

**DEVELOPING ARABIC
USABILITY GUIDELINES FOR
E-LEARNING WEBSITES IN
HIGHER EDUCATION**

Mohamed Benaïda

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Mohamed Benaïda

**School of the Built Environment
University of Salford, Salford, UK**

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Abstract

Despite the widespread availability of e-learning websites in the Arab world, the link between Arabic culture, Arabic language and the usability of e-learning websites has been researched very little. Moreover, the Arab world lacks usability guidelines to support the creation of effective Arabic e-learning websites. Poor usability often means poor user interaction and hence reduced user acceptance and satisfaction.

This research undertakes an experiment with 50 Arab participants to investigate their judgement of an Arabic and English e-learning website. The participants completed seven e-learning tasks and completed an e-learning, evaluation, usability, and aesthetics questionnaire. The participants gave their feedback on the positive and negative features of each e-learning website following the experiment. This experiment was followed by a case study and fuzzy set theory analysis to validate the results. The findings are summarised in nine Arabic usability guidelines.

This thesis contributes to the body of knowledge in various ways. Firstly, it establishes the differences between Arabic and English languages and their effects on usability. Secondly, it identifies the design elements and barriers that affect the usability of Arabic websites. Thirdly, it produces nine usability guidelines for improving the usability of Arabic e-learning websites. In particular, these guidelines suggest using appropriate images and contents, which respect cultural and religious values, by using blue as a main colour, 12/13-point font size and Arabic Traditional font type, and that the written content should be written by a native Arabic-speaking writer. These guidelines contribute towards creating e-learning systems that have high learnability and high efficiency. However, aesthetics may not have a strong influence on the judgment of Arab users.

1 Chapter One: Introduction

1.1 Overview

The concept of usability has dramatically influenced and advanced technologies and interactive systems in the world, particularly in the West. The Arab world, however, is still far from this evolution (Abouchedid & Eid, 2004; Fraij, 2013; Guessoum, 2006), especially in the sector of education. In essence, there are two types of education, face-to-face and online. Face-to-face education is the traditional approach to delivering knowledge and training and involves direct contact between the teacher and the learner. However, online education is a modern approach to delivering knowledge and training and takes various forms such as distance learning and e-learning. This thesis focuses and investigates the use of Arabic e-learning websites.

Currently, e-learning plays a dominant role in the domain of education and business (Qi et al., 2009), and it is viewed as a medium that offers training for employees and education for students wherever they are. It opens up various opportunities to develop knowledge, abilities and skills (Trondsen, 2004). The adoption of, and the widespread use of, e-learning websites in different educational institutions contributes to the increase in their usage and thereby the number of their users. A key factor in the success of e-learning websites is good usability (Stara et al., 2005). As usability ensures a smooth interaction between the learner and the e-learning website, resulting in high satisfaction.

Usability guidelines enable designers, website managers and maintainers, usability specialists, researchers, staff and students to be conducted in the creation of usable websites and software applications that satisfy the needs of end users. Whilst the West enjoys a wealth of usability guidelines established through long-lasting research

studies, the Arab world still lacks usability guidelines which can be used to steer the development of e-learning websites.

This thesis will focus on improving the usability of Arabic e-learning websites to facilitate higher education and on developing usability guidelines that explain to developers and researchers how usability affects the quality and success of e-learning websites, especially those using Arabic as their main interface language.

1.2 Background Review

The International Standard Organisation (ISO, p.7) defines usability as “effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular environment”. According to Agarwal (2004, Nielsen (1993) and Murphy et al (1999) usability refers to how users can easily and quickly do what they want using the system, how users can avoid making mistakes during system use, and how users can remember to use the system if they decide to use it again on future occasions. If the system has poor usability the user may leave it permanently and never come back to it. Melis et al. (2003) confirmed the view that many e-learning systems fail because practitioners focus on improving the established methods of learning instead of improving the learning experience of learners.

However, Shackel (2009, p.2) viewed usability from a slightly different angle, suggesting that usability is not based only on the ease of use but also on efficiency. Thereby, Shackel proposed the following definition for the usability of a system: “The capability in human functional terms to be used easily and effectively by the specified range of users, given specified training and user support, to fulfil the specified range of tasks, within the specified range of environmental scenarios“.

Nielsen (1993) defined usability by five primary components: Learnability, Efficiency, Memorability, Satisfaction and Errors. These five components contribute to the definition of usability as follows:

- **Learnability:** focuses on how easy it is to learn to use the system, even if the user has never seen or used the system before.
- **Efficiency:** focuses on how quickly the user can complete tasks.
- **Memorability:** focuses on how the user can remember what functions and features he/she has used before in order to use the system again correctly. In other words how to make the system easy to learn and remember.
- **Error:** when the user makes some errors, the system should enable him to recover from them easily. The rate of errors should be kept as low as possible.
- **Satisfaction:** the user should be highly satisfied and happy with the system, leading him/her to use it another time.

To sum up, usability primarily focuses on how users work with a new interactive technology and how they can use it easily, without any complications, during all the interaction stages from the beginning to the end (Tselios & Avouris, 2001).

Wong et al. (2003) showed that unusable e-learning systems impede the student learning experience, leading the learner to focus on how to use the system rather than learning the content. Usability evaluation is not usually included in the design of e-learning systems because it is expensive and time consuming (Kjeldskov et al., 2004).

The word “culture” has various meanings depending on its use. There are more than 300 definitions of the term varying in meaning from one author to the other (Sun, 2004).

Fiske (2002, p.8) argued “culture is a socially transmitted or socially constructed constellation consisting of such things as practices, competencies, ideas, schemas,

symbols, values, norms, institutions, goals, constitutive rules, artefacts, and modifications of the physical environment”.

This definition provides an idea on how culture can have an impact on the usability of any system. For example, in the Arab world it is unacceptable to use the words ‘girlfriend’ or ‘boyfriend’ since these words imply a relationship between the two genders outside marriage. However, the same words are acceptable in the Western culture. Although at first, this example seems relevant only to social relationships, it has a direct influence on the content of websites. Literature shows that the content directly influences the usability of websites (Belanche et al., 2012; Bringula & Basa, 2011; Nantel & Glaser, 2008; Thielsch et al., 2013). As such, Arab users are expected to disprove of web content, which reports on such social relationships that are naturally classified as abnormal in the Arab culture.

In information technology, Kerne (1998, p.2) defined culture as “the on-going, mutually recursive networks of processes, and resulting products that form our collective subjectivities”. Chapter two sheds more light on the role of culture in web design and e-learning systems and discusses the link between culture, usability, websites and language. In this research, the concept of culture is used to investigate the effects of beliefs and social values and principles on the perception of Arabic users and its influence on the usability of websites.

1.3 Problem Statement

While western universities employ advanced and sophisticated e-learning tools and technologies which have been developed based on comprehensive theories, Arab universities have only recently started to adopt these state-of-the-art technologies (Allen et al., 2009). Universities in the Arab world purchase e-learning tools from commercial

companies, e.g. Blackboard, or use e-learning open source systems, e.g. Moodle. Usually these e-learning tools are translated from English into Arabic directly without taking into account the evident cultural and linguistic differences between the two societies. Moreover, some of these e-learning tools mix the two languages together on the same page, translating only a few sentences and keeping the rest in English or French. The structure and navigation of some e-learning tools retain the original layout of English despite the right-left writing direction in Arabic.

The research challenge is to investigate the usability of such e-learning websites to enhance e-learning in the Arab world. Despite the large amount of money spent on buying Arabic e-learning systems, no systematic measures have been applied to test their usability, nor have any research efforts been undertaken to develop usability guidelines that suit the cultural and linguistic needs of Arab users. There is a lack of studies in the literature, which test the efficiency of current Arabic e-learning websites and their adoption amongst Arab users. For example, it is important to investigate whether such e-learning websites are successfully used by students with minimum problems and high satisfaction. It is important to ensure that e-learning websites accomplish what they are expected to deliver to their diverse users (i.e. students, staff and administrators). They need to be efficient, effective, engaging, easy to use, and to respect cultural values and linguistic principles in order to guarantee their successful adoption and use.

This thesis provides a detailed investigation of the factors that may affect the judgment of Arab users when using Arabic e-learning websites. These factors include language, culture, web design and usability. The thesis also strives to develop appropriate usability guidelines that can help designers to develop usable and attractive Arabic e-

learning websites. This would improve the overall quality of learning and the interaction experience offered to Arab learners. In effect, making e-learning websites usable and attractive would improve learners' overall satisfaction and encourage them to re-use the e-learning website regularly.

Studies on the relationship between usability, language and culture in the Arab world are still in their early stages. Up until now, no systematic studies have attempted to show how usability is influenced by the Arabic culture and language, and how usability guidelines can be devised to help Arab users use interactive e-learning websites more efficiently. The principal aim of this research is to develop Arabic usability guidelines for e-learning websites in higher education. Usability is perceived to be an important criterion in developing high quality software artefacts. Thus, it is imperative to define usability guidelines specific to Arabic e-learning websites to facilitate e-learning.

1.4 Research Aim

This thesis aims to develop usability design guidelines for Arabic e-learning websites.

1.5 Research Objectives

In pursuing the general aim of this research, the researcher has established eight objectives focusing into the following aspects:

- Reviewing current usability guidelines for English websites and Arabic websites.
- Understanding the link between culture, language, web design features and usability perception by web users.
- Exploring the differences between Arabic and English cultures using Hofstede's dimensions.

- Designing and implementing an experimental e-learning website which includes both an Arabic and English version.
- Performing an experiment with Arab users to investigate the link between culture, language, e-learning and usability.
- Defining the key challenges for, and the barriers against, the successful use of Arabic e-learning websites.
- Validate through a follow-up case study and fuzzy set theory.
- Suggesting Arabic usability guidelines for e-learning websites to ensure barriers are minimised for students pursuing education in Arabic.

This research focuses on addressing the link between e-learning, usability, culture, and language. As such, it addresses how culture and language can be used to improve the usability of e-learning websites. However, other types of websites such as commercial websites and news websites are excluded from this research. Moreover, the effects of sound and animation are not studied in this research. This research does not study the effects of gender on the perceptions of usability.

1.6 Research Questions

The current research endeavours to answer the following research questions:

- What are the differences in usability perception by Arab users between Arabic e-learning websites and English e-learning websites?
- What are the main barriers and challenges that Arab web users face when using Arabic e-learning websites?
- Which usability guidelines can be developed to improve the usability of Arabic e-learning websites?

1.7 Structure of the Thesis

In general, this thesis is organised into nine chapters, structured logically as follows.

Chapter one: defines the problem statement, the motivation, the aim and the objectives in carrying out this research.

Chapter Two: reviews the literature relevant to e-learning in general and discusses the link between the usability of e-learning websites, culture, language, and e-learning.

Chapter Three: justifies the research methodology and presents the relevant research methods for this thesis. Moreover, it presents the structure of the experimental e-learning website and details the data collection methods and process.

Chapter Four: highlights the preparation for the data collection with a focus on the development of the experimental website and the experiment.

Chapter Five: focuses on describing the results of the experiment resulting from the objective and subjective data. The objective data includes task completion time and number of clicks. The subjective data includes ratings of evaluation, usability, aesthetics, and the e-learning questionnaires.

Chapter Six: presents a case study investigating the usability of two existing e-learning websites to confirm the results of chapter five.

Chapter Seven: validates the data collected from the experts using fuzzy set theory analysis.

Chapter Eight: proposes and discusses the nine usability guidelines for Arabic e-learning websites focusing on: images, colour, font, language, information content, learnability, efficiency, aesthetics, and satisfaction. These guidelines are supported by

references from the literature and by the results of the experiment and the fuzzy set theory.

Chapter Nine: discusses the contributions made by this research and highlights its limitations as well as proposing future work in this area.

2 Chapter Two: Literature Review

2.1 Introduction

This chapter reviews the previous research and the theories that relate to the areas of e-learning, culture, usability and language. This review aims to understand the relationship between the areas above, how they relate to each other, and to discover the main factors that affect their relationships. It starts by highlighting the different types of e-learning in higher education and their underlying theories. This chapter also describes the differences and similarities between Arabic culture and English culture and describes previous research studies in this area, with a particular focus on Hofstede's cultural dimensions. Moreover, chapter two describes the link between usability and web design, culture, e-learning, aesthetics and language. In the absence of Arabic usability guidelines, this chapter discusses the existing usability guidelines within Western culture.

This chapter also highlights the morphology and composition of Arabic language and how it may affect the usability of e-learning websites. This review is essential to examine the strengths and weaknesses of previous research studies in this area. The following figure (2-1) shows the four areas that will be examined.

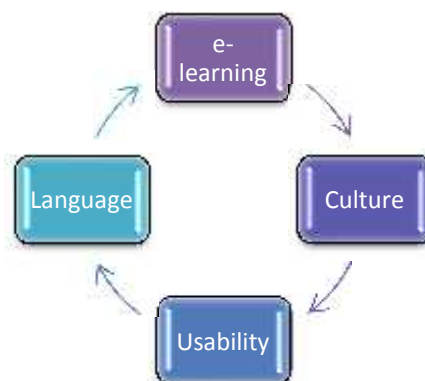


Figure 2-1. The four areas under examination

2.2 E-learning

Rowlands (2003, p.125) defined e-learning as “a term used to help describe the various uses of technology for learning, teaching, training, and wider knowledge management”. E-learning solutions simplify the transfer of information and skills to the right people at the right time (Ruttenbur et al., 2000). At the end of the last century, the world of education expanded rapidly and the current revolution in technology has created radical changes in the methods of education. The Internet leads these changes and many schools and universities in the education sector are engaged in the domain of online courses.

E-learning impacts on the education domain everywhere and is crucial to any effective educational system. E-learning can be written in various ways (e-learning, elearning, eLearning, E-learning...). The definition of e-learning may differ from one person to another and from one culture to another; however there is a general definition that combines the principal elements of e-learning. Sun (2006) defined e-learning as follows: “E-learning is basically a web-based system that makes information or knowledge available to users or learners and disregards time restrictions or geographic proximity.” (Sun et al., 2008, p.2).

E-learning covers a wide range of subjects that are delivered through the internet, intranets, CD-ROMs, videos, audios, TV, text medium, forums, and satellite broadcasts (Lee et al., 2010). Tavangarian et al (2004, p.2) stated that e-learning “all forms of electronic supported learning and teaching which are procedural in character and aim to effect the construction of knowledge with reference to the individual experience, practice and knowledge of the learner. Information and communication systems, whether networked or not, serve as specific media (specifically in the sense elaborated previously) to implement the learning process”.

In general e-learning uses computer network technology to deliver information and educational materials to the users. Watson et al. (2004) referred to online learning as “education in which instruction and content are delivered primarily via the Internet” (Cavanaugh et al., 2009, p.2). E-learning also plays a major role in training. It has become more important than before with the aim of keeping up with the speedy growth of technology in the world. It is for this reason that companies, such as Dell, CISCO and Microsoft, offer good training opportunities to their staff around the world through e-learning centres. This enables them to gain high quality skills and expertise rapidly and in a cost-efficient manner.

2.2.1 Types of e-learning

There are three types of learning environments: distance learning, e-learning, and online learning. Moore et al. (2011, p.1) defined distance learning thus: “describes the effort of providing access to learning for those who are geographically distant”. Because computers are now involved in the domain of education, definitions of distance learning focus on the delivery of instructional materials. All the definitions of distance learning emphasise the relationship between the learner and the instructor by their use of various instructional materials in different times and places.

2.2.2 Theories

To provide a better understanding of the types of e-learning , it is instructive to discuss the main theories behind e-learning. There are various theories in the domain of learning but, generally, there are three commonly known theories that are used in learning, namely: behaviourism, cognitivism and constructivism. The next sections cover each of these theories.

2.2.2.1 Behaviourism

“Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I’ll guarantee to take any one at random and train him to become any type of specialist I might select -- doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors.” (John Watson, Behaviorism, 1930, p.82).

In the last century, many researchers (Ivan Pavlov, Thorndike, Skinner and Watson.) defined the behaviour of users in a learning situation as: “learning is a change in observable behaviour caused by external stimuli in the environment” (Ally, 2004, p.6). Behaviourism views behaviour as seeing a black box containing an inner process which is ignored. The focus is on the black box itself from the sense that all the study focuses around this black box.

“Stimulus-response” is behaviourism which starts by an external stimuli being applied on a unaffected passive learner. Behaviour is thus built up through positive and negative reinforcement which encourages this behaviour to happen again. both positive or negative discourage the behaviour from being repeated. Learning is, therefore, defined as a variation in the behaviour in the learner. Behaviourists commend a deductive and structured approach to designing online courses, in order to ensure that basic concepts, skills and factual information are rapidly acquired by the learners.

2.2.2.2 Cognitivism

The sensory store within human beings establishes the information that is received via different senses and transfers it to two way long term and short-term memory via different cognitive processes (Mödrischer, 2006). Jean Piaget, father of the cognitivism theory, tried to answer the following question: how does knowledge

develop in our mind? To answer this question, Piaget emphasised the cognitive and mental processes that make learning and thinking possible. The key to learning is how to remember information, how to think correctly and, furthermore, how to solve problems.

Piaget studied babies and observed when the information is repeated once the child maintains mental balance and integrates the information into a cognitive structure. If the information is new, the child will lose mental balance and accommodate the new conditions. Furthermore, the cognitivism theory focuses on the active nature of learning. The learner explores the environment around him by himself and learns from what he discovers. Therefore, the individual is naturally interested in exploring the environment and will learn through discovery (Gallagher and Reid, 2002).

2.2.2.3 Constructivism

Constructivism theories assume knowledge construction in the mind of the human who is interactive rather than reactive (Demetria & Cole, 2004). Constructivists try to answer the main question as to how humans construct knowledge. At the same time, there are many other questions waiting for answers; for instance, do we know what the term “information” means? Moreover, whether this information impacts on the human thinking process? While a learner is exploring new things and discovering them individually, the learner can construct his knowledge through the experience that is gained from these new discoveries. In conclusion, the main idea is that the knowledge should be constructed by the learner himself rather than supplied from the outside.

Doolittle et al. (1999, p.5) accepted that there are four tenets of constructivism: “1. Knowledge is not passively accumulated; but rather, is the result of active cognising by the individual. 2. Cognition is an adaptive process that functions to make an

individual's behaviour more viable given a particular environment; 3. Cognition organises and makes sense of one's experience, and is not a process to render an accurate representation of reality; and, 4. Knowing has roots both in biological/neurological construction, and is social, cultural, and language-based”.

2.2.3 Differences between Traditional Learning and e-learning

There are striking differences between traditional learning and e-learning. Perhaps the cost is the most influential factor in this equation, with e-learning offering the lower cost (Brody, 2010). The fees paid for traditional learning is growing dramatically especially in the UK. Indeed many students cannot afford to pay the large amounts of money charged yet, at the same time; they want to gain a higher education degree. E-learning is a viable alternative for those who are unable to pay tuition fees. In addition, students do not have to pay for other additional costs (such as accommodation, travel, transport, etc.). This could encourage many sections of the society to benefit from this occasion possibility. E-learning may thus provide a promising solution for those who are unable to pay the tuition fees charged by educational institutions for traditional learning. Other differences include:

- a) In traditional learning the provider controls the process from the beginning to the end without any significant role undertaken in the provision process by the recipient (student or trainee); in e-learning the provider (for example, the teacher or trainer) and recipient share the responsibility.
- b) In traditional learning the provider offers materials and advises the learner, whereas in e-learning the learner interacts with the provider through email, e-classroom, chat rooms and other processes of learning (Cimermanová, 2009).

2.2.4 Advantages and Disadvantages

Nowadays, people who are interested in pursuing careers in education face many challenges including time, cost and distance. E-learning provides a good solution for such barriers and challenges. Flexibility is one of the major advantages of e-learning. The learner can resume his/her education wherever and whenever he/she wishes (provided he/she has access to a computer with an Internet connection) and all that is required from him/her is to choose the right time to do so. Moreover, e-learning offers different types of learning styles.

Another advantage of e-learning is the savings in money and time. It is not always easy for everyone to travel to another city or country to join a college or university. Similarly, not everyone has the ability to pay for university or college fees, accommodation and living expenses. E-learning can provide opportunities for varied sections of society at less cost and with less time spent (Hameed et al., 2008). Group working gives learners an opportunity to share ideas with others around the world without any limits such as national or regional boundaries. Such an advantage can help the learner to explore other ideas, gain experience with a variety of learners from different cultures and may help them to solve problems that can occur during the process of educational life. E-learning can be used for training purposes as well in order to learn new skills and can provide new approaches towards achieving beneficial trainings. Through e-learning a learner can obtain new information and help from experts around the world by asking questions through email, chat rooms and e-classes or via any other synchronous (learners coming into contact at the same time) or asynchronous (learners coming into contact at different times) learning method.

On the other hand there are some disadvantages that may cause some difficulties for the users of e-learning; for instance, it can be quite expensive to develop an e-learning

system for the provider and users of e-learning. E-learning often requires new skills that are necessary so that a user will be familiar with/can use the new technology (Cantoni et al., 2004).

2.2.5 E-learning and Higher Education

Higher education benefits in many ways from e-learning. Students and staff may use e-learning systems every day not just to retrieve information via search engines and transaction services, but also to deliver high quality infrastructure, content development and support. Furthermore, e-learning in higher education opens up learning opportunities and the opportunity to use learning tools.

Laurillard (2004, p.2) argued “it is important because e-learning can make a significant difference to how learners learn, how quickly they master a skill, how easy it is to study and, equally important, how much they enjoy learning.”. The characteristics of students have changed in the last few years; as they have gained more experience, a majority of them have enough skills to use the new technology and are more effective with it. The growth in communication, particularly the Internet and information technologies, enables the higher education sector to make its position stronger by using e-learning (Ojukwu, 2006). University students now have web access to lecture notes, assignments, audio lectures and selected digital resources in order to develop and support their study. They have personalised web environments, such as web portals, in which they can join discussion forums with their class or group mates. This new kind of access gives them greater flexibility in study.

2.2.6 E-learning Market

The e-learning market is growing every year particularly within the last decade. As an example, the USA market has risen from 1.1 billion dollars in 1999 (Van der Wende, 2002) to 18.2 billion dollars in 2010, and is expected to reach 24.8 billion dollars by 2015, with a growth of 5.9% (Adkins, 2011). These statistics show that the USA is the biggest market of e-learning in the world.

North America is expected to be top of the market for e-learning until at least until 2015. However, the second biggest market in the world comes from Asia, especially the South Korean market which covered 5.9% of the world market in 2007, with a market worth about 1.7 billion dollars. This state of affairs relates to the number of Internet users. Statistics shows that more than 79% of South Koreans use the Internet, 100% of South Korean schools are connected to the internet and more than 91% of South Korean universities use e-learning courses (Hwang, 2008). After South Korea, China is expected to be the second largest market by 2015. In Europe, the UK market is still the biggest market with a 4.76% growth in 2009, worth £472 million. With this growth rate the UK market will lose this leadership to France, Germany, or Eastern European countries like Poland, Slovakia, or Hungary (Glynn et al., 2010).

2.3 Culture

2.3.1 Definition of Culture

“Culture hides much more than it reveals, and strangely enough what it hides, it hides most effectively from its own participants.” Edward T. Hall (p.29). The word ‘culture’ has different meanings depending on its use. This is why its definitions differ from one author to another (Sun, 2004). There are more than 300 definitions of the term culture (Hillier, 2003).

One of the most widely used definitions of culture is that put forward by Hofstede, the father of cross culture, who argued that culture is: “the collective programming of the mind which distinguishes the members of one group from another” (Hofstede, 2001a, p.21) In essence, this states that a group of people somewhere share the beliefs, attitudes, behaviours, traditions and values that differentiate them from other groups. Our everyday actions are controlled by our behaviour and background, which are, in turn, controlled by major invisible cultural factors.

Fiske (2002, p.8) argued: “A culture is a socially-transmitted or socially-constructed constellation consisting of such things as practices, competencies, ideas, schemas, symbols, values, norms, institutions, goals, constitutive rules, artefacts, and modifications of the physical environment”. Fiske’s definition is more comprehensive as it uses many factors that help construct and reinforce the culture of any nation. Fisk’s definition provides an idea as to how culture can have an impact on usability and how culture influences the usability of any system.

In information technology, Kerne (1998, p.38) defined culture as: “The on-going, mutually recursive networks of processes and resulting products that form our collective subjectivities”. It is important to understand the culture of the consumers that one targets. This understanding gives one the ability to make the right decisions when communicating with people and to build a good relationship with them in order to achieve the target (whatever the target is: business, education, social case and so on). When researcher talks about a particular culture he should consider it as a lifestyle rather than use it as a scale (e.g. which one is more superior, logical or noble than others) to distinguish between groups.

Special attention must be given to the following points: the most common definition of the word culture in the world of social sciences is based on three facts: the way of life pursued by people (values, visions of life, skills, beliefs, social heritage, traditions and norms which lead the society), artistic achievement and knowledge (Barakat, 1993). These elements are gained through the development of society, as well as through contact with communities and other cultures.

Many studies have shown that culture affects global organisations around the world; for instance, Kotter and Heskett (1992) revealed that organisations which consider cultural elements in their strategy have increased their profits by 756% compared to those which have disregarded the cultural factor. Coopers and Lybrand discovered, after a study conducted on 100 companies, that 85% of participants confirmed that the main barriers when trying to merge were the management style and culture (Bader et al., 2012; Schneider, 2002). In conclusion, culture is a collection of many factors that affect the direction of thinking and how a person or a group judges something negatively or positively.

2.3.2 Hofstede and Cultural Dimensions

Hofstede, who was working in IBM as a psychologist, developed a model that identifies five dimensions that are affected by culture. These dimensions varied between different countries. Hofstede's study included 116,000 employees around the world. The data were collected between 1967 to 1973 from 40 countries (Hofstede, 1980). Hofstede extended his study to include another ten countries including countries in the Middle East (Arab countries). Hofstede's study only characterized the general culture of these countries, thus it did not concentrate on the individual level (Appelt & Astapenko, 2011).

Nevertheless, there are a number of reasons why this study has been accepted by researchers: firstly, ease of access when it is used to measure different cultures; secondly, it gives a clear idea of the culture that will be studied, or with which the researcher is involved; thirdly, it is the most prevalent and satisfactory study from among the specialists in the field of culture studies. Therefore, research in this area in the Arab world needs a focused study that sheds light on the culture of the Arab world. Hofstede's dimensions consist of five dimensions which focus on power distance, masculinity and femininity, individualism and collectivism, uncertainty avoidance, and long-term orientation.

Power Distance (PDI)

The power distance dimension is defined as “the extent to which less powerful members of a society accept and expect that power is distributed unequally” (Hofstede, 1997, p.61). In a high power distance, the supervisor manages and consults with those who are under his/her power and the employees look to him/her as a leader who is responsible for the project or work (Tsui, 2004).

Masculinity and Femininity (MF)

‘The dominant values in a masculine society are achievement and success; the dominant values in a feminine society are caring for others and quality of life.’(De Mooij & Hofstede, 2010, p.5). This dimension presents how much a society values the role of males and females. In feminine societies, the quality of life and the level of the relationship between the two genders are more valued than any other factors. In masculine cultures competitiveness, motivation, assertiveness and accretion of wealth are valued more than society as a whole.

Khastar et al. (2011) argued that masculine societies focus on the difficulty and competition for materiality and ideas. Likewise, income and progress are significant for employees. For example, in a masculine society, women take care of the household whilst men bring money to support the household. In feminine cultures, household work is shared more between husband and wife than in masculine cultures. Men also do more shopping in feminine cultures as they are more caring (De Mooij & Hofstede, 2010). In other words, masculinity focuses on materialism and achieving the goals, whilst femininity focuses on feelings and wellbeing.

Individualism and Collectivism (IC)

De Mooij and Hofstede (2010, p.5) argued that individualism and collectivism are defined as ‘people looking after themselves and their immediate family only, versus people belonging to in-groups that look after them in exchange for loyalty’. Masakazu (1994, p.127) defined modern individualism as “a view of humanity that justifies inner beliefs and unilateral self-assertion, as well as competition based on these”. The second half of the first definition above emphasises the strength of relationships with others in the community whereas in individualism, the person looks after himself and his family. Collectivism groups are more expressive words like shame, grief and pessimism. Individualism behaviour is open, more trusting than others of strangers. In contrast, someone with collectivism behaviour has a dual stance, one inside his/her society and another with strangers. A collectivist has a high level of trust with his/her group and is cohesive with them. Additionally, his/her behaviour with strangers are less open; he/she is less direct with others and is more ambiguous in his/her relationships (Al Omoush et al., 2012).

Uncertainty Avoidance (UAI)

Uncertainty avoidance relates to the level of concern society members express when in unclear or unknown circumstances. Low uncertainty avoidance is more likely to reform than high uncertainty avoidance. Furthermore, high uncertainty avoidance has a traditional preference for ancient methods rather than new innovations. At the same time, avoiding uncertainty is primarily caused by worries and dissatisfaction with ambiguity (Veltri & Elgarah, 2009).

Long-term Orientation (LTO)

Long-term orientation refers to the level at which society holds together. In high long-term culture, the status in a relationship is the key point, besides personal flexibility.

These dimensions can be used as a scale to rate the impact of culture from one country to another (Park & Lemaire, 2010).

Many factors influence a user's satisfaction, a user's needs and his/her behaviour. Perhaps the factors that have the most impact are: the user's background and the user's level of education, culture evaluation and time context (Lindahl & Granath, 2006).

Short-term orientations are based on highlighting the value of consistency and the stability of the person with respect to customs and traditions. Establishing the principles of truthfulness and honesty requires specific attention, more so than any other meanings.

The people involved in this study have worked in the same surroundings as those where the study was undertaken. However, the level of education of staff in IBM is higher than the average and the data were collected from IBM employees. In this respect, the study may not provide a complete picture of the background, traditions and culture of the society that it has analysed.

2.3.3 The Importance of Understanding the Culture of Others

Ethnic groups differ from one society to another and from one nation to another. The factors of the style of life, religion, background and tradition play a critical part in any decision that anyone can take to form or that any group can take to form an idea about others. Thus, a misunderstanding of the culture of consumers can lead any business or system to fail to reach the desired targets. A lack of respect and appreciation of the culture of others may also cause a similar effect. In such cases, it becomes difficult to accomplish the objectives of any project.

Distinguishing cultural differences is the right approach for the success of any company or organisation that desires to find a place in the global market; particularly when one realises that the competition is increasing between companies and organisations. Educational and commercial sites that do not pay attention to this aspect will face many obstacles that prevent them achieving any reasonable success around the world. Ball (2008) has shown that every culture has its own characteristics and beliefs that affect nearly all aspects of human behaviour and help bring order to a society and its individuals. However, the best way to understand any culture and society is to live in it. From daily observations, one can learn, appreciate and value the thinking of the people of that culture.

Fredric and Rohm (2010, p.9) suggested that “in order to communicate, work, and live with people in other cultures, it is important to understand one’s own ethnocentric lens before one can begin to interpret others”. Noiwan and Norcio (2006) emphasised the importance of paying attention to language translation and culture in order to create a good interface.

2.3.4 The Arab Culture

The Arab world is one of the most strategic regions of the world. This is due to a number of reasons:

(a) It produces more than half of the world's production of oil and gas. (b) It is a large market with many rich countries when compared to Latin America or Eastern Europe or South Asia. (c) It is a very important geopolitical area due to its location (traversing three continents: Africa, Asia, and Europe).

The Arab world is an area of growing economic significance and offers investors and exporters many opportunities across many business sectors (Fattouh & El-Katiri, 2012).

The Arab world has great economic, political and social diversity.

2.3.5 Hofstede and the Arab Culture

Hofstede (2010) argued that Arab people have a high power distance (80). Furthermore, the uncertainty avoidance is also high (68) whilst individualism is low. In Arab society, parents and family are the centre of attention and concern. The Arab family system is male-controlled and the role of the individual in the family is less influential than the role of the family. An Arab person can sacrifice the opportunity of a better job for the sake of staying close to his family, community and place of birth. To the contrary, a westerner places his comfort and profit on top of all social concerns. The hierarchy in the family is important in the Arab world. The father is at the top of this pyramid. An authoritarian father has full respect and his orders must be obeyed and implemented. This situation is quite different in the West. The individual is at the centre of everything and his/her needs come before the needs of family, parents, and community. The relationship between relatives is very strong and very close. In Hofstede's dimensions masculinity averages 53 in the Arab world as a consequence of background,

mentality, religion, and the accumulation of experience and expertise throughout the ages.

2.3.6 The Arab World

The first observation that can be made is that the dimensions of Hofstede treat the Arab world as a unique entity and a single state although the Arab world is composed of twenty-three countries. In reality, there are some differences between the Arabs of North Africa and of the Gulf. This study has disregarded the role of religion in the shaping of the behaviour of Arabs.

Table 2-1: Hofstede Arabic countries' scores.

Country	Power	Individualism	Uncertainty	Masculinity	Long term
Arab Countries < Egypt, Iraq, Kuwait, Lebanon, Libya, Saudi Arabia, and the United Arab Emirates >	80	38	68	53	NA

Hofstede's study included seven countries from the Arab world: two from North Africa (Egypt and Libya), three from the gulf (Saudi Arabia, United Arab Emirates, and Kuwait), one from Sham (Lebanon) and Iraq. One important issue that must be described in this study is the culture of Arabic countries. However, there are twenty-three Arab countries with major differences. GDP (Central Intelligence Agency - CIA, 2009), there are many differences between them that can be observed in their economics,

education and background over the last century. Tang and Koveos (2008) argued the changes in economic conditions are the main part of cultural dynamics.

The Arab world can be divided into four groups: North Africa, the Gulf, West Asian Arab countries and the rest of the Arab world. The North African Arab countries include: Algeria, Morocco, Tunisia, Libya, Egypt and Mauritania. The Gulf countries include: Qatar, Saudi Arabia, UAE, Bahrain, Kuwait, and Oman. The West Asian Arab countries are Syria, Palestine, Jordan, Lebanon, and Iraq. The rest of the Arab world includes Sudan, Somalia, Yemen, Djibouti, and Comoros.

However, there are common similarities between Arab countries such as traditional, cultural, linguistic and religious factors. For example, males still dominate in society in general and women are expected to take care of the children and manage the home. Arabic society is still regarded as more conservative when compared to western society despite the increasing number of women in the work market in the last decade (Whiteoak et al., 2006).

In general, the Arab world links with Eastern countries rather than with Western countries, which mean that collectivism is more acceptable and practical in the Arab world than individualism.

2.3.7 Comparing Arab Culture and British Culture using Hofstede's

Dimensions

There are three main reasons why this study selected the UK as the primary candidate for comparison against Arabic culture. Firstly, this research was conducted in the UK and all of its participants live in the UK. This assisted the researcher in understanding the topic better as he had a direct contact with the participants. Secondly, this comparison allowed comparing of the English system and the Arabic system and

enabled testing of the usability of the Arab system. Thirdly, famous e-learning systems (e.g. Blackboard) have been developed by the West for the countries of the Arab world and one needs to understand the needs of these countries.

In the last decade, a series of studies have focused on investigating the impact of culture on different societies (Leung & Bhagat, 2005, Mahajan 2012 Nangalia 2010, Triandis & Suh, 2002;). The majority of these studies have concentrated on the United States, which symbolises the West. The Arab world, however, has received little attention in regard to unravelling the link between culture and the influences of the society. Comparison-wise, there are no documented studies in the literature that have systematically compared the Arab culture and the British culture with the aim of identifying the differences and similarities of the two cultures. In particular, there is a lack of understanding of the factors, identities and impacts that constitute the two cultures.

The Arab world consists of 23 countries spread across North Africa and the Middle East. These countries share one language, one religion (more than 90% are Muslims), cultural values and traditions (Barakat, 1993). In addition, there are more than 380 million inhabitants today in the Arab world and this number is anticipated to reach 435 million by 2030 (El Sherif, 2012). Whilst Arab countries do share commonalities, there are admittedly some variations between Arab countries especially as regards the degree of cultural acceptance of certain practices such as the dress code. In general, the societies in North Africa are more similar to western societies than the Middle East societies are to western societies.

There are great opportunities for companies and organisations around the world within the large Arabic market particularly in terms of investment, especially in the current

global economic crisis (Mahajan, 2012). It is, therefore, crucial for those companies and organisations that are considering initiating links and establishing business relationships with the Arab world to understand the culture and dynamics of this region. This is because misunderstanding a particular culture and its central tenets can negatively affect the performance and success of businesses and projects. Comprehending the culture of others also explains and answers why many projects, companies and programmes are successful in some areas and unsuccessful in others, why people look at programmes or software from different angles, and why, for example, transfer technology meets much resistance in some societies and cultures.

Studies (Leung & Bhagat, 2005; Triandis & Suh, 2002) have shown that the most important variable in the reaction of how people behave is culture and the constructs that govern that particular culture. It is safe to say that significant differences can be identified between the Arab and British cultures. For instance, in the UK a large proportion of the people are Christians whereas in the Arab world the majority of people are Muslims. This difference shows that the background of the two societies is dissimilar and thus the method of viewing issues is different. In addition, these backgrounds shape values and principles. When this factor is combined with the language factor, they show the gaps and differences between the two cultures. Based on Hofstede's (2001) dimensions, Arab world society and British society and their characteristics vary significantly on four dimensions (see figure 2-2).

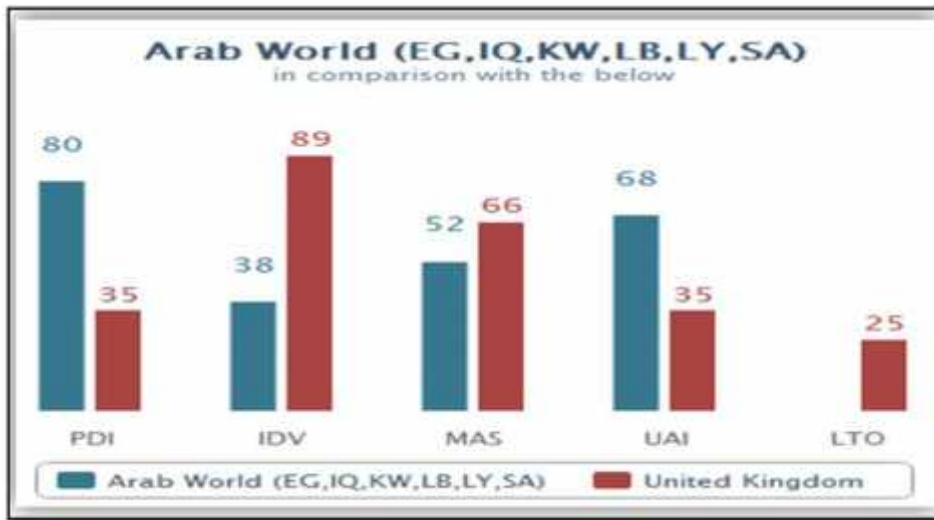


Figure 2-2: A comparison of Hofstede's dimensions between Arabic societies and British society.

