.524176 | 0.5329 | 0.603729 | 0.614656 | 1 |

**Table 4: average of variance extracted (AVE)**

| | SEN | SIN | SI | SF | FC | CSE | ANX | EE | PE |
|---|---|---|---|---|---|---|---|---|---|
| SEN | 1 | | | | | | | | |
| SIN | 0.954 | 1 | | | | | | | |
| SI | 0.955 | 0.966 | 1 | | | | | | |
| SF | 0.957 | 0.969 | 0.97 | 1 | | | | | |
| FC | 0.953 | 0.964 | 0.965 | 0.968 | 1 | | | | |
| CSE | 0.957 | 0.968 | 0.969 | 0.972 | 0.967 | 1 | | | |
| ANX | 0.962 | 0.974 | 0.975 | 0.977 | 0.973 | 0.977 | 1 | | |
| EE | 0.958 | 0.97 | 0.971 | 0.973 | 0.967 | 0.973 | 0.978 | 1 | |
| PE | 0.958 | 0.969 | 0.97 | 0.973 | 0.968 | 0.972 | 0.978 | 0.974 | 1 |

## Appendix H

1- Loading and errors

**Standardized Regression Weights: (Group number 1 - Default model)**

| | | | Estimate |
|---|---|---|---|
| EE | <--- | SIN | .113 |
| EE | <--- | ANX | -.120 |
| EE | <--- | CSE | .121 |
| EE | <--- | SEN | .250 |
| EE | <--- | FC | .400 |
| PE | <--- | CSE | .001 |
| PE | <--- | SEN | .251 |
| PE | <--- | SF | .126 |
| PE | <--- | EE | .236 |
| PE | <--- | SIN | .100 |
| PE | <--- | ANX | -.240 |
| BI | <--- | FC | .284 |
| BI | <--- | SF | .230 |
| BI | <--- | SI | .096 |
| BI | <--- | SEN | .187 |
| BI | <--- | PE | .113 |
| BI | <--- | EE | .212 |
| ANX2 | <--- | ANX | .987 |
| ANX1 | <--- | ANX | .977 |
| CSE3 | <--- | CSE | .944 |
| FC2 | <--- | FC | .957 |
| SF1 | <--- | SF | .972 |

| | | | Estimate |
|---|---|---|---|
| SI3 | <--- | SI | .981 |
| SIN2 | <--- | SIN | .934 |
| SE2 | <--- | SEN | .950 |
| SE1 | <--- | SEN | .961 |
| SF4 | <--- | SF | .901 |
| FC5 | <--- | FC | .928 |
| SIN1 | <--- | SIN | .933 |
| CSE1 | <--- | CSE | .981 |
| SF2 | <--- | SF | .959 |
| SI4 | <--- | SI | .886 |
| ANX4 | <--- | ANX | .957 |
| ANX3 | <--- | ANX | .984 |
| FC1 | <--- | FC | .935 |
| PE3 | <--- | PE | .961 |
| PE2 | <--- | PE | .954 |
| PE4 | <--- | PE | .958 |
| EE6 | <--- | EE | .969 |
| EE5 | <--- | EE | .962 |
| SIN3 | <--- | SIN | .955 |
| FC3 | <--- | FC | .948 |
| BI3 | <--- | BI | .966 |
| BI2 | <--- | BI | .961 |
| BI1 | <--- | BI | .943 |