The results from Hofstede's dimensions for these two societies (1984; 2001) show that the power distance score (PDI in the figure 2-2) for the Arab world is 80 which is considerably higher when projected against the PDI score of the UK which is 35 (Mohammadi et al., 2012). In the Arab world, decisions and orders are made by leaders and then delegated to subordinates to accomplish. Arab countries are authoritarian in nature whereby leaders are responsible for making decisions and whatever they decide is held to be right and should not be challenged by others. As such, subordinates cannot function without the prior knowledge and agreement of their leaders, otherwise, the consequences are often not favourable. The decision-making process in the Arab World is very centralised and usually depends on one key figure. This decision-making process reveals how people think and act, and how power is delegated within a chain of command in the Arab world. On the other hand, managers or supervisors in the UK make decisions usually after negotiating with subordinates and taking into account various opinions and perspectives. This consequently makes the

decision process less centralised, enabling the supervisor to receive the necessary support to achieve his duties. Engaging employees also provide new ideas and assists in reaching well-rounded decisions. In effect, responsibility is shared between the supervisor or main manager and employees. Moreover, in the West openness and fairness allows an employee to complain to the manager in case of annoyance or disagreement about a particular decision and this complaint is usually taken into consideration. Such interaction and positive criticism are often two healthy elements in the decision-making process.

In the uncertainty avoidance (UA) element, the Arab world scores 68 in comparison with a UA score of 35 for the UK. High uncertainty avoidance refers to the act of taking minimum risks and resorting to established methods rather than trying new approaches. Indeed the closed cultures in the Arab world are usually bound to stick to existing and well-established approaches to performing tasks and solving challenges. They are usually reluctant to adopt new approaches because of a fear of what could result. This obviously restricts creativity and limits thinking 'outside the box'. However, British culture is more willing to embrace new ideas, methods and challenges in order to achieve better results and improve on traditional ways of performing tasks.

The Arab world's individualism score is 38 because of its collectivist society where the concept of togetherness is very important and strong. Notably, this score is considerably lower than the UK's individualism score of 89, which is one of the highest scores in the world. Individualist people are directed by personalised philosophies and objectives instead of doing things collectively. Such an approach means to consider the interests of oneself and make decisions with little consideration of how such decisions may affect the group.

Arabic society often puts the family first as the main consideration above everything else. The relationship with family, friends, neighbours and general society is crucial in the lives of Arab people. An Arab person is typically concerned for the group. In contrast, British people are more self-interested and, in a sense, selfish. Individuals consider solely his/her interests and sometimes those of his/her close family rather than society as a whole. In fact, privacy and individualism is at the centre of any action that is undertaken in the West (Buda et al., 1998).

Notions such as reputation, dignity, shame and honour are less considered and recognised in British cultural society than in Arab society. In Arab society dignity is perceived as a very important and is a serious concern for every family and member of society. For example, it is unacceptable for a man and a woman who are not related to have a relationship outside marriage, such as being friends. In the majority of Arab societies, it is forbidden for unrelated opposite genders to kiss, hug, or even shake hands when socialising. In contrast, these very same examples are readily acceptable in the culture of the UK. Shame is a high-profile concept and thought to be brought onto a family, in Arab culture, if members of the family do something that defies the accepted principles and values of Arab culture. The consequences are usually severe for someone who brings shame onto a family. In some cases, the person may be disowned by his/her family and rejected by society. In addition, Arabs value reputation highly. A person is usually judged by his/her reputation in society. Thus, people avoid issues that can harm their reputation. Another factor that plays a big role in Arab society is family background and roots, which indicates the position of that particular person and family in society.

The Arab world's masculine aspect obtained a score of 53, while the UK achieved a slightly higher score of 66. Thus, British culture is more masculine whereby

competition and assertiveness are more highly valued in society. The Arab world rating shows a more equal and balanced relationship between male and female as compared to UK society. The following table lists the differences between Arab and British cultures.

Table 2-2: The differences between Arab and British cultures.

Hofstede	Arab Society	British Society
High/Low Power Distance	Power is unequal. Decisions follow a top-down approach, usually coming from the leader to subordinates. Decisions are more centralised.	Responsibility is shared between the supervisor and respective subordinates. The decision - making process is less centralised.
Masculinity/ Femininity	Masculine society. More equality between male and female.	Masculine society. More assertiveness and aggressiveness.
Individualism and Collectivism	Collectivist and more concerned society. The individual has a high concern for the group and exchange for devotion. Reputation, dignity, shame, honour and pessimism occupy a higher consideration.	Among the highest individualism scores in the world. Privacy and individual-ism is the centre of any action. The person focuses only on himself and on close family rather than on society as a whole.
High/Low Uncertainty Avoidance	Do not like to take a risk and prefer to use traditional and established methods.	Prefers to try a new way / approach instead of traditional ways.

To conclude, Arab world culture is distinct from British culture and the differences are evident across all four of Hofstede's dimensions, namely High/Low Power Distance, Masculinity/Femininity, Individualism and Collectivism, High/Low Uncertainty Avoidance. These differences explain why it is crucial for companies and businesses in the Arab world to build different multi-language systems and software applications that can accommodate Arabic cultural dimensions. This is because different cultures reflect different views of the same thing, providing various explanations for what is happening

around us. Different cultures also mean different ways of thinking, styles of living and social lives. Such cultural differences must be taken into account when designing a website or producing a targeted programme for a different culture, particularly when the differences are evident and at the opposite end of the spectrum, such as in this case. This comparison provides initial insights into how these cultural differences can affect the usability of any system or software developed for an Arab audience.

2.3.8 The Link between Arab Culture and Web Design

Statistics on users of the Internet released by the Internet World Statistics in 2011 show that more than 2.2 billion people around the world use the Internet, with English speakers still leading in the use of the Internet (26.8%) followed by the Chinese (24.6%) and Spanish (7.8%). The Arab world comes in the seventh place (3.8%). Figure 2-3 gives more details. In 2011, the biggest growth in Internet users in these world records was the Arab world with a 2,500% increase. These statistics confirm that the Arab world has the fastest growing increase in Internet users. Moreover, the position of the Arab world in the global economy is influential as it is one of the fastest growing markets in the world.

Arabic Speaking Internet Users Statistics
Internet User Statistics and Population Stats for the countries and regions with Arab Speaking Internet Users

ARABIC SPEAKING INTERNET USERS AND POPULATION STATISTICS						
REGION	Population (2011 Est.)	% Pop. of World	Internet Users, 31-Dec-2011	Penetration (% Population)	Users % World	Facebook 31-Dec-2011
Arabic Speakers	359,340,646	5.1 %	86,077,806	23.9 %	3.8 %	34,572,080
Other Languages	6,570,714,508	94.9 %	2,181,155,936	33.2 %	96.2 %	764,520,080
WORLD TOTAL	6,930,055,154	100.0 %	2,267,233,742	32.7 %	100.0 %	799,092,160

Figure 2-3: Arabic Speaking Internet Users' Statistics

Nowadays a website is not merely just putting together a combination of text, graphic, sounds and language. Designing a website requires expert skills in the areas of structural design, graphic design, and content design. A key criterion for designing successful websites is an understanding of the target users, their cultural practices and societal needs. In other words, a website that reflects the society and culture of its users is more likely to be accepted and impactful. A study of the elements of web design and the behaviour of users may help designers to redesign the system and deliver some useful guidelines at the same time (Würtz, 2005).

Studies (Cyr, 2013; Eristi, 2005; Ishak et al., 2012; Lee & Kacen, 2008) have shown that the most significant variable in web design is the cultural factor. Culture does not affect only the quality but also affects the aesthetics, functions and the whole design of the website. Taking cultural factors into account in the process of designing a web page increases the functionality, aesthetics, quality and success of the design. It is important when creating or developing any system to take into consideration these issues at all stages during the design of the system. Information and culture are more globalised than ever before; therefore, designers' websites today should consider and reflect cultural factors.

In the last decade, a number of studies have explored the relationship between culture and web design. Zhao et al. (2003) have studied the differences in the cultural dimensions of website design and content between American and Chinese societies, and have shown a difference in the content characteristics and design. Singh and Baack (2004) investigated American and Mexican websites. This study showed important differences in the description of local cultural values on the web. Differences were not limited to cultural variations but extended also to the usage of language, colour, icons, signs and symbols. Marcus and Gould (2000) conducted a study on cultural dimensions

and global web user interface design to examine various global websites by applying Hofstede's cultural dimensions. Sun (2001) carried out an exploratory study on web pages and found that there is a cultural impact on the design of any website; indeed it is deemed as a crucial factor in increasing the usability of multicultural websites. Cyr and Trevor (2004) argued that culture affects colour, content, symbols, language and graphics.

Sapir and Whorf's hypothesis suggested that colours are not objective but are determined by what our culture prepares us to perceive. However, other studies have objected to Sapir and Whorf's view indicating that normal humans have similar sense perceptions of colour since all humans share the same physiology of the eye. However, the terms used to describe colours may differ across cultures (Kramsch, 1998).

Kim and Kuljis (2010) presented a study comparing UK and South Korean charity websites using Hofstede's cultural dimensions. The authors concluded that differences exist between these two cultures as reflected in the design of the websites and the differences can affect a user's assessment of a particular product. Simon (2001) found that e-commerce applications and websites in general reflect western culture and the reason behind this is that websites and e-commerce applications have been developed in western countries. The same point can be made for e-learning designs (Zaharias, 2008).

A few studies have investigated the relationship between culture and the web design of Arabic websites. For example, Khushman (2009) argued that e-business websites developed for the western culture (i.e. for low power distance, low uncertainty avoidance, high individualism, and high masculinity cultures) are not compatible with Arabic culture (i.e. high collectivism, high power distance, high uncertainty and low masculinity cultures). These characteristics can impede the use of new technologies on

Arabic websites. Khushman (2009) study revealed that Hofstede's dimensions do not reflect the design characteristics of Arabic user interfaces. However, this point may need further studies to explore to what extent culture affects the behaviour and judgment of Arab users on websites. Marcus (2009) studied the influence of culture on Arabic websites and chose three countries as samples from Arabic countries. Marcus' study was based on Hofstede's cultural dimensions and provided important insights on the link between Arab culture and web design. Arabic web users mainly prefer more representative pictures and links to external websites and also desire to see more multi-lingual content and interactive design features. However, Marcus' study lacked precision, as it did not rely on a questionnaire and interviews with actual users to gather data. Instead, it relied only on empirical observation.

Generally, web designers in both societies (the West and the Arab world) expect no major differences between the two societies and thus translate between the two languages without any consideration of cultural differences. This supposition was reinforced by the study carried out by Al-Badi (2010) who argued that web designers in western society and Arabic society assume that their users shared similar preferences and perceptions about many website usability issues. However, this is not true, and to design one size for all users is not the right way to build a successful website that can satisfy users from differing cultures and backgrounds. Al-Badi also argued for the consideration of the consumer's cultural background. Designers attempt to understand target users but, when they design systems for multicultural backgrounds, they fail to reach the desired goal. Studies (Cyr & Trevor-Smith, 2004; Juric et al., 2003; Khushman, 2009; Tanveer 2008) have shown that cultural differences are influential in the development of websites. When a site is designed to be closer to the culture of the target users, it is more successful in accomplishing its final objectives. At the design

state, the designer can establish what the user needs and incorporate the factors that may affect the process of design.

These studies have proved mostly that designing a site for a particular culture might not make it an appropriate fit for other different cultures. Culture is controlled by language, customs, traditions and meanings of symbols and words. Every culture has its own characteristics that are unique and distinct from other cultures. However, this does not mean that there are no relationships and commonalities among cultures. Cultural differences should be taken into account when designing any website, whether educational or commercial or any other type, to ensure success and usability. Taking these factors into consideration will enhance the marketability of websites and systems to make them more competitive in the market. Such consideration will also enhance the trust of users from differing cultures, such as from the Arab world where concerns about privacy and security are high.

The empirical links between culture and designing websites for Arab users on the one side and Hofstede's dimensions on the other side emphasises the need for web designers (when designing websites for Arabic users) to consider the pattern of thinking of Arab users, which differs to that of English users. For instance, knowing the role of the family in Arab society may change the outlook of website design radically. Portraying a picture of a family on the web page instead of a single man, woman or child sitting alone may be more impactful. If the web designer is aware of this factor, it may play a significant role in the success of the website and provides a good opportunity for the designer to learn about the needs and desires of the target users.

However, currently there are no design guidelines or rules that can assist the designers of Arabic e-learning systems in reaching their objectives and accomplishing them.

The design of the interface is a crucial part as it is the face of the system with which the user interacts. If the user is satisfied with it then he/she will continue to browse the rest of the site. Otherwise, the user may leave the site and may never return. On a few occasions, when past users leave negative feedback about a particular system this may affect the future acceptance of the system by other users.

2.4 Usability

Usability is defined by the International Standard Organisation (ISO, 1998, p.7) as: “effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular environment”. Usability is perceived as an important criterion in developing high quality software artefacts. It is imperative to define guidelines specific to Arabic e-learning websites to facilitate built environment education. Usability refers to how a user can easily and quickly do what is expected from the system, can avoid mistakes during the use of the system, and can remember how to use the system in the future. If the system has poor usability, then the user is more likely to avoid the system in the future, and the final consequence of that is that the whole system is a failure. A quick and easy way to test the usability of a system is to perform a usability expert review whereby an expert inspects the usability issues of the system. Another type of usability inspection method is called usability testing where actual end users are involved in the evaluation. End users are usually recruited via email, telephone calls, visits, schools and colleges.

Gathering user requirements plays an important role in identifying user needs and expectations of the system. A number of techniques can be used to gather requirements such as focus groups, observations, interviews, informal chat and surveys. Selecting the right technique depends on a number of criteria such as time, resources and the goal(s)

of the system. A website with a good usability is likely to reach its objectives and goals. Usability focuses on satisfying users' needs and goals through appropriate interaction mechanisms and appropriate user interfaces.

2.4.1 The Main Factors of Usability

Usability does not just concern how a user can easily use a system but also how the system is made more effective, more efficient and enhances learning. Moreover, usability also considers the cost and training involved in order to support the user (Shackel, 2009). In this section, the researcher will discuss the three main factors of usability: Efficiency, Effectiveness and Satisfaction.

2.4.1.1 Efficiency

ISO 9241-11 defines efficiency as “the resources expended in relation to the accuracy and completeness with which users achieve goals” (Lee et al., 2010, p.2). The efficiency of a system gives the developer a good opportunity to investigate the speed with which users complete particular tasks, and how a system reacts to different user input. The main components of efficiency comprise task learning time and task accomplishment time.

2.4.1.2 Effectiveness

ISO 9241-11 defines effectiveness as “the accuracy and completeness with which users achieve specified goals” (Lee et al., 2010, p.2). Addressing the question: what is the ability of the user to achieve the target task they focus on? Effectiveness is measured by how a user completes tasks. However, the main components of effectiveness comprise quality/correctness of solutions and error rates. These can represent a measure of the outcome of the user's interaction with the system (Frøkjær et al., 2000).

2.4.1.3 Satisfaction

ISO 9241-11 defines satisfaction as “the freedom from discomfort, and positive attitudes towards the use of the product“(Lee et al., 2010, p.2). Therefore, the satisfaction factor focuses on how comfortable the user is with the system and how satisfied he/she is with its different features.

All these factors should be taken into account when developing an interactive system, otherwise usability issues will constantly appear during the user interaction with the system. Developers have to pay a great deal of attention when designing a new system to safeguard that they incorporate previous usability factors to ensure a successful outcome.

2.4.2 Importance of Usability

Various organisations, including those in the higher education sector, use e-learning technologies to disseminate knowledge and to train their employees. Some of these organisations fail to reach their goals because they overlook the role of usability. Without considering and taking on board usability, it is quite challenging to build an effective e-learning website. The role of usability should be investigated and user needs should be understood and integrated in the development of such systems (Agarwal, 2004).

The majority of educational organisations and institutions employ an e-learning website because it enhances their flexibility, efficiency and capability to disseminate knowledge. Poorly designed systems incur low levels of user satisfaction and interest causing the system to fail in delivering its objectives and the user to permanently leave using the system. Indeed, usability is important for both the user and the system or product. From the point of view of the users, usability makes a system more usable and easy to use and

it affects directly the interaction between the users and the interface of the system. Successful systems guarantee user satisfaction, future returns and increased traffic, whereas unsuccessful systems frustrate users and force them to abandon the system and find alternative ones. Moreover, easy to use and well-designed systems ensure peace of mind for their developers as system maintenance costs are kept at a minimum. However, unusable systems increase maintenance, redesign costs and time spent and may lead to the complete failure of projects. In conclusion, usability is the principal ingredient in creating successful e-learning, e-commerce, online tools or any other user interface-based product (De Marsico & Levia, 2003).

2.4.3 Usability and Web Design

Palmer (2002)'s study suggested that the key to the success of a website is associated with download, navigation, content, interactivity and responsiveness (feedback options and FAQs). Some characteristics, which should be considered when designing web pages, are given below.

Homepage: the home page is the main page and the entry page that users usually view first and by which they judge the website. Users scan the home page through its headlines and main sentences and after that decide to stay or leave the site. This scanning can happen in only eight seconds (Trondsen, 2004). The usability of the homepage can be the key to the success of any website as it is the first thing users see. Simplicity, ease of use and a balanced presentation (in colour, symbols, type and size of font, pictures, and general design) are key features for success. Nielsen and Tahir (2001) gave ten guidelines for homepage usability as follows:

- Include a One-Sentence Tagline.

- Write a Window Title with Good Visibility in the Search Engines and Bookmark Lists.
- Group all Corporate Information in One Distinct Area.
- Emphasize the Site's Top High-Priority Tasks.
- Include a Search Input Box.
- Show Examples of Real Site Content.
- Begin Link Names with the Most Important Keyword.
- Offer Easy Access to Recent Homepage Features.
- Don't Over-Format Critical Content such as Navigation Areas.
- Use Meaningful Graphics, For Example Show Real Photos of People.

A good designer ensures that a website has a flexible font size to allow users to change the font size as required. In essence, the designer should use a default size that suits the majority of users. In addition, the website should not include images that contain text. To improve the readability of text, the designer should choose a colour with a good contrast and use consistent ideas, bulleted lists and short text. In addition, the designer should avoid horizontal scrolling whenever possible (Cyr et al., 2010; Garrett, 2003; Giese & Holmes, 2002; Nielsen & Tahir, 2001; Seethamraju, 2006; Simon, 2001; Tarafdar & Zhang, 2005).

2.4.4 Localisation of Usability

Jeziarski and Yajaman (2003, p.134) defined localisation as “The process of adapting an application and in particular the user interface, to suit a specific culture”. Around the globe local people have diverse sources of knowledge and differing forms of information communication. Therefore, a successful web system is one that can protect the culture and identity of the users interacting with it (Smith et al., 2010). Existing

research has shown that the components of usability (i.e. efficiency, effectiveness and satisfaction) impact on the character of usability professionals from one country to another (Kuhnt, 2002).

Usability localisation simplifies efforts, reduces costs and facilitates user interaction when the users' culture in the target area is properly studied and understood. However, specialists of localisation concentrate on the techniques and details of interface localisation, such as colour and layout, rather than on an understanding of the role of local culture and how it influences the usability of a system. The challenge is to empower target users from other cultures and backgrounds to use the system efficiently by taking into account their cultural needs.

2.4.5 Globalisation of Usability

Jeziarski and Yajaman (2003, p.133) defined globalization as: “the term given to the process of making sure that an application does not contain any internal dependencies on a particular culture”. Systems which are globalised show, use and process a wide range of languages and formats in order to ensure global acceptance by addressing a large number of users.

Global companies face new challenges when trying to extend globally from local markets to global markets. The challenge is how to make websites efficient, useful and interactive with customers from other languages and cultures especially bearing in mind that the number of Internet users has increased dramatically in the last decade. In 2005 the number of non-English speaking users of the Internet reached 1.1 billion (Lo & Gong, 2005) and increased to 2.4 billion in 2012 (InternetWorldStats.com, 2012). Figure 2.4 gives more details on the internet usage statistics.

INTERNET USAGE STATISTICS
The Internet Big Picture
World Internet Users and Population Stats

WORLD INTERNET USAGE AND POPULATION STATISTICS						
June 30, 2012						
World Regions	Population (2012 Est.)	Internet Users Dec. 31, 2000	Internet Users Latest Data	Penetration (% Population)	Growth 2000-2012	Users % of Table
Africa	1,073,380,925	4,514,400	167,335,676	15.6 %	3,606.7 %	7.0 %
Asia	3,922,066,987	114,304,000	1,076,681,059	27.5 %	841.9 %	44.8 %
Europe	820,918,446	105,096,093	518,512,109	63.2 %	393.4 %	21.5 %
Middle East	223,608,203	3,284,800	90,000,455	40.2 %	2,639.9 %	3.7 %
North America	348,280,154	108,096,800	273,785,413	78.6 %	153.3 %	11.4 %
Latin America / Caribbean	593,688,638	18,068,919	254,915,745	42.9 %	1,310.8 %	10.6 %
Oceania / Australia	35,903,569	7,620,480	24,287,919	67.6 %	218.7 %	1.0 %
WORLD TOTAL	7,017,846,922	360,985,492	2,405,518,376	34.3 %	566.4 %	100.0 %

NOTES: (1) Internet Usage and World Population Statistics are for June 30, 2012. (2) CLICK on each world region name for

Figure 2-4: internetworldstats. Internet Usage Statistics the Internet Big Picture

2.4.6 Usability and Aesthetics

Studies have revealed that aesthetics significantly influences the perceived usefulness and ease of use of a whole website or system. Hartmann et al. (2008), Hassenzahl and Monk (2010), Kurosu and Kashimura (1995), and Tractinsky (2000), all reported a strong relationship between usability and the attractiveness of a website, thus supporting this theory. Li and Yeh (2010) concluded that design aesthetics do not only show the attractiveness of a website but directly influences the characteristics of the website. Tractinsky and Lavie (2003) showed that aesthetics are concerned with website design elements (layout, picture, colour, icons and font) as a whole instead of looking at them as separate elements. In this research, participants will be asked to complete an aesthetics questionnaire to gauge Arab users' impressions. Perceived aesthetics focus on two main parts, classical characteristics and expressive characteristics of a website. Classical characteristics measure the simplicity of a website whereas expressive characteristics measure the originality and creativity of a website.

2.4.7 Usability Evaluation and Measurement

There are a number of usability evaluation techniques that can be used. These techniques fall into two major categories: user testing and heuristic analysis. Research (Delice & Gungor, 2009; Tan et al., 2009; Lai, 2007) has shown that the number of evaluators used in both methods depends on the experience of the experts and on the number of subjects and scenarios. The Tan group found that users play a leading role in detecting usability problems. Following the test given by Tan et al. users filled in evaluation questionnaires to report on any problems that they encountered during the test. Evaluators worked via the interface two times to consider interaction problems. Evaluators then listed the usability problems they encountered. The results showed that the heuristic analysis discovered 60% of the usability problems, whilst user testing discovered another 30% of the problems. Both methods discovered another 10% of the problems. The analysis considered the severity of the problems on three levels: severe, medium and mild, and each level was identified by two methods.

The main objective of Tan and his group was to make a comparison between the efficiency and effectiveness of the user testing method and the heuristic analysis method. They found that both methods complemented each other and addressed different usability problems and different levels of severity problems. The Tan study showed that evaluators or users could discover only 35% of the usability issues. This agrees with the results of Spool and Schroeder (2001) which showed that five evaluators could discover only 35% of the usability problems. However, this percentage is less than half of that which Nielsen reported in his study (i.e. five evaluators discovered 75% of usability problems). The explanation for these findings is that the quality of the experts is different. Finally, in certain cases one of the two methods is better than the other and more efficient.

In conclusion, heuristic analysis evaluates the information that already exists. User testing brings out the experience, interaction and comments of the users. Furthermore, user testing and heuristic analysis are both required in a usability study but they play different roles during the stages of developing a website. Heuristic analysis can be undertaken in the early stages while user testing can be used in the later stages. Additionally, the number of evaluators used depends on two main factors: firstly, the quality of the evaluators and, secondly, the use of heuristics.

Shackel (2009) argued that there are three kinds of measurements for evaluation: dimension, performance and attitude. Dimensional criteria may pass and fail a judgement. Attitude criteria assess the user's view of the cost and the relative difficulty or otherwise in achieving the performance. Performance will assess the operational capability that can be achieved by the human user. Specification of usability and evaluation are not enough for the designer to achieve a good usability; both must be done carefully and with great skill.

2.4.8 Usability and Culture

There are many factors that can influence user satisfaction, needs and behaviour. Maybe the most influential of these factors are user background, level of education, culture evaluation and time context (Lindahl & Granath, 2006). Barber and Badre (1998) showed that cultural differences influence the way people perceive the usability of websites. The authors coined the term 'culturability' to refer to the merging of culture and usability. Evers and Day (1997) demonstrated the impact of culture in accepting and perceiving user interfaces. Clemmensen et al. (2009) argued that the majority of research on usability evaluation methods assumes that culture does not affect usability evaluations.

According to Daniel et al. (2011) at the present time several researchers have examined the point at which cultural issues impact on websites' usability. Respect for culture in the design of websites could increase the usability of websites. What is appropriate for one culture may be confusing or unacceptable in another culture. Symbols, icons and pictures provide examples of how there are differences in the perception of users (from different cultures) to specific design features (what they favour and what they reject). Daniel et al. (2011)'s study concluded that the cultural factor is an important element in achieving highly effective websites and it is important that designers are very cautious about the cultural and usability requirements of the users. Daniel also argued that what users perceive on websites is impacted upon by their culture.

Wallace and Yu (2009) showed that culture is correlated to a number of usability factors and to perceptions of usability when they compared North American and Taiwanese subjects. In their study, the authors assessed usability objectively by analysing completion time and number of errors, and subjectively by analysing users' ratings in a usability questionnaire. Their research revealed that culture is strongly linked to perceptions of effectiveness and is moderately correlated with other perceptions of usability. The authors concluded that different cultural groups have different perceptions of usability and, therefore, different needs. Researchers should develop a guide to make clear that culture affects the usability of multilingual websites.

2.4.9 Usability and Language

In 2011, around 75% of Internet users were non-English speaking users. Moreover, 80% of European websites offer languages other than just English despite the associated costs, as cultural factors and differences need to be taken into account when designing websites more than ever before (Smith et al., 2001).

Studies (Medhi et al., 2011; Smith et al., 2001) have shown that the usability of a user interface improved when the designer considered the native language of the user. Indeed, there are many problems (including poor usability) in websites that try to address the needs of people whose first language is different to that used in the website. A practical solution to this problem is to translate the website into the other language and then back into the original language. It is difficult to guarantee quality and usability if the designer of a website uses another language that is not his/her own language. Other studies have revealed a close link between the context culture when using local language and the usability of the websites (Hillier, 2003).

The stimulation and desire of the customer are strongly linked with the usability of a website in addition to the level of the language that is used when the design of a website is undertaken. The translation of a website to suit other cultures may require a change to the whole design since the acceptance of the website may rely upon the culturally-based needs of the users (Nantel & Glaser, 2008). Users are impacted by the language, culture, and religion when they try to build an impression about any website. According to Nantel and Glaser (2008), there are no studies that are available that investigate the link between the usability of a website and the cultural and linguistic background of its designers. Hillier (2003) explored the relationship between language, cultural context and website usability in Western and Eastern cultures.

Websites incorporate many important components such as symbols, pictures, navigation tools, language, direction of the written language, sounds, shapes, help features and icons. All of these components are affected by culture and language and, in turn, these components are used to build a website. Thus, it is essential that they receive consideration (Badre, 2000; Hillier, 2003). Moreover, Hillier (2003) reported that

translations of contents, culture and context influence the way people perceive and react to an e-commerce website.

2.4.10 Usability and e-learning Systems

E-learning systems are interactive software products that enable educational organisations and institutions to disseminate knowledge, promote learning and train employees. Such systems provide many benefits to their users including flexibility, cost-effectiveness, convenience and engagement. The important component of e-learning systems is their “usability” by which the end users interact and engage with the e-learning system. The majority of educational institutions have an e-learning system; the reasons for this are flexibility, efficiency and the capability to connect with other sectors. However, many of these systems fail to achieve their goals or the quality that is expected by their users (Miller, 2005). Websites with poor usability equate to poor interaction and attraction for the user. Hence, the consequence of this is that the website ultimately fails.

According to Alsumait and Al-Osaimim (2010), those looking at the usability of e-learning systems should consider pedagogy, effectiveness, efficiency and the satisfaction created by their interfaces. Despite the important role of usability in the success of e-learning systems, there are only a few studies that have investigated this role (Grani & ukuši , 2011). According to Grani and ukuši (2011), progress in e-learning has been slow which may be linked to poor design in e-learning systems. This factor (poor design in e-learning systems) is strongly linked to a misunderstanding of the role of usability in designing e-learning systems.

Usability experts use design guidelines to evaluate the user interface design. On the other hand, the developer needs to answer many questions regarding the methods that a

learner uses to get the information, the environment that the users work under, and the experience that they have. Answers to these questions will help the developer to understand how the user thinks which, in turn, will assist in leading to the creation a successfully designed system. It is important to ensure an e-learning system is easy to use by the target users and that these users understand and interact with the system efficiently. Many universities use e-learning systems, but some of these systems fail to reach their goals as a result of overlooking the role of usability. Without considering usability, it is almost impossible to build an effective e-learning system. In conclusion, usability is essential in creating effective web-based e-learning environments (Veldof, 2003).

2.4.11 Usability Guidelines

This section will investigate the current usability guidelines for e-learning websites in the English language; this will provide a clear answer to one of the objectives of this thesis at the end of this section. Overall, there are three sources for usability guidelines that currently lead in the sector of usability. These are discussed below.

2.4.11.1 International Standard ISO 9241-151

The International Organization for Standardisation (ISO) is a non-governmental organization founded in Geneva that works to improve technical standards for products and services sold. International Standard ISO 9241-151 is divided into a main part (9241) and a subpart (151). The main part comes under the name of 'Ergonomics of human system interaction'. This standard has an essential role in the world of usability. Subpart 151 is part of ISO 9241 and is found under the name 'Guidance on World Wide Web user interfaces'. ISO 9241-151 concentrates on the following areas: high-level

design decisions and design strategy, content design, navigation and search, and content presentation (Del Valle et al., 2010).

The aim of ISO 9241-151 is to create guidance for those considering WWW user interfaces and to improve usability. This document provides terms and definitions for users to allow them to understand the guidelines; for example: the interaction object component of the web user interface accepts user input (links, buttons, input fields, check boxes, selection lists). Another example: a splash screen temporary page is shown prior to the homepage when a website is first accessed. The document also describes the differences between three important features: process, design and evaluation aspects and additionally describes how to combine them together to create human-centred web user interfaces.

2.4.11.2 Research-Based Web Design and Usability Guidelines

The National Cancer Institute in the U.S.A (which is part of the Department of Health and Human Services HHS) has developed guidelines under the name of 'Research-Based Web Design and Usability Guidelines' to help designers, website managers, website maintainers, usability specialists, researchers and students.

These guidelines are a result from the efforts of expert designers and researchers who analysed more than 400 websites (Leavitt & Shneiderman, 2007). Around 13 usability professionals rated each guideline using a 5 point Likert-like scale to express their degree of agreement or disagreement. Web designers can evaluate their websites using these guidelines. The Guidelines Handbook in its latest version (2006) contains a total of 209 guidelines, 22 more guidelines than the previous version (2004). The guidelines' developers divided these guidelines into 18 chapters focusing on the following:

- Design Process and Evaluation.
- Optimizing the User Experience.
- Accessibility.
- Hardware and Software.
- The Homepage.
- Page Layout.
- Navigation.
- Scrolling and Paging.
- Links. Text Appearance.
- Lists. Screen-Based Controls.
- Graphics, Images and Multimedia.
- Writing Web Content.
- Content Organization.
- Search.
- Usability Testing.

Each chapter includes a number of guidelines. Every guideline is defined and provides explanations alongside its source and the importance rating given to it by experts and researchers. The following table (2.3) shows the guideline, comments, sources, strength of evidence and relative importance.

Table 2-3: Research-Based Web Design and Usability Guidelines

Guideline	Comments	Sources	Strength of evidence	Relative importance
<p>Chapter one (Provide Useful Content) Provide content that is engaging, relevant, and appropriate to the audience.</p>	<p>Content is the information provided on a website. Do not waste resources providing easy access and good usability to the wrong content. One study found that content is the most critical element of a website. Other studies have reported that content is more important than navigation, visual design, functionality, and interactivity.</p>	<p>Asher, 1980; Badre, 2002; Baldwin, Peleg-Bruckner and McClintock, 1985; Celsi and Olson, 1988; Evans, 1998; Levine, 1996; Nielsen and Tahir, 2001; Nielsen, 1997b; Nielsen, 2000; Rajani and Rosenberg, 1999; Sano, 1996; Sinha et al., 2001; Spyridakis, 2000; Stevens, 1980.</p>	<p>5</p>	<p>5</p>
<p>Chapter three (Synchronize Multimedia Elements) To ensure accessibility, provide equivalent alternatives for multimedia elements that are synchronized.</p>	<p>For multimedia presentations (e.g., a movie or animation), synchronize captions or auditory descriptions of the visual track with the presentation.</p>	<p>Ahlstrom and Longo, 2001; Chisholm, Vanderheiden and Jacobs, 1999b; Galitz, 2002; Mayhew, 1992; United States Government, 1998.</p>	<p>3</p>	<p>2</p>

Chapter six: Page Layout. (Align Items on a Page) Visually align page elements, either vertically or horizontally.	Users prefer consistent alignments for items such as text blocks, rows, columns, checkboxes, radio buttons, data entry fields, etc. Use consistent alignments across all Web pages.	Ausubel, 1968; Bailey, 1996; Esperet, 1996; Fowler, 1998; Spyridakis, 2000; Trollip and Sales, 1986; Voss et al., 1986; Williams, 1994; Williams, 2000.	4	5
Chapter Eleven: Text Appearance. (Use Familiar Fonts). Use a familiar font to achieve the best possible reading speed.	Research shows no reliable differences in reading speed or user preferences for twelve point Times New Roman or Georgia (Serif fonts), or Arial, Helvetica, or Verdana.	Bernard and Mills, 2000; Bernard, Liao and Mills, 2001a; Bernard et al., 2002; Boyarski et al., 1998; Evans, 1998; Tullis, Williams, 2000.	3	5

2.4.11.3 JISC Guidelines

UK colleges and universities created the digital technology sector to support UK post-16 and higher education. This sector helps research, administration, teaching and learning in the UK. JISC (Joint Information Systems Committee) provides many services. Amongst these services is a new environment for learning, teaching and research, as well as guidance on institutional change. The JISC guidelines contain 121 guidelines relating to academic websites; of these 85 guidelines are designed for customers who are considering online courses, and the rest of guidelines consider digital libraries, portals and personalisation (Bevan & Kincla, 2004).

The purpose of this committee is to provide guidelines for JISC-funded services. There are two types of users. The committee focuses on JISC resource development and managers of JISC services. From sixteen institutions around the world, which responded to whether they have use HCI (Human Computer Interaction) design principles or

usability guidelines, only five of them said they have guidelines, and only one institution uses them (Bevan & Spinhof, 2007).

As presented above, the West enjoys a wealth of web design usability guidelines, which were developed over a long period of time and through many research studies. The purpose of these guidelines is to increase the usability of websites and the satisfaction of their users. These web guidelines cover various areas such as content, layout, navigation, images, animation, and interactivity. On the contrary, the Arab world suffers from lack of guidelines, and mainly relies on existing web design guidelines available from the West. This is justified due to the lack of research studies in this area by Arab researchers. However, the Arab culture is different from the British culture as demonstrated by Hofstede (2001). As such, culture influences the way users perceive and interact with websites. Thus, it is important to ensure that websites conform to the culture of the intended users; this research endeavours to cover this gap.

Indeed this is one of the first studies to shed light on the usability of Arabic websites in a systematic way, with the target of studying the judgment of Arabic users on usability and establishing specialised guidelines. These guidelines are expected to have various practical implications as discussed in Chapter 9.

2.5 Language

There are critical human characteristics which distinguish humans from the other creatures, a key one is their ability to communicate verbally with others. Language plays a key role in delivering messages that are transmitted. Language is not the only technique of communication but it is an effective way to express our feelings, ideas, emotions and senses. It is an internal vessel, through which we express all that is going on in ourselves in terms of sadness, anger, joy, happiness and love, etc.

Language is a very complicated term; scholars have defined it from different angles. This research focuses on the general meaning of language. Chomsky defined language as “a set (finite or infinite) of sentences, each finite in length, and constructed out of a finite set of elements” (Lyons, 1981; Syal & Jindal, 2007, p.7). Barthes (1977, p.56) defined language from a different perspective: "Language is an intermediate object between sound and thought: it consists in uniting both while simultaneously decomposing them". Whorf (1956, p.5) defined language thus: "Language shapes the way we think, and determines what we can think about". Sapir argued that Language is a human and non-instinctive method of communicating ideas, emotions and wants by a system of voluntarily produced symbols (Logan, 2007).

It is obvious that Chomsky takes into consideration the structure of language in terms of sentences and words and how they are linked together to produce the language used to speak and communicate. The location of a word within a sentence is crucial as it can carry multiple meanings and syntax that determine the general meaning of the sentence. Barthes looked at the language as a way of connecting audio and thinking, a combination that reflects what the speaker wants to deliver to others. Language, as defined by Whorf, is the figure of what we are thinking, as it is not possible to think of something if there is no word in the language that can express what we are thinking of. Language does not only influence our way of thinking but also influences our perception of everything around us.

To conclude, language is a combination of a structure of sentences and words, sound and thinking and, without language, it is difficult to communicate ideas. Therefore, language is a bridge for transferring information from a sender to a receiver. In other words, language is similar to our nervous system which delivers messages from the

body to the brain. The use of language is not limited to voice only; there are also non-verbal communication forms such as signs, symbols, body language or the use of eyes. Each of these forms can provide an effective language that can be used to send the right information. Sometimes non-verbal communication may be an easier and faster way to deliver information to others than verbal communication. Below is an example to illustrate that there are occasions when one word may have more than one meaning in the Arabic language.

Below is an example to illustrate that there are occasions when one word may have more than one meaning in the Arabic language.

Word	Meanings				
Fatara or Futira	Split	Create	Start	Incision	Bake

2.5.1 Arabic Language

2.5.1.1 Morphology and Structure of Arabic Language

Hourani (1983), in describing the relationship between Arabs and their language, suggested that the Arab people more than any other ethnic group are conscious of their language. The Arabs see this not only as the greatest of their arts, but also as their common good.