**Regression Weights: (Group number 1 - Default model)**

| | | | Estimate | S.E. | C.R. | P | Label |
|---|---|---|---|---|---|---|---|
| EE | <--- | SIN | .122 | .039 | 3.098 | .002 | par_8 |
| EE | <--- | ANX | -.113 | .049 | -2.288 | .022 | par_9 |
| EE | <--- | CSE | .115 | .052 | 2.203 | .028 | par_11 |
| EE | <--- | SEN | .254 | .057 | 4.439 | *** | par_15 |
| EE | <--- | FC | .432 | .054 | 8.003 | *** | par_23 |
| PE | <--- | CSE | .001 | .062 | .011 | .991 | par_10 |
| PE | <--- | SEN | .269 | .072 | 3.753 | *** | par_16 |
| PE | <--- | SF | .122 | .058 | 2.086 | .037 | par_24 |
| PE | <--- | EE | .248 | .069 | 3.594 | *** | par_25 |
| PE | <--- | SIN | .114 | .048 | 2.390 | .017 | par_28 |
| PE | <--- | ANX | -.238 | .060 | -3.983 | *** | par_29 |
| BI | <--- | FC | .318 | .043 | 7.467 | *** | par_12 |
| BI | <--- | SF | .220 | .033 | 6.642 | *** | par_13 |
| BI | <--- | SI | .101 | .020 | 5.030 | *** | par_14 |
| BI | <--- | SEN | .197 | .039 | 5.002 | *** | par_17 |
| BI | <--- | PE | .111 | .033 | 3.346 | *** | par_18 |
| BI | <--- | EE | .219 | .043 | 5.121 | *** | par_19 |
| ANX2 | <--- | ANX | 1.011 | .015 | 75.679 | *** | par_1 |
| ANX1 | <--- | ANX | .987 | .015 | 65.384 | *** | par_2 |
| CSE3 | <--- | CSE | 1.000 | | | | |
| FC2 | <--- | FC | 1.113 | .029 | 37.588 | *** | par_3 |
| SF1 | <--- | SF | .997 | .022 | 46.031 | *** | par_4 |
| SI3 | <--- | SI | 1.000 | | | | |
| SIN2 | <--- | SIN | 1.000 | | | | |
| SE2 | <--- | SEN | 1.000 | | | | |
| SE1 | <--- | SEN | 1.030 | .027 | 38.078 | *** | par_5 |

| | | | Estimate | S.E. | C.R. | P | Label |
|---|---|---|---|---|---|---|---|
| SF4 | <--- | SF | .798 | .025 | 32.335 | *** | par_6 |
| FC5 | <--- | FC | 1.047 | .032 | 33.187 | *** | par_7 |
| SIN1 | <--- | SIN | 1.022 | .031 | 32.976 | *** | par_20 |
| CSE1 | <--- | CSE | 1.019 | .026 | 39.840 | *** | par_21 |
| SF2 | <--- | SF | 1.000 | | | | |
| SI4 | <--- | SI | .912 | .065 | 14.011 | *** | par_22 |
| ANX4 | <--- | ANX | 1.002 | .020 | 52.270 | *** | par_26 |
| ANX3 | <--- | ANX | 1.000 | | | | |
| FC1 | <--- | FC | 1.000 | | | | |
| PE3 | <--- | PE | 1.068 | .025 | 43.542 | *** | par_27 |
| PE2 | <--- | PE | 1.013 | .022 | 41.663 | *** | par_30 |
| PE4 | <--- | PE | 1.000 | | | | |
| EE6 | <--- | EE | 1.044 | .024 | 44.328 | *** | par_31 |
| EE5 | <--- | EE | 1.000 | | | | |
| SIN3 | <--- | SIN | 1.022 | .029 | 35.793 | *** | par_32 |
| FC3 | <--- | FC | 1.130 | .031 | 36.140 | *** | par_33 |
| BI3 | <--- | BI | .997 | .021 | 46.476 | *** | par_55 |
| BI2 | <--- | BI | 1.000 | | | | |
| BI1 | <--- | BI | .991 | .025 | 40.244 | *** | par_56 |

2- Model fit measures

**CMIN**

| Model | NPAR | CMIN | DF | P | CMIN/DF |
|---|---|---|---|---|---|
| Default model | 94 | 348.919 | 312 | .074 | 1.118 |
| Saturated model | 406 | .000 | 0 | | |
| Independence model | 28 | 16103.583 | 378 | .000 | 42.602 |

**RMR, GFI**

| Model | RMR | GFI | AGFI | PGFI |
|---|---|---|---|---|
| Default model | .065 | .937 | .918 | .720 |
| Saturated model | .000 | 1.000 | | |
| Independence model | 2.820 | .076 | .008 | .071 |

**Baseline Comparisons**

| Model | NFI Delta1 | RFI rho1 | IFI Delta2 | TLI rho2 | CFI |
|---|---|---|---|---|---|
| Default model | .978 | .974 | .998 | .997 | .998 |
| Saturated model | 1.000 | | 1.000 | | 1.000 |
| Independence model | .000 | .000 | .000 | .000 | .000 |