Arabic language, the mother tongue of more than 350 million people, is a Semitic language and contains 28 characters. It is considered less modern than other languages (Al-Muhtaseb & Mellish, 1996; Habash & Sadat, 2006). In Arabic there are four alphabet shapes: right connected shape, left connected shape, connected shape, and

isolated shape (Al-Muhtaseb & Mellish, 1996). The letter (Qaf) is an example of how the letter structure changes in different positions within a word as follows:

- - -

The characteristics of a Semitic language, which can complicate authorship analysis, include inflections diacritics, word length, and elongation (Abbasi & Chen, 2005). Arabic is an inflected language where derivation stems words from a root (Abbasi & Chen, 2005). There are more than five thousand roots from which 85% of Arabic words are derived (Al Hajjar, 2010) Each root can legally combine with only a small subset of phonologically distinct patterns, at an average of about seventeen or eighteen. This decisive derivational process is controlled by old-fashioned lexicography (Beesley, 1993).

There are two categories in Arabic grammar: syntax studies the case endings of words and their positions in the sentence, and morphology studies the forms of words and their transformations to the intended meanings. The morphology of the Arabic language is significantly more difficult than any other morphology found in the commonly studied European languages (Habash & Sadat, 2006). For instance certain letters in Arabic script are spelled inconsistently leading to various forms of the same word. An Arabic sentence contains words. Each word may be a verb, a noun, or a particle; these three types of words also have sub-categories. A noun in Arabic is a name describing a person, thing or idea and it attributes gender, number, person and definiteness. The verb specifies an action with different tenses and aspects. The perfect tense is used for an action already done (e.g. he went), the imperfect tense is used when an action is not completed (e.g. he is going). The imperative tense signifies command or request (e.g. go) (Al-shalabi & Kanaan, 2004).

Diacritics (the marking above or below letters) are used to indicate special phonetic values. For example, in English the word 'résumé' uses a diacritic, which is the little mark on top of the letter 'e', which affects the word's pronunciation and meaning (Al-Muhtaseb & Mellish, 1996). In Arabic, a diacritic is used in every word to symbolise short vowels, consonant lengths and the relationships between words. However, diacritics are rarely used by Arabic writers but are essential in the Quran in order to avoid mistakes and ambiguity. For non-Arabic speakers it is hard to differentiate between words without the use of diacritics.

2.5.2 Language and Translation

Translating from one language to another requires a deep knowledge of the language to be translated because one word may carry several meanings for different linguistic usages of the word according to its sentence structure or according to what the speaker wants to express. This point is very important; many of those who undertake translation from one language to another have neglected it. The same word can be received differently in different languages. Simple word-to-word translation may not always provide the intended meaning. Other factors that relate to the structure of language and culture need to be taken into account. Studies (Cintas & Anderman, 2009; House, 2009; Munday, 2001) have claimed that translation is closely related to culture because, during the process of translation, there is a significant contact between two languages and cultures as well. Therefore, translation is a form of intercultural communication (House, 2009).

It is crucial that the translator from a source language to a target language is proficient in both languages and strongly familiar with the vocabulary and grammar of both languages. He/she also needs to have a deep understanding of the morphology and

structure of sentences and be fully aware of the meanings of words. Moreover, the language to be translated should be the mother language of the interpreter to account for the influence of culture, background, customs and religion. All this is required in order to deliver the correct meaning to the target user. Siddiek (2010) showed that elements of bad translation can occur from a lack of knowledge of culture as well as from a lack of understanding of the context in the source language.

Nantel and Glaser (2008) emphasised that perceived usability rises when a website is initially created in the native language of the end user. Hence, translation, even if the quality is excellent, affects users of a site. Hillier (2003)'s study showed how context and culture play a significant role in the way people interact with a website, demonstrating a relationship between cultural context, usability and language. Hence, when the text is translated, the design of a site may need to be changed (Rustenburg et al., 2000). Hillier (2003) argued that there are three types of multilingual websites that can be established

- Home websites: these involve a short translation to another language and usually translate some pages into another language.
- Multi-home sites: this involves translation into many languages where each site is generally placed under one single domain name, and each language has the same design and layout.
- Separate sites: this involves creating a separate site for each translation. Sun et al. (2000) argued that each kind of site needs different techniques and specific attention in all the stages of translation.

Translators need to identify lexical units, e.g. words and idioms, and understand their meaning in linguistic contexts and distinctive social areas, and need to emphasise the

multifactorial differences. One word could mean various things according to the context in which it appears and the translation process requires identifying the correct lexical, grammatical and stylistic parts. Translation needs a deep understanding of the original text on the one hand and the expression of content and method in another language on the other hand. Moreover, translation necessitates the consideration of the relationship between language and culture and requires a deep understanding of the target language especially when one considers the differences between the composition of Arabic and English languages (this is in addition to the divergence in Arab and English cultures which is quite distinct (Lee et al, 2011). The quality of machine translation output has affected the morphological richness of languages and the differences in syntax of languages (Verleysen, 2013).

2.5.2.1 Translation from English to Arabic Language

Each language has its own features and characteristics that distinguish it from other languages. The Arabic language with its building blocks and meanings is different from the English language in a number of areas such as the compositions, morphologies, meanings, grammatical rules, spelling, and even the direction of writing. It is evident that the divergence between the two languages is greater than their convergence. Moreover, the Arabic language is a Semitic language whereas the English language is a West Germanic language (Fulk, 2008).

The two cultures are also distinct. Such linguistic differences make it hard to translate from Arabic to English and vice-versa. Whenever there is a convergence of cultures, customs and traditions, translation becomes easier and the understanding of a meaning becomes closer to the intended meaning. However, whenever cultures diverge, meaning becomes diverged too, and translation becomes more difficult. Moreover, such a

divergence requires more scrutiny of the semantics and meanings of the words that are to be used in the translation of websites (e.g. an educational programme or a commercial website that is translated from one language to another). For example, the Arabic word 'فُشْشَا', pronounced 'Fussha' in English; when it is translated into English, using Google translator or a Babylon dictionary or any other dictionary, the following definitions are provided: "pure, classic, and standard". However, these definitions do not reflect the true meaning of the word 'Fussha'. There are English words with a close meaning but they do not reflect the exact meaning. The same problem occurs when one tries to translate the words 'هَاجِسٌ and هَاجِسٌ', pronounced 'Hajiss and Haouajiss' respectively in English. There are no English words which reflect the true meaning of those two words. There are many sentences and phrases that are impossible to translate from Arabic to English and still keep their original meaning. For instance, the literal translation of the Arabic sentence 'رَأَيْتُ طِفْلاً كَالْقَمَرِ', pronounced 'raaytu teflaten ka-lkamar' in English is: I saw a girl like the moon. In English this sentence is incomprehensible and does not make much sense. However, the actual meaning of this sentence in Arabic describes the stunning beauty of the girl. Arabs use the word 'moon' beyond its literal meaning to describe anything beautiful. This attribution stems from their environment and culture as Arabs across the Arab world see the moon frequently in the clear sky and its light symbolises beauty. A literal translation of the following example 'هَبَاءٌ مَنثورًا', pronounced 'habaan manthoran', into English does not provide any appropriate meaning; Babylon translates it to: floating dust scattered about. However, the closest meaning to that sentence in English is "your work has gone down the drain".

The Arabic language is very rich in words and in meanings of words and, at the same time, it has many rooted words. The ancient Arab grammarians put forward the rules

and created an integrated approach to the study of Arabic language. Hence, the grammarians divided the Arabic language into two main parts: grammar and morphology. Grammar is concerned with the changes that can take place in the last letter of the word while morphology is concerned with the structure of the word. In other words, the science of Arabic grammar focuses on the cases of the word according to their location in the sentence in terms of ‘damma’ which makes a sound of “oo” , ‘Fathah’ which makes a sound of “a”, or traction ‘kasra’ which makes a sound of “ee” or sokoun “a~a”. Morphology focuses on building a word in terms of weight increase or decrease and ensures that it knows the difference between the types of derivation and the actions of the act. Morphology provides rules for transforming a word from one format to another in order to get a new meaning. The following figure shows some examples of this.

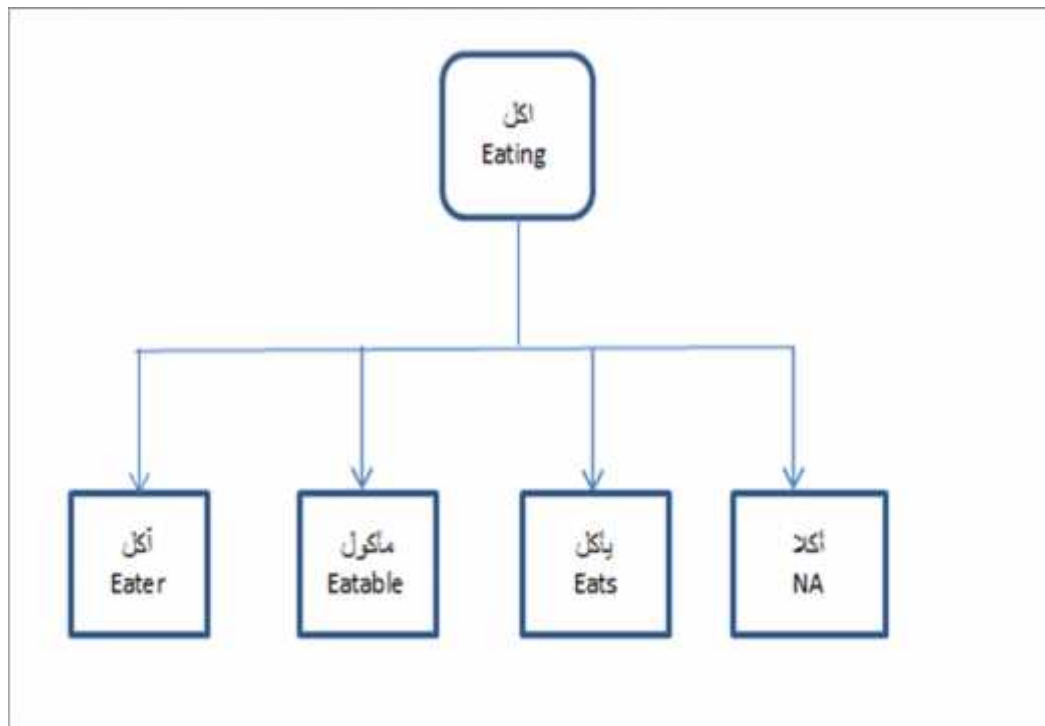


Figure 2-5: the roots of eating verb

The example above confirms that a translator needs a deep knowledge and understanding of the target language in order to create a e-learning website, that can reflect the right meaning and to ensure that the e-learning websites are useful and easy to understand. In respect to the Arabic language, without a knowledge of grammar, morphology and the syntactic functions of Arabic language pronouns, it becomes extremely challenging to translate to and from Arabic into another language (e.g. English). The quality of translation will not be of as good a quality if a web content is simply translated from English to Arabic without any consideration of culture. Cintas and Anderman (2009, p.14) argued that “localisation needs to build in an in-depth knowledge of the local culture which in turn means that a multilingual website cannot be researched and developed in English and then simply sent off to be translated; rather, every aspect needs to be discussed and studied prior to development and subsequent implementation”. As noted by Dong and Salvendy (1999), it is essential in the field of interface design to accommodate cultural diversity.

In conclusion, the Arabic language is a complicated and very rich language (Al-Sughaiyer & Al-Kharashi, 2003). Translation into Arabic needs special care; it particularly requires that attention be paid to checking and examining every word. It is possible to reach the target of the translation for any e-learning website by offering courses covering the rules of the Arabic language and mastering its translation, taking into account cultural influences and constraints to deliver the correct meaning. In the Arab world, specific words have dedicated meanings and they ought to be placed in specific contexts. The previous examples show the link between some words and Arabic culture. Additionally, one has to take into consideration the general construction of the Arabic language.

2.5.3 Relationship between Language and Culture

The relationship between language and culture is quite strong. Language is used to preserve and deliver culture and cultural bonds together. Witherspoon (1980) argued that it is challenging to study any particular culture without considering the native language spoken within it. Similarly, no language can be studied in separation from the culture in which it is spoken. Therefore, knowing a language will make it easier to understand a culture and its people. Even if people are brought up in the same or similar cultural situations, they may still speak different languages (Downey et al., 2004). Therefore, people, who share the same culture, but speak different languages, may have different issues, views and opinions. Thus, learning a new language consists of learning of a new culture. Culture is dependent on language. Therefore, the triangle of language, culture and communication cannot be separated. It is analogous to a body's nervous system and reaction; language is the body, culture is the nervous system, and the reaction is the communication. There is no language without culture; at the same time there is no communication without culture.

Pan and Cao (2010) described language as an important aspect of social life, similar to law, art and religion. In addition, language is a crucial symbolic system of culture. Studies have shown that a person who speaks more than one language has an opinion, personality and effect which differ depending on the language he/she is speaking at that time. This demonstrates how language can affect the personality of a human. Hillier argues that it is not possible to learn any language without learning about the cultural context of that language (Hillier, 2003).

2.5.4 The Link between Language and Web Design

Numerous studies have measured the correlation between website designs and the use of language. Sackmary and Scalia (1999) stated that language provides a supreme cultural variation between websites. Zhao et al. (2003) indicated that the Spanish language is the chosen language for the Mexican websites despite English websites being available and providing corresponding translations. Language can be considered as a dominant marketing device on websites that has an impact on online users.

Language is the backbone of websites that provide information and is an important aspect of culture. However, the way in which language has an effect on websites is still far from clear (Cyr & Smith, 2004). The quality of any translation plays a decisive role when considering the internationalisation of websites. Robbins and Stylianou (2002) assessed global corporate websites demonstrating that only 7% of Anglo sites included a translation capability in contrast to 100% for Latin American and Asian sites. Cyr and Trevor-Smith (2004) showed that awareness of the correlation between language, usability and culture in the Arab world is still in its early stages. So far, there have been no attempts to conduct research to show how usability is determined by Arabic culture and language, or on how usability guidelines can be constructed to help Arab users use interactive e-learning systems more competently.

2.5.5 Learning Domain

In 1956, Benjamin Bloom and his group developed a process of learning later known as Bloom's Taxonomy of Learning Domains. Taxonomy is a scientific process which classifies and arranges things into groups. The key point in learning is the hierarchy of levels. To design a learning system, the programme needs to be developed, tested and to achieve the first level before moving on to the next level and so on. The level of

difficulty increases as one progresses through the levels. The progress may be slow or rapid depending on the learning. These domains can be used across a wide range of sectors, for instance, in education; it is possible to benefit from Bloom's taxonomy to guide learning design across varied kinds of subject areas such as business, physical sciences, social sciences and the arts (Tyran, 2009). Bloom divided learning into three domains: cognitive domain, affective domain and psychomotor domain.

- Cognitive domain: this is learning that transfers knowledge and may be called Knowledge. It contains six levels: knowledge, comprehension, application, analysis, synthesis and evaluation. It commences from simple thinking order skills up to higher order thinking skills. For example, an evaluation process is based on the perception that the student, before issuing a cognitive assessment, must first be provided with the information then be able to understand it, then have the ability to analyse it and ultimately can assess and evaluate it (design of learning strategies). Bloom et al. (1956) included the following levels: Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The following table included more details (Huitt, 2009).

Table 2-4: Bloom et al.'s Taxonomy of the Cognitive Domain

Level	Definition	Sample Verbs	Sample Behaviours
Knowledge	The student recalls or recognizes information, ideas and principles in the approximate form in which they were learned.	Write List Label Name State	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.

		Define	
Comprehension	Student translates, comprehends, or interprets information based on prior learning.	Explain Summarize Paraphrase Describe Illustrate	The student will explain the purpose of Bloom's taxonomy of the cognitive domain.
Application	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	Use Compute Solve Demonstrate Apply Construct	The student will write an instructional objective for each level of Bloom's taxonomy.
Analysis	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence or structure of a statement or question.	Analyze Categorize Compare Contrast Separate	The student will compare and contrast the cognitive and affective domains.
Synthesis	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	Create Design Hypothesize Invent Develop	The student will design a classification scheme for writing educational objectives that combine the cognitive, affective, and psychomotor

			domains.
Evaluation	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify	The student will judge the effectiveness of writing objectives using Bloom's taxonomy.

- Hence, the majority of students learning in this domain (e. g. the cognitive domain) are developed through classroom instruction. This domain contains six levels: recall data, understand, apply, analyse, synthesise and evaluate.
- The affective domain is an area of learning that focuses on studying feelings and attitudes. For example, in education the student's affective skills are established through structured leadership in groups, design projects and career development (Roszilah et al., 2012). There are five levels in this domain: receive, respond, value, organise personal value system, and internalise value system. The affective domain provides a framework for teaching, training and assessing the effectiveness of course design and delivery (Mohanadarshan et al., 2012).
- The psychomotor domain is an area of learning that defines physical movement or task classification. Simpson (1972) argued that the psychomotor domain comprises physical movement, coordination and motor-skills' areas. These skills are measured in four terms: speed, procedures, distance or techniques in execution. For example, the student in a psychomotor domain is developed in many ways such as via a laboratory setting (Roszilah et al., 2012). This domain includes five levels: imitation, manipulation, developing precision, articulation and naturalisation.

2.5.6 Religion

Religion plays a crucial role in the life of Arab Muslims. Islam is not isolated from the lives of Muslims; Islam is part of all the details of daily life for Muslims. Van der Walt (2000, p.33) defined religion thus: “religion is a central directness of all human life towards the real or presumed ultimate source (God/god) of meaning and authority”.

It is very difficult to distinguish between Islam and Arab culture since Islam is the main source of Arabic culture. However, a similar combination of culture and religion is not unique to Islam and is common in all religions. Thus, firstly, it is useful to know what Islam is. The religion of Islam is the complete acceptance of the teaching and guidance of God. A Muslim accepts freely and willingly the supreme power of God and strives to live his or her life according to the revealed teachings of God. Islam is the fastest growing religion in the world (Hasnain et al., 2008). There are many differences between the principles of Islam and western culture; for example, collectivism is a characteristic of Islam and the family unit is the basis of Islamic society. At the same time, Islam pays greater attention to the role of the parents inside the family; the father plays the main role in the family and it is an obligation for every member of the family to show respect towards the parents. People’s cultural customs are an important part of their religious practices (Hasnain et al., 2008).

According to Ishak et al. (2012), there are very few studies, which discuss the relationship between religion and interface design. Ishak’s group argue, in their study, that culture influences users from one religion to another (culture influences by religion), and stated that every religion has specific dimensions of culture which differ from one religion to another. In other words, a different religion means a different culture. Not only that, different religions also mean that followers of religion also have different preferences when using interface elements. Moreover, this study confirmed

that a designer should develop interface design in order to attract users from different religions. Additionally, Fagan (2010) suggested that students who practise a religion tend to have increased academic performance and to have more positive self-values than students who do not practice a religion.

Omotosho's (1998) study shows that there is a strong relationship between Arabs and Islam and this is reflected in Arab culture. This clearly confirms that Arab people always judge things based on an Islamic point of view and adjust their lives to suit Islamic principles and guidelines. Thus, it is crucial to have knowledge of Islam in order to understand Muslim participants' behaviour and their interaction with websites. In Islam dress is an important factor and females must cover their body from the view of others. As a result of this it is not permissible to include images where, for example, a female is dressed in tight or short clothing. Therefore, it would be useful if a number of studies could consider the relationship between usability, web design and a user's religion in order to determine how these three factors affect each other.

2.6 Summary

Chapter two provides an overview of the work already undertaken relating to the domains of e-learning, culture, usability and language. In particular, it explores the barriers that hinder the successful use and adoption of e-learning websites. The review demonstrated a connection between four main factors: e-learning, culture, language, and usability. E-learning plays a crucial role in the education sector and the combination of traditional learning techniques together with e-learning could improve the quality of learning provided to students and learners. Universities and other institutions in the higher education sector prefer to use e-learning websites for reasons of flexibility and because of their capability to connect with people remotely. Moreover, e-learning today

is not just relevant to the education sector; it also extends to the business sector as it creates numerous investment opportunities for companies.

Culture is a collection of many factors that affect the direction of thinking, a person or a group's judgement about things around us negatively or positively. Hofstede's dimensions reveal various differences in cultural factors between Arabic culture and Western culture. These differences include different ways of thinking, ways of evaluating ideas, the nature of an individual's view on society. A few studies have investigated the relationship between culture and the web design of Arabic websites (Khushman, 2009; Marcus, 2009). The review has shown that more studies are needed to explore the impact of culture on the behaviour and judgment of Arab users on websites. Moreover, this chapter showed that no usability guidelines have been developed yet for Arabic e-learning websites or systems. Usability is a complex area which needs more attention in order to create websites that have a global appeal (to different cultures and nationalities). Localisation of web designs (Making web designs more engaging for localities) also needs more consideration in order to meet the needs of local users.

Chapter two also defines how website usability is related to culture. However, the literature review revealed no design guidelines explaining how usability is influenced by culture. Such knowledge would assist web designers in designing the right websites for local people. Different cultural groups have different perceptions of usability; therefore, these differences can sometimes affect the way in which websites are perceived. This means culturally different groups may have differing judgements about the same website. Likewise, user interaction with the website is directly affected by the usability of the website and the quality of the content used throughout the website.

Another factor that plays a major role in the quality of a website is the quality of any translation, which needs to consider the culture of the intended users.

In addition, chapter two discusses the role of usability in e-learning websites. Progression forwards by the e-learning domain is slow and it has many problems that obstruct the development of e-learning. This slow adoption may be related to a lack of understanding of the impact of usability on the quality of e-learning websites.

There are three main sources for obtaining usability guidelines in the West. These are as follows: International Standard ISO 9241-151, Research-Based Web Design and Usability Guidelines and JISC (Joint Information Systems Committee). The goal of ISO 9241-151 is to deliver guidance for those considering WWW user interfaces and to increase the usability of education websites. Research-Based Web Design and Usability Guidelines were created to help web designers, website managers, website maintainers, usability specialists, researchers and students achieve the target of the use. This source contains 209 guidelines within 18 chapters. The Joint Information Systems Committee provides 121 guidelines relating to academic websites and is aimed at customers who are considering online courses, digital libraries, portals and personalisation. However, the literature shows there are no usability guidelines for e-learning websites that are dedicated to helping designers, maintainers, staff, companies and students create or use usable e-learning websites.

This chapter explores how culture, language and usability affect the users and designers of Arabic e-learning websites. The literature review revealed that there are no studies which have evaluated the effects of these factors on the design of Arabic e-learning websites. Therefore, the Arab world requires more research on creating dedicated usability guidelines that improve the usability of e-learning websites and the interaction of users.

Finally, this chapter highlights the various differences between Arabic culture and English culture in respect of many factors. The views of the two cultures on evaluation are different. Arabic society is more conservative, more collectivist, more masculine, has more power distance and has more long-term distance. In addition, the differences in religion between the two cultures play a major role on the life style; for instance, what is appropriate in the English culture may be perceived as inappropriate in the Arabic culture. The languages (i.e. Arabic and English) are also radically different in respect to characters, morphology and the direction of writing. All these differences need to be taken into account by designers when developing e-learning websites for Arab users. This means designers need to design e-learning websites that respect the religion and the culture of the target users (in this case, Arab users).

The next chapter, chapter three, discusses the methodology of, and the procedure for, the studies conducted in this research.

3 Chapter Three: Research Methodology

3.1 Introduction

This chapter details the research methodology followed to answer the main questions of this research as specified in chapter one. In essence, it describes the processes of this research to collect and analyse data. It starts by describing and justifying the research philosophy, the research approach, the research process and the objects of investigation adopted in this research. It then continues by describing the structure of the e-learning website developed to answer the questions in chapter one. Moreover, this chapter presents the data collection methods used in this research, along with the type of data collected and the ways in which these data were analysed. This chapter also provides an overview of the case study methods and the fuzzy set theory methods used to validate the results of the experiment. Finally, this chapter discusses the validity and reliability characteristics of the data as well as the possible ethical issues surrounding the studies of this research.

3.2 Research Methodology and Research Methods

Ghauri and Gronhaug (2002, p.47) defined research design as “the overall strategy chosen to obtain the information required to answer the research question”. Hence, to answer the research question it is necessary to describe which methods are appropriate for collecting and analysing data. Firstly, it is essential to distinguish the differences between research methods and research methodology. Methods are ways of conducting and implementing research. However, the research methodology is the science and philosophy behind all research (Adams et al., 2007). In this respect, research methods are considered to be the steps that are needed to accomplish the tasks, whereas research

methodology justifies the methods that are employed during the research process. Examples of research methods include questionnaires, interviews, experiments and field trials.

3.3 Research Philosophy

The research philosophy is the backbone of the research process as it provides a real opportunity for researchers to improve their research skills. Moreover, it enables them to increase their confidence with regard to using the appropriate methodology (Holden et al., 2004). However, the view of science researchers is formed by two crucial philosophical assumptions, namely epistemology and ontology. Epistemology is based on the assumptions of what is the best way to study the world and the best way to use a subjective or objective approach to study social reality. Ontology is based on the assumptions of how to view the world and whether the world is changing constantly or is dependent on the dynamics of the social system (Bhattacharjee, 2012). The following figure (Saunders, 2009) provides clear details on the stages of research opinion including philosophies, approaches, strategies, choices, time horizons and techniques and procedures.

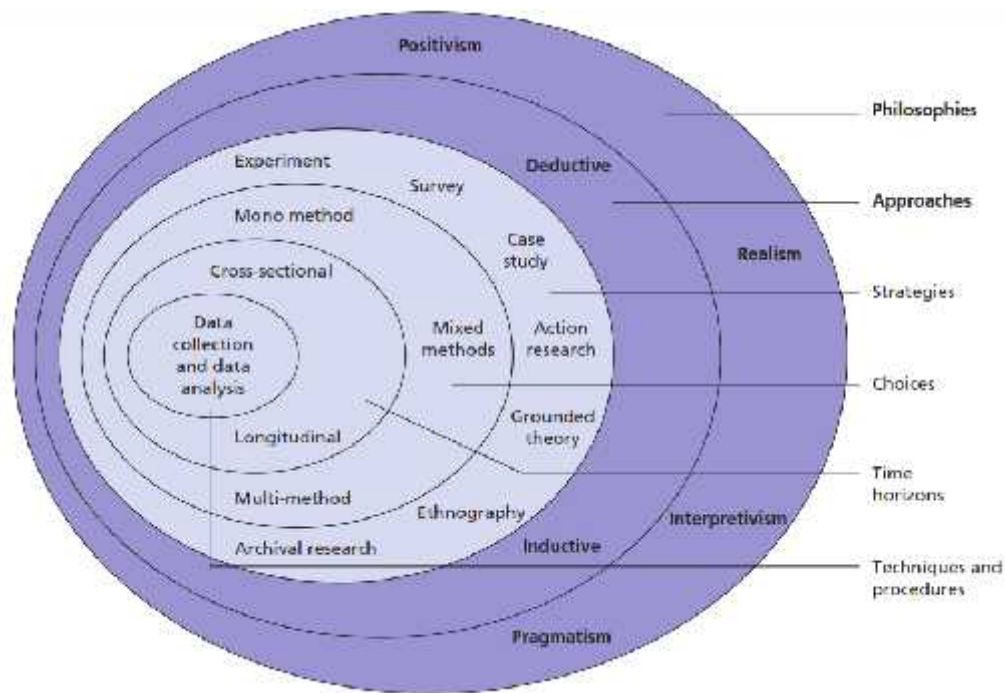


Figure 3-1: Research Opinions.

3.4 Epistemology

Epistemology is coined from the Greek word ‘Episteme’ (meaning theory of knowledge and science) and is the field of philosophy concerned with analysing the nature and scope of knowledge (DeRose, 1999). It mainly focuses on the nature of knowledge, how to produce it, and what the scope of our knowledge is (Gettier, 1963).

There are four types of knowledge (Henrichsen, et al., 1987):

- Intuitive knowledge: based on feelings (such as belief and intuition) rather than on hard facts.
- Authoritative knowledge: based on information collected from different sources such as people and books.
- Logical knowledge: found by means of reasoning from a generally accepted knowledge to a new knowledge.
- Empirical knowledge: based on objective facts that are demonstrated through

observation and experimentation.

This thesis will primarily focus on establishing empirical findings through a number of user studies and observations. In addition, it will also rely on reviewing related work and reasoning the observations to come up with solid conclusions.

According to Gettier (1963), a subject's (S) belief (P) may be true and justified when the following conditions are satisfied: if, and only if, the belief is true, the subject believes in P, and the subject is justified in believing P. Another important question relating to "what is required to be known?" is "what do we know?" Pessimists claim that we know less than we think we know (DeRose, 1999). Sceptical arguments are used to show how some things that we know fail to apply to some of our beliefs. Two views exist on the structure of knowledge or beliefs: foundationalism and coherentism (Cruz, 2006). Foundationalists argue that there are certain basic beliefs which do not require justification due to the characteristics that these beliefs incorporate and they reject the fact that all our beliefs need to be based on other beliefs to be justified. However, coherentists argue that every belief is based on other beliefs and deny that beliefs are intrinsically epistemically positive.

The main branches of epistemology include the constructivism and positivism philosophies. The constructivism view argues that reality is socially constructed by, and between the, people experiencing it within a particular context and time where various actions take place. This reality depends on our subjective understanding and, therefore, can be different from one person to another. However, the positivism view argues that reality is objective and quantifiable via the senses. As such, reality is the same for everyone and can be discovered using systematically controlled experiments and can be generalised.

The current thesis will rely on both schools of thought to analyse the data. The

collected data will be objective, such as time on task and response correctness when performing interaction tasks using the e-learning website. The rest of the data will be gathered using the think-aloud protocol, questionnaires and interviews where end users will report on their personal experiences.

To attain the aim of this thesis, knowledge will originate through a comprehensive empirical experiment in which participants will interact with the e-learning websites and complete a set of tasks. The experiment will use two primary methods for collecting raw data, namely: questionnaires to collect perceptions and experiences of using multi-language e-learning websites from the representative end users, and de-brief interviews to collect further information and expand on the main points summarised from the questionnaires.

The following table summarises the main methods that will be used to collect and analyse knowledge in this thesis along with its methodology.

Table 3-1: The main methods that used in this thesis.

Epistemology	Method	Methodology
Positivism	Questionnaire	Experimental
	Semi-structured	
	Interview	Evaluation
Social Constructivism	Data reduction	
	Statistical analysis	
	Content analysis	

3.5 Ontology

Ontology is a field of philosophy concerned with the science of what is, on the kinds and structures of objects, properties, events, processes and relations found in every area of reality (Floridi, 2003) In other words, ontology's emphasis is on the nature of reality. There are two parts in this assumption, objectivism and subjectivism. Saunders (2009) defined these two concepts as follows:

- Objectivism describes “the position that social entities exist in reality external to social actors concerned with their existence.”(Saunders, 2009, p.110). In this respect, objectivism describes the realities observed in society instead of the reactions and thoughts of the experimenter.
- Subjectivism “holds that social phenomena are created from the perceptions and consequent actions of those social actors concerned with their existence.” (Saunders, 2009, p.110).

This thesis aims to understand the impact of Arabic language and culture on the use of e-learning websites by Arab users, and how differences in language and culture affect the perceived usability of e-learning websites. For this reason, it is judged that subjectivism is the appropriate method to undertake this thesis.

3.6 Research Approach

There are two broad methods of reasoning in scientific research: deductive and inductive. Deductive reasoning focuses on general observations and then progresses into more specific observations of the research findings. It consists of a general statement called the first premise, followed by a more precise statement inferred from this (the second premise), and then a conclusion which follows on logically from the two statements (Walliman, 2011). It is also known as the top- down approach. In contrast,

inductive reasoning works from specific observations, and then develops a general conclusion or theory from these observations. Usually in this approach, the data are collected and analysed to develop the theory. Another striking difference between the two approaches lies in the way of reasoning whereby the deductive approach starts with theory and principles to gradually make confirmations and deductions whereas the inductive approach starts from actual experiences and observations to develop general theories and principles, as depicted in the figure below.

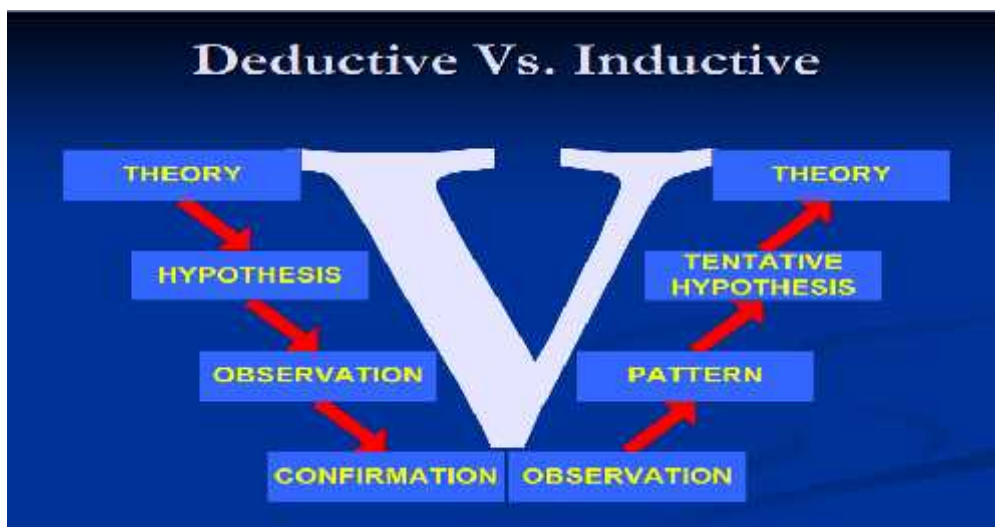


Figure 3-2: Deductive versus Inductive Research Approaches.

This research study proceeds from the idea that there is a difference between Arab users and non-Arab users' culture especially when using e-learning websites and it then moves on to more precise questions about the impact of language and culture, such as: How does culture influence Arab users when using these systems?.

In conclusion, the aim of this thesis is to design Arabic usability guidelines for e-learning websites as a major output of this thesis. Therefore, this research is deductive by nature as it starts from a more general claim (i.e. that cultural and language differences affect the usability perception of e-learning websites) and works towards confirming the claim by actual studies.

3.7 Research Process

To fulfil the objectives of this research, three complementary steps will be followed during the course of this thesis as described below:

Phase One: this research starts by investigating existing research studies in the area of culture and societies, usability, language and e-learning websites. This investigation will endeavour to fulfil two objectives as follows:

Define the research problem: analysing previous studies and the state-of-the-art findings in the area of culture and language and the linking these findings to web design will enable the researcher to find out the gaps in the literature and clearly identify the research aim and objectives of this thesis. In effect, this exercise will help the researcher focus his investigation in order to address a research gap and thereby further develop knowledge in a particular aspect. This will be progressed by a set of appropriate research questions.

Review the related literature: the researcher will undertake a systematic and comprehensive review to identify the theories and models that elaborate on the differences between various cultures, especially between the Arab world and the UK, and the theories and models that explain the link between culture and language on the one hand and culture and web design on the other hand. This exercise will also specify the cultural practices that shape personality traits, habits and acceptance by individuals. In respect to web design and e-learning, the literature will provide an overview of usability, its guidelines and usability's link to culture. At the end of the literature review, the researcher will establish inferences as to how culture and the usability of websites are related.

Phase Two: the next phase of the research aims to build a multi-language e-learning website and to collect participants' impressions and feedback. This phase consists of three primary steps as described below.

Design of a multi-language e-learning website: this represents an important step in the thesis completion as it endeavours to demonstrate the hypotheses devised in this research. Such hypotheses will be drawn from an analysis of related work where relevant theories, models and principles that relate to culture differences and web design will be discussed. This proof of concept will be built based on the results of phase one.

The two versions of the website will contain the same content but will exhibit the differences between Arab and British culture and language. From a technical perspective, the website will act as a multi-language e-learning website and will be implemented using HTML, CSS and SQL whereby users are able to interact with the system, view and read pages, and download and upload papers. The e-learning website will contain a number web design features like colour, images, and layout. Users' reactions to these design features will be investigated in an experimental study.

Experimental study: for the purpose of this thesis, knowledge will originate from an experimental study to investigate and test the hypotheses demonstrated by the e-learning website. This step will collect data from users with regard to their experiences and interactions with the e-learning website developed from the previous step.

The researcher proposed the following hypotheses based on the literature review:

Hypothesis
H01: There is no difference between the effect of images on usability for English and Arabic e-learning websites

H02: There is no difference between the effect of colour on usability for English and Arabic e-learning websites
H03: There is no difference between the effect of font on usability for English and Arabic e-learning websites
H04: There is no difference between the effect of Learnability on usability for English and Arabic e-learning websites
H05: There is no difference between the effect of language on usability for English and Arabic e-learning websites
H06: There is no difference between the effect of satisfaction on usability for English and Arabic e-learning websites.
H07: There is no difference between the effect of content on usability for English and Arabic e-learning websites
H08: There is no difference between the effect of efficiency on usability for English and Arabic e-learning websites
H09: There is no difference between the effect of Aesthetics on usability for English and Arabic e-learning websites

At first, a target of 50 students will be recruited by advertising a call for participation by direct contact with students and via notice boards across the School of the Built Environment at the University of Salford. The researcher will also use his network and contacts to recruit suitable candidates. For the purpose of this study, only those who can speak and read both languages (i.e. Arabic and English) will be recruited. The researcher will recruit users from different Arab countries to cover and represent the Arab world. To avoid bias, 25 users will start with the Arabic version whilst the other

25 will start with the English version. The study will take place in the School of Built Environment or within the premises of the University of Salford.

The experiment will start by gathering demographic data (e.g. age, gender, occupation) and Internet background (e.g. browsing experience, computer use) from the users. Next, participants will be instructed to complete a number of interactive tasks on the e-learning website such as: finding information on the e-learning website and downloading particular papers of relevance to students. It is crucial to highlight that user feedback and reactions will be collected using a myriad of research methods, for instance, questionnaires focusing on the usability dimensions and de-briefing interviews focusing on impressions and inviting further feedback. Throughout the experiments, users will be encouraged to verbalize their search strategies, impressions and reactions to the e-learning website and their overall satisfaction. Users' interactions and speech will be recorded using dedicated screen capturing software, e.g. Camtasia. The collected data in this step will form the foundation for the next step.

Analysis and interpretation of data: this step applies to the selection of qualitative and quantitative methods to analyse the objective and subjective data gathered from the experimental study. Such data will identify user reactions to both the Arabic and English version of the e-learning website and the major problems associated with each version. Objective data will take the form of task completion time, task correctness, and the number of errors for each version. These data will be inserted into a statistical software package, SPSS, for statistical analysis with the aim of detecting significant differences in respect to perceived usability and the aesthetics of the two versions. Subjective data will be provided by capturing qualitative feedback and opinions and the rating scores given on the features and interaction experiences of the two versions. The

comments and feedback will be used to identify different reactions to the two versions and infer links between culture and language and user experience. In this step, the researcher will employ a content analysis research technique to code and analyse the data to identify emerging themes and trends. Conclusions that explain the effect of language and culture on user performance and user satisfaction will be drawn from this analysis. These conclusions will be formalised into a model. In addition, the comparison will enable the formulation of dedicated e-learning design guidelines for designing effective Arabic e-learning websites.