**RMSEA**

| Model | RMSEA | LO 90 | HI 90 | PCLOSE |
|---|---|---|---|---|
| Default model | .018 | .000 | .028 | 1.000 |
| Independence model | .345 | .340 | .349 | .000 |

**Appendix L:**

Table 1.0 Chi-square statistics

| df | P = 0.05 | P = 0.01 | P = 0.001 |
|---|---|---|---|
| 1 | 3.84 | 6.64 | 10.83 |
| 2 | 5.99 | 9.21 | 13.82 |
| 3 | 7.82 | 11.35 | 16.27 |
| 4 | 9.49 | 13.28 | 18.47 |
| 5 | 11.07 | 15.09 | 20.52 |
| 6 | 12.59 | 16.81 | 22.46 |
| 7 | 14.07 | 18.48 | 24.32 |
| 8 | 15.51 | 20.09 | 26.13 |
| 9 | 16.92 | 21.67 | 27.88 |
| 10 | 18.31 | 23.21 | 29.59 |
| 11 | 19.68 | 24.73 | 31.26 |
| 12 | 21.03 | 26.22 | 32.91 |
| 13 | 22.36 | 27.69 | 34.53 |
| 14 | 23.69 | 29.14 | 36.12 |
| 15 | 25 | 30.58 | 37.7 |
| 16 | 26.3 | 32 | 39.25 |
| 17 | 27.59 | 33.41 | 40.79 |
| 18 | 28.87 | 34.81 | 42.31 |
| 19 | 30.14 | 36.19 | 43.82 |
| 20 | 31.41 | 37.57 | 45.32 |
| 21 | 32.67 | 38.93 | 46.8 |
| 22 | 33.92 | 40.29 | 48.27 |
| 23 | 35.17 | 41.64 | 49.73 |
| 24 | 36.42 | 42.98 | 51.18 |
| 25 | 37.65 | 44.31 | 52.62 |

| | | | |
|---|---|---|---|
| 26 | 38.89 | 45.64 | 54.05 |
| 27 | 40.11 | 46.96 | 55.48 |
| 28 | 41.34 | 48.28 | 56.89 |
| 29 | 42.56 | 49.59 | 58.3 |
| 30 | 43.77 | 50.89 | 59.7 |
| 31 | 44.99 | 52.19 | 61.1 |
| 32 | 46.19 | 53.49 | 62.49 |
| 33 | 47.4 | 54.78 | 63.87 |
| 34 | 48.6 | 56.06 | 65.25 |
| 35 | 49.8 | 57.34 | 66.62 |
| 36 | 51 | 58.62 | 67.99 |
| 37 | 52.19 | 59.89 | 69.35 |
| 38 | 53.38 | 61.16 | 70.71 |
| 39 | 54.57 | 62.43 | 72.06 |
| 40 | 55.76 | 63.69 | 73.41 |
| 41 | 56.94 | 64.95 | 74.75 |
| 42 | 58.12 | 66.21 | 76.09 |
| 43 | 59.3 | 67.46 | 77.42 |
| 44 | 60.48 | 68.71 | 78.75 |
| 45 | 61.66 | 69.96 | 80.08 |
| 46 | 62.83 | 71.2 | 81.4 |
| 47 | 64 | 72.44 | 82.72 |
| 48 | 65.17 | 73.68 | 84.03 |
| 49 | 66.34 | 74.92 | 85.35 |
| **50** | **67.51** | **76.15** | **86.66** |
| 51 | 68.67 | 77.39 | 87.97 |
| 52 | 69.83 | 78.62 | 89.27 |
| 53 | 70.99 | 79.84 | 90.57 |
| 54 | 72.15 | 81.07 | 91.88 |
| 55 | 73.31 | 82.29 | 93.17 |
| 56 | 74.47 | 83.52 | 94.47 |
| 57 | 75.62 | 84.73 | 95.75 |
| 58 | 76.78 | 85.95 | 97.03 |