Phase Three: this phase aims to validate the results of phase two, i.e. the guidelines, by conducting a case study. This case study will allow for the testing of the theoretical model on a number of selected websites. In this respect, e-learning websites in Arabic from several Arab countries will be compared and inspected to see whether they conform to the theoretical model and guidelines. This will enable the model to be refined and conclusions drawn for future lessons. The phases of research methods and The Arabic Usability Guidelines' Formation Process are shown in the following figures (3-3, 3-4).

Phases of the research

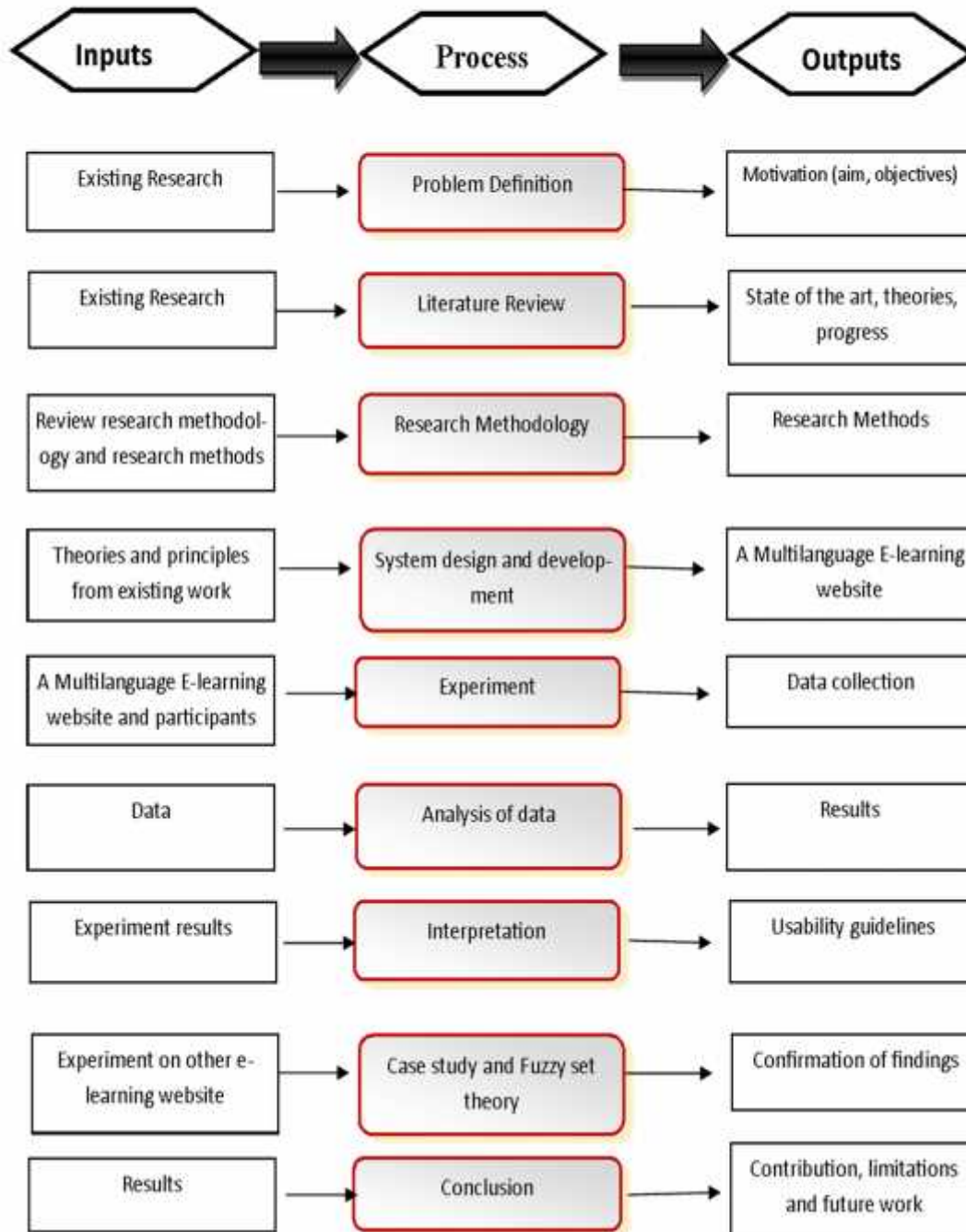


Figure 3-3: Phases of the research methods

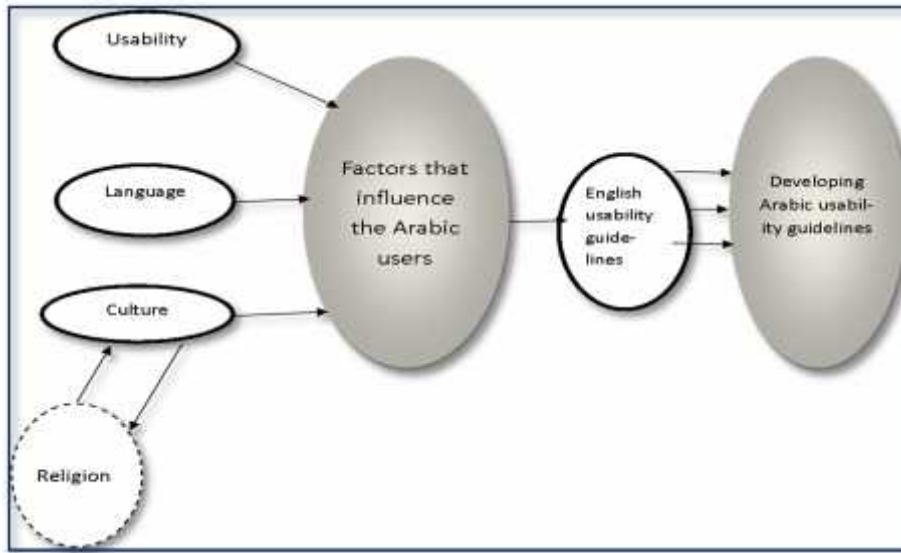


Figure 3-4: The Arabic usability guidelines' formation process

3.8 Objects of Investigation

This results presented in this thesis are largely based on the results from the usability study of users' reactions to both the Arabic and English versions of the e-learning website. The e-learning website is a platform for interactive learning for students in the School of the Built Environment in the University of Salford. The next section will discuss the structure and features of each version of the e-learning website.

3.9 Structure of the Website

3.9.1 English Version

The English site contains nine principal pages as follows: Homepage, Courses, Timetable, Assessments, Exams, Enquiries, Questionnaire, Library and, finally, the Contact Us page.

Homepage: this is the entry page of the web portal. It contains many features that can help the student to navigate through the system and find the appropriate pages more quickly.

E-learning Website
Welcome to your website

Navigation Menu

- Home
- Courses
- Time Table
- Assessments
- Exams
- Enquiries
- Questionnaire
- Library
- Contact Us

The University Union Bar Announcement

"We offer a vast array of alcoholic and non-alcoholic drinks and run tons of offers. You can enjoy these safe in the knowledge that all our profit goes back into keeping prices low and improving your Union. We pride ourselves on our real ale selection and you can take your pick from our four hand-pulls, we even have our own beer – Hoptimus Prime! There's plenty to share as well with pitchers and jugs full of cocktails, beers, ciders or pop, perfect for after society meet-ups, hand-ins or dreaded exams. We also have a brand new menu which you can download by clicking the button below."

[click me](#)

Research Methods

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose.

Research objectives

we may think of research objectives as falling into a number of following broad groupings :

- To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies)
- To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies)
- To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as diagnostic research studies)
- To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies).
- To identify organisations objectives for team briefing schemes.
- To determine the factors associated with the effectiveness criteria for team briefing being met.
- To develop an explanatory theory that associates certain factors with the effectiveness of team briefing schemes.
- To describe the extent to which the effectiveness criteria for team briefing have been met.

UNDERSTANDING RESEARCH PHILOSOPHIES AND APPROACHES

The research philosophy you adopt contains important assumptions about the way in which you view the world. These assumptions will underpin your research strategy and the methods you choose as part of that strategy. In part, the philosophy you adopt will be influenced by practical considerations. However, the main influence is likely to be your particular view of the relationship between knowledge and the process by which it is developed. The researcher who is concerned with facts, such as the resources needed in a manufacturing process, is likely to have a very different view on the way research should be conducted from the researcher concerned with the feelings and attitudes of the workers towards their managers in that same manufacturing process. Not only will their strategies and methods probably differ considerably, but so will their views on what is important and, perhaps more significantly, what is useful.

Hypotheses

Whereas theories are general statements and research questions are mid -level statements, hypotheses (plural

Figure 3-5: Home page of Studentportal. English version.

Courses: this page contains six modules. Each module contains many papers, as pdf files, relating to the subjects taught at the University of Salford. The student can download any information that they need from these links.



Figure 3-6: Courses page

Timetable: this page contains three types of timetables for first year, second year and third year students.

E-learning Website

Welcome to your website

Navigation Menu

- Home
- Courses
- Time Table
- Assessments
- Exams
- Enquiries
- Questionnaire
- Library
- Contact Us

The University Union Bar Announcement

*We offer a vast array of alcoholic and non-alcoholic drinks and run tons of offers. You can enjoy these safe in the knowledge that all our profit goes back into keeping prices low and improving your Union. We pride ourselves on our real ale selection and you can take your pick from our four hand-pulls, we even have our own beer – Hoptimus Prime! There's plenty to share as well with pitchers and jugs full of cocktails, beers, ciders or pop, perfect for after

TIMETABLE

Time table is available for 'First year', 'Second year' and 'Third year'.

[First year](#)

[Second year](#)

[Third year](#)




Figure 3-7: Timetable page

Assessments: In this part, the user can upload any file and send it. However, in this section, the web automatically measures the performance of the web by calculating the time that the system spends in uploading the file to the database. This feature helped the researcher to record the time that users spend when uploading the desired files.

E-learning Website

Welcome to your website

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[click me](#)

Please upload your assessments here

PLEASE CHOOSE A FILE:

No file chosen

Figure 3-8: Assessments page

Exams: This page offers an easy way to gain an idea about the style and methods of the exams and to be better prepared for them by practising before starting the real exams.

On this page, users may find various past exam papers from previous years and for all the modules that will be taken during the academic year. For instance, first year students can download first year exam papers and so forth.



Figure 3-9: Exams page

Questionnaire: a questionnaire is a valuable way of capturing the impressions and interaction of the users with the system. Users proceed through a number of questions at their own pace. To take the test, the user selects Their answer and then clicks the Submit Query. The web questionnaire is a one of this research’s test questionnaires and contains fifteen questions focusing on the usability of the web portal. In addition, the

participant can list the topmost positive aspects and negative aspects of the Student Portal following their interaction with it.

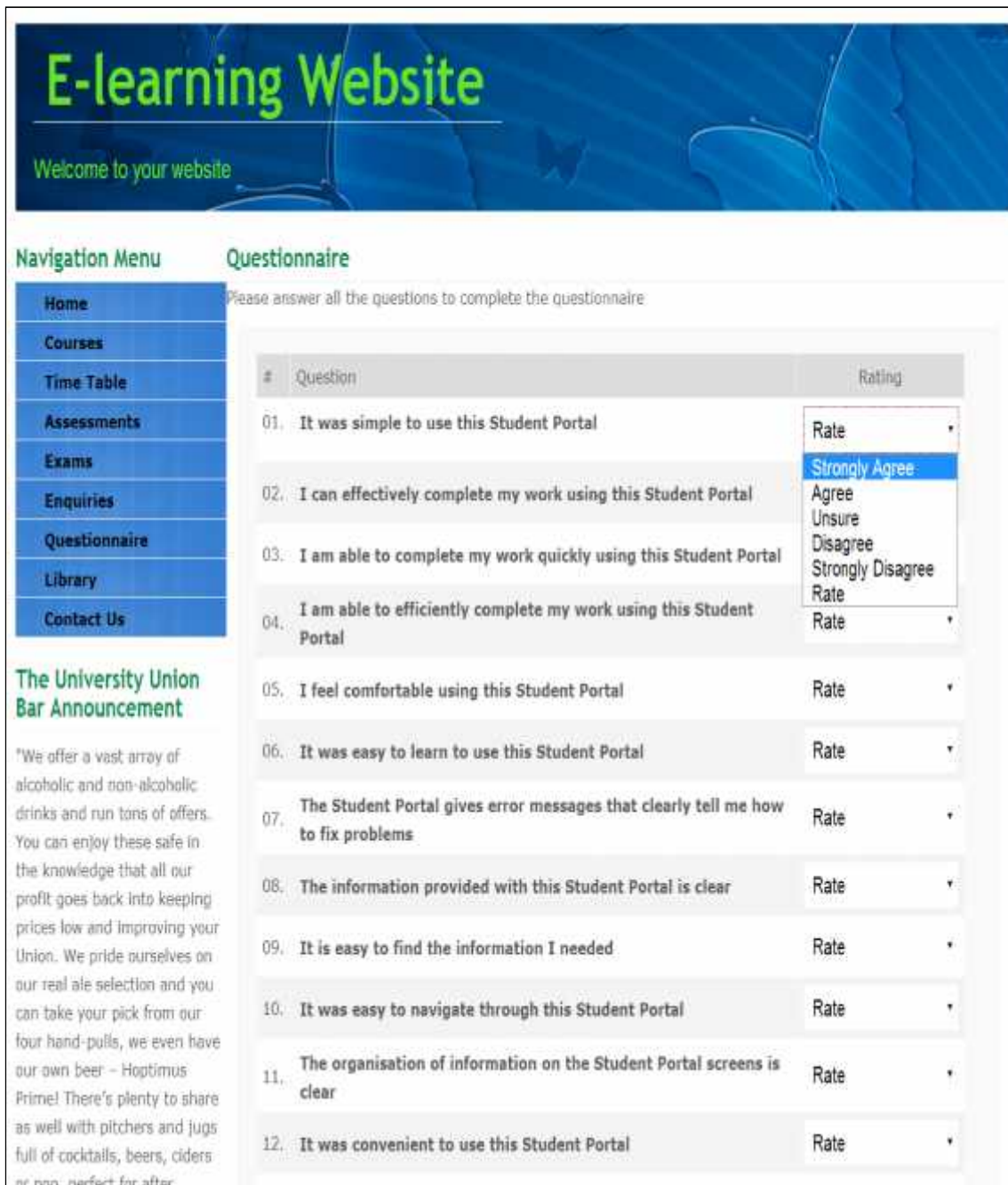


Figure 3-10: Questionnaire page

Enquiries: This page offers the opportunity to send emails whenever the user faces any problems at any time.

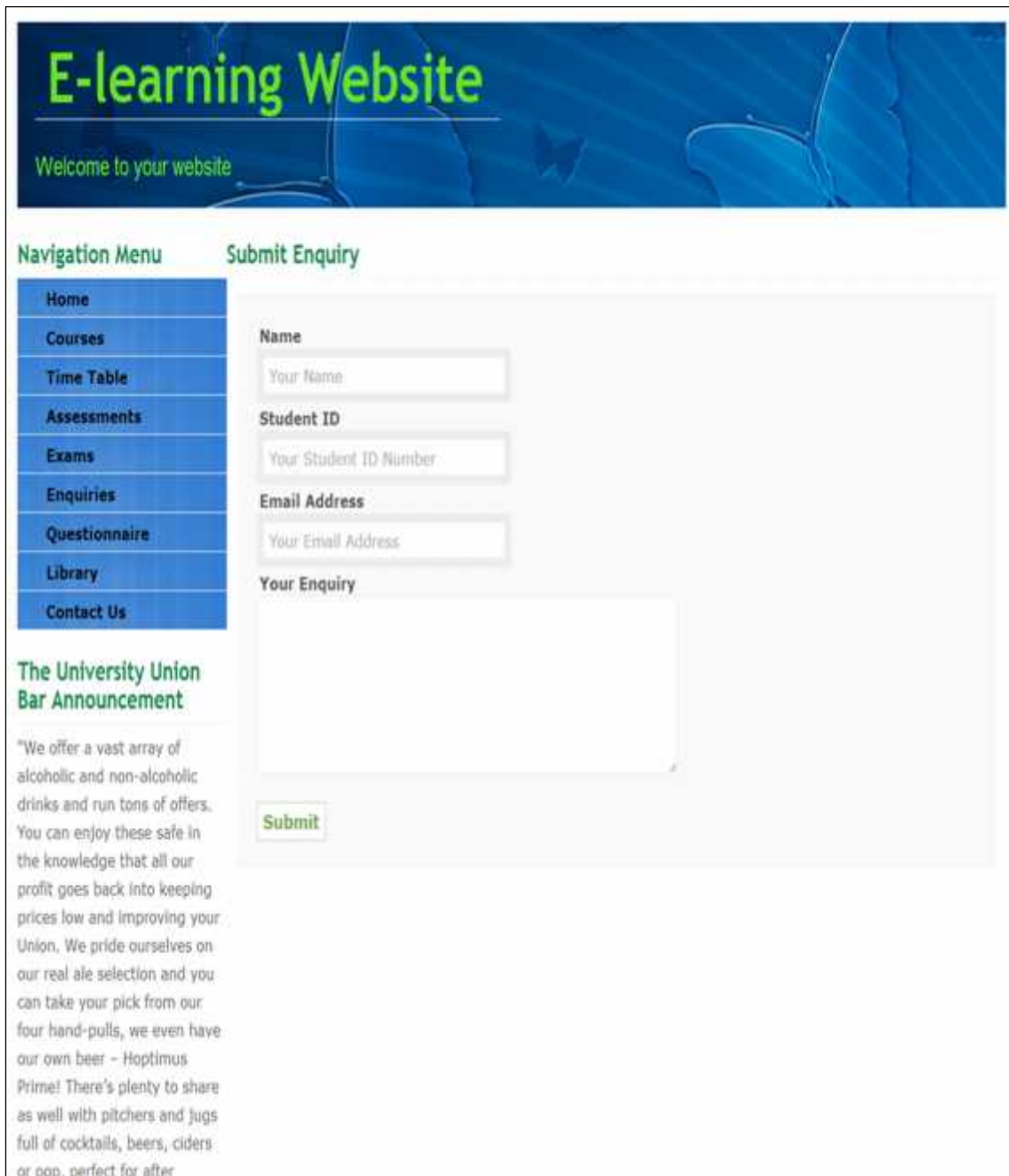


Figure 3-11: Enquiries page

Library: this page helps the student to access the library immediately via the web portal. This allows them to borrow or search for any material they need from the library of the university.

E-learning Website

Welcome to your website

Navigation Menu

- Home
- Courses
- Time Table
- Assessments
- Exams
- Enquiries
- Questionnaire
- Library
- Contact Us

Library

To see how a tutorial is delivered over the Internet. [sobe.salford](#)

To see how it is delivered in a virtual learning environment. [salford University Library](#)




The University Union Bar Announcement

"We offer a vast array of alcoholic and non-alcoholic drinks and run tons of offers. You can enjoy these safe in the knowledge that all our profit goes back into keeping prices low and improving your Union. We pride ourselves on our real ale selection and you can take your pick from our four hand-pulls, we even have our own beer - Hoptimus Prime! There's plenty to share as well with pitchers and jugs full of cocktails, beers, ciders or pop, perfect for after society meet-ups, hand-ins or dreaded exams. We also have a brand new menu which you can download by clicking the button below."

[click me](#)

Figure 3-12: Library page

Contact Us: through this page, the student can contact the author and/or the administration of the University to ask for help and support (for example, the researcher's supervisor and the assessor of the project).

E-learning Website
Welcome to your website

Navigation Menu

- Home
- Courses
- Time Table
- Assessments
- Exams
- Enquiries
- Questionnaire
- Library
- Contact Us

Phone: +44 (0)161 295 4600
Fax: +44 (0)161 295 5011

New Undergraduate and Postgraduate Taught course enquiries:
 UK/EU students:
 T +44 (0)161 295 4545
 course-enquiries@salford.ac.uk

International/non-EU students:
 T +44 (0)161 295 4545
 international-enquiries@salford.ac.uk

New Postgraduate Research course enquiries:
 T +44 (0)161 295 3458
 cstresearch@salford.ac.uk

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If you have already made an application and have questions:
Email: a.j.fleming@salford.ac.uk

For equality and diversity
Email: m.arif@salford.ac.uk

For all other enquiries:
Email: enquiries-sobe@salford.ac.uk

School of the Built Environment
 University of Salford
 4th Floor, Maxwell Building
 The Crescent
 Salford, Greater Manchester
 M5 4WT

Figure 3-13: Contact Us page

3.9.2 Arabic Version

The Arabic version of the e-learning website contains exactly the same structure, web pages and features as presented above. The pages include: Homepage, Courses, Timetable, Assessments, Exams, Enquiries, Questionnaire, Library and finally Contact Us. However, the Arabic version incorporates and exhibits some necessary differences

such as the language (i.e. Arabic) and the direction of the writing which is from right to left as opposed to English writing which is from left to right. The content of the Arabic version is the outcome of a direct translation from the English version, whereby each page was translated by the researcher directly into Arabic as appropriate. As such, both versions of the e-learning websites contains the same pages and structure and the same amount of content. The only limitation in the Arabic version is that it has hyperlinks leading to English exam papers. The colour and pictures of these two e-learning websites are considered in the next sections.

موقع التعليم الإلكتروني
مرحباً بكم في موقع البوابة

مناهج البحث

لغرض من البحث هو اكتشاف الأجابة على الأسئلة من خلال تطبيق العلمى الإجابات. والهدف الرئيسى من البحث هو معرفة الحقيقة التى كانت مجابة والذي لم تكن اكتشفت حتى الآن. على الرغم من كل دراسة بحثية لديها هدف محدد الخاصة. يمكننا أن نذكر في أهداف البحث والوقوف في عدد من النعمات واسعة بعد:

أهداف البحث

يمكننا أن نذكر في أهداف البحث والوقوف في عدد من النعمات واسعة بعد:

- اكتسب الألفة مع ظاهرة أو لتخفيف رؤى جديدة في ذلك [دراسات مع هذا ويطلق على الكائن في طريقة العرض كما استكشافية أو formulative البحوث دراسات]؛
- تصور بدقة خصائص فرد معين، أو وضع مجموعة (ومن الظروف دراسات مع هذا الكائن في طريقة العرض كما وضعى البحوث دراسات)؛
- تحديد التكرار الذى يحدث شيئاً أو الذى يرتبط ذلك مع شيء آخر (ومن المعروف دراسات مع هذا الكائن في طريقة العرض كما تخصصى بحث دراسات)؛
- لاختبار فرضية وجود علاقة سببية بين المتغيرات (وتعرف مثل هذه الدراسات كما فرضية الاحتمال البحوث والدراسات).
- لتحديد أهداف المتطعات تخطط لإجابة فريق.
- لتحديد العوامل المرتبطة معايير فعالية لتلخيص لإجابة فريق.
- لوضع نظرية تفسيرية أو الرسللة عوامل معينة مع فعالية تخطط لإجابة فريق.
- لوصف مدى فعالية معايير للإجابة فريق ذلك استوفيت.

الفلسفات بحث النفاهم والمناهج

فلسفة البحث الذى يعتمد على اقتراحات هامة حول الطريقة الذى يقوم به من العالم. وسوف تدعم هذه الافتراضات استراتيجيات البحوث الخاصة بك والأنساب التى تختارها كجزء من تلك الاستراتيجيات. فى جزء منه، وسوف يتأثر فلسفة كنت تعتمد على اعتبارات عملية. ومع ذلك، فإن التأثير الرئيسى ومن المرجح أن يكون عرض معينة من العلاقة بين المعرفة والعملية التى من خلالها يتم تطويره. الباحث الذى يشعر مع الحقائق. مثل الموارد اللازمة فى عملية التصنيع. من المرجح أن يكون وجهة نظر مختلفة جداً على البحث الطريقة التى ينهى أن تتم من الباحث المعنية مع مسائل ومواقف العمال بعدو مديرهم فى ذلك عملية التصنيع نفسها. ليس فقط سوف الاستراتيجيات وأساليبهم ربما تختلف اختلافاً كبيراً، ولكن، حيث، وخطات نظريهم عدد، ما هو مهم، وربما الأهم من ذلك، ما هو مفيد.

الملاحة القائمة

- الصفحة الرئيسية
- البرود
- الجدول الزمني
- الواحات
- الاصحابات
- استفسارات
- أسئلة
- العقبة
- بنا اتصل

اعلان من اتحاد الجاهة الجامعية.

نحن نقدم مجموعة واسعة من العنصرىات الكحولية وشرب الكحولية ونسجل طن في العروض. يمكنك التمتع بهذه أسمة فى المعرفة التى لدينا جميع الأرباح يعود إلى حفظ انخفاض الأسعار وتحسين الاتحاد الخاص. ونحن نذكر على اختيارنا البرة الحقيقية، ويمكنك أن نجاز من وجهة نظراً أربعة اليد نسجنا، لدينا حتى البرة الخاصة بنا - Hoptimus رتسنا هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل من الكوكيلات والبيرة وشرب البعاج أو البوب، والكماق للتعلم بعد نسبة المسعة اليد الإضافة أو النص الإصحابات. لدينا أيضا قائمة العلامه

Figure 3-14: Home page of Studentportal Arabic version.

You have gone full screen. [Exit full screen \(F11\)](#)

موقع التعليم الإلكتروني

مرحبا بكم في موقع البوابة

<h3 style="text-align: center; color: #0056b3;">اللغة</h3> <ul style="list-style-type: none"> • تأثير اللغة والثقافة • تأثير اللغة • اللغة العربية ووظيفة الصرف 	<h3 style="text-align: center; color: #0056b3;">سهولة الاستعمال</h3> <ul style="list-style-type: none"> • ما هو الفرق بين قابلية الاستخدام وتجربة المستخدم • سهولة الاستخدام الفلسفة والمفاهيم • قابلية الاستخدام والبرمجيات • ما هو الفرق بين قابلية الاستخدام وتجربة المستخدم 	<h3 style="text-align: center; color: #0056b3;">الملاحظة القائمة</h3> <ul style="list-style-type: none"> الصفحة الرئيسية المواد الحدوث الرمزي الواجبات الامتحانات استفسارات اسئلة المكينة بنا افضل
<h3 style="text-align: center; color: #0056b3;">البحث طرق</h3> <ul style="list-style-type: none"> • فلسفة البحث • نظرية المعرفة • منهجية البحث النوعي 	<h3 style="text-align: center; color: #0056b3;">الثقافة</h3> <ul style="list-style-type: none"> • تأثير الثقافة على المحاضرين • أنماط الفكر الثقافي • الثقافة وقابليتها للاستخدام على شبكة الإنترنت 	<h3 style="text-align: center; color: #0056b3;">اعلان من اتحاد الخانة الجامعية.</h3> <p>نحن نقدم مجموعة واسعة من المشروبات الكحولية وغير الكحولية ونشغيل طي من العروض. يمكنك التمتع بهذه أمانة في المعرفة التي لدينا جميع الأرباح يعود إلى حفظ انخفاض الأسعار وتحسين الاتجاه الجامعي. ونحن نفخر على اختيارنا البيرة الحقيقية، ويمكنك أن نختار من وجهة نظريا أربعة البذ نسجنا، لدينا حتى البيرة الخاصة بنا - Hoptimus رئيسا هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل عن الكوكبيلات والسيرة وشراب التفاح أو البوم، والكمان للمجتمع بعد تلبية العنينة البذ الإضافية أو اللعين الامتحانات... لدينا أيضا قائمة الملاحة</p>
<h3 style="text-align: center; color: #0056b3;">الاستطلاع نماذج</h3> <ul style="list-style-type: none"> • كيفية تصميم استبيان جيد • قبل اجراء الاستبيان • الاستبيان 	<h3 style="text-align: center; color: #0056b3;">الالكتروني التعليم</h3> <ul style="list-style-type: none"> • نماذج من العمليات الالكترونية • الآثار المترتبة على المجتمع جراء التعليم عبر الانترنت • التفاعل الجوى بين العربية والانكليزية 	

Figure 3-15: Courses page, Arabic version.

موقع التعليم الإلكتروني

مرحباً بكم في موقع البوابة

الجدول الزمني

الجدول الزمني منوفر للسنوات التالية "السنة الأولى" * "السنة الثانية" "السنة الثالثة"

- السنة الأولى
- السنة الثانية
- السنة الثالثة

الملاحة القائمة

- الصفحة الرئيسية
- المواد
- الجدول الزمني
- الواجبات
- الامتحانات
- استفسارات
- اسئلة
- المكتبه
- بما اتصل



اعلان من اتحاد الحانه الجامعية.

*نحن نقدم مجموعة واسعة من المشروبات الكحولية و غير الكحولية ونسهل من من العروض. يمكنك التمتع بهذه أمة في المعرفة التي لدينا جميع الأرباح تعود إلى حفظ انخفاض الأسعار ونحسب الاتحاد الخاص. ونحن نفخر على اختيارنا البيرة الحقيقية، ويمكنك أن تختار من وجهة نظراً أربعة اليد سحب، لدينا حتى البيرة الخاصة بنا - Hoptimus رئيساً هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل من الكوكيلات والبيرة وشراب التفاح أو البوب، والكمال للمجتمع بعد تلبية المستغة اليد الإضافية أو اللصص الامتحانات. لدينا أيضا قائمة العلامة

Figure 3-16: Timetable page



الملاحة القائمة

[الصفحة الرئيسية](#)

[العواد](#)

[الجدول الرمدي](#)

[الواجبات](#)

[الامتحانات](#)

[استفسارات](#)

[اسئلة](#)

[المكتبة](#)

[بنا اتصل](#)

اعلان من اتحاد الحابه الجامعية.

"نحن نقدم مجموعة واسعة من المقررات الكتوبية وعبر الكتوبية وتشمل ظن من الفروض، يمكنك التمتع بهذه أسسه في المعرفة التي لدينا جميع الأرباح تعود إلى حفظ انخافس الأسفار وتحسين الاتحاد الخاص. ونحن نفخر على اختيارنا السيرة الحقيقية، يمكنك أن تختار من وجهة نظركا أربعة أيد نسخت، لدينا حتى السيرة الخاصة بنا - Hopômus وتميزا هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل من الكوكبيلات والسيرة وشراء التفاع أو السوب، والكمال للمجتمع بعد شبه السيلفة اليد الإمالة أو القعن الامتحانات، لدينا أيضا قائمة المقامه المتغيرة الجديدة التي يمكنك التزليل من خلال التفر على البر أذناه.

انقر هنا

برحي تحميل القيمان الخاصة بك هنا

No file chosen

Figure 3-17: Assessments page

موقع التعليم الالكتروني

مرحبا بكم في موقع البوابة

السنة الكاملة للاختبارات السابقة*

السنة الاولى

السنة الثانية

السنة الثالثة

الملاحة الفائمة

- الصفحة الرئيسية
- المواد
- التحولات الزمنية
- الواجبات
- الامتحانات
- استفسارات
- اسئلة
- المكتبه
- بنا اتصل

اعلان من اتحاد الحابه الجامعيه.

نحن نقدم مجموعة واسعة من المستويات الكهوية وغير الكهوية وتشمل من المرفق، يمكنك التمتع بهذه أمتة في المعرفة التي لدينا جميع الأرباح يعود إلى حفظ انخفاض الأسعار وتحسين الاتحاد الجامي، ونحن نفخر على اختيارنا السرة الحقيقية، وهكذا أنا أختار من وجهة نظري أرفعه اليد نسخ، لدينا حتى السرة الخاصة بنا - Hoptimus رئيس! هناك الكثير للمشاركة كذلك مع أارتين وألترين كامل من الكوكبات والسرة وشراب الفلاح أو الوب، والكامل للمجتمع بعد نسبة المسئلة اليد الإضافية أو النص الامتحانات... لدينا أيضا قائمة العلاقات الخيرية الجديدة التي يمكنك التبريل من خلال السر على الير أدناه.

لعر هنا



Figure 3-18: Exams page

موقع التعليم الإلكتروني

مرحباً بكم في موقع البوابة

ارسل تساؤلك

الاسم

رقم الطالب

البريد الإلكتروني

تسائلك

[Submit](#)

الملاحة القائمة

- الصفحة الرئيسية
- المواد
- الجدول الزمني
- الواجبات
- الامتحانات
- استفسارات
- استاذ
- المكتبة
- بنا اتصل

اعلان من اتحاد الباحة الجامعية.

نحن نقدم مجموعة واسعة من المشروعات التكنولوجية وغير التكنولوجية ونشغل طين من الفروع. يمكنك التمتع بهذه أتمه في المعرفة التي لدينا - جميع الأرباح تعود إلى حفظ أبحاثنا الأستاذ وتحسين الأبحاث الخاص. ونحن نوفر على اختيارنا السيرة التعليمية. يمكنك أن تتجاز من وجهة نظرا أوجه البد نسجده لنا حتى السيرة الخاصة بنا - Hopimus زبيرا هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل من الكوكبتلات والسيرة وشرب التفاح أو الوبه والكمان للمجتمع بعد تليه السيرة البد الإضافة أو القين الامتحانات. لدينا أيضا قائمة أنظمة التطرية الجديدة التي يمكنك التبريل من خلال البفر على الزر أدناه.

انقر هنا

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Figure 3-19: Enquiries page

#	السؤال	التقييم
01	كان من السهل استخدام بوابة الطالب	التقييم
02	استطيع إكمال عملي بشكل فعال باستخدام بوابة الطالب	التقييم
03	أنا قادر على إنهاء عملي بسرعة باستخدام بوابة الطالب	التقييم
04	أنا قادر على إنهاء عملي بكفاءة باستخدام بوابة الطالب	التقييم
05	أسهر بالراحة عند استخدام بوابة الطالب	التقييم
06	كان من السهل تعلم كيفية استخدام بوابة الطالب	التقييم
07	بوابة الطالب تعطي رسائل الخطأ التي تقول بوضوح لي كيفية إصلاح مشاكل	التقييم
08	المعلومات المقدمة في بوابة الطالب واضحة	التقييم
09	من السهل أن تجد المعلومات اللازمة	التقييم
10	كان من السهل النقل عبر بوابة الطالب	التقييم
11	نظيم المعلومات على شاشات بوابة الطالب واضحة	التقييم
12	كان استخدام بوابة الطالب مريحاً بالنسبة لي	التقييم
13	وجدت بوابة الطالب مفيدة أكثر من اللازم	التقييم
14	شعرت بالفائدة أثناء استخدام هذه البوابة	التقييم

الملاحة القائمة

- الصفحة الرئيسية
- المواد
- الحدوث الرسمي
- الواجبات
- الامتحانات
- استفسارات
- اسئلة
- المكتبه
- بنا اتصل

اعلان من اتحاد الحابه الجامعية.

نحن نقدم مجموعة واسعة من المشروبات الكحولية وغير الكحولية وتشمل طن من العروض، يمكنك التمتع بهذه أمة في المقرفة التي لدينا جمع الأرباح يعود إلى حفظ انخفاض الأسعار وتحسين الاتحاد الخاص، ونحن نعتز على اختيارنا البيرة الحقيقية، ويمكنك أن تختار من وجهة نظري أربطه اليد نسحب- لدينا حتى البيرة الخاصة بنا - Hoptimus وليس! هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل في الكوكيتلات والبيرة وشراب التفاح أو البود، ولكنك للمجتمع بعد لبيرة المشقة اليد الإضافة أو تليس الامتحانات- لدينا أيضا قائمة العلاءة التجارية الحديثة التي يمكنك التريل من خلال التفر على الز أدناه.

نمر هنا

Figure 3-20: Questionnaire page

موقع التعليم الإلكتروني

مرحبا بكم في موقع البوابة

المكتبة

للاطلاع على مواضيع أكثر الرجاء التكرم بالنقر على الرابط التالي sobe.salford

يمكنك الدخول الى المكتبة عبر الرابط التالي salford University Library




لملاحة القائمة

- الصفحة الرئيسية
- المواد
- الجدول الزمني
- الواجبات
- الإختبارات
- استفسارات
- اسئلة
- المكتبة
- بنا اتصل

إعلان من اتحاد الحابه الجامعيه.

نحن نقدم مجموعة واسعة من المشروبات الكحولية وغير الكحولية لتسهيل عن من العرض، يمكنك تمتع بهذه أسبه في المعرفة التي لدينا جميع الأرباح يعود إلى حفظ تخفيض الأسعار وتحسين الاتحاد الخاص، ونحن نغز على اختيارنا سيرة الحقيقة، يمكنك أن تختار من جهة نظريا أربعة البد نسخة، لدينا حتى السيرة الخاصة بنا - Hoptmus ليس، هناك الكثير للمشاركة كذلك مع أأريق وأأريق كهل من الكوكيتلات السيرة وشرب التفاح أو الورد، ولكنكم لمجتمع بعد تلبية المنفعة اليد لإضافة أو قلص الإختبارات، لدينا بما قلصه الملاحة التجارية الجديدة التي يمكنك التنزل من خلال انقر على البر أدناه.

فر هنا

Figure 3-21: Library page

موقع التعليم الإلكتروني

مرحباً بكم في موقع البوابة

الهاتف: +44 (0)161 295 4600

الفاكس: +44 (0) 161 295 5011

نساؤلات حول الدراسات الجامعية والدراسات العليا:

Tel: +44 (0)161 295 4545
 course-enquiries@salford.ac.uk

تطلّاب من المملكة المتحدة والاتحاد الأوروبي: international-enquiries@salford.ac.uk

استفسارات حول دورة "بحوث الدراسات العليا" الجديدة:

Tel: +44 (0)161 295 3458
 cstresearch@salford.ac.uk

إذا كنت قد قدمت بالفعل طلباً و لديك أسئلة:

a.j.fleming@salford.ac.uk

المساواة والتنوع:

m.anf@salford.ac.uk

كل بقية النساؤلات:

enquiries-sobe@salford.ac.uk

School of the Built Environment
 University of Salford
 4th Floor, Maxwell Building
 The Crescent
 Salford, Greater Manchester
 M5 4WT

الملاحة العامة

- الصفحة الرئيسية
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- استفسارات
- أسئلة
- العنكبوت
- نما اتصل

إعلان من اتحاد الحايه الجامعية.

"نحن نقدم مجموعة واسعة من المشروعات التكنولوجية وغير التكنولوجية ونضطلع طي من الفروع، يمكنك التمتع بهذه أمتة في المعرفة التي لدينا جميع الأرباح يعود إلى حفظ انخفاض الأسعار وتحسين الاتحاد الخاص. ونحن نفخر على اختيارنا السورة الحقيقية، ويمكنك أن تختار من وجهة نظراً أربعة أيد تسحب، لدينا حتى السورة الخاصة با - Hoptimus وليسراً هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل من التوكسيلات والسيرة وشربان النجاج أو النوم. والتكفال للجمع بعد تلبية المسئلة أيد الإضافة أو التغير الامتحانات، لدينا أيضا قائمة الطلاب التجارية الجديدة التي يمكنك التبريل من خلال التفر على المر أتناه.