| | | | |
|---|---|---|---|
| 59 | 77.93 | 87.17 | 98.34 |
| 60 | 79.08 | 88.38 | 99.62 |
| 61 | 80.23 | 89.59 | 100.88 |
| 62 | 81.38 | 90.8 | 102.15 |
| 63 | 82.53 | 92.01 | 103.46 |
| 64 | 83.68 | 93.22 | 104.72 |
| 65 | 84.82 | 94.42 | 105.97 |
| 66 | 85.97 | 95.63 | 107.26 |
| 67 | 87.11 | 96.83 | 108.54 |
| 68 | 88.25 | 98.03 | 109.79 |
| 69 | 89.39 | 99.23 | 111.06 |
| 70 | 90.53 | 100.42 | 112.31 |
| 71 | 91.67 | 101.62 | 113.56 |
| 72 | 92.81 | 102.82 | 114.84 |
| 73 | 93.95 | 104.01 | 116.08 |
| 74 | 95.08 | 105.2 | 117.35 |
| 75 | 96.22 | 106.39 | 118.6 |
| 76 | 97.35 | 107.58 | 119.85 |
| 77 | 98.49 | 108.77 | 121.11 |
| 78 | 99.62 | 109.96 | 122.36 |
| 79 | 100.75 | 111.15 | 123.6 |
| 80 | 101.88 | 112.33 | 124.84 |
| 81 | 103.01 | 113.51 | 126.09 |
| 82 | 104.14 | 114.7 | 127.33 |
| 83 | 105.27 | 115.88 | 128.57 |
| 84 | 106.4 | 117.06 | 129.8 |
| 85 | 107.52 | 118.24 | 131.04 |
| 86 | 108.65 | 119.41 | 132.28 |
| 87 | 109.77 | 120.59 | 133.51 |
| 88 | 110.9 | 121.77 | 134.74 |
| 89 | 112.02 | 122.94 | 135.96 |
| 90 | 113.15 | 124.12 | 137.19 |
| 91 | 114.27 | 125.29 | 138.45 |

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|---|---|---|---|
| 92 | 115.39 | 126.46 | 139.66 |
| 93 | 116.51 | 127.63 | 140.9 |
| 94 | 117.63 | 128.8 | 142.12 |
| 95 | 118.75 | 129.97 | 143.32 |
| 96 | 119.87 | 131.14 | 144.55 |
| 97 | 120.99 | 132.31 | 145.78 |
| 98 | 122.11 | 133.47 | 146.99 |
| 99 | 123.23 | 134.64 | 148.21 |
| 100 | 124.34 | 135.81 | 149.48 |

Table 2.0: Mahalanobis Distance ($D^2$)

| |
|---|
| 49.33225100222466 |
| 58.28293589423599 |
| 71.26301643871446 |
| 53.53890065235184 |
| 69.72984662454024 |
| 78.40567381911032 |
| 72.03785623134448 |
| 77.50479862062132 |
| 53.74078775512097 |

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|---|
| 71.19054781734073 |
| 76.18760581510475 |
| 57.964479828433674 |
| 80.5300158775027 |
| 52.66536537567762 |
| 71.33577425235201 |
| 83.22633563846256 |
| 83.70835436441199 |
| 74.44955628343992 |
| 62.307379270557846 |
| 59.66980910564004 |
| 49.13493873920147 |
| 35.56760570015083 |
| 36.54834656765777 |
| 47.13290603505391 |
| 75.94894203934737 |
| 55.245229934800435 |

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|---|
| 41.94108275221369 |
| 53.989604037087524 |
| 41.49501493506418 |
| 81.752335601301 |
| 52.17892110699728 |
| 54.53103381569707 |
| 56.246518877547494 |
| 22.114137529604086 |
| 41.605854944234416 |
| 62.21755701410208 |
| 55.888063627830164 |
| 70.08819897340774 |
| 79.89064250262459 |
| 70.74199958201561 |
| 85.81670392609774 |
| 58.70004265534363 |
| 35.54948550004322 |

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|---|
| 35.87176902005299 |
| 60.00052257386501 |
| 44.34264305337467 |
| 35.11836624115479 |
| 30.862210867391443 |
| 32.45794378239801 |
| 68.3521312952267 |
| 75.80010743866134 |
| 33.99956995654795 |
| 40.48509432759577 |
| 64.4164810026907 |
| 55.66087889297851 |
| 38.70608586399047 |
| 30.164765842689555 |
| 82.81301238952383 |
| 68.3539816922508 |
| 54.861761701087445 |