تفرها

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Figure 3-22: Contact Us page

3.10 Use Case Diagram

In order to capture the intended behaviour of the system, i.e. the functional requirements (these are the minimum functionalities that the system has to provide), use case diagrams can be used. In such diagrams, the researcher specifies the main actors in the

e-learning websites, the main functionalities of the system and the interactions between the actors and the system functionalities. The actors and the different scenarios of the e-learning websites are demonstrated below.

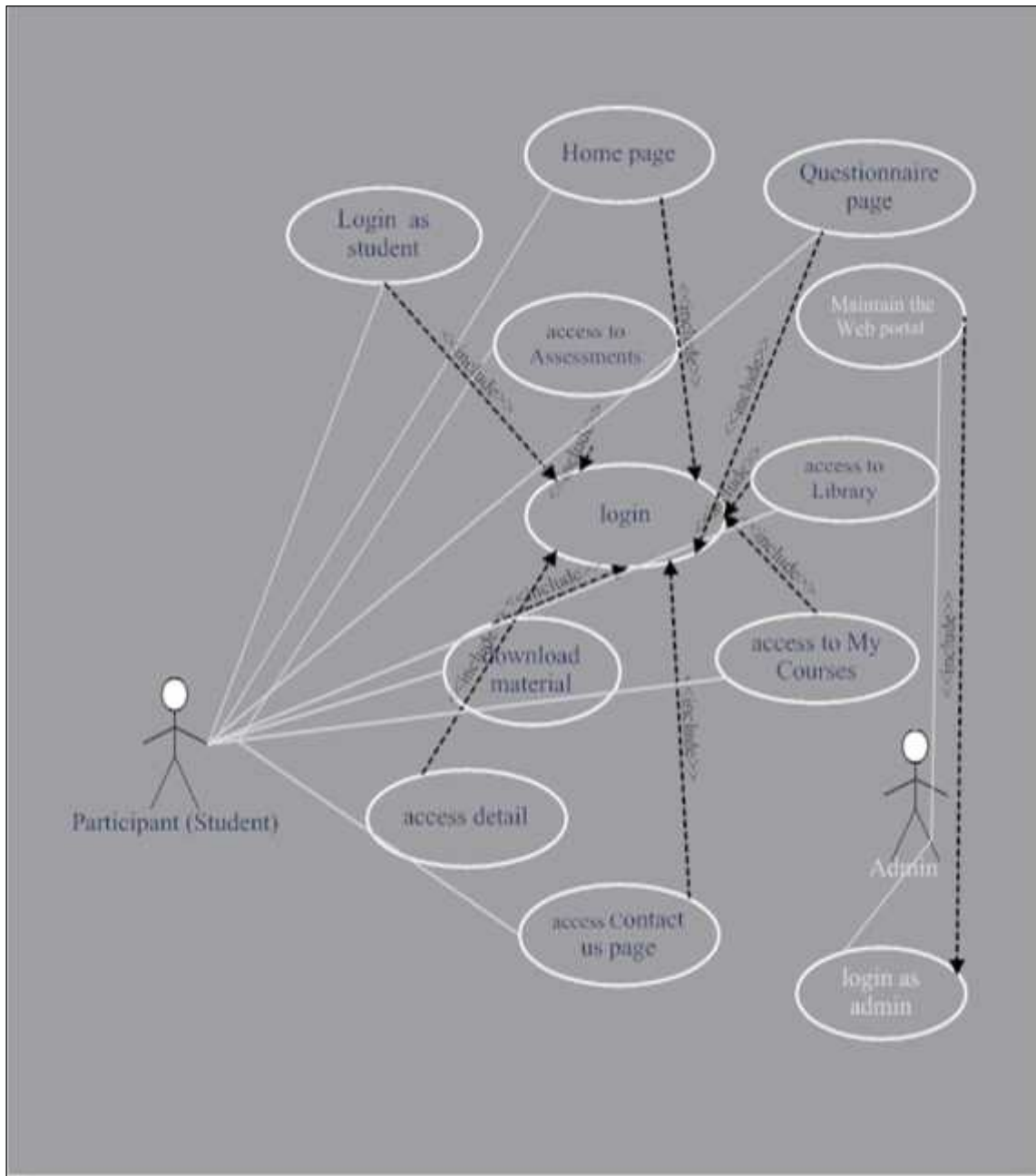


Figure 3-23: Use case diagram of the e-learning websites

3.11 Data Collection Methods and Techniques

Data collection is the key that enables the research to accomplish the correct evaluations more effectively. Data collection is advantageous as it provides the researcher with the chance to work with empirical data. Good data need to have three major criteria: they have to be reliable, relevant and representative. Reliability means that the data provide accurate and consistent calculations. Relevance means that the data capture the intended measurements. Representativeness means the data portray the service being measured.

There are two well-known methods for collecting data: the quantitative and qualitative data collection methods. Many studies have reported on the differences between these two methods (Belk, 2006; Creswell, 2003; Jackson, 2009; Marvasti, 2004; Saunders, 2009).

Qualitative research is an in-depth study of social and cultural phenomena and an analysis of the quality of the human experience and, at the same time, it consists of non-numeric data or data that have not been quantified (Saunders, 2009). Qualitative researchers typically make passive observations with no intent of manipulating a causal variable (Jackson, 2009). It is a method of collecting data and tends to describe the meaning in-depth.

Quantitative research consists of the use of certain techniques that characterise the human experience in numeric data (statistics). It usually starts with a hypothesis for testing, observes and collects data, statistically analyses the data and, finally, draws conclusions (Jackson, 2009). Quantitative methods (e.g. questionnaires and experiments) deliver data that are easy to investigate statistically, and are properly consistent and reliable. The quantitative method is used when researchers need to make comparisons between two or more things and, at the same time, using numbers to show data.

There are many sources from which qualitative data can be collected. Generally, the most common source is the interview (which is often recorded using audio recorders and then the responses transcribed before an analysis is undertaken). Another data source is observation and this method records the reaction of the participant (Cooper, 2012). Sometimes qualitative data collection can occur within surveys or case studies and within document analyses.

Quantitative data sources include experiments (this aspect is explored in detail in the next sections) and non-experimental studies and surveys (which use questionnaires and sometimes interviews for collecting data which is then analysed thereafter). Both methods (i.e. qualitative and quantitative) can be combined to collect data. One of the most common methods for collecting qualitative data are face-to face interviews. This method will be used during this research. At the same time, collecting quantitative data will not be neglected and, as an example, the researcher will record numeric data (quantitative data), such as the ratings by users in response to the usability questionnaires and the average time taken for completing search tasks.

Since this study compares two e-learning websites, one in Arabic and the other in English, with the aim of testing the level of usability of both versions it is crucial to describe the methods that will be used to investigate the web design features and in testing the usability. Investigating the user interface design can be achieved by using two methods: usability inspection methods that are performed by usability professionals and experts to investigate the user interface, and empirical methods that involve representative end users to evaluate the user interface.

3.11.1 Usability Inspection Methods

Nielson and Mack (1994, p.170) defined usability inspection methods as follows: usability methods “is the generic name for a set of methods based on having evaluators inspect or examine usability-related aspects of a user interface”. Usability inspection methods are one of the significant approaches in accomplishing usability tests. As was mentioned previously it is normal practice for an expert or a group of inspectors to try to detect usability problems in a website in order to improve the quality of the usability. Many approaches can be used to evaluate the usability of websites including cognitive walk-through, pluralistic walk-through, formal inspections and heuristic evaluation (heuristic evaluation is described in chapter two).

3.11.2 Empirical Usability Methods

In order to inspect and improve the usability of interactive systems, there are various empirical usability methods, which can be applied. The widespread methods for collecting data and user interaction experiences are observation, performance measurement, thinking aloud, and questionnaires. The observation method focuses on watching the user and his/her interactive actions. In essence, this method does not require a technology tool. More details on this method are given below.

3.11.3 The Observation Method

The observation method is used to find out what a user does, his/her work context and how technology assists him/her (Rogers et al., 2011). Sanders (2009) listed three types of observations: primary observation which focuses on observing what happens directly and recording these actions in diaries; secondary observation which focuses on the verbal statements of the user on what has happened, and experimental observation which focuses on user perceptions and impressions about user experience and recording

these perceptions in diaries. This study relies on empirical usability methods whereby users will be observed directly performing a number of search tasks using the e-learning website. The data collected from this study will include direct interaction with the system, user actions performed, user impressions, and feelings about the system following the study.

3.11.4 Performance Measurement

Martinez (2012, p.39) defined performance measurement as “testers or software tools record usage data and obtaining statistics during the test”. Indeed performance measurement is one of the famous empirical usability measures that evaluate user performance objectively in order to shape the design of the interface. In addition, it is also used to assess if the usability objectives are satisfied and it measures the time that users take to accomplish tasks and counts the number of errors that are made by users. Moreover, performance measurement is usually used to compare different interfaces (Nielsen, 1993). In this research, performance measurement will focus on:

- Calculating the average time (in seconds) needed to complete each search task.
- Calculating the average number of clicks per search task for each e-learning version.

3.11.5 Thinking Aloud Protocol

Someren et al. (1994, p.1) defined thinking aloud as: “a method which consists of asking people to think aloud while solving a problem and analysing the resulting verbal protocols”. In other words, a protocol enables the participant to talk aloud about whatever they are thinking and to verbalise their thoughts during their participation throughout the experiment. Thinking aloud is a very useful and valuable usability method as it helps the researcher to understand how users view the interface and how

they proceed to use it. It also shows which factors can affect the system and at, the same time, identifies the problems that require immediate attention by the designer. Likewise, it is a beneficial method of avoiding misinformation and obtaining direct data about the solution processes (Someren et al., 1994).

3.11.6 Questionnaires

Questionnaires are an indirect method of collecting the opinions of users about a particular system. Questionnaires can also measure the satisfaction of users and their predilections (Holzinger, 2005). There will be more discussion on the questionnaire in the section on the data collection process. In summary, this research will use a combination of the methods discussed above. It will observe user interaction with the e-learning website, collect performance data, and will ask users to verbalise their thoughts and complete post-study questionnaires.

3.12 Types of Data

The following sections will explore the different types of data, especially primary data and secondary data.

3.12.1 Primary Data

Sekaran (2003) defined primary data as information that is attained first hand by a researcher on the variable of concern for the specific purpose of the study. The researcher collects data directly from the participants in order to answer particular questions. Thus, primary data are original data that are collected from original sources.

Primary data are especially concerned with the research problem and are more related to the realisation of the research objectives than secondary data (Wiid & Diggins, 2009)

Primary data are obtained through different processes in the form of interviews, surveys and observations. These processes are usually performed by telephone, post, online questionnaires or paper-based questionnaires (Easterby-Smith et al., 2004). When the required information is not available through secondary data, it is best to use primary data sources. There are three ways to collect primary data: interview, questionnaire and observation. In this research, the data and information were collected using primary data methods via direction observation, thinking aloud, questionnaires, and post-study interviews.

3.12.2 Secondary Data

Heaton (2004, p.16) defined secondary data analysis as “a research strategy which makes use of pre-existing quantitative data or pre-existing qualitative data for the purposes of investigating new questions or verifying previous studies”. Secondary data are neglected in this thesis because the data were collected from the participants directly and no appropriate data collected from another source were available.

3.13 Data Collection Process

It is crucial before starting to collect data to answer several important questions in order to identify the required data and the sources of these data, for example what type of data to collect, which kind of data collection methods are appropriate for this thesis, who are the stakeholders in this research? Answers to these questions are the key to collecting the relevant and appropriate data. This thesis will rely on three different data collection techniques: questionnaire, interview, and observation.

3.13.1 Questionnaires

A questionnaire can be laid out in a variety of ways and it can be used in many diverse conditions. A questionnaire is a range of questions that is used to elicit answers from users to help investigate research questions. The questions are usually divided into unstructured or structured questions. Unstructured questions ask the participant to provide a response in the way that they feel most comfortable, whereas structured questions ask the participant to select an answer from a given set of choices (Bhattacharjee, 2012). Delivering the questions in a similar way to a variety of people is an important step in most survey research. Questionnaires are divided into two types: self-administered questionnaires and interviewer-mediated questionnaires.

Questionnaires differ in the way they are developed and in how users are involved to complete them (Saunders, 2009). Self-administered questionnaires are completed by users whereas interviewer-administered questionnaires are completed by an interviewer using the users' responses. Self-administered questionnaires are divided into four categories: Intranet-mediated questionnaires; these are developed and completed electronically.

- Postal or mail questionnaires: these are posted to users who complete them on paper and return them to the interviewer.
- Delivery and collection questionnaires: these are handed to users who answer them in their own time and they are collected once completed.
- Other types of questionnaires include telephone questionnaires which are undertaken by telephone. This type of questionnaire is not relevant for the purpose of this research as this study will be carried out in a usability laboratory

where participants' interaction with the system can be observed and recorded using appropriate software applications (e.g. Camtasia).

The empirical study in this research uses self-administered questionnaires which are handed to the participants at the start of the experiment. The participant is then asked to complete the questionnaire and return it at the end of the experiment. Additionally, this research uses an interviewer-administered questionnaire at the end of the experiment. This questionnaire is performed face-to-face to discuss any issues encountered during the interaction with the e-learning website and to explore any particular impressions and reactions to the systems. The questions in this questionnaire will be based on previous similar studies in this domain (e-learning, usability, web design and aesthetics) and on the literature review in chapter two of this thesis. The questions in questionnaires should be clear, should use simple language to avoid any misunderstanding and should be relevant to the e-learning websites. The following section describes the questionnaires that will be used to elicit user satisfaction and subjective ratings on the two versions of the e-learning website.

This thesis uses the following user questionnaires to assess e-learning outcomes, the usability of the system, aesthetics and user performance as described below.

- **Evaluation Questionnaire:** this questionnaire (see Appendix A) is concerned with five parts (general questions, colour, language, font and culture). More details on this questionnaire are provided in the next chapter. Overall, this questionnaire has twenty five questions with three primary objectives:

- To gain a better understanding of the demographics and the characteristics of the Arab users (e.g. age, gender, etc.) and how these influence the e-learning website.

- To investigate the influence of colour, font and other elements, generally, as used in the e-learning websites on user judgment.
- To understand the role of language and culture on the reactions and impressions of Arab users towards some specific symbols, pictures and colours. This understanding will help create usability guidelines that are appropriate for designers aiming to develop e-learning websites for Arab users. These guidelines will empower web designers in understanding the needs and characteristics of Arab users and how web design features influence their e-learning experiences.
- **E-learning Participant Questionnaire:** this questionnaire (see Appendix B) was originally designed by The University of Northampton research department. This questionnaire focuses on the reaction of users to the e-learning websites following their use of both versions of the system. It explores the key features that affect users' judgments of the system. This questionnaire contains twelve questions that mostly concentrate on how they affect the users of e-learning websites, what kind of issues they encounter during the use of the e-learning websites, and on users' suggestions on how to improve their interactive experience with the system in the future.
- **Usability Questionnaire:** this questionnaire (see Appendix C) contains fifteen questions which focus on the usability of the system (e.g. how easy it is to use the system), the advantages and disadvantages of each version of the system in the way affect the reaction of the users (both Arabic and English versions). This questionnaire enables the development of a clear understanding of the key differences and similarities between the Arabic and English versions and how they affect the users of e-learning websites. This questionnaire (a Computer System Usability Questionnaire) is based on

the computer system usability questionnaire which was developed in 1993 by the IBM company which was published in 1995 (Lewis, 1993). Since then it has been widely used by researchers around the globe. However, the questionnaire will be slightly modified in order to be appropriate for the target audience by deleting some of the questions that are deemed to be inappropriate for this thesis.

- **Aesthetics Questionnaire:** this questionnaire (see Appendix D) looks at the beauty of the websites and how they influence the component characteristics of the website (Li & Yeh, 2010) and, at the same time, this questionnaire attempts to capture the extent of the aesthetic impact on Arab users. The questionnaire consists of fifteen questions based on Noam Tractinsky's questionnaire (Tractinsky & Lavie, 2003) but with some basic changes made to relate it to the objectives of this thesis.

3.13.2 Interviews

Marczyk et al. (2005) argued that interviews are a form of self-reporting and are an efficient way of collecting a variety of data. It is required that all the participants are asked the same questions in the same order and in the same kind of timespan to evade any dissimilarity in the collection of data. Interviews can take different forms depending on the field of research. Interviews focus on studying and exploring the behaviour, opinions, feelings and actual experiences of the participants. Questions in interviews enable the interviewer to understand phenomena that are relevant to the research in an organised manner. The types of questions differ depending on the purpose of the research. Questions can take the form of 'how' and 'why' to find out about participants' behaviour and impressions.

3.13.3 Structured Interviews

A structured interview is based on pre-set questions that should be standardised and identical. These questions are asked of the participant and the researcher records the responses. Structured interviews are also called quantitative research interviews (Saunders, 2009) and are very useful to use in experiments in order to collect data from participants. In this type of interview, all participants are asked the same questions in the same order and using a common rating scale (U.S. Office of Personnel Management).

3.13.4 Semi-Structured Interviews

A semi-structured interview falls between unstructured and structured methods. In this type of interview, the researcher usually has a list of questions and asks the participant to respond to these specific open-ended questions (Zikmund et al., 2009). The questions are divided into sections. Semi-structured interviews offer flexibility and allow the interviewer to add or abandon specific questions during the interview depending on the progress of the interview. The data generated during the interview should be recorded by audio-recording the conversation (Saunders, 2009). The participant has ample freedom to respond to the questions and the researcher has a schedule in order to keep the participants on track with the topics and subjects that are of interest to the researcher. The researcher uses semi-structured interviews to offer flexibility to the participant (to allow greater flexibility in the responses) and thus gain the benefits of a face-to-face interview.

3.13.5 Unstructured Interviews

Unstructured interviews are an informal method that can be used to explore the area being investigated in-depth. They also provide a flexible format, which allows the

researcher to explore specific points that relate to the research objectives and questions. The questions in an unstructured interview emerge from answers of the participant to specific questions by the researcher picking up on specific cues and themes (Fisher, 2007).

In this thesis, researcher will use semi-structured interviews at the end of the empirical study to gain further insights into the participants' perceptions of, and the judgments on, the two versions of the e-learning website. The questions will focus on points relevant to culture and language and how they influence the participants' judgment of the web design features such as colour, font and pictures. The questions will also shed light on the overall e-learning experience in both versions. The interview will start on these points and then explore further themes and topics as they emerge from the participants. Moreover, the interview will address any interaction and usability problems observed during the tasks.

3.13.6 Observation Methods

Observation is a technique for collecting and gathering information on participant behaviour, interaction and events relating to a specific phenomena or process. There are three primary types of observation techniques:

- Covert observation: this is when the participant does not know that the observer is observing him/her. The observer is hidden in such a case. This technique is also known as the unobtrusive observation technique. In this type of observation, participants are more likely to act naturally.
- Overt observation: this is when the participant knows that the observer is observing him/her. The observer is known to the participant in this case. This is also known as the obtrusive technique.

- Researcher participation: this is when the observer takes part in the actual experiment with the participant to obtain a greater understanding of the process being studied.

Observations have many advantages. In observations, data are collected when an activity or user interaction is happening and observation enables the viewing of the real behaviour of the actual users. On the hand, observations might be affected by the observer's bias and are known to be time consuming. In addition, participants who are being watched could perform better because they know they are being watched.

It is judged that the overt observation technique is the most appropriate technique for this study as it allows the researcher to observe and take notes of interesting user actions and issues. These issues will be discussed and explored further in the section on the semi-structured interviews.

3.13.7 Think Aloud Technique

In this experiment, qualitative data and user opinions will be collected (face-to-face) using the think aloud protocol. This technique enables participants to verbalise their thoughts in respect to their mental planning, their processes, impressions and feelings about using the e-learning website. Of particular interest is how the participants undertake specific tasks, what kind of issues they encounter and how they judge the qualities of the two versions of the e-learning website. The data generated through the think aloud technique will be recorded for follow up analysis.

3.14 Data Analysis

The key element to answering the suggested research questions is the analysis of the collected data. The first stage will focus on building an investigation strategy to support

the researcher in obtaining the best analysis in order to examine the proposed research problem. The researcher has to investigate how this should be undertaken, particularly when discovering, arranging and recombining facts and data. Morse (1994) stated that data analysis in case study research always begins after collecting the necessary data. One of the objectives of data analysis is to test the research hypotheses. Hypothesis testing compares the observed pattern of scores with the pattern predicted by the hypothesis. Thereafter, the statistical results can confirm or reject the hypothesis (Dul & Hak, 2007). Hypothesis testing is a rigorous and precise process.

This research collects and uses mixed data as described before (qualitative and quantitative data). For each type of data, appropriate analysis techniques will be applied. The literature review undertaken for this thesis defined four different areas that will be examined and investigated using a number of questionnaires and interviews which will be developed to fulfil the aim and objectives of this research. Each of these four areas tackles different issues and will assist the researcher in answering the research questions of this research.

3.14.1 E-learning Area

This area will be investigated and examined through an empirical study and questionnaires in order to uncover any issues that might occur when Arab users interact with e-learning websites and to discover the best ways to design appropriate e-learning websites that can satisfy the learning needs of Arab users and improve their interaction experience.

3.14.2 Culture Area

The thesis predicts that culture has an impact on e-learning websites and web design in general. The data that will be gathered through observation during the experiment and

the follow-up interviews will be analysed by using SPSS software to gain feedback from end users about how their culture influenced their interaction with the e-learning website. This knowledge will establish the cultural needs of Arab users in a successful learning process and explain the link between culture and web design features such as images.

3.14.3 Language Area

This area will explore the effect of language on the domain of web design and which specific elements of language can impact on Arabic e-learning websites. This objective can be achieved via the data that will be collected during experiment and from the evaluation questionnaire, the usability questionnaire and the aesthetics questionnaire. However, the literature review illustrated two other areas that need more attention: the area of translation and the meaning of words and sentences that should be used in the contents and text of an Arabic e-learning website.

3.14.4 Usability Area

The data obtained from the participants and the inferred knowledge gained will be used to develop design guidelines for Arabic e-learning websites. The data will be analysed by using qualitative and quantitative methods as described in the next section.

3.15 Quantitative and Qualitative Data Analysis Techniques

The process of data analysis consists of three essential stages: (a) preparing the data, (b) analysing the data, and (c) interpreting the data (Marczyk et al, 2005). Each stage will be discussed in the following sub-sections. In essence, there are two methods for analysing data: qualitative and quantitative.

3.15.1 Preparing the Data

Quantitative data are collected through some of the questionnaires and are then entered into SPSS (Statistical Software Package) for follow up analysis. The data are categorised into four categories (i.e. e-learning, usability, aesthetics, and culture), with each category sub-divided into further categories. For example, e-learning can be divided into two sections: information on technology use and the use of online tools, with each section containing six for section A and five questions for section B. In the next step, the users' ratings and scores are transferred from the questionnaires into SPSS to organise the data and prepare it for analysis. In this case the data is numeric and therefore will be analysed using SPSS software. Quantitative research usually uses tables, statistics and graphs to illustrate the results of the data gathered.

Qualitative data are gathered through a number of techniques such as interviews, thinking aloud protocol and observations (recorded in Camtasia Studio 7 software). These data are transcribed and typed into Microsoft Word and then organised for further analysis.

3.15.2 Analysing the Data

Quantitative data are numerical and hold the evidence required to answer the main questions of this thesis. Thus, such evidence needs to rely on a variety of statistical processes that can help researchers describe and examine the relationship between different variables and examine the results to find the correct answers to the researcher's questions. There are two types of statistics that can be used to analyse quantitative data that have been collected: descriptive statistics and inferential statistics. **Descriptive statistics** are the main way of examining the relationships between variables and, at the same time, describing the data. **Inferential statistics** "can be used to calculate the

probability that the populations are different and the experimental intervention did have an effect” (Marshall & Jonker, 2011, p.3).

Hence, this research will use both types of statistics. Descriptive statistics will describe the general trends of the variables in this study (user demographics, culture, language, e-learning, and usability). On the other hand, the use of inferential statistics will help the researcher to establish the relationships between these variables in order to draw conclusions about the behaviour of our sample. Of prime interest is the influence of culture and language on user judgment and user perception of e-learning websites.

3.15.3 Interpreting the Data

When the data have been analysed, the next step is to interpret the results to make sense of the findings. The data should be examined to summarise and explain what the results mean and how the data are useful in answering the main questions of the research.

Moreover, there are a number of questions that need attention in this step such as:

- What patterns and topics are emerging from the data?
- Are there any results that are surprising?
- What are the main findings that require further attention?
- Do the results make sense?
- Do the findings explain and justify the main questions of this research?
- The answers to these questions are the key to a clear interpretation of the data (Wilder, 2009). The following table shows the differences between quantitative and qualitative research methods (Saunders, 2009).

Table 3-2: Differences between Quantitative and Qualitative Research

Quantitative data	Qualitative data
<ul style="list-style-type: none"> • Based on meanings derived from numbers 	<ul style="list-style-type: none"> • Based on meanings expressed through words
<ul style="list-style-type: none"> • Collection results in numerical and standardised data 	<ul style="list-style-type: none"> • Collection results in non-standardised data requiring classification into categories
<ul style="list-style-type: none"> • Analysis conducted through the use of diagrams and statistics 	<ul style="list-style-type: none"> • Analysis conducted through the use of conceptualisation

3.16 Case Study Method and Design

Yin (2009) defined a case study as a research method used in several situations to extract the knowledge of individuals and groups on organisational, social, political and related phenomena. The case study is an empirical inquiry that examines contemporary phenomena within its real life context particularly when the boundaries between the phenomenon and context are not clear. Yin (2009) stated however that the aim for using a case study is to understand the phenomenon in its real life in-depth. Furthermore, there are many benefits to use the case study method, for example because such a method is dynamic and flexible .

Yin (2009) divided case studies into three main categories, namely exploratory, descriptive and explanatory case studies. The aim of the exploratory case study category is to explore a phenomenon in data that are not clear. The second category is the descriptive case study category which is used to describe the natural phenomena that occurs within the data in question. Finally, the explanatory case study category explains why certain behaviours occur by determining the causes and effects. Researchers tend to use questionnaires to collect data from users. The questionnaires used in this study were

based on two different websites (Arabic version and English version) developed by the researcher. Moreover, the researcher adopted the case study method in order to validate the proposed Arabic usability guidelines for e-learning websites.

3.17 Fuzzy Set Theory

In 1965, Zadeh developed the concept of the fuzzy set theory. It is a useful method for defining some form of uncertainty. Zadeh also developed fuzzy logic to account for the fuzziness of natural language, for example “well” and “not well”. The Zadeh theory is a mathematical tool to solve problems of ambiguity and vagueness. Zadeh proposed using values ranging from zero to one for presenting the membership function, $\mu_A(x) = 1$ and if it clearly does not $\mu_A(x) = 0$. The values between zero and one represent intermediate degrees of membership.

However, several real world applications cannot be handled and defined by a classical set theory (Chen & Pham, 2001); the fuzzy set theory can successfully be used for modelling systems fraught with uncertainty. Fuzzy set theory allows decision makers to incorporate unquantifiable information, incomplete information, non-obtainable information and partially unknown facts into a decision model (Kahraman, 2008, Kulak et al., 2005, Mehrian et al., 2012).

3.17.1 Technique for Order Preference by Similarity to Ideal Solution

The technique for order preference by similarity to ideal solution (TOPSIS) is a beneficial and practical procedure for the selection and ranking of a number of possible substitutes through measuring Euclidean distances. TOPSIS was initially established by Hwang and Yoon in 1981 and is built on the perception that the selected alternative must have the shortest distance from the perfect solution and the longest distance from the negative best solution (Ertugrul & Karakasoglu, 2007, Kumar et al., 2013). The

positive-perfect solution is composed of all the greatest principles obtainable from the criteria, as opposed to the negative ideal solution which comprises all of the non-ideal values obtainable from the criteria (Wang & Lee, 2007). The advantages of TOPSIS can be concluded in the following points: it is not difficult to use, it considers all types of criteria, it is rational and understandable, the computational processes are straightforward, and the concept permits the pursuit of the best alternatives' criterion depicted in a simple mathematical calculation (Bhutia & Phipon, 2012).

3.18 Validity and Reliability

There are two famous characteristics of the instrument of measurement, validity and reliability. Validity aims to answer the question "Does the instrument measure what you want it to measure?". Reliability means the results should be consistent and repeatable at the same time. Therefore, the measuring instrument usually gives the same results when using the same measure, even if the measurement is repeated more than once. However, the results are considered unreliable if the measurement instrument gives different results under the same conditions (Tavakol et al., 2008). There are various ways to measure the reliability of instruments in behavioural research including the Test - Retest Method, alternative forms, split-halves, inter-rater reliability and internal consistency. Reliability testing relies on equivalence, stability over time, and internal consistency (Drost, 2010). In the Test - Retest Method, a group of respondents are made to take a test and then later, they redo it and the results should be consistent. In alternative forms, dissimilar measures are gathered at different times. In the split-halves method, two measures are used by dividing the data into two halves, where the outcome is two tests and two new measures testing similar behaviour. In internal consistency, questions are grouped in a questionnaire to measure the same concept or construct.

Internal consistency can be measured using several statistical techniques. Cronbach's Alpha, developed by Lee Cronbach in 1951, is one of the widely used techniques as it measures how well the different items complement each other when measuring the same concept. From a sample of users, Cronbach's Alpha is used to measure the reliability of a test or a scale and it ranges between 0 and 1. A value of 0.70 or higher represents acceptable reliability.

Validity emphasises the level to which an instrument measures what it is expected to measure (Tavakol & Dennick, 2011). Cook and Campbell (1979, p.37) defined validity as the "best available approximation to the truth or falsity of a given inference, proposition or conclusion". There are three types of validity to help establish validity:

1. Internal Validity: this considers if the experiment has been well designed when the results are in; it also considers the level of confidence in the experiment and the data that have been collected, and if the study is comparatively free of confusion.
2. External Validity: this considers how the results can be generalised in order to make a general judgment about the majority of Arab users with regard to their overall interaction with e-learning websites, and which usability guidelines are suitable for them.
3. Construct Validity: this considers whether the observations of the study measure the intended constructs or concepts.

3.19 Ethical Issues

Data will be collected anonymously as no names will be requested during the experiment. The research is not interested in the names of people but rather in their ideas and views with regard to the system that is being tested. Therefore, the researcher will keep no record of names. The researcher will ask all participants to sign a consent

form that will clearly explain the tasks of the experiments and what is expected from the experiment. The consent form will also clarify that the data collected will be analysed anonymously without any links to names and identities and that information from the study will be passed on to third parties.

No safety hazards are associated with the experimental study in this research as the participants will merely be using a e-learning website to find information. Upon completion of the experiment, the participants will evaluate the sites using usability questionnaires. In summary, the materials will include:

- The Arabic version of the e-learning website.
- The English version of the e-learning website.
- A laptop or desktop computer in order to view the e-learning websites.
- Camtasia software to capture user interaction with the e-learning websites.
- Paper questionnaires.
- A pen to complete the questionnaire.

3.20 Summary

Chapter three describes the research methodology and the research methods that were followed to undertake the research studies of this thesis. It also presents the data analysis techniques that will be used to analyse the results in chapter five. This research adopted the mixed research method to answer the research questions of this thesis. One of the objectives of this research is to understand the influence of Arabic language and culture on the use of, and judgment on, e-learning websites. The researcher judged that objectivism and subjectivism are both appropriate methods to explore how these factors can affect the usability of e-learning websites. Data will be collected from Arab users by their completing a set of tasks. Moreover, two primary methods will be used for

collecting data: interviews and questionnaires will be used to collect experiences and perceptions on using multi-language e-learning websites from representative end users.

This research chose a deductive research approach since it starts from a general claim (i.e. that cultural and language differences affect users' usability perception of e-learning websites) and leads to confirming this claim by realistic studies.

This research contains three phases. The first phase defines and analyses the research problem and reviews the related literature. The second phase designs and implements two multi-language e-learning websites (an Arabic version and an English version). Next, the experimental study takes place and users will be asked to perform a number of interaction tasks on the e-learning websites. Data will be collected from users using the methods that are detailed in this chapter. Finally, the collected data will be analysed and interpreted. Phase three is created to validate the results of phase two by using two methods: case study and fuzzy set theory. These methods will test the theoretical model for a number of selected e-learning websites. This will enable the researcher to create the appropriate usability guidelines for Arabic e-learning websites. In this stage, the researcher aims to test the level of usability of the Arabic and English versions. This thesis uses two methods to investigate the two e-learning website versions: a user study that is a type of empirical method that requires representative end users to evaluate the user interface, and a case study, which is a usability inspection method that is performed by usability professionals and experts to investigate the websites (both the Arabic and English versions).

The user study collects primary data from direct interaction with the computer system, from the user actions performed, and from the user impressions and feelings concerning the system following the study. Performance measurements include the average time taken to complete each task during the experiment and the average number of clicks on

each task during the experiment. Subjective feelings were captured using the usability questionnaire and the aesthetics questionnaire. The users are asked to think-aloud (i.e. verbalise their thoughts) to explain their views towards e-learning websites and the factors and problems that affect e-learning websites. The results will focus on four areas: the e-learning area, the culture area, the language area and the usability area, with the aims of exploring the relationship between these areas and how they affect each other in order to produce usability guidelines for Arabic e-learning websites.

The collected data are of two types. Quantitative data uses tables, statistics and graphs and are analysed by using a T-test to establish the differences between the two versions of the e-learning websites. Qualitative data include comments and text and are gathered by using several techniques such as interviews, the thinking aloud protocol and observations. All of these data are processed through the normal stages of preparation, analysis, and interpretation. As such, both quantitative and qualitative data analysis techniques will be used to analyse the data. The numerical results will be analysed using descriptive statistics (e.g. mean and standard deviation) and inferential statistics (e.g. repeated measure t-test) to highlight the differences between the Arabic and English versions of the e-learning websites.

The case study method is valuable in identifying the strengths and weaknesses of the selected e-learning websites. Fuzzy set theory is used to validate results of the case study from the perspective of the experts. Since the qualitative data capture the feelings of the participants, the fuzzy set theory is used to allow the decision-makers to incorporate unquantifiable information, incomplete information, non-obtainable information and partially unknown facts into the decision model. Moreover, the case study and fuzzy set theory help in validating the proposed Arabic usability guidelines for e-learning websites.

Following on from the discussion of the methodology in this chapter, the next chapter (chapter four) describes how the data are collected in this research using different data collection techniques.

4 Chapter Four: Data Collection Planning

4.1 Introduction

This chapter describes the systems and instruments that are used to undertake the experiment in order to answer the main questions of this thesis. It starts by describing the development of the experimental e-learning websites (both Arabic and English versions) together with their underlying programming languages. This chapter presents the list of materials used to collect the data, with a strong focus on the questionnaires and follow-up interviews. This chapter defines the experiment and details all the e-learning tasks to be performed by the participants. Moreover, this chapter lists the questionnaires that are used in the experiment to capture the feelings and satisfaction of the participants, such as the evaluation questionnaire, the e-learning questionnaire, the usability questionnaire and the aesthetics questionnaire.

4.2 Design and Development of the E-learning Websites

Through the interface design, various design elements can be addressed including symbols, colour, font, font size, images and language. All of these elements, when collected together, reflect the culture of the users (Daniel et al., 2011, Singh & Baack, 2004)see section 2.2.9. The key objectives in developing two versions of the system are to firstly explore users' reactions towards the Arabic version of the website and compare them to their reactions towards the English version of the website and, secondly, to assess the usability of the overall system.

The next section discusses how this system was designed and implemented. The designed system was built after examining various e-learning websites including Arabic e-learning websites and English e-learning websites. As discussed in previous chapters, especially in the section on the literature review, any website in general should be

controlled by the five principles of usability: effectiveness, efficiency, learnability, memorability and satisfaction (Neilson, 1993).

There is a certain level of recommendations that should be respected during the design of any system. For example, participants should smoothly navigate between the homepage and other pages, how easy it is to find the information they need, how fast the page should respond to user requests, and so on. One of the most important aspects of web design is to build a system that can be used by anyone, including those who have little experience of using the Internet, to allow them to find the information they need with minimum effort. Following recommended design principles when designing any interactive system results in a system that is simple and easy to use which contains relevant and clear content. The following diagram clarifies the structure of the e-learning website system.

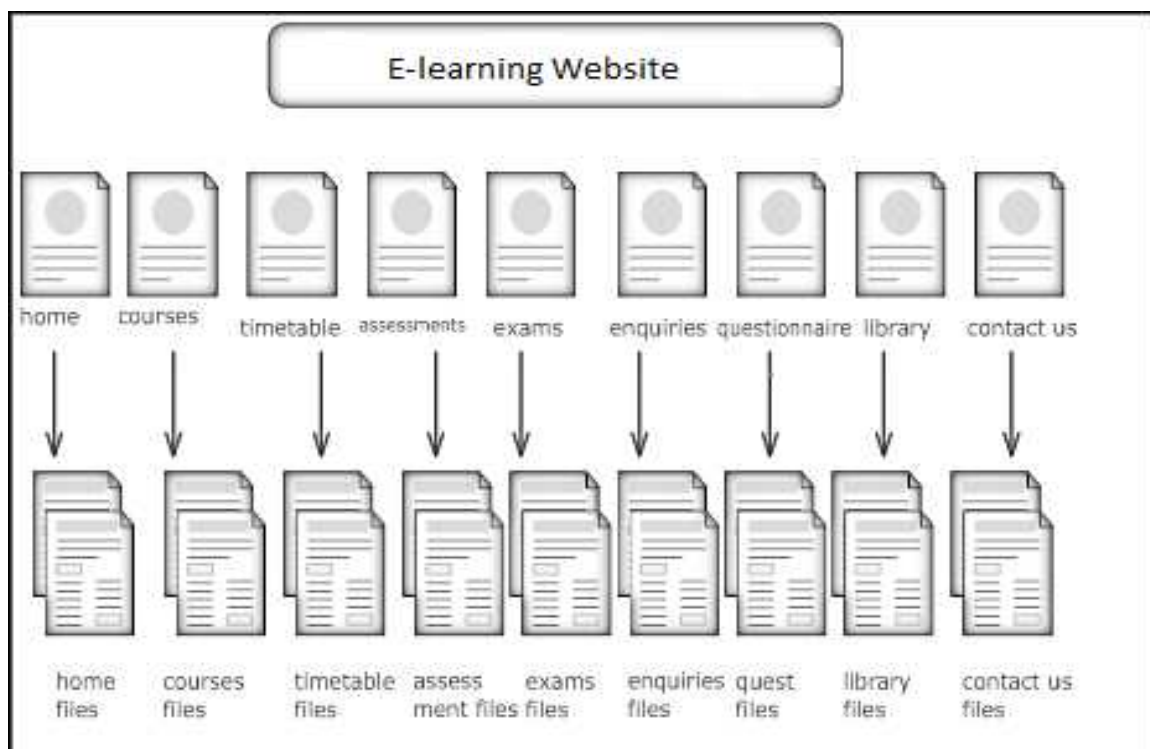


Figure 4-1: Structure of the e-learning websites.

The websites are designed to contain the main elements that are needed in any e-learning websites. These include the following pages; Home page, courses, timetables, exam papers, assessments, enquiries (should students need more information about the content of the website or any other kind of help), questionnaires, library and contact us page (general information about the student portal site itself). The researcher for a number of reasons performed the design of the e-learning websites: an online system or website is difficult to control if one is not its owner as the creator of the website may change the e-learning website during the course of the experiment. In addition, it is difficult to investigate all the points that the researcher wants to focus on using an existing websites or systems. For this reason, it was decided to create an e-learning system in order to obtain the data required for this thesis.

The full structure of the sites are described in chapter three (see section 3.8) with a focus on the technical details. This section describes the points, which are not discussed in chapter three. This thesis studies five main areas: e-learning, usability, culture, web design elements, and language. Therefore, there are a range of options that have been adopted by this research. The two versions use white background while the colour of the main logo is blue. This design choice was motivated by the study of Marcus (2009) who showed that Arab users prefer white as the background colour whilst blue dominates the colour schemes of Arabic websites.

Pictures; were chosen to represent two different types of backgrounds: British backgrounds and Arabic backgrounds. Some pages contain both types of pictures representing the two different cultures. Some pages contain pictures from an Arabic background only, whilst others contain pictures from an English background only. This design choice was aimed at recording the reaction of Arab users towards the various kinds of pictures and to measure their feelings towards them.

Announcements; were put on the homepage of both versions. These announcements were obtained from the University of Manchester Students' Union and were translated using the Babylon website, without any change to the translation. The purpose of this was to measure the reaction of Arab users towards some words which are acceptable in the west but may not be acceptable in the Arab world. A standard font size (12) and Times New Roman type was used for both versions of the e-learning websites. The usability performance of both systems was examined by comparing the participants' performance during the undertaking of seven tasks. Performance was measured using the following steps:

- Number of clicks: in order to measure how easy it was to use the site.
- Completion time: to measure how long it took the participants to complete the tasks on each version.
- Correctness: to measure how accurate the responses to the tasks were.

4.3 Programming Languages

The researcher used HTML and PHP to implement the various functionalities of the two e-learning websites. PHP offers various advantages and thus was selected by the researcher. PHP is an open source language and enjoys huge support from many forums and programmers all over the world. This enabled the researcher to save a lot of time particularly as all the services are free and easy to use (e.g. web functionality is built-in; it does not need to be rebooted often; it is compatible with the majority of operating systems, and codes can be downloaded free from official PHP resources).

The researcher used MySQL, which is declarative language that can be used to create, manage, store and maintain databases. It is one of the quickest ways of organising data and provides a framework for accessing data rapidly and efficiently. In addition, one of

the most important features MySQL offers is the ability to hold large amounts of information and run swiftly at the same time. The design of the e-learning websites was performed using Macromedia Dreamweaver (version 8.02) which is a professional HTML editor that enables users to efficiently design codes, and maintain and develop websites, web pages and applications. Dreamweaver offers many other features, such as CSS, framesets and page designs. Moreover, it facilitates the use of many languages such as HTML, XML, ASP, VBScript, and JavaScript.

موقع التعليم الإلكتروني

مرحبا بكم في موقع النوبة

مناهج البحث

لغرض من البحث هو اكتشاف الآخوة على الأسئلة من خلال تطبيق العملي الإجرائيات. والهدف الرئيسي من البحث هو معرفة الحقيقة التي كانت محيأة والذي لم تكن اكتشف حتى الآن، على الرغم من كل دراسة بحثة لديها هدف محدد اتجاهه، يمكننا أن نفكر في أهداف البحث والوقوف في عدد من النحجعات واسعة بعد:

أهداف البحث

يمكننا أن نفكر في أهداف البحث والوقوف في عدد من النحجعات واسعة بعد:

- اكتسب الألفة مع ظاهرة أو لتحقق رؤى جديدة في تلك (دراسات مع هذا ويطلق على الكائن في طريقة العرض كما استكشافي أو formulative البحوث دراسات)؛
- لتصور بدقة خصائص فرد معين، أو وضع مجموعة (ومن المعروف دراسات مع هذا الكائن في طريقة العرض كما وصفي البحوث دراسات)؛
- لتحديد التكرار الذي يحدث شيئا أو التي تربط ذلك مع شيء آخر (ومن المعروف دراسات مع هذا الكائن في طريقة العرض كما شخصي بحث دراسات)؛
- لاختبار فرضية وجود علاقة سببية بين المتغيرات (وتعرف مثل هذه الدراسات كما فرضية الاختيار البحوث والدراسات).
- لتحديد أهداف المخطمان تخطط لإحاطة فريق
- لتحديد العوامل المرتبطة معايير فعالية لتلبيها لإحاطة فريق.
- لوضع نظرية تفسيرية أن الرميطة عوامل معينة مع فعالية خطط لإحاطة فريق.
- لوصف مدى فعالية معايير للإحاطة فريق ذلك استوفيت.

الفلسفات بحث النفاهم والمناهج

فلسفة البحث الذي يعتمد على اقتراحات عامة حول الطريقة التي يقوم بعرض العالم. وسوف ندعم هذه الافتراضات استراتيجيات البحوث الخاصة بك والأساليب التي تختارها كجزء من تلك الاستراتيجية. في جزء منه، وسوف يتأثر فلسفة كنت تعتمد على اعتبارات عملية. ومع ذلك، فإن التأثير الرئيسي ومن المرجح أن يكون عرض معينة من العلاقة بين المعرفة والعملية التي من خلالها يتم تطويره، الباحث الذي يشعر مع التحقن، مثل الموارد اللازمة في عملية التصور، من المرجح أن يكون وجهة نظر مختلفة جدا على البحث الطريقة التي ينبغي أن يتم من الباحث المعنية مع مشاعر ومواقف العمال نحو مديرهم في ذلك عملية التصحيح نفسها. ليس فقط سوف الاستراتيجيات وأساليبهم ربما تختلف اختلافا كبيرا، ولكن حتى وجهات نظرهم على ما هو مهم، وربما الأهم من ذلك، ما هو مفيد.

الملاحة العامة

- الصفحة الرئيسية
- الحواد
- الحدود الزمني
- الواجبات
- الإشجانات
- استفسارات
- اسئلة
- المكتبة
- بنا اتصل

إعلان من اتحاد الحابة الجامعية.

نحن نقدم مجموعة واسعة من المسريوات الكحولية وغير الكحولية وتنشيل ظن من العروض. يمكنك التمتع بهدد آمنة في المعرفة التي لدينا جميع الأرباح يعود إلى حفظ انخفاض الأسعار وتحسين الاتحاد الخاص. ونحن نعتبر على اختيارنا البيرة الخفيفة، يمكنك أن تختار من وجهة نظرا أربعة البذ تسحب، لدينا حتى البيرة الخاصة بنا - Hoptimus ريسا هناك الكثير للمشاركة كذلك مع أنيق وأنيق كامل من الكوكيتلات والبيرة وسرات النجاج أو البوب، والكعكالم للمجتمع بعد نسبة المعينة البذ الإعاقيه أو اللصني الإيجابيات... لدينا أيضا قائمة العلامه

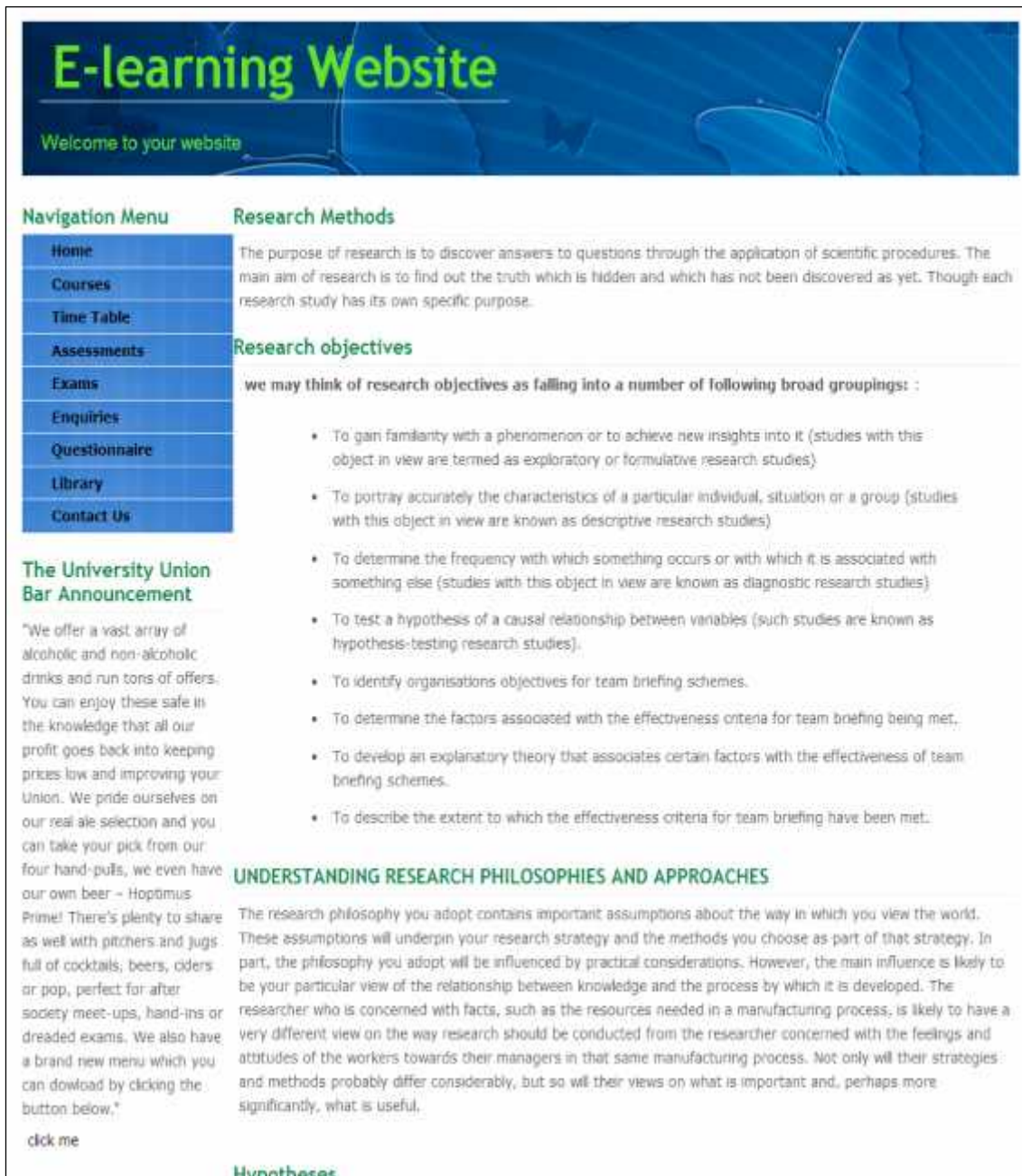


Figure 4-2: Arabic and English versions of the e-learning websites.

4.4 Experiment

As described in the chapter two, this study instructed students to accomplish several tasks with a focus on the five components of usability (learnability, efficiency, memorability, satisfaction, and errors) (Nielsen, 1993). The researcher recorded user interactions, responses and any verbal feedback. To avoid bias participants were divided

into two groups: group one started with the Arabic version, then moved onto the English version whilst group two started with the English version, and then moved on to the Arabic version. This was to minimise any effects of order on user judgments on the e-learning websites, given that the two versions contained the same content, colour, background, toolbar, font, materials and pictures. Seven tasks were created to enable full interaction with the e-learning websites. The time taken to complete these tasks were measured and reported in seconds for both versions of the e-learning websites. The average number of errors and the number of clicks were also recorded (Nielsen, 1993). The first, second and third tasks were designed to instruct participants to download the timetable, exam papers and, from the courses page, a pdf file respectively. The fourth task was designed to ask the participants to upload a file and to assess the satisfaction of Arab users when viewing some pictures that appeared on the page while uploading the file. Task five asked the participants to fill in and send enquiries through a dedicated fill-in form. Task six asked the participants to download a pdf file from the courses page. This task was repeated to measure whether the users could easily remember how to perform the task by relying on their experience from task three. Finally, task seven asked participants to fill in a questionnaire; this is a typical e-learning task whereby students can provide input into e-learning websites. The following table summarises the seven tasks undertaken by the participants.

Table 4-1: E-learning tasks in the experiment.

Task Number	Description of task
Task One	Download the second year timetable.
Task Two	Download exam paper 'number three'

Task Three	Download the ‘research philosophy pdf file’ from the research methods’ module
Task Four	Upload your assessment file
Task Five	Fill in the enquiry form and submit your enquiry
Task Six	Download the “Cultural Influences on Immigrants.pdf” course
Task Seven	Fill in a form

In summary, the users’ interactions, reactions and feedback to/on these tasks enabled the researcher to answer the main questions of this research. The goal of a usability evaluation is to evaluate the system by looking at the components of usability: effectiveness, efficiency, errors, and response of the user (Bastien, 2008, Horsky, 2009).

4.5 Overview of the Participants

All participants in this experiment studied in the School of the Built Environment at the University of Salford, pursuing an undergraduate degree or a postgraduate degree (including Masters students and PhD students). Participants came from different Arab countries including: Algeria, Libya, Jordan, Sudan, Saudi Arabia, Qatar, UAE, Lebanon, Palestine, Yemen, Somalia and Iraq. Their age varied from 20 to 51 years.

4.6 Interviews

Interviews are an efficient way of collecting data and assist the researcher in gathering valid and reliable data (Marczyk et al., 2005, Saunders et al., 2009). The data were collected by using semi-structured interviews providing a flexible situation and thus enabling the participants to answer or avoid some questions (Zikmund et al., 2009). All

participants took part in the face-to-face interviews and completed all the tasks that are required. Participants were recruited to take part in this study through email and by direct contact (by telephone) and through relationship with students in the School of the Built Environment at the University of Salford. Recruitment of the participants and the data collection took more than six months in total. The study lasted approximately 90 minutes per person, whereby the participants completed the interaction tasks in approximately 30 minutes, completed the interview in approximately 30 minutes and answered the evaluation questionnaires in approximately 30 minutes.

Before the interviews took place, the two e-learning websites (the Arabic and the English versions) were checked to ensure correctness and were saved onto a laptop which participants used to conduct the study. At the start of the study, the researcher asked the participants to read and sign the consent form (which detailed the specifics and requirements concerning participation in the study). All the participants agreed to take part and signed the consent form before starting.

The participants were divided randomly into two equal groups as described in section 3.12.2. 25 participants commenced by using the Arabic version, followed by the English version of the e-learning website. The remaining 25 participants commenced by using the English version, followed by the Arabic version. This was undertaken to eliminate any effects of order, ensuring that user judgements were not influenced by the order in which they viewed the two versions. This results in reliable data.

However, before starting the study the researcher gave the participants an opportunity to take a tour of both versions of the e-learning site using the laptop. This was accompanied by an explanation of the objectives and the steps of the study. Participants' interaction was recorded throughout the study using Camtasia software

(version 7). This allowed the researcher to record all the reactions of the participants for post-study analysis.

During the study, participants were encouraged to express their feelings and opinions whilst the researcher made notes of these comments. Participants were offered a break half-way through the study if needed. This was to ensure that fatigue did not affect their performance and feedback. At the end of the tasks, participants were instructed to report three or more positive and negative comments. This allowed the researcher to recognise the strengths and weaknesses of the e-learning websites. Finally, at the end of the study, participants completed the evaluation questionnaire as discussed in the next section.

4.6.1 Evaluation Questionnaire

As described in chapter three, section 3.12.1, the evaluation questionnaire contains two parts, one for the Arabic version and the other for the English version. These two parts contain the same questions, except for question number 17, which was excluded from the English evaluation questionnaire because it concerned the level of translation and there is no translation from Arabic language to English language (the text is originally in English and Translated to Arabic language). Therefore, the Arabic evaluation questionnaire contains 18 questions and the English evaluation questionnaire contains 17 questions. The structure of the questionnaire was divided into five main sections: general, images, colour, language and font.

The general section contains two questions relating to gender and age to explore the age and gender of the participants. The images' section contains four questions that relate to the level of confidence in the images, assessing how important the use of images is to the Arab users and the level of satisfaction with the images used in the website; also the consistency between the images in each version. The purpose of this section was to

examine the importance of the images in the Arabic e-learning website and what type of images the participants liked or disliked having in the system in order to make a judgement about the use of images and the reasons why participants preferred specific images. This helped the researcher to explore the factors that may affect the judgment of Arab users concerning images in e-learning websites.

The section on colour contains five questions, seeking user opinions about the colours used on the site, and whether the user prefers another colour other than the colours of the website. The questions in this section were designed to check the favourite colour and the least favourite colour of the users and any additional comments relating to the use of colours. This part helped the researcher to identify the inclinations and desires of the participants regarding the colours used.

The language section includes four questions including questions on the language that the participant prefers, and how the direction of writing from right to left affects the user's judgement. After the researcher has assessed the native language of the participant and the level of knowledge the user has of the English language, then the level of translation from English to the Arabic language will be examined. Finally, there are three questions involving font. This includes favourite font size, favourite font type, and any further comments about font. This part is designed to explore the font type and size that makes the Arab users feel most comfortable when using the system.

4.6.2 E-learning Questionnaire

This section is divided into two sub-sections: sub-section A links to information about the participant's use of technology, and section B links to the use of online tools. Each sub-section consists of six questions. The first sub-section focuses on general questions, such as the number of years the participant has been using the computer, where the

participant accesses a network computer, how often he/she accesses email, the number of hours the participant spends on the internet, and if the participant changes colour, icons, font size, and menu items.

The second sub-section focuses on the use of online tools such as the social networks and the number of hours spent on them, the type of synchronous chat tools used by the participant, the type of messaging and discussion tools used, and if the participant has any online personal space. The purpose of this section is to estimate the extent of interaction with e-learning tools.

4.6.3 Usability Questionnaire

One of the most important parts of this study is the usability questionnaire that was originally designed by IBM in 1993. The IBM questionnaire (CSUQ) contains nineteen questions but this was reduced to fifteen questions as described in chapter three, section 3.12.1. The questionnaire uses seven scale levels, starting from 1 (strongly disagree) and finishing with 7 (strongly agree).

The usability questionnaire used in this study was designed to discover the similarities and differences between the Arabic version and the English version from point of view of the participants (especially the extent to which the system is usable) and to explore the conceptual differences of usability between the Arabic and the English versions (see the objectives in section 1.5). The questionnaire led to the answers for the research questions: What are the differences in usability perception of Arab users between Arabic e-learning websites and English e-learning websites? What are the main barriers and challenges that Arab web users face when using Arabic e-learning websites?

The usability questions relate to: whether the system is simple, effective, efficient, comfortable, easy to learn, the number of errors made, whether the information is clear,

how easy it was to find the information needed, how the information is organised, whether the system is convenient to use, the level of confidence of the participant, and the satisfaction of the participant. In essence, the questionnaire focuses on the components of usability: effectiveness, efficiency, memorability, satisfaction and errors (see section 1.3 and section 2.3.1).

4.6.4 Aesthetics Questionnaire

This questionnaire was designed to gain an idea as to how much the Arab users are concerned about the importance of the beauty in e-learning websites, and how it influences their judgment of websites (Li & Yeh, 2010). This questionnaire contains fifteen questions linked to: aesthetics' design, pleasantness of the design, clarity, the symmetry of the design and the level of creativity, and fascination with the design. Additionally whether the participant felt joyful, felt pressure, felt gratified, and whether the system provided reliable information.

4.7 Summary

This chapter describes the techniques that were used to collect the data. This includes the design and development of the two versions of the e-learning website, in Arabic and English. This chapter defines the structure of both the e-learning websites and illustrates the main design elements, which represent the building blocks of the sites. Both versions have the same number of web pages and contain exactly the same content. Each version of the e-learning website contains a total of 9 web pages. One version was written in Arabic whilst the other version was written in English. Next, the researcher will move on to describe the programming languages, e.g. HTML, PHP, and MySQL, used to build the website.

This chapter also describes the tasks in the user study that the participants undertook. In total, seven tasks were designed to measure and evaluate usability and user interaction with the e-learning websites. The users' interactions with, reactions to and feedback on these tasks allowed the researcher to answer the main questions of this thesis. Moreover, the main objective of a usability evaluation is to evaluate a website with a view to looking at the components of usability: effectiveness, efficiency, errors, learnability, and satisfaction. This chapter defines the participants who were involved in the user study. The interviews included an evaluation questionnaire, which is categorised into four main parts: images, colour, language and font. Each part contains questions to measure the reaction of the participants. The e-learning questionnaire is divided into two sections: section A captures information about the participant's use of technology, and section B captures the use of online tools. The usability questionnaire comprises fifteen questions, focusing on five categories following the classifications put forward by Nielsen (1993): learnability, efficiency, memorability, satisfaction, and errors. The questions are on a seven-point Likert scale. Finally, the aesthetics questionnaire contains fifteen questions to measure the satisfaction of the users and their feelings regarding using the e-learning websites. This questionnaire is adapted from the work of Tractinsky and Lavie (2001).

After this description of the techniques and instruments used to collect the data and the feedback from the participants, the next chapter (chapter 5) analyses the data and describes the results.

5 Chapter Five: Data Analysis and Results

5.1 Introduction

This chapter presents the results from the analysis of the objective data and subjective data gathered from the experiment. The findings are demonstrated using tables and statistical analysis techniques.

The results presented in this chapter are divided into six sections. The first section discusses the performance of the participants and reports on the T-test results. The second section discusses the results of the evaluation questionnaire (on the Arabic and English versions of the websites) with a focus on the evaluation of images, colour, language, and font. The third section discusses the results of the e-learning questionnaire comprising the following elements: information about technology use and the use of online tools. The fourth section discusses the usability questionnaire (Arabic and English versions) and reports on the T-test results. The fifth section discusses the aesthetics questionnaire (Arabic and English versions). Finally, the sixth section presents qualitative results from the positive and negative feedbacks of the participants.

5.2 Demographics of Subjects

5.2.1 Participants

50 participants were recruited for this usability study. 34 (68%) were males and 16 (32%) were females. All the participants were students in the Built Environment School at the University of Salford. Their mean age is 34 years.

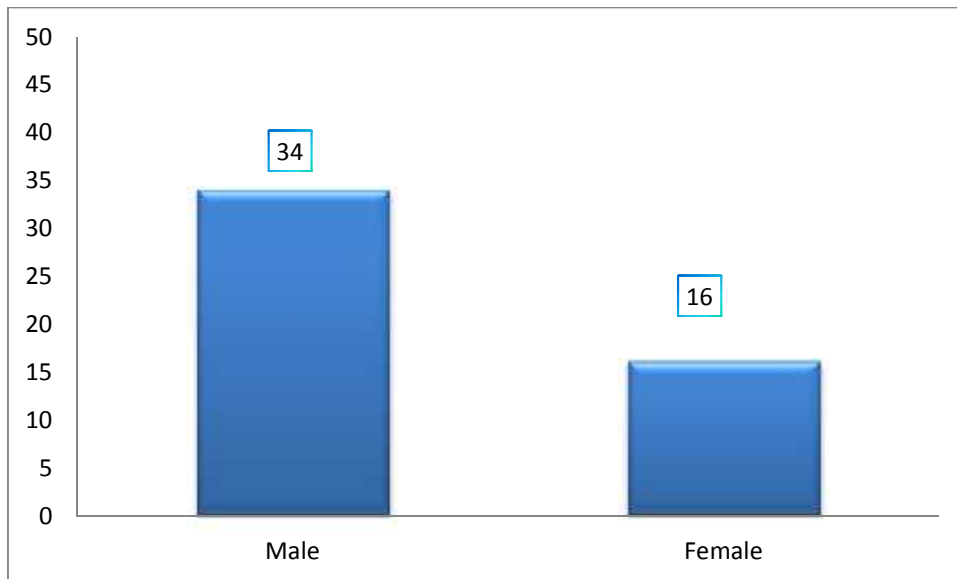


Figure 5-1 Participant gender

5.2.2 Section A: Information about Participant Technology Use

The e-learning questionnaire captures information about the use of everyday technologies. It consists of six basic questions. The first question focused on the familiarity of participants with a computer. In total, 48 participants (96%) had been using a computer for more than 10 years. Only two participants had been using a computer for less than 10 years. The second question focused on the daily use of computers by the participants. 45 participants (90%) used a computer on a daily basis. The first and second questions demonstrated familiarity of the participants with computers. The third question focused on accessibility to a network. 34 participants (68%) reported access to a home and university network. The fourth question focused on frequency of access to email and the Internet. 45 participants (90%) reported accessing email and the Internet on a daily basis. The fifth question focused on the number of hours spent on the Internet per week. On average, 40 participants (80%) spent 21 hours or more browsing the Internet every week. The remaining 10 participants (20%) spent an average of 10-20 hours browsing the Internet every week. The sixth

question focused on the customisation of computer applications by the participants. Only 23 participants (46%) reported that they had customised computer applications to accommodate their preferences. In the conclusion, all the participants were well educated and were familiar with Internet and computer skills and the majority of them had many years' experience of the Internet.

Table 5-1: Information on technology use

Questions				
1. How many years have you been using a computer?	2 Less than 10 years 48 10-20 years			
2. I normally use a computer:	45 Every day 3 A few times a week 2 Occasionally			
3. I have access to a networked computer:	34 Home & university	8 Home, work & university	5 Home	3 University
4. I normally access email and/or the Internet:	45 Every day	3 Few times a week	2 Occasionally	
5. How many hours a week do you spend at home or	10 (10-20)	36 (21-40)	4 (more than 40)	

somewhere else on the Internet?	hours)	hours)	
6. When I use a computer, I customise it to suit my personal preferences	27 No	23 Yes	

5.2.3 Section B: Use of online tools

This questionnaire captures information on the use of online tools by the participants. It consists of six basic questions. The first question focused on the use of social networks and the type of social networking applications. 44 participants (88%) reported using social networks such as Facebook. 34 of those (77%) used social networking sites on a daily basis. Only 6 participants had not used social networking websites and applications. The second question focused on the use of synchronous chat tools. Surprisingly, only 19 participants (38%) reported using chat tools a few times a week, such as Skype and instant messaging applications. The third question focused on the use of messaging and discussion tools. 47 participants (94%) reported using discussion tools such as email clients, forums, and telephone applications. The fourth question focused on the playing of online games and the use of virtual worlds. Only 6 participants (12%) reported playing online games and using virtual worlds such as Call of Duty, and Miniclip. The fifth question focused on the ownership of online personal space other than social networking accounts. Only three participants reported having an online

personal space, e.g. a blog. The sixth question focused on the use of other social networking tools. Two participants reported the use of Twitter.

Table 5-2: The use of social networks, chat tools and discussion tools by the participants

Questions		
1. I use social networks	44 Yes 26 (Facebook) Every day 8 (Facebook) Few times a week 8 Other (Facebook, Hotmail, Yahoo etc.) Every day 2 No comments 6 No 6/6 no comments	
2. I use synchronous chat tools	No: 31	19 Yes 5 (Chat rooms) 6 (Skype) 5 Instant messaging 3 Other
3. I use messaging and discussion tools	No: 3	Yes: 47 38 Email 3 Forums 21 Phone texting 2 Phone apps (e.g. Viber)
4. I play online games or use virtual worlds and talk to other players	No: 44	Yes: 6 Examples include: Call of duty, Miniclip, Second life, Xbox
5. I have an online personal space other than a social network	No: 47	Yes: 3 3 (blogs)

6. I use other social and communication tools online	No: 48	Yes:2 2 (Twitter)
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5.3 Performance Data

The performance data collected in this study included two main usability metrics, namely, the average completion time and the average number of clicks. Average completion time is measured in seconds and refers to the average time taken by the participants to complete a particular task. The average number of clicks refers to the average number of web clicks by the participants to complete a particular task. Participants completed seven different tasks for the Arabic version and English version of the e-learning websites. For each of these tasks, the results are summarised in table 5.1.

Generally, the average completion times for the Arabic and English versions of the e-learning website were similar for some of the usability tasks. In this respect, completion time for task one, task two, task three and task six were similar between the Arabic and English e-learning websites. All of these tasks asked the participants to download information (e.g. a timetable and an exam paper) from the e-learning website as discussed in the chapter four. Average download time ranged between 15.8 – 26.46 seconds in the Arabic version, and between 14.34 – 23.89 seconds in the English version.

However, statistical analysis showed that the average completion time for task four, task five and task seven differed significantly (Paired-samples t-test, $P < 0.05$). For all these tasks (i.e. four, five, and seven), participants spent longer completing the tasks in the Arabic version than in the English version. Participants took 44.65 seconds to complete task four in the Arabic version and 34.62 seconds in the English version (t-test,

p=0.030). Participants took 73.67 seconds to complete task five in the Arabic version and 52.46 seconds in the English version (t-test, p=0.011). Finally, participants took 327.62 seconds to complete task seven in the Arabic version and 251.94 seconds in the English version (t-test, p=0.000).

However, statistical analysis for the average number of clicks between the Arabic and English versions of the e-learning website revealed no significant statistical differences apart from in the first task. This means that the participants had the same number of clicks on both versions of the website. In respect of task one, participants had more mouse clicks in the English version (2.40) than in the Arabic version (2.12), (Paired samples t-test, P=0.022).

Participants had an average of 2.12, 2.29, 2.56, 2.72 clicks for tasks one, two, three and six respectively in the Arabic website. Participants had an average of 3.59, 5.22, and 43.22 clicks for tasks five, four and seven respectively in the Arabic website. Participants had an average of 2.10, 2.40, 2.55, 2.94 clicks for tasks one, two, three and six respectively in the English version. Participants had an average of 3.70, 5.20, and 41.48 clicks for tasks five, four and seven respectively in the English version.

It is worthwhile noting that all the participants were able to complete all tasks for both versions of the e-learning website. As such, average correctness for each version was 100% (see Appendix E).

Table 5-3: Performance data in the usability study -statistical significance, t-test, shaded.

	Average Completion Time (Seconds)	Average Number of Clicks

Task	Arabic	English	Arabic	English
One	15.8	14.34	2.12	2.4
Two	20.5	22.88	2.72	2.94
Three	26.46	23.89	2.56	2.55
Four	44.65	34.62	5.22	5.20
Five	73.67	52.46	3.59	3.70
Six	20.36	17.47	2.29	2.10
Seven	327.62	251.94	43.22	41.48

5.4 Evaluation of the Websites

5.4.1 Images

There were four questions that focused on the effect of images on user perception and satisfaction. The first question addressed whether the images in each of the versions give the participants different feelings. In response to this question, 48 participants (96%) agreed that the images incited negative feelings in the Arabic version. 26 of those participants (52%) attributed this to cultural reasons, i.e. these images contradicted their cultural values. 8 others (16.66%) linked this to a combination of culture and religion. 6 others (12%) linked this directly to religious reasons. 43 participants (86%) agreed that images incited negative feelings in the English version. 23 of those (54%) attributed this to cultural reasons. 8 others linked this to cultural and religious reasons. 5 others linked this merely to religious reasons. The remaining participants (12%) disagreed that the images evoked negative feelings.

The second question in the questionnaire addressed the importance of using images in e-learning websites and the rationale behind this. 48 participants (96%) agreed that using images is crucial in Arabic e-learning websites for the following reasons: images evoke people's interest (31.25%), images make e-learning websites attractive (29.16%), images improve understanding and clarity (27.08%) and images can communicate religious conformance (6.25%). 46 participants (92%) agreed that using images is important in English e-learning websites for the following reasons: images make e-learning websites attractive (28.26%), images evoke people's interest (26.08%), images improve understanding (15.21%), and images evoke positive feelings (8.69%).

The third question in the questionnaire addressed whether the images evoked happiness in the participants and the reasons behind this happiness. Six participants in Arabic e-learning websites indicated that the images evoked positive feelings, whereas 44 participants disagreed that the images evoked positive feelings in them in the Arabic website. Of those who disagreed, 29 participants (65.90%) attributed their discontent to cultural reasons. 8 others (18%) reported cultural and religious reasons. 5 others (11.36%) reported religion as the primary reason for discontent. However, 11 participants agreed that images evoked their positive feelings in the English website whilst 39 other participants expressed discontent. Of those who disagreed, 23 participants (58.97%) reported culture as the primary reason for their discontent. 7 others (17.94%) reported culture and religion, and 5 others (12.82%) reported religion as the reason for their dissatisfaction.

The fourth question addressed whether the images portrayed consistency across the e-learning websites. 43 participants (86%) felt that the images were inconsistent across the Arabic version as they contradicted their cultural values (88.37%). 41 participants

(82%) felt that the images were inconsistent across the English version as they contradicted their cultural values (85.36%).

Table 5-4: The effect of images on the design of e-learning websites

	Arabic version		English version	
1. In general the use of images in the e-learning website give you negative feelings?	Yes: 48 26 culture 8 culture and religion 6 religion 8 no comments	No: 2 2 culture	Yes: 43 23 culture 7 no comments 5 religion 8 culture and religion	No: 6, N/A 1 1 culture 5 no comments
2. Do you think it's important to use images?	Yes 48: 15 interesting 14 attractive 13 enhances understanding and clarity 3 conformance to religion 3 no comments	No 2: 1 good description 1 no comments	Yes 46: 13 attractive 12 interesting 7 better explanation 4 positive feeling 2 other 8 no comments	No 4: 3 unattractive 1 no comments
3. Are you happy about the images that you find through the e-learning website?	Yes 6: 3 no comments 1 good feeling 1 good pictures 1 only few pictures	No: 44 29 culture 8 culture and religion 5 religion 1 no comments 1 not enough	Yes: 11 11 no comments	No: 39 23 culture 7 culture and religion 5 religion 2 no comments 2 others
4. Do you feel that there is consistency between the images?	Yes:5 3 no comments 2 different culture 1 good picture	No: 43 38 different culture 3 no comments 2 other N/A: 2 2 no comments	Yes:8 3 no comments 2 different culture 3 other	No: 41 35 different culture 5 no comments 1 N/A N/A: 1 1 no comments

5.4.2 Colour

Four questions focused on the effect of colour on user perception and satisfaction. The first of these questions focused on whether it was felt necessary to change the colour of the e-learning websites. 41 participants (82%) found the colour of the Arabic version to

be of good quality. 40 participants (80%) found the colour of the English version to be satisfactory. The second question focused on the colour scheme considered to be appropriate for the e-learning websites. There was an agreement that blue is the favourite colour for the Arabic version (68%) and the English version (74%) of the e-learning websites. 4 participants (8%) selected green as their favourite colour for the Arabic version. 4 others (8%) selected red as their favourite colour for the English version. The third question enquired about the least favourite colours of the participants. Participants agreed that black and yellow were the least favoured colours for e-learning websites (50% to 56%). These were followed by purple, green, orange and red. The fourth question enquired about the favourite colour of the participants. 34 participants (68%) indicated that blue is their favourite colour, followed by red (14%) for both the Arabic and English versions.

Table 5-4: The effect of colour on the design of e-learning websites

	Arabic version		English version	
1. Do you think we need to change the colour of the website?	Yes: 9 9 no comments	No: 41 29 good 4 no comments 2 effective colour 6 others	Yes: 10 10 no comments	No: 40 26 good 7 no comments 4 effective colour
2. Which is the best scheme colour for the e-learning website?	34 Blue 4 Green 3 Red 8 other 1 no comments		37 Blue 4 Red 3 Orange 6 others	
3. What is your least favourite colour?	14 Black 14 Yellow 6 Red			

	5 Purple 5 Orange 4 Green 2 Others
4. What is your most favourite colour?	34 Blue 7 Red 2 Black 2 Purple 2 Red and Blue 3 other

5.4.3 Language

Four questions focused on the effect of language on user perception and satisfaction. The first of these questions enquired about participants' preferences in regard to the language they enjoy using. 34 participants (68%) preferred to use Arabic, whilst the remaining 16 participants (32%) favoured English for e-learning websites. The second question addressed the link between the direction of writing and user judgment of the e-learning websites. 32 participants (64%) agreed that the direction of writing (i.e. right to left) in the Arabic version affected their judgement of the e-learning website. 50% favoured Arabic merely because it was their mother language. The remaining 18 participants (36%) said there was no link between writing direction and user judgment. However, only 25 participants (50%) agreed that the direction of writing (left to right) in the English version affected their judgement of the e-learning website. The third question asked about the native language of the participants. All the participants in this study indicated that Arabic is their native language. The fourth question assessed the quality of translation used in the Arabic website on a 5-point rating scale, with 1 = poor and 5 = excellent. The average rating score was 1.52 indicating a poor translation of the

content in the Arabic version. This poor score was attributed to the poor translation and the incorrect meaning conveyed through the content of the site.

Table 5-5: The effect of language on the design of e-learning websites

	Arabic version	English version
In order of preference, which language do you enjoy using:	34 Arabic 30/34 mother language 3/34 beautiful language 1/34 understand both 16 English 16/16 no comments	
Does the direction of writing (e.g. from left to right) in the website affect your judgment of the e-learning website?	Yes: 32 16 mother language 16 no comments No: 18 5 familiar with both 10 no comments 3 other	Yes: 25 20 no comments 1 familiar with Arabic 2 Arabic better 1 different language different feeling 1 direction affect me No: 25 16 no comments 9 familiar with both
What is your native language?	50 Arabic	
What do you think of the level of the translation used on the Arabic site?	19 (level1) (the worst) 23 (level 2) 4 (level 3) 1 (level 4) 3 (level 5) Reason: 40 bad translation 5 hard to understand 5 other	

5.4.4 Font

Two questions focused on the effect of font on user perception and satisfaction. The first of these questions enquired about participants' preferences in regard to the text font. 22 participants (44%) preferred size 13 and 21 participants (42%) preferred size 12

for the font of the Arabic version. However, 22 participants (44%) preferred size 12 and 19 participants (38%) preferred size 13 for the font of the English version. The second question enquired about the type of font preferred for the e-learning websites. 23 participants (46%) selected Traditional Arabic and 12 participants (24%) selected Times New Roman as their favourite font for the Arabic version. However, 30 participants (60%) selected Times New Roman and 13 participants selected Calibri as their favourite font for the English version.

Table 5-6: The effect of text font on the design of e-learning websites

Question	Arabic version	English version
Which size from the following options do you favour?	22 (size 13) 21 (size 12) 7 (size 14)	22 (size 12) 19 (size 13) 9 (size 14)
Which type of font do you favour for e-learning websites?	23 Traditional Arabic 12 Times New Roman 7 Arial 8 Other	30 Times New Roman 13 Arial 2 Calibri 5 Other

5.5 Usability of the Websites

The usability questionnaire consisted of 15 questions to measure the usability of both versions of the e-learning websites, i.e. the Arabic and English versions. Each question was rated on a 7-point Likert scale, where 1 = strongly disagree, 4 = neutral and 7 = strongly agree.

5.5.1 Usability Questionnaire Data Analysis

There were two types of usability questionnaires, an Arabic questionnaire and an English questionnaire. The first question on the English version addressed how simple the e-learning website was to use. Results showed that 31 participants scored 6/7 (62%), 16 participants (32%) scored 7/7 and 3 participants (6%) scored 5. For the Arabic

version, 30 participants (60%) scored 6/7, 13 participants (26%) scored 7/7 and 6 participants scored 5 (12%).