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|---|
| 33.82406558214293 |
| 31.231002558442672 |
| 47.9691237217195 |
| 31.66670370675519 |
| 21.908266054824775 |
| 44.72966663710408 |
| 40.017707088224206 |
| 39.0717977179588 |
| 40.18154219798967 |
| 61.55938911170982 |
| 47.353258800244475 |
| 36.29674931615921 |
| 45.86296287769061 |
| 44.83978982751978 |
| 39.597908101311376 |
| 53.560043019136444 |
| 47.15361689981104 |

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|---|
| 20.66844274387075 |
| 42.18266373731222 |
| 50.575598158711834 |
| 49.6140404067935 |
| 22.013935354300806 |
| 44.34177245933095 |
| 33.25381930784492 |
| 71.12962980591514 |
| 52.72323191812083 |
| 55.46786820507521 |
| 34.51618934914592 |
| 38.531125592657745 |
| 44.400720386480515 |
| 49.95583654763574 |
| 57.44332082535085 |
| 53.93500528476924 |
| 35.72727239123674 |

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|---|
| 38.359706038707614 |
| 45.45036129155303 |
| 39.43479674081754 |
| 72.07283530662751 |
| 36.6934184714769 |
| 75.59850762028015 |
| 52.411018816977304 |
| 52.5634386387863 |
| 45.827554681405 |
| 55.04399376937736 |
| 62.0438067512624 |
| 48.65394061403552 |
| 47.74306281915021 |
| 47.52875919126444 |
| 52.65963874193303 |
| 47.91699046480417 |
| 41.5579459816714 |

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|---|
| 42.61757664028686 |
| 36.72352210957323 |
| 31.8152140602589 |
| 49.978486072189504 |
| 46.47973890309127 |
| 41.11291598068236 |
| 66.09884914448635 |
| 38.58404706388905 |
| 44.684778564943954 |
| 42.60383295466191 |
| 29.003716147682145 |
| 37.29372006459839 |
| 64.80905573076495 |
| 29.245067567229867 |
| 68.09915200687107 |
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| 40.99209557084546 |

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| 75.24061473556246 |
| 26.691298499051435 |
| 38.155080703323094 |
| 31.26362339102145 |
| 53.322091104622665 |
| 76.34329020903972 |
| 56.61223866387179 |
| 50.34472467850151 |
| 49.64427517740981 |
| 50.298010150852015 |
| 51.39770055522871 |
| 53.209591711601 |
| 34.95042883703864 |
| 41.38831493395454 |

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| 29.717216083645358 |
| 71.29863096226109 |
| 43.704362990296865 |
| 43.52436712447225 |
| 49.19931120453767 |
| 49.6795950861712 |
| 70.95432543612638 |
| 25.403504541015543 |
| 26.68862853808997 |
| 50.979719310076504 |
| 45.365348349318296 |
| 32.974842727215226 |
| 52.1432405608069 |
| 21.772838362394182 |

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| 35.131721351889375 |
| 41.427155476630745 |
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| 62.095264253682515 |
| 26.973850444340925 |
| 50.74210154147641 |
| 39.37037858345033 |
| 32.53943920620424 |
| 35.15906364034583 |
| 69.82168547171466 |
| 60.877212487498156 |
| 71.71918442206416 |
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| 50.798466576366806 |

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| 68.89833220808114 |
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| 50.66566713913742 |
| 64.71756461896629 |
| 46.19674692816728 |

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| 58.739234457816 |
| 42.6333703115612 |
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| 36.653632936471446 |
| 40.122969414212456 |
| 55.56498049076979 |
| 52.76281324756646 |
| 49.21568846509198 |
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| 52.8242125284899 |
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| 45.26864056724949 |
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| 35.21988292336709 |
| 45.515456477864326 |
| 35.41462139796169 |
| 40.13432224027277 |
| 64.55364141482652 |
| 60.311119258278644 |

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| 61.587112265461606 |
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| 80.33898490177064 |
| 47.45560285663668 |
| 68.42319055197946 |
| 81.49108247398577 |
| 58.15036040984998 |
| 35.792449926910585 |
| 76.05430133536201 |
| 71.53481895174875 |

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|---|
| 77.78329621288225 |
| 40.64816008823261 |
| 49.33225100222466 |