The second question focused on how effectively the participant could complete his work using the e-learning website. For the English version, 34 participants (68%) scored 6, 16 participants (32%) scored 7. For the Arabic version, 29 participants (58%) scored 6, 14 participants scored 5 (28%), 6 participants scored a 7 (12%).

The third question measured whether users could complete their work quickly. For the English version, 31 participants (62%) scored 6, 11 participants scored 7 (22%), 8 participants (16%) scored 5. For the Arabic version, 21 participants (42%) scored 5, 19 participants (38%) scored 6 and 9 participants (18%) scored 7. The fourth question focused on how efficiently the participant could complete his work using the e-learning website. For the English version, 30 participants (60%) scored a 6, 13 participants (26%) scored 5 and 7 participants (14%) scored 7. For the Arabic version, 20 participants (40%) scored 6, 19 participants (38%) scored 5 and 9 participants (18%) scored 7.

The fifth question focused on how comfortable the user felt using the e-learning website. For the English version, 32 participants (64%) scored 6, 8 participants (16%) scored 5, 5 participants (10%) scored 7 and 5 participants (10%) scored 4. For the Arabic version, 29 participants (58%) scored 6, 14 participants (28%) scored 5 and 9 participants (18%) scored 7. The sixth question measured how easy it was to learn to use the e-learning website. For the English version, 34 participants (68%) scored 6, 8 participants (16%) scored 7 and 8 participants (16%) scored 5. For the Arabic version, 21 participants (42%) scored 6, 21 participants (42%) scored 5 and 6 participants (12%) scored 7.

The seventh question addressed whether the e-learning website gave error messages. For the English version, 25 participants (50%) scored 6, 14 participants (28%) scored 5 and 6 participants (12%) scored 4. For the Arabic version, 18 participants (36%) scored 5, 15 participants (30%) scored 6 and 11 participants (22%) scored 4. The eighth question on the English version how clear the information was on the e-learning website asked. Results showed that 31 participants (62%) scored 6, 11 participants (22%) scored 5 and 7 participants (14%) scored 7. For the Arabic version, 24 participants (48%) scored 6, 17 participants (34%) scored 5 and 7 participants (14%) scored 7. The ninth question on the English version was based on how easy it was to find information in this e-learning website. 32 participants (54%) scored 6, 12 participants (24%) scored 5 and 6 participants (12%) scored 7. For the Arabic version, 25 participants (50%) scored 6, 15 participants (30%) scored 5 and 7 participants (14%) scored 7. The tenth question focused on how easy it was to navigate through this e-learning website. For the English version, 29 participants (58%) scored 6, 11 participants (22%) scored 5 and 10 participants (20%) scored 7. For the Arabic version, 32 participants (64%) scored 6, 12 participants (24%) scored 5 and 5 participants (10%) scored 7. The eleventh question addressed whether the organisation of the information on the e-learning website screens was clear. For the English version, 33 participants (66%) scored 6, 9 participants (18%) scored 5 and 8 participants (16%) scored 7. For the Arabic version, 30 participants (60%) scored 6, 12 participants (24%) scored 5 and 5 participants (10%) scored 7. The twelfth question focused on how convenient it was to use the e-learning website. For the English version, 27 participants (54%) scored 6, 19 participants (38%) scored 5. For the Arabic version, 21 participants (42%) scored 5, 11 participants (22%) scored 4, 9 participants (18%) scored 6 and 5 participants (10%) scored 7. The thirteenth question measured whether the portal was unnecessarily complex. For the English version, 34

participants (68%) scored 1 and 12 participants (24%) scored 2. For the Arabic version, 22 participants (44%) scored 1, 18 participants (36%) scored 2 and 6 participants (12%) scored 3. The fourteenth ‘question’ was a statement: “I felt confident using this e-learning website.” For the English version, 37 participants (74%) scored a 6, 8 participants (16%) scored 5 and 5 people (10%) scored 7. For the Arabic version, 20 participants (40%) agreed scored 5, 14 participants (28%) scored 6 and 11 participants (22%) scored 4. The fifteenth question focused on how, overall, the participants were satisfied with the e-learning website. For the English version, 34 participants (68%) scored 6, 9 participants (18%) scored 7 and 7 participants (14%) scored a 5. However, in the Arabic version, 21 participants (42%) scored 5, 17 participants (34%) scored 4 and, finally, 10 participants (20%) scored 6. (See the Appendix F). The tables below provide full details on the results and feedback by the participants for both versions (Arabic and English).

Table 5-7: Usability Questionnaire -English version - Results

Questions	Low	1	2	3	4	5	6	7	High
1. It was simple to use this Student Portal	strongly disagree	0	0	0	0	3	31	16	strongly agree
2. I can effectively complete my work using this Student Portal	strongly disagree	0	0	0	0	4	34	12	strongly agree
3. I am able to complete my work quickly using this Student Portal	strongly disagree	0	0	0	0	8	31	11	strongly agree
4. I am able to efficiently complete my work using this Student Portal	strongly disagree	0	0	0	0	13	30	7	strongly agree
5. I feel comfortable using this Student Portal	strongly disagree	0	0	0	5	8	32	5	strongly agree
6. It was easy to learn to use this Student Portal	strongly disagree	0	0	0	0	8	34	8	strongly agree
7. The Student Portal gives error messages that clearly tell me how to fix problems	strongly disagree	0	1	0	6	14	25	4	strongly agree
8. The information provided with this Student Portal is clear	strongly disagree	0	0	0	1	11	31	7	strongly agree

9. It is easy to find the information I needed	strongly disagree	0	0	0	0	12	32	6	strongly agree	
10 It was easy to navigate through this Student Portal	strongly disagree	0	0	0	0	11	29	10	strongly agree	
11 The organization of information on the Student Portal screens is clear	strongly disagree	0	0	0	0	9	33	8	strongly agree	
12 It was convenient to use this Student Portal	strongly disagree	0	0	0	1	19	27	3	strongly agree	
13 I found this Student Portal unnecessarily complex	strongly disagree	34	12	2	0	0	1	1	strongly agree	
14 I felt confident using this Student Portal.	strongly disagree	0	0	0	0	8	37	5	strongly agree	
15 Overall, I am satisfied with this Student Portal	strongly disagree	0	0	0	0	7	34	9	strongly agree	
			1	2	3	4	5	6	7	

Table 5-8: Usability Questionnaire -Arabic version- Results

			1	2	3	4	5	6	7	
1. It was simple to use this Student Portal	strongly disagree	0	0	0	1	6	30	13	strongly agree	
2. I can effectively complete my work using this Student Portal	strongly disagree	0	0	0	1	14	29	6	strongly agree	
3. I am able to complete my work quickly using this Student Portal	strongly disagree	0	0	0	1	21	19	9	strongly agree	
4. I am able to efficiently complete my work using this Student Portal	strongly disagree	0	0	0	2	19	20	9	strongly agree	
5. I feel comfortable using this Student Portal	strongly disagree	0	0	0	1	14	29	6	strongly agree	
6. It was easy to learn to use this Student Portal	strongly disagree	0	0	0	2	21	21	6	strongly agree	
7. The Student Portal gives error messages that clearly tell me how to fix problems	strongly disagree	1	1	3	11	18	15	1	strongly agree	
8. The information provided with this Student Portal is clear	strongly disagree	0	0	1	1	17	24	7	strongly agree	
9. It is easy to find the information I needed	strongly disagree	0	0	0	3	15	25	7	strongly agree	
10 It was easy to navigate through this Student Portal	strongly disagree	0	0	0	1	12	32	5	strongly agree	
11 The organization of information on the Student Portal screens is clear	strongly disagree	0	0	0	0	12	30	8	strongly agree	

12	It was convenient to use this Student Portal	strongly disagree	0	0	4	11	21	9	5	strongly agree
13	I found this Student Portal unnecessarily complex	strongly disagree	22	18	6	0	3	0	1	strongly agree
14	I felt confident using this Student Portal	strongly disagree	0	1	1	11	20	14	3	strongly agree
15	Overall, I am satisfied with this Student Portal	strongly disagree	0	1	1	17	21	10	0	strongly agree
			1	2	3	4	5	6	7	

5.5.2 T-Test Results

The paired-samples t-test (see Appendix E) on the average score for each usability question revealed significant statistical differences between the Arabic version and English version. The differences were evident in the following questions: question 2, question 3, question 5, question 6, question 7, question 12, question 14 and question 15. Participants believed that they could complete their work more effectively using the English version (6.16/7) than with the Arabic version (5.84/7), (t-test, $p=0.001$). Participants believed they were able to complete their work quicker using the English version (6.06/7) than with the Arabic version (5.72/7), (t-test, $p=0.014$). Participants felt more comfortable using the English version (5.74/7) than the Arabic version (5.06/7), (t-test, $p<0.000$). Participants felt that English version (5.96/7) was easier to learn to use than the Arabic version (5.62/7), (t-test, $p=0.005$). Participants reported that the English version (5.44/7) gave more error messages that clearly help them to fix the problems than the Arabic version (4.78/7), (t-test, $p=0.001$). Participants rated the English version (5.62/7) as more convenient to use than the Arabic version (4.88/7), (t-test, $p=0.001$). Participants felt more confident using the English version (5.90/7) than the Arabic version (5.08/7), (t-test, $p<0.000$). Finally, participants felt more satisfied using the English version (6.02/7) than the Arabic version (4.76/7), (t-test, $p<0.000$). No

statistical differences were found for the remaining usability questions (i.e. questions 1, 4, 8, 9, 10, 11, and 13). (See Appendix F).

5.6 Aesthetics of the Websites

The aesthetics questionnaire was adapted from the work of Tractinsky and Lavie (2004) and contained 15 questions focusing on the aesthetics' features of the Arabic and English versions and on the feelings of pleasure and joy of the participants in using the e-learning sites. Each of the questions was rated on a 7-point Likert scale, with 1 = strongly disagree and 7 = strongly agree. Overall, no significant statistical differences were found between the Arabic and English versions of the e-learning website with regard to aesthetics.

5.6.1 Aesthetics Questionnaire Analysis Data

There were two types of aesthetic questionnaires, an Arabic version and an English version. The first question on the aesthetic questionnaire in the English version was on "aesthetic design." 21 participants (42%) scored 6 and 14 participants (28%) scored 5. For the Arabic version, 24 participants (48%) scored 6 and 12 participants (24%) scored 7. The second question focused on whether the website had a pleasant design. For the English version, 29 participants (58%) scored 6 and 9 other participants scored 7. For the Arabic version, 23 participants (46%) scored 6 and 14 other participants (28%) scored 7.

The third question focused on "clear design." For the English version, 20 participants (40%) scored 6 and 16 participants (38%) scored 7. For the Arabic version, 26 participants (52%) scored 6 and 16 participants (32%) scored 7. The fourth question measured the Clean of the design. For the English version, 23 participants (46%) scored

6, 12 other participants (24%) scored 5 and 11 participants (22%) scored 7. For the Arabic version, 21 participants (42%) scored 6 and 14 participants (28%) scored a 7.

The fifth question addressed “symmetric design”. For the English version, 19 participants (38%) scored 5 and 15 participants (30%) scored 6. For the Arabic version, 21 participants (42%) scored 6, 10 participants (20%) scored 5 and another 10 participants (20%) scored 7. The sixth question focused on “creative design”. For the English version 15 participants (30%) scored 5 and 14 participants (28%) scored 6. For the Arabic version, 12 participants (24%) scored 6, another 11 participants (22%) scored 5 and 11 participants (22%) scored 4.

The seventh question focused on “fascinating design”. For the English version, 16 participants (38%) scored 5 and 12 participants (24%) scored 6. For the Arabic version, 12 participants (24%) scored 4, 10 participants (20%) scored 5 and 10 participants (20%) scored 6. The eighth question addressed the “use of special effects”. For the English version, 12 participants (24%) scored 2 and 12 participants (24%) scored 5. For the Arabic version, 12 participants (24%) scored 2, 10 participants (20%) scored 6 and 9 participants (18%) scored 5.

The ninth question focused on “original design”. For the English version, 17 participants (34%) scored 6 and 11 participants (22%) scored a 7 in the Likert scale. For the Arabic version, 24 participants (48%) scored 6, and 10 participants (20%) scored 5.

The tenth question was on “sophisticated design”. For the English version, 15 participants (30%) scored 5 and 11 participants (22%) scored 6. For the Arabic version, 10 participants (20%) scored 4, 16 participants (32%) scored 6 and 15 participants (30%) scored 5.

The eleventh question focused on “feeling joyful”. For the English version, 24 participants (48%) scored 6 and 8 participants (16%) scored 7. For the Arabic version,

17 participants (34%) scored 6, 11 participants (22) scored 5 and another 11 participants (22%) scored 7. The twelfth question focused on “feeling pleasure”. For the English version, 17 participants (34%) scored 6, 12 participants (24%) scored 5 and 11 participants (22%) scored 7. For the Arabic version, 17 participants (34%) scored 6, 11 participants (22%) scored 7 and 10 participants (20%) scored 5.

The thirteenth question was on “feeling gratified”. For the English version, 12 participants (24%) scored 5 and 11 participants (22%) scored 6; additionally, another 11 participants (22%) scored 7. For the Arabic version, 15 other participants (30%) scored 6 and 11 participants scored (22%) 5. The fourteenth question asked whether the site contained no mistakes. For the English version, 26 participants (52%) scored 6 and 9 participants (18%) scored 7. For the Arabic version, 25 participants (50%) scored 6 and 9 participants (18%) scored 7.

Finally, the fifteenth question focused on “the site provides reliable information.” For the English version, 25 participants (50%) scored 6 and 17 participants (34%) scored 7. For the Arabic version, 22 participants (44%) scored 6 and 17 participants (34%) scored 7. The tables (5.10, 5.11) below provide full details on the results and the feedback of participants for both versions (Arabic and English version) (See Appendix G).

Table 5-9: Aesthetics Questionnaire -English version- Results

			1	2	3	4	5	6	7	
1. Aesthetic design	strongly disagree	0	1	1	5	14	21	8	strongly agree	
2. Pleasant design	strongly disagree	0	1	1	3	7	29	9	strongly agree	
3. Clear design	strongly disagree	0	1	0	5	8	20	16	strongly agree	

4. Clean design	strongly disagree	0	1	2	1	12	23	11	strongly agree
5. Symmetric design	strongly disagree	0	2	4	5	19	15	5	strongly agree
6. Creative design	strongly disagree	1	0	4	8	15	14	8	strongly agree
7. Fascinating design	strongly disagree	1	2	4	9	16	12	6	strongly agree
8. Use of special effects	strongly disagree	9	12	3	5	12	4	5	strongly agree
9. Original design	strongly disagree	0	1	4	8	11	17	9	strongly agree
10. Sophisticated design	strongly disagree	1	3	5	10	15	11	5	strongly agree
11. Feel joyful	strongly disagree	1	2	5	4	6	24	8	strongly agree
12. Feel pleasure	strongly disagree	1	2	1	6	12	17	11	strongly agree
13. Feel gratified	strongly disagree	3	5	1	7	12	11	11	strongly agree
14. Site contains no mistakes	strongly disagree	2	2	0	4	7	26	9	strongly agree
15. Site provides reliable information	strongly disagree	0	0	1	1	6	25	17	strongly agree

		1	2	3	4	5	6	7	
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TABLE 5-10: Usability Questionnaire -Arabic version- Results

		1	2	3	4	5	6	7	
1. Aesthetic design	strongly disagree	0	1	2	7	4	24	12	strongly agree
2. Pleasant design	strongly disagree	0	0	1	4	8	23	14	strongly agree
3. Clear design	strongly disagree	1	0	0	1	6	26	16	strongly agree

4. Clean design	strongly disagree	1	0	3	4	7	21	14	strongly agree
5. Symmetric design	strongly disagree	0	0	4	5	10	21	10	strongly agree
6. Creative design	strongly disagree	0	4	4	11	11	12	8	strongly agree
7. Fascinating design	strongly disagree	1	5	6	12	10	10	6	strongly agree
8. Use of special effects	strongly disagree	6	12	5	6	9	10	2	strongly agree
9. Original design	strongly disagree	2	5	1	5	10	24	3	strongly agree
10. Sophisticated design	strongly disagree	0	4	1	5	15	16	9	strongly agree
11. Feel joyful	strongly disagree	1	1	2	7	11	17	11	strongly agree
12. Feel pleasure	strongly disagree	2	1	3	6	10	17	11	strongly agree
13. Feel gratified	strongly disagree	3	5	2	5	11	15	9	strongly agree
14. Site contains no mistakes	strongly disagree	3	1	5	2	5	25	9	strongly agree
15. Site provides reliable information	strongly disagree	0	2	0	4	5	22	17	strongly agree

			1	2	3	4	5	6	7	
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5.6.2 T-Test Results

The Arabic version received the highest scores for the following aspects: site provides reliable information (6.12/7), site has a clear design (5.88/7), site has a clean design (5.74/7). However, it received the lowest scores for the following aspects: site uses special effects (3.62/7), site has a sophisticated design (4.76/7), site has a fascinating design (4.94/7).

On the other hand, the English version received the highest scores for the following aspects: site has a clear design (6.06/7), site provides reliable information (5.92/6), and site has a pleasant design (5.90/7). However, it received the worst average scores for the following aspects: site uses special effects (3.76/7), site has a fascinating design (4.58/7), and participants felt gratified in using the English version. (4.94/7) (See Appendix G).

5.7 Content Analysis of Qualitative Data

Qualitative data was collected and transcribed from videos taken during the experiment into an excel spreadsheet. Qualitative data included the participants' opinions and feedback about the advantages and disadvantages of the two versions of the e-learning sites. Certain contents in the statements were counted for the Arabic and English versions of the e-learning site. On average, the Arabic version received 100 positive comments and 122 negative comments. This is 2 positive comments and 2.44 negative comments per participant. However, the English version received 91 positive comments and 84 negative comments. This is 1.82 positive comments and 1.68 negative comments.

Each of these comments were then coded and classified under a theme as summarised in the table below. Each of themes were then counted and summed up. The positive feedback for the Arabic version resulted in a total of nine themes. The Arabic version was praised for its clear structure (18.62% of the themes), ease of use (14.70% of the themes), appealing design (13.72% of the themes), good use of colours (11.76% of the themes), ease of navigation (11.76% of the themes), simplicity (9.80% of the themes), good organisation (9.80% of the themes), easy to access (5.88% of the themes), and ease of transferring information (2% of the themes). The positive feedback for the

English version resulted in a total of 7 themes. The English version was praised for its clear structure (32.97% of the themes), appealing design (18.68% of the themes), ease of navigation (18.68% of the themes), ease of access (15.38% of the themes), simplicity (9.89% of the themes), interesting design (2.20% of the themes), and fast download times (2.20% of the themes).

The negative feedback for the Arabic version resulted in a total of 8 themes. The Arabic version was criticised for the inappropriate pictures for the audience of the site (31.15% of the themes), the weak quality of the translated content on the site (25.40% of the themes), the inappropriate contents and words used within the website (18.85% of the themes) which clashes with the cultural values of the participants, the small font size which made it difficult to read the text on the site (16.40%), the absence of sound in the site (3.27% of the themes), bad use of colours (1.63%), the lack of images within the site (1.63%), and difficulty to navigate through the site (1.63%). However, the negative feedback for the English version resulted in a total of 5 themes. Participants criticised the use of the inappropriate pictures deemed unsuitable for the audience of the site (32.14% of the themes), the inappropriate contents and words on the site (28.57%), the lack of pictures (9.52% of the themes), and the lack of interesting colours (5.95% of the themes).

Table 5-11: Results of Content Analysis of the Qualitative Data for the Arabic and English Versions of the E-learning Site.

Negative Feedback		Positive Feedback	
Arabic version	English version	English version	Arabic version

1. Announcement: website contains inappropriate words/content 23 occurrences (18.85%)	Announcement: website contains inappropriate words / content 24 occurrences (28.57%)	Clear structure: 30 occurrences (32.97%)	Clear structure: 19 occurrences (18.62%)
Translation: Some content does not reflect the correct meaning 31 occurrences (25.40%)	Lack of pictures: 8 occurrences (9.52%)	Appealing design: 17 occurrences (18.68%)	Good use of colour: 12 occurrences (11.76%)
Pictures: Website contains inappropriate pictures 38 occurrences (31.15%)	Pictures: website contains inappropriate pictures 27 occurrences (32.14%)	Easy to access: 14 occurrences (15.38%)	Appealing design: 14 occurrences (13.72%)
Font size: Small font size 20 occurrences (16.40%)	Font size: Small font size 20 occurrences (23.80%)	Easy to navigate: 17 occurrences (18.68%)	Easy to use: 15 occurrences (14.70%)
No sound: 4 occurrences	Lack of interesting colours: 5 occurrences (5.95%)	Simple: 9 occurrences (9.89%)	Easy to navigate: 12 occurrences (11.76%)
Bad use of colour: 2 occurrences		Interesting: 2 occurrences	Simple: 10 occurrences (9.80%)
Need more pictures: 2 occurrences		Quick download: 2 occurrences	Good organisation: 10 occurrences

			(9.80%)
Hard to navigate: 2 occurrences			Easy to access: 6 occurrences (5.88%)
			Easy to transfer: 2 occurrences

The following table shows the hypotheses and their data analysis

Table 5-12: Hypotheses and data analysis

Hypothesis	Test Results
H01: There is no difference between the effect of images on usability for English and Arabic e-learning websites	Tested through Questionnaire and survey
H02: There is no difference between the effect of colour on usability for English and Arabic e-learning websites.	Tested through Questionnaire and survey
H03: There is no difference between the effect of font on usability for English and Arabic e-learning websites.	Tested through Questionnaire and survey
H04: There is no difference between the effect of Learnability on usability for English and Arabic e-learning websites.	Tested through Questionnaire, survey and T-test
H05: There is no difference between the effect of language on usability for English and Arabic e-learning websites.	Tested through Questionnaire and survey

H06: There is no difference between the effect of satisfaction on usability for English and Arabic e-learning websites.	Tested through Questionnaire, survey and T-test
H07: There is no difference between the effect of content on usability for English and Arabic e-learning websites.	Tested through Questionnaire, survey and T-test
H08: There is no difference between the effect of efficiency on usability for English and Arabic e-learning websites.	Tested through Questionnaire, survey and T-test
H09: There is no difference between the effect of Aesthetics on usability for English and Arabic e-learning websites.	Tested through Questionnaire, survey and T-test

5.8 Summary

This chapter reports on the key findings from the experiment that was undertaken by a total of 50 Arabic participants. The experiment was created to analyse an e-learning websites, which was implemented in Arabic and in English. Participants were instructed to accomplish seven tasks and to give qualitative feedback about both versions.

Analysis of the performance data demonstrated that the average completion time for tasks four, five and seven differed significantly between the two versions, with participants taking longer to complete the tasks in the Arabic version. These differences may be attributed to a lack of understanding of the Arabic version, as a result of the poorly-translated content. This meant that participants spent longer in interpreting the content of the Arabic version. However, no statistical differences were found with

respect to the average number of clicks between the two versions. Similarly, the average task correctness for each version was 100%.

The results of the evaluation questionnaire showed that the majority of the participants reported negative feedback on the Arabic version, which was perceived to contradict their culture and religion. The majority of participants agreed that blue is the most preferred colour for Arab users followed by red. They agreed that black and yellow were the least preferred colours for Arab users. Participants preferred using the Arabic language rather than the English language. They agreed that the direction of the writing (i.e. right to left) in the Arabic version affected their judgement of the e-learning website. Moreover, the Arab users indicated that the translation of the content into Arabic was very poor and delivered incorrect meanings which affected the usability of the Arabic e-learning version. Analysis of the data showed that the majority of participants preferred font size 12 or 13 for the Arabic version and size 12 for the English. Moreover, the participants preferred the Traditional Arabic font type for the Arabic version and Times New Roman font for the English version.

The analysis of the usability questionnaire data demonstrated that the usability of Arabic and English versions differed statistically (using Paired-samples T-tests) with the Arabic version receiving lower usability scores. The differences related to three criteria: efficiency (question three), learnability (questions two, six and seven), and satisfaction (questions five, twelve, fourteen and fifteen). This indicates that satisfaction and learnability are the most affected criteria when the two versions are compared. Clearly, the Arabic e-learning version failed to fulfil the needs of the Arab users. Results showed no statistical difference in respect to the aesthetics of the Arabic and English versions. Finally, content analysis of the qualitative data resulted in 100

positive comments and 122 negative comments for the Arabic version, against 91 positive comments and 84 negative comments for the English version. The analysis showed that participants complained mostly about inappropriate content in the two versions in the form of text and images, and about the poor quality of the translation in the Arabic version. Both versions were complemented for their clear structure and appealing design.

Following the discussion of the experiment in this chapter, the next chapter (chapter six) presents a case study to validate the key results from the experiment.

6 Chapter Six: Case Study

6.1 Introduction

Chapter six presents the results of a case study. A case study is a research strategy used to investigate a particular phenomenon within a real life context and is used to provide answers for questions (what, why, and how). This case study focuses on examining two different e-learning websites for two universities to validate the findings of the experiment. The two selected e-learning websites belong to two universities ranked amongst the top Arabic universities in the Shanghai University Ranking (2013). King Saud University ranks 195 (Saudi Arabia) and Cairo University ranks 435 (Egypt). The case study examines four criteria: images, colour, language and font and how these criteria are influenced by Arabic culture.

6.2 Choice of E-learning Websites for Analysis

The researcher has chosen two universities for the case study, King Saud University in Saudi Arabia and Cairo University in Egypt. These universities were chosen as they are ranked as top Arabic universities in the Shanghai Ranking website and the Times Higher Education website for 2013. The Shanghai Ranking lists only five universities from the Arab world as ranking amongst the top 500 universities in the world, four of them being from Saudi Arabia (with King Saud University on the top) and the fifth being the University of Cairo in Egypt. The researcher chose the highest ranked university from Saudi Arabia (i.e. King Saud University) and the highest ranked university from Egypt (Cairo University). This allowed the researcher to examine e-learning websites from two different Arab countries.

This case study will test and evaluate the following areas: pictures, colours, language, culture and font. The reason for this evaluation is to examine if it is possible to

generalise theoretical propositions. Furthermore, the type of case study that will be followed in this chapter is the explanatory type of case study which explains the phenomenon in-depth (Aghapour, 2012). However, the researcher, in this thesis, forms theories and thereafter tests the theory in real-life.

6.3 Describing and Analysing Data

6.3.1 King Saud University

The King Saud University was ranked as the best Arabic university in 2013 in the Shanghai Ranking. Additionally, their website is ranked one of the best websites within Arabic universities.

6.3.1.1 Structure of the King Saud University Website

The structure of the King Saud University website contains five essential parts: the logo bar, the horizontal navigation bar, the header, the main content (text area) and the footer. Moreover, the logo bar includes the university logo and vertical subtitles (administration, student, etc.). The navigation bar is horizontal and contains information on the colleges, research and media and so on. The header function comprises special promotions to interact with the visitors of the website; for example, advertisements and news from the university. The main content holds two types of information, text and pictures. Finally, the footer holds some information about the services; for example how to contact the University.



Figure 6-1: King Saud University home page top.



Figure 6-2: King Saud University home page footer.

There are many features, which can be observed in this website as follows.

6.3.1.2 Images

It is easy to notice that there is no sign of a female photograph on the whole of the University site (King Saud University). This reflects Hofstede's dimension wherein he describes Arab culture as being a masculine society. However, this supports the findings of this research that Arab society is very sensitive to photographs of females when used in websites. Another important observation that can be made is on the content of the pictures, which included a photograph of the President of the University. This also fits in with the Hofstede dimension wherein he described Arabic society as having a power distance dimension whereby the supervisor is the manager and employees look to him as the leader who is responsible for the project or work (Tsui, 2004). In addition, the pictures reflect the type of society in the Arabic world as all the pictures present a group of people. Hofstede showed that Arab culture has one of the highest scores in collectivism culture, and this is exactly what the pictures reflect and the experiment also illustrates this reality quite clearly.

6.3.1.3 Font

A variety of fonts and font sizes are used on the site. The navigation bar and the subtitles on the left side of the logo bar use a 13 point bold type. A 12 point font size is used on the main content with a bold font on the titles. The website uses the following types of fonts: 'Droid Arabic Kufi', 'Helvetica Neue', Arial, Sans-Serif on the main content and 'Droid Arabic Naskh', 'Open Sans', Sans-Serif in the logo bar.

6.3.1.4 Colour

It is noticeable that the site demonstrates only two types of colours. White is used for the background and a blue colour is used for the University logo, navigation bar,

subtitles and the main titles on the main contents page. Finally, the footer uses a dark blue colour.

6.3.1.5 Language

The site uses Arabic language on its the main page and offers an English version as well. However, one of the most prominent features in the Arabic language in the website is the direction of writing (right to left). Native Arabic speakers create the text, thus there is no doubt about the level of correctness of the language. This also confirms that the best results for creating a good text without mistakes can be achieved only if a native speaker of that language creates it. Any translation made by machines or undertaken by translator who is not a native speaker (and has a different culture) can affect the accuracy of a language that is used on a website. Moreover, this is exactly what the researcher has described in chapter three and which the experiment results have shown in chapter five. Additionally, the King Saud University website has many details which are informative for website visitors. The site consists of many features that can help students and staff as well.

6.3.1.6 Culture

Overall, the King Saud University website design reveals Arabic cultural requirements. Its pictures reflect Arabic society such as the type of clothing, the relationships between members of society and the mentality of Arabs. The font also illustrates the depth of how much Arabs are attached to the past (Kufa is a symbol to Kufa city in Iraq where it was one of the most cultural city in the Islamic empirical). Additionally, this proves how proud they are to bring the past to the present day. The blue colour also verifies the relationship between Arabs and nature. Arabs see blue a sky in their daily lives and this gives them tranquillity and self-assurance which, in turn, has an effect on their

judgement of their favourite colour. The content of the website illustrates a lot of information that may be needed by the users in order to feel relaxed when using the website and this reflects in the high-uncertainty-avoidance trait of Arabic users as the Hofstede study has shown before.

6.3.2 Cairo University

Cairo University was ranked by Shanghai Ranking website and the Times Higher Education website as the second best Arabic university in 2013.

6.3.2.1 Structure of the Cairo University Website

The structure of the Cairo University website contains the following parts: the logo bar, the header, two horizontal navigation bars (left and right), the main content (text area) and two footer bars. Additionally, the logo bar includes the University logo and vertical subtitles (home, calendar, links, contacts and search). The header bar contains some announcements on University activities; the navigation bar is horizontal and contains three main titles: information about the University, student society inside the University and media and news. The main contents hold text and pictures. Finally, the footer is divided into two. The first one holds some information about the University, for example how to contact the University, and some links to social network webpages like Twitter and Facebook. The second footer holds the same information as that already in the header bar except for the University logo.



Figure 6-3: Cairo University homepage.

There are many features which can be observed in this website as follows.

6.3.2.2 Images

The same point about images can be made here (as for the King Saud University web site); there are no pictures of females (at this moment). Again, this reflects Hofstede's dimension that Arab cultures demonstrate a higher score as a masculinity society. However, this also supports the thesis results which have shown that Arab society becomes very sensitive to photos of females when they are used in websites and e-learning systems. Similarly, the pictures include a photograph of the President of Cairo

University on the website's home page and this also emphasises a point that Hofstede confirmed, namely that Arab society is a power distant culture.

Additionally, the website includes an image of the university buildings, even the University logo refers to the Pharaonic period. These provide examples of how much Arabs are concerned with the past and this is reflected by their use of past imagery and symbols in the present. Again, these results are consistent with experiments' results in this thesis.

6.3.2.2 Font

A variety of font sizes are used on the site but, overall, the site mostly uses the Tahoma font type. The left box on the page uses 12 point font size and the right box uses a 13 point font size. A 10 point font size is used for the main content and 15 point size on the titles.

6.3.2.3 Colour

It is noticeable that the site uses three types of colour; white for the background, gold on the logo bar and blue for the navigation bar, subtitles and the main titles. Moreover, the content font and the footer also use a blue colour. The dominant colour on the page is clear blue.

6.3.2.4 Language

The website uses Arabic language on the main page and offers an English version of the website. The website is designed by a native Arab supervised by Cairo University web designers and development team. There is no concern about the correctness of language that is used on the website. These results are consistent with the experimental results in this thesis. More details will be presented in the discussion chapter. The Cairo

University website also contains weekly information that may be of importance for students. In addition, the site has many other features such as details on academic affairs, research at Cairo University, students, and so on.

6.3.2.5 Culture

Generally, Cairo University's website design reveals Arabic cultural requirements. It is clear that there are no pictures of females on the site and this emphasises that Arabic society is a masculine society where female pictures should not appear in formal websites. This fact is what this thesis confirmed through the experiment and from the data that was collected from the Arab users. The pictures also demonstrate that the Arab society values the past; the logo is a good example of that. The colour blue is the most favoured colour on the website, and this demonstrates the nature of Arab society, which is characterised as a masculine society. In addition, blue is associated with nature and Arab society is very close to nature, perhaps closer than is the case for most modern civilisations.

Arabs see blue skies in their daily lives and this gives them tranquillity and self-assurance which, in turn, has an effect on their judgement of their favourite colour. The content of the website illustrates a lot of information that may be needed by the users in order to feel relaxed when using the website and this reflects in the high-uncertainty-avoidance trait of Arabic users as the Hofstede study has shown before.

6.4 Summary

This chapter has presented a case study to validate the results of the experiment. The results of the case study have shown that two Arabic e-learning websites (King Saud University from Saudi Arabia and Cairo University from Egypt) do not include any

female pictures. This supports the results of the experiment, confirming that Arab society is still resistant to using female photographs in websites. This is mainly due to the type of clothing worn by the women (Arabic culture) rather than their gender. Some pictures on these University websites contained the Presidents of the Universities, which reflects the power distance element of Arabic culture. Other pictures contained groups of people, which reflect the collectivism element of Arabic culture. Furthermore, a 12-point font size is used throughout these websites, confirming the results from the experiment. White is used as the background while blue is the main colour on these two e-learning websites and is used for the logo, the navigation bar, subtitles and the main titles. Again, this reiterates the results of the experiment. The quality of the text is good; this is due to native Arabic speakers creating it. Both e-learning websites contain a lot of content reflecting the high-uncertainty-avoidance trait of the Arabic society.

Finally, the results from the case study confirm that all the previous design elements are affected by the culture and religion of the Arab users. Next, chapter 7 reports on the results of applying fuzzy set theory to the Arabic and English versions of the e-learning website.

7 Chapter Seven: Comparative Evaluation of Usability of E-learning Websites

7.1 Introduction

This chapter discusses a multi-criteria decision-making technique, TOPSIS (Technique for Order Preferences by Similarity to Ideal Solution), for evaluating the usability of e-learning websites based on identifying usability criteria. As the chosen criteria are subjective in nature, fuzzy set theory concepts are used. Fuzzy set theory deals with problems of ambiguities, uncertainties, imprecision, vagueness and subjectivity associated with human judgment (Cheng et al., 2011; Filipowicz, 2008; Kabir & Hasin, 2012; Raj & Kumar, 1999). Triangular fuzzy numbers are employed to parameterise the linguistic variables used by the experts to express their judgments on the evaluation of usability criteria and e-learning websites. A numerical example is provided to illustrate and verify the practical application and usefulness of this approach for evaluating e-learning websites. Finally, a sensitivity analysis of the results is carried out to study the influence of variation in weights on the overall usability of websites.

7.2 Evaluation of Usability of E-learning Websites

Several studies have been reported in the literature concerning evaluations of the usability of websites (Spool & Schroeder, 2001; Tan et al., 2009). These studies are based on user testing or on heuristic analysis. Tan et al. (2009) reported that above methods of testing depend on the experience of the expert and on the number of subjects and scenarios. Nevertheless, the application of multi-criteria decision-making (MCDM) for the evaluation of usability has not been found in the extant literature. Therefore in this study, a MCDM technique, TOPSIS (Technique for Order Preferences by Similarity

to Ideal Solution), has been used for evaluating the usability of websites. Nine usability criteria are taken from the literature in order to evaluate the websites. These are: images, colour, language, efficiency, font, learnability, information content, satisfaction and aesthetics.

7.2.1 Fuzzy Linguistic Variables and Fuzzy Numbers

Fuzzy linguistic variables are variables whose values are not numbers but are lingual expressions or terms, i.e. words or sentences in natural or artificial language (Hsieh et al., 2004; Zadeh, 1975). In many real life situations, the judgments formulated by a decision-maker are often characterised by vagueness. Fuzzy numbers are introduced to appropriately express linguistic variables. In general, triangular and trapezoidal fuzzy numbers are used.

In this study, the importance weights of the various criteria and the performance of the qualitative criteria are considered as linguistic variables and are represented by triangular fuzzy numbers (TFNs). The triangular fuzzy numbers are expressed as a triplet (a, b, c) to describe a fuzzy event. The parameters a , b and c indicate the smallest possible value, the most promising value, and the largest possible value respectively. A triangular fuzzy number M is shown in Figure 7-1 (Deng, 1999). A membership function is defined from the universe of discourse to $[0, 1]$.

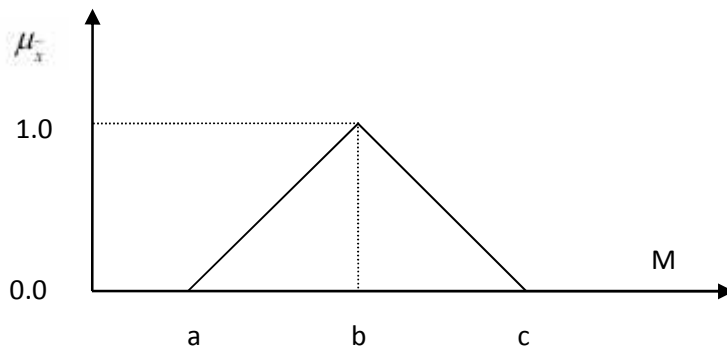


Figure 7-1: Triangular fuzzy number,

For the purposes of the present study, a 5-point scale (very poor, poor, fair, good and very good) is used. For instance, the linguistic variable “Good” can be represented as (5, 7, 9) as shown in Figure 7-2 (red colour).

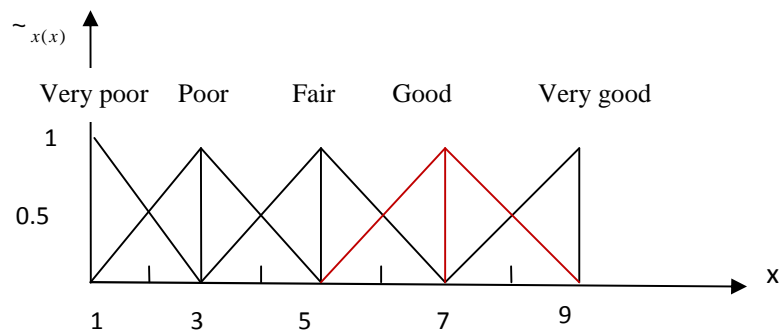


Figure 7-2: Membership function of the five levels of linguistic variables

7.2.2 The TOPSIS Method

The TOPSIS method is a Technique for Order Preference by Similarity to Ideal Solution and was proposed by Hwang and Yoon (1981). The ideal solution (also called the positive ideal solution) is a solution that maximises the benefit criteria and attributes (in addition, it minimises the cost criteria and attributes) while the negative ideal solution (also known as the anti-ideal solution) maximises the cost criteria and attributes (in

addition it minimises the benefit criteria and attributes). The so-called benefit criteria and attributes are the criteria for maximisation, while the cost criteria and attributes are the criteria for minimisation. The best alternative that is closest to the ideal solution and far from the negative ideal solution (Wang & Elhag, 2006).

Wang and Elhag (2006) informed that some extensions are suggested in the literature. In this case, the TOPSIS method frequently used to contend with fuzzy MCDM problems. The most basic extension is to convert a fuzzy MCDM problem into a crisp one using defuzzification. In this case it is possible some information may be lost and only gives a crisp point estimate for the relative closeness of each alternative (Wang & Elhag, 2006). Another extension is to define the Euclidean distance between any two fuzzy numbers as a crisp value. The Euclidean distance can be defines as the distance of two triangular fuzzy numbers $\tilde{a} (a_1, a_2, a_3)$ and $b (b_1, b_2, b_3)$ Chen (2000).

$$d(a, b) = \sqrt{\frac{1}{3} \{ (a_1 - b_1)^2 + (a_2 - b_2)^2 + (a_3 - b_3)^2 \}}$$

However, the Euclidean distances of every alternative to the ideal solution and negative ideal solution are both crisp values. (Wang & Elhag, 2006).

7.2.3 Brief Description of Methodology

The proposed fuzzy TOPSIS procedure consists of the following series of steps (Sevкли et al, 2010):

1. Identify the e-learning website's evaluation criteria.
2. Select an appropriate linguistic scale and ask the nominated decision makers to rate, in linguistic terms, the important criteria and the usability of the websites against each of the identified criteria.

3. Fuzzify the linguistic variables by assigning TFN triplets and develop a fuzzy decision matrix.

$$\tilde{D} = \begin{matrix} A_1 \\ A_2 \\ A_3 \\ \dots \\ A_m \end{matrix} \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \dots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \dots & \tilde{x}_{2n} \\ \dots & \dots & \dots & \dots \\ \tilde{x}_{m1} & \tilde{x}_{m2} & \dots & \tilde{x}_{mn} \end{bmatrix}, i = 1, 2, \dots, m; j = 1, 2, \dots, n$$

4. Compute the aggregate fuzzy weights for all criteria.

$$\tilde{W}_j = (W_{j1}, W_{j2}, W_{j3})$$

$$W_{j1} = \min_k \{W_{jk1}\}, W_{j2} = \frac{1}{k} \sum_{K=1}^K W_{jk2}, W_{j3} = \max_k \{W_{jk3}\} \text{----- (1)}$$

5. Obtain the aggregated fuzzy decision matrix that integrates the opinions and preferences of the decision makers.

$$\tilde{X}_i = (\tilde{X}_{i1}, \tilde{X}_{i2}, \tilde{X}_{i3})$$

$$\tilde{X}_{j1} = \min_k \{ \tilde{X}_{jk1} \}, \tilde{X}_{j2} = \frac{1}{k} \sum_{K=1}^K \tilde{X}_{jk2}, \tilde{X}_{j3} = \max_k \{ \tilde{X}_{jk3} \} \text{----- (2)}$$

6. Normalise the aggregate fuzzy decision matrix using a linear scale transformation to overcome the problem of handling criteria with different units of measurement and scales (Kumar et al., 2013). If $\tilde{X}_{ij} = (a_{ij}, b_{ij}, c_{ij})$ ($i = 1, \dots, n, j = 1, \dots, m$) are triangular fuzzy numbers, then for the benefit criteria, the normalisation is carried out using the following equations:

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_j^+}, \frac{b_{ij}}{c_j^+}, \frac{c_{ij}}{c_j^+} \right) \text{----- (3)}$$

where

$$c_j^+ = \max_i c_{ij}$$

7. Compute the weighted normalised decision matrix by multiplying \tilde{r}_{ij} by \tilde{W}_j

$$\tilde{v} = \tilde{r}_{ij} (\times) \tilde{w}_j \quad \text{Where } v = [\tilde{v}_{ij}] , i = 1, 2, \dots, m, j = 1, 2, \dots, n \text{ ----- (4)}$$

8. Identify fuzzy positive and negative ideal solutions using following equations:

$$A^* = (\tilde{v}_1^*, \tilde{v}_2^*, \dots, \tilde{v}_n^*) \quad \text{Where } \tilde{v}_j^* = \max_i \{v_{ij}\}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \text{ ---- (5)}$$

$$A^- = (\tilde{v}_1^-, \tilde{v}_2^-, \dots, \tilde{v}_n^-) \quad \text{Where } \tilde{v}_j^- = \min_i \{v_{ij}\}, i = 1, 2, \dots, m; j = 1, 2, \dots, n \text{ ---- (6)}$$

9. Compute the distance of each alternative from fuzzy positive ideal solution (FPIS)

and the fuzzy negative ideal solution (FNIS). The Euclidean distance d_i^*, d_i^- of each weighted alternative from the FPIS and the FNIS is calculated using the equations presented by Chen (2000):

$$d_i^* = \sqrt{\frac{1}{3} \sum_{j=1}^m (v_{ij} - v_j^*)^2}, i = 1, 2, \dots, n \text{ ----- (7)}$$

$$d_i^- = \sqrt{\frac{1}{3} \sum_{j=1}^m (v_{ij} - v_j^-)^2}, i = 1, 2, \dots, n \text{ ----- (8)}$$

10. Compute the Closeness Coefficient and rank the alternatives in descending order.

The Closeness Coefficient (CC_i) represents the distance of each alternative from FPIS and FNIS (Kumar et al., 2013). In addition, is defined as:

$$CC_i = \frac{d_i^-}{(d_i^* + d_i^-)}, i = 1, 2, \dots, m \text{ ----- (9)}$$

11. The best alternative is the one that is closest to the FPIS and farthest from the FNIS.

7.2.4 Application

Two e-learning websites (one in English and one in Arabic) were designed for this study. These two websites are used here as alternative for evaluating the usability. The application of the fuzzy TOPSIS approach for a comparative evaluation of usability has been discussed in this section. Three experts based on nine criteria evaluated these two websites: images, colour, language, efficiency, font, learnability, information content, satisfaction and aesthetics. The hierarchical structure for this decision-making problem is shown in Figure 7-3.

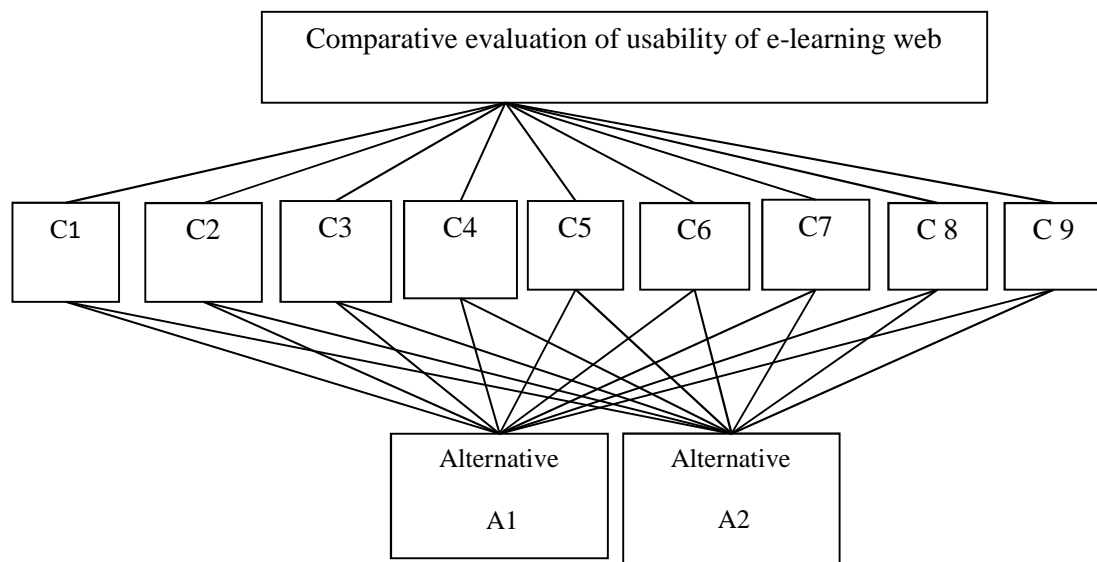


Figure 7-3: The hierarchical structure of the comparative evaluation of English and Arabic e-learning websites.

The relation importance weights of the nine criteria are explained by using linguistic variables (very low, low, medium, high, and very high). The ratings of the alternatives are characterised by linguistic variables (very poor, fair, good and very good). The linguistic variables are described in Table 7-1. The three experts (E1, E2 and E3) expressed their views on the importance weights of the nine criteria and the ratings of

each alternative with respect to the nine criteria independently. Tables 7-1 and 7-2 show linguistic variables and the rating of usability criteria practices by the three experts.

Table 7-1: Linguistic variables

Linguistic variables for the relative importance weights of the nine criteria		Linguistic variables for the alternatives ratings	
Term	Membership Function	Term	Membership Function
Very Low (VL)	(1,1,3)	Very Poor (VP)	(1,1,3)
Low (L)	(1,3,5)	Poor (P)	(1,3,5)
Medium (M)	(3,5,7)	Fair (F)	(3,5,7)
High (H)	(5,7,9)	Good (G)	(5,7,9)
Very High (VH)	(7,9,9)	Very Good (VG)	(7,9,9)

Table 7-2: Rating of usability criteria practices by the experts

Usability Criteria	E1	E2	E3
Images (C1)	VH	H	VH
Colour (C2)	H	H	VH
Language (C3)	VH	VH	VH
Efficiency (C4)	H	VL	VH
Font (C5)	VL	H	H
Learnability (C6)	H	VH	H
Information Content (C7)	VH	VH	H
Satisfaction (C8)	VH	VH	VH
Aesthetics (C9)	L	VL	L

Table 7-3: Linguistic assessment of e-learning websites

Usability Criteria	English (A1)			Arabic(A2)		
	E1	E2	E3	E1	E2	E3
Images (C1)	F	P	F	VP	VP	P
Colour (C2)	G	G	G	VG	G	G
Language (C3)	VG	VG	VG	VP	VP	VP
Efficiency (C4)	G	G	F	F	P	F
Font (C5)	F	VG	G	F	G	G
Learnability (C6)	F	G	G	F	P	P
Information Content (C7)	F	F	F	P	P	F
Satisfaction (C8)	F	G	F	VP	P	VP
Aesthetics (C9)	G	G	F	G	G	VG

The linguistic terms are changed into triangular fuzzy numbers by a conversion scale of 1–9. Table 7-4 and Table 7-5 present the parameterised linguistic variables and the fuzzy ratings used for the criteria and the websites respectively.

Table 7-4: Representation of the relative importance weights by TFN

Usability Criteria	E1	E2	E3
Images	(7,9,9)	(5,7,9)	(7,9,9)
Colour	(5,7,9)	(5,7,9)	(7,9,9)
Language	(7,9,9)	(7,9,9)	(7,9,9)
Efficiency	(5,7,9)	(3,5,7)	(7,9,9)
Font	(3,5,7)	(5,7,9)	(5,7,9)
Learnability	(5,7,9)	(7,9,9)	(5,7,9)

Information Content	(7,9,9)	(7,9,9)	(5,7,9)
Satisfaction	(7,9,9)	(7,9,9)	(7,9,9)
Aesthetics	(1,3,5)	(3,5,7)	(1,3,5)

Table 7-5: Fuzzy decision matrix for e-learning websites

Usability Criteria	English			Arabic		
	E1	E2	E3	E1	E2	E3
Images	(3,5,7)	(1,3,5)	(3,5,7)	(1,1,3)	(1,1,3)	(3,5,7)
Colour	(5,7,9)	(5,7,9)	(5,7,9)	(7,9,9)	(5,7,9)	(5,7,9)
Language	(7,9,9)	(7,9,9)	(7,9,9)	(1,1,3)	(1,1,3)	(1,1,3)
Efficiency	(5,7,9)	(5,7,9)	(3,5,7)	(3,5,7)	(1,3,5)	(3,5,7)
Font	(3,5,7)	(7,9,9)	(5,7,9)	(3,5,7)	(5,7,9)	(5,7,9)
Learnability	(3,5,7)	(5,7,9)	(5,7,9)	(3,5,7)	(1,3,5)	(1,3,5)
Information						
Content	(3,5,7)	(3,5,7)	(3,5,7)	(1,3,5)	(1,3,5)	(3,5,7)
Satisfaction	(3,5,7)	(5,7,9)	(3,5,7)	(1,1,3)	(3,5,7)	(1,1,3)
Aesthetics	(5,7,9)	(5,7,9)	(3,5,7)	(5,7,9)	(5,7,9)	(7,9,9)

The aggregate weights of various criteria are calculated using equation (1) and for the alternatives using equation (2). For example, for criteria C_1 , the aggregated fuzzy weight is given by:

$$w_{j1} = \min (7, 5, 7) = 5, w_{j2} = \frac{1}{3}(9 + 7 + 9) = 8.33, \text{ and } w_{j3} = \max (9, 9, 9) = 9,$$

So, the aggregated weight for criteria C_1 , $w_{c1} = (5, 8.33, 9)$. Similarly, the aggregate weights for all criteria (C_1, \dots, C_9) and the alternatives with respect to the nine criteria are computed and presented in Table 7-6 and Table 7-7.

Table 7-6: Aggregate fuzzy weights

Usability Criteria	E1	E2	E3	Agg. Fuzzy
				Wt
Images	(7,9,9)	(5,7,9)	(7,9,9)	(5, 8.33, 9)
Colour	(5,7,9)	(5,7,9)	(7,9,9)	(3, 7.67, 9)
Language	(7,9,9)	(7,9,9)	(7,9,9)	(7, 9, 9)
Efficiency	(5,7,9)	(3,5,7)	(7,9,9)	(3, 7, 9)
Font	(3,5,7)	(5,7,9)	(5,7,9)	(3,6.33, 9)
Learnability	(5,7,9)	(7,9,9)	(5,7,9)	(5,7.67, 9)
Information Content	(7,9,9)	(7,9,9)	(5,7,9)	(5, 8.33, 9)
Satisfaction	(7,9,9)	(7,9,9)	(7,9,9)	(7,9,9)
Aesthetics	(1,3,5)	(3,5,7)	(1,3,5)	(1,3.67,7)

Table 7-7: Aggregate fuzzy decision matrix for e-learning websites

Aggregate Fuzzy Weight For The Alternatives	English	Arabic
Images	(1, 4.33, 7)	(1, 2.67, 7)
Colour	(5, 7.00, 9)	(5, 7.67, 9)
Language	(7, 9.00, 9)	(1, 1.00, 3)

Efficiency	(3, 6.33, 9)	(1, 4.33, 7)
Font	(3, 7.00, 9)	(3, 6.33, 9)
Learnability	(3, 6.33, 9)	(1, 3.67, 7)
Information Content	(3, 5.00, 7)	(1, 3.67, 7)
Satisfaction	(3, 5.67, 9)	(1, 2.33, 7)
Aesthetics	(3, 6.33, 9)	(5, 7.67, 9)

In this case, all the criteria belong to the Benefit (B) category. Therefore, all the elements of the decision matrix are normalised using equation (3). As example, the normalised rating for The English website for criteria C_1 is obtained as under:

$$c_j^+ = \max_i c_{ij} = 7.00$$

$$\tilde{r}_{ij} = \left(\frac{1}{7}, \frac{4.33}{7}, \frac{7}{7} \right) = (0.143, 0.619, 1.000).$$

Similarly, the normalised values of all the e-learning websites for all the criteria are computed and specified in Table 7-8.

Table 7-8: Normalised fuzzy decision matrix for e-learning websites

	English	Arabic
Images	(0.143, 0.619, 1.00)	(0.143, 0.381, 1.00)
Colour	(0.556, 0.778, 1.00)	(0.556, 0.852, 1.00)
Language	(0.778, 1.00, 1.00)	(0.111, 0.111, 0.333)
Efficiency	(0.333, 0.703, 1.00)	(0.111, 0.481, 0.778)
Font	(0.333, 0.778, 1.00)	(0.333, 0.703, 1.00)
Learnability	(0.333, 0.703, 1.00)	(0.111, 0.408, 0.778)

Information Content	(0.429, 0.714, 1.00)	(0.143, 0.524, 1.00)
Satisfaction	(0.333, 0.630, 1.00)	(0.111, 0.253, 0.778)
Aesthetics	(0.333, .703, 1.00)	(0.556, 0.852, 1.00)

The weighted normalised fuzzy decision matrix for the alternatives against the nine criteria is computed by using equation (4) and is shown in Table 7-9. For example, the weighted normalised rating of e-learning websites 1 against criteria C₁

$$V_{11} = [(0.143 \times 5), (0.619 \times 8.33), (1.000 \times 9)]$$

$$= (0.715, 5.156, 9.000)$$

Equations (5) and (6) are used to identify the (FPIS) and the (FNIS) and are presented in Table 7-9.

Table 7-9: Weighted normalised fuzzy decision matrix for e-learning websites

Criteria	English			Arabic			FNIS	FPIS
Images	0.71	5.15	9.00	0.71	3.18	9.00	0.714	9.00
Colour	1.67	5.97	9.00	1.67	6.54	9.00	1.667	9.00
Language	5.44	9.00	9.00	0.78	1.00	3.00	0.778	9.00
Efficiency	1.00	4.92	9.00	0.33	3.37	7.00	0.333	9.00
Font	1.00	4.92	9.00	1.00	4.45	9.00	1.000	9.00
Learnability	1.67	5.39	9.00	0.56	3.13	7.00	0.556	9.00
Information Content	2.14	5.95	9.00	0.71	4.37	9.00	0.714	9.00
Satisfaction	2.33	5.67	9.00	0.78	2.33	7.00	0.778	9.00
Aesthetics	0.33	2.58	7.00	0.56	3.13	7.00	0.333	7.00

The distance d_i^*, d_i^- of each weighted alternative from the FPIS and the FNIS is computed using equations (7) and (8) and is presented in Table 7-10. For example, for

alternative F_1 and criteria C_1 , the distances $d(A_1, A_i^*)$ and $d(A_1, A_i^-)$ are computed into the following equations:

$$d(A_1, A_i^*) = \{1/3(0.71-9.00)^2 + (5.15 - 9.00)^2 + (9.00 - 9.00)^2\}^{1/2} = 5.274, \text{ and}$$

$$d(A_1, A_i^-) = \{1/3(1-9.000)^2 + (5.996 - 9.000)^2 + (9.000 - 9.000)^2\}^{1/2} = 5.427$$

Table 7-10: Distance $d(A_1, A_i^*)$ and $d(A_1, A_i^-)$ for e-learning websites

	A1-English		A2-Arabic		
	d_i^-	d_i^+	d_i^-	d_i^+	
A1-C1	5.427	5.274	A2-C1	4.991	5.847
A1-C2	4.908	4.582	A2-C2	5.082	4.466
A1-C3	7.234	2.053	A2-C3	1.289	7.475
A1-C4	5.675	5.184	A2-C4	4.229	6.078
A1-C5	5.144	5.184	A2-C5	5.030	5.313
A1-C6	5.656	4.718	A2-C6	4.006	6.050
A1-C7	5.719	4.333	A2-C7	5.228	5.481
A1-C8	5.596	4.302	A2-C8	3.702	6.221
A1-C9	4.062	4.618	A2-C9	4.175	4.341
A1-Ci	49.421	40.248	A2-Ci	37.734	51.271

The Closeness Coefficient is calculated using equation (9) and the alternatives are ranked accordingly. For example, the Closeness Coefficient (CC_1) for the alternative A1 is computed as:

$$CC_1 = \frac{30.401}{(30.401 + 35.326)} = 0.4625$$

Table 7-11 shows the Closeness Coefficient values for all the e-learning websites under evaluation.

Table 7-11: Closeness Coefficient (CC_i) for e-learning websites

	English	Arabic
d_i^-	49.421	37.734
d_i^*	40.248	51.271
CC_i	0.551	0.424
Rank	1	2

The comparison of CC_i values of the alternatives yields the following ranking order $A_1 > A_2$. Thus, one can say that the English e-learning website has the highest usability.

7.2.5 Sensitivity Analysis

The criteria importance weights are often, as in the case of this study, obtained based on the subjective judgments of the decision makers. Therefore, it is needed to take a sensitivity analysis to understand the effect of the criteria weights on the final usability ranking of the websites. The analysis resumes the strengths of the suggested approach.

In this analysis, a total of 14 experiments were conducted. The details of the 14 experiments are presented in Table 7-12. The first case in the table represents the set of weights computed in the current study { $Wc_1 - ((5.00, 8.33, 9.00))$, $Wc_2 - ((3.00, 7.67, 9.00))$, $Wc_3 - (7.00, 9.00, 9.00)$, $Wc_4 - (3.00, 7.00, 9.00)$, $Wc_5 - (3.00, 6.33, 9.00)$, $Wc_6 - (5.00, 7.67, 9.00)$, $Wc_7 - (5.00, 8.33, 9.00)$, $Wc_8 - (7.00, 9.00, 9.00)$ and $Wc_9 - (1.00, 3.67, 7.00)$ } while the others represent the set of weights assigned for the purpose of the sensitivity analysis. As can be seen in Table 7-12, in the first five experiments equal

weights are assigned to all the criteria; that is, the weights of all the criteria are set equal to (1,1,3) in the first experiment, then (1,3,5) in the second experiment and (3,5,7), (5,7,9) and (7,9,9) for the third, fourth and fifth experiments respectively. In the remaining nine experiments, the weight combinations are chosen by setting, one by one, the weight of one criterion at the highest level (7,9,9) and that of the remaining criteria? at the lowest value (1,1,3). For example, in experiment 6, the criterion C1 is assigned the highest weight (7, 9, 9) whereas the remaining criteria have weight (1, 1, 3). It can be seen from Table 7-12 and Figure 7-4, that the English e-learning website has the highest usability score in all 14 experiments. Therefore, it can be concluded that this decision making process is relatively insensitive to the criteria weight with the English e-learning website emerging as best e-learning website.

Table 7-12: Closeness Coefficient (CC_i) values for different criteria weight settings

Expt No.	Weight Assignment	Overall score (CC_i)		
		English	Arabic	Ranking
Current study	W_{c1} - ((5.00, 8.33, 9.00)),	0.551	0.424	A1>A2
	W_{c2} - ((3.00, 7.67, 9.00)),			
	W_{c3} - (7.00, 9.00, 9.00),			
	W_{c4} - (3.00, 7.00, 9.00),			
	W_{c5} - (3.00, 6.33, 9.00),			
	W_{c6} - (5.00, 7.67, 9.00),			
	W_{c7} - (5.00, 8.33, 9.00)			
	W_{c8} - (7.00, 9.00, 9.00)			
	and W_{c9} - (1.00, 3.67, 7.00)			

Expt 1	$W_{c1-c9}=(1,1,3)$	0.452	0.384	A1>A2
Expt 2	$W_{c1-c9}=(1,3,5)$	0.491	0.414	A1>A2
Expt 3	$W_{c1-c9}=(3,5,7)$	0.514	0.418	A1>A2
Expt 4	$W_{c1-c9}=(5,7,9)$	0.530	0.420	A1>A2
Expt 5	$W_{c1-c9}=(7,9,9)$	0.580	0.439	A1>A2
Expt 6	$W_{c1}=(7,9,9), W_{c2-c9}$ $=(1,1,3)$	0.470	0.401	A1>A2
Expt 7	$W_{c2}=(7,9,9), W_{c1, c3-c9}$ $=(1,1,3)$	0.467	0.410	A1>A2
Expt 8	$W_{c3}=(7,9,9), W_{c1,c2, c4-c9}$ $=(1,1,3)$	0.526	0.347	A1>A2
Expt 9	$W_{c4}=(7,9,9), W_{c1-c3, c5-c9}$ $=(1,1,3)$	0.485	0.396	A1>A2
Expt 10	$W_{c5}=(7,9,9), W_{c1- c4, c6-c9}$ $=(1,1,3)$	0.473	0.411	A1>A2
Expt 11	$W_{c6}=(7,9,9), W_{c1- c5 \& C-7-}$ $c9=(1,1,3)$	0.485	0.392	A1>A2
Expt 12	$W_{c7}=(7,9,9), W_{c1- c6 \& C8-}$ $c9=(1,1,3)$	0.488	0.408	A1>A2
Expt 13	$W_{c8}=(7,9,9), W_{c1- c7 \& c9}$ $=(1,1,3)$	0.481	0.384	A1>A2
Expt 14	$W_{c9}=(7,9,9), W_{c1- c8}$ $=(1,1,3)$	0.469	0.429	A1>A2

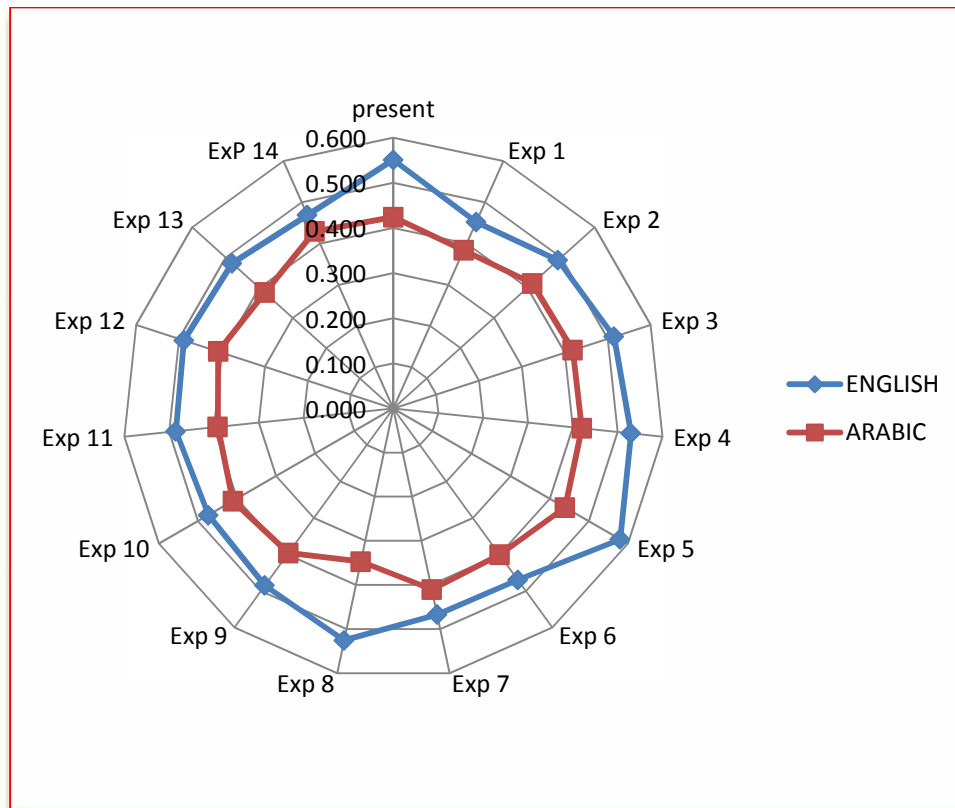


Figure 7-4: Results of the sensitivity analysis

7.3 Summary

This chapter presented a multi-criteria decision-making model for the comparative evaluation of the usability of e-learning websites based on fuzzy TOPSIS. In order to evaluate the usability of this research's e-learning websites, nine criteria were selected from the literature as follows: images, colour, language, efficiency, font, learnability, information content, satisfaction and aesthetics. The results validate the applicability of a multi-criteria decision-making technique for the evaluation of e-learning websites. The multi-criteria decision-making technique demonstrated that the usability of the English version of the e-learning website is better than that of the Arabic version across all the selected criteria. These results showed the same ranking for the Arabic e-learning website, confirming the findings of the experiment and the case study. In conclusion,

the fuzzy TOPSIS was used to assess the suitability of the proposed usability guidelines in this research.

The next chapter (chapter eight) puts forward the usability guidelines for Arabic e-learning websites and discusses their implications for web design.

8 Chapter Eight: Discussion

8.1 Introduction

This chapter presents and discusses the contributions of this research in the form of nine usability guidelines for developing efficient and usable Arabic e-learning websites for Arab users. This chapter is divided into nine sections focusing on: images, colour, font, learnability, language, satisfaction, information content, efficiency and aesthetics. Each of these sections provides a guideline, along with an explanation, references from the literature and evidence from the results of the experiment, case study, and fuzzy set theory. In addition, each guideline is accompanied by figures showing good and bad examples from e-learning websites in order to demonstrate this guideline.

8.2 Usability Guidelines for Arabic E-Learning Websites

The next nine sections present and discuss the main guidelines put forward by this research for designing effective Arabic e-learning websites.

8.2.1 Images

Images are considered very important design elements in the creation of interactive and visual designs. Images contribute to the overall aesthetics and graphical look of websites (Bonnardel et al., 2011, Garrett, 2011; Salinas, 2002). They also enable online consumers to make purchase decisions about products that are on sale through their images on websites (Cyr, 2013). Yang (1994) reported that having many images reduces the loading speed of websites. Geissler (2001) confirmed that images might create positive feelings and responses from consumers.

Interestingly, images in websites are found to be perceived differently by various cultures (Cyr et al., 2009; 2010). As such, user preferences in regard to the use of

language, colour and images must be taken into account when designing websites. In countries with high uncertainty avoidance, such as in Arab countries, websites should be designed with a particular focus on colour, image, look and feel. However, such localisation can prove expensive and the results may not be rewarding.

The results from this study revealed that the participants liked the use of pictures in the e-learning websites and paid high attention to the type of images included in the e-learning websites. Participants reported that pictures on e-learning websites need to respect their culture which is governed by cultural values and religious principles. In Arabic countries, the use of pictures of women on e-learning websites has to conform to some values. For instance, women are expected to only show their face and hands. In general, pictures of women are not commonly used in Arabic e-learning websites. This was confirmed by the results of the case study, where none of the tested e-learning websites contained a single image of women although these e-learning websites covered two different countries, namely Saudi Arabia and Egypt. Extensive analysis has shown that the United Arab Emirates is amongst the few Arab countries (another one is Jordan) which use images of women in their websites. This may be explained by the fact that the United Arab Emirates is more liberal than the rest of the Arabic countries. Marcus (2009) studied the influence of culture on Arabic websites and chose three countries as a sample of Arabic countries. Marcus' study was based on Hofstede's cultural dimensions and provided important insights into the link between Arab culture and web design. Arabic web users mostly prefer more representative pictures and links to external websites and desire to see more multilingual content and interactive design features. The case study showed the use of images which included a photograph of a group of people in both e-learning websites, e.g. in both the King Saudi University and the Cairo University websites. This result confirms the claim of Hofstede (2010) that Arabic

culture has a high collectivism factor which emphasises the importance of the group and family in society.

Table 8-1: Guideline One: Images

Guideline	Comments	Other Sources	Strength from the users' view	Strength from the experts' view
<p>Use images in the e-learning website, which respect the culture and religion of its users. For example, use of images of females wearing hijab (i.e. Islamic dress for women) is considered more appropriate.</p> <p>Use images of groups and families rather than images of individuals.</p>	<p>Usually e-learning systems do not involve the use of images; however, this study shows that the Arab audience prefers a site, which contains pictures. Pictures invoke positive feelings and the interest of the participants.</p> <p>When using female pictures, the designer of the e-learning website should be careful, for example, the hijab is very popular and it is the most acceptable form of clothing for women in the Arab world.</p> <p>As the goal of the e-learning website is to satisfy its users, the designer should respect Arabic culture and religion to guarantee success.</p>	<p>Bonnardel et al. (2011), Cyr et al. 2009. Cyr et al. (2010)</p> <p>Cyr (2013)</p> <p>Garrett (2011), Salinas (2002).</p> <p>Marcus (2009)</p> <p>Yang (1994)</p>	<p>Qualitative results illustrate that the users gave higher attention to the type of pictures on the site. 48 participants (96%) agreed that images on the site caused negative feelings in the Arabic version. 26 of those participants (52%) attributed this to cultural reasons as these images contradict their cultural values. (16.66 %) linked this to a combination of culture and religion. (12 %) linked this directly to religious motivations.</p>	<p>Fuzzy TOPSIS: experts reported that images are very important for designing an e-learning system for Arab users. The fuzzy results show that images scored a high level of significance.</p>

Figure 8-1 presents an example of good usage of images within an Arabic e-learning website. However, figure 8-2 shows an example of the type of image that is not acceptable in Arabic culture (e.g. images portraying drinking behaviour).



Figure 8-1 King Khaled University, Saudi Arabia

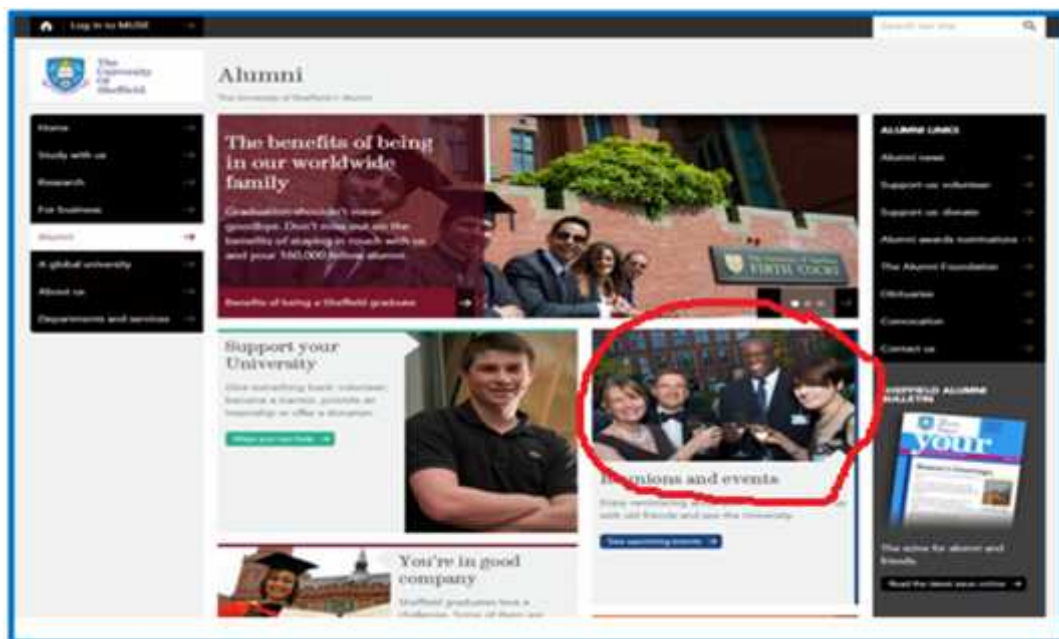


Figure 8-2: The University of Sheffield, UK.

8.2.2 Colour

One of the key design features which has a strong influence on user evaluation and on the perception of websites in general is colour. The literature reports on a few research studies that demonstrate a link between the usability of websites and colour (Lui et al., 2004). Psychological research also claims a relationship between human emotions and colour (Cyr et al., 2010). There are two conflicting views on the link between emotions and colour. The first view stipulates that emotional reactions are triggered by physiological and environmental factors (Valdez & Mehrabian, 1994). However, the second view stipulates that emotional reactions are invoked by evolutionary and biological factors (Elliot & Maier, 2007).

Noiwan and Norcio (2006) highlighted that investigating the effect of colour on web design across varying cultures is an overlooked topic despite its importance. Such studies on colour have the potential to broaden interface designers' understanding and knowledge of how web users of different cultures respond to specific colours. However, until today, studies investigating the link between colour and culture are based on case studies and personal experiences (Marcus & Gould, 2000). In essence, understanding the reactions of different cultures to specific design factors and issues has to be performed through systematic testing which leads to theory building (Tractinsky, 2004). Cyr et al. (2010, p.2) defined colour appeal as "the degree to which colours on websites are perceived by the user as pleasing, appealing, and appropriate". Psychological studies have studied the influence of different colours on preferences (Lichtle, 2007). Lichtle (2007) suggested that 'blue' is perceived as aesthetically pleasing and is associated with the concept of trust. Simon (2001) confirmed that colour, coupled with effective communication, influences trust and the perceptions of websites by web users.

Although colour is believed to influence human perceptions and emotional reactions (Valdez & Mehrabian, 1994), only a few studies have looked into the effect of colour on Internet-based environments (Cyr, 2008). For example, Ballast (2002) demonstrated that 'red' is linked directly with excitement, 'blue' with comfort and security, 'orange' with distress and upset, 'purple' with dignity and stateliness, 'yellow' with cheerfulness. In addition, some colours may be linked with several emotions whilst some emotions may be linked with more than one colour (Ward, 2004). Adams and Osgood (1973) stipulated that colours are highly preferred regardless of age, ethnic group, or culture, whilst Eysenck (1941) claimed that colour preferences are culturally-based. Choungourian (1968) demonstrated that red and blue were the most preferred colours among American subjects but were less preferred by other cultures (Kaya, 2004). In collectivist countries, a website's visual design is perceived as very important. Researchers have indicated that colour may have different meanings for different cultures (Sun, 2001).

The finding of this study has revealed that the participants strongly favoured the blue colour in the Arabic version of the e-learning website. This result aligns with the various opinions in the literature. For instance, Boyatzis and Varghese (1994) showed that light colours, such as blue and yellow, are associated with positive emotions such as strength and happiness. Reinforcing this view was Saito (1996) who found that blue is linked to feelings of relaxation and calmness, along with happiness, comfort, peace and hope. Saito justified that blue evokes positive feelings as people associate it with the ocean, water or sky. This leads to calm and relaxation. Indeed, the qualitative results showed that blue is preferred amongst the study's participants who also linked their positive feelings to the blue sky and sea in Arabic countries. However, blue may also be associated with sadness, depression and loneliness (Saito, 1996). On the other hand,

dark colours, such as black and grey, are associated with negative emotions such as sadness and anger. Saito (1996) also found that Asian groups preferred blue as they felt it was linked to positive aspects such as refreshing, beautiful and bright. Similarly, Kaya (2004) claimed that cooler colours such as blue are perceived more favourably than warmer colours such as yellow or red.

Thus, colour is important and can be used to communicate particular meanings and feelings and different cultures use their preferred colour(s) in their websites. For example, India commonly uses red and saffron in the design of their websites (Smith et al., 2004). The results of the case study showed that both the University e-learning websites use blue as their primary colour to engage students and visitors. Indeed, the majority of educational websites in the Arab countries use blue as their main colour, for example, King Saud University (Saudi Arabia), University of Tunis (Tunisia), University of Baghdad (Iraq), University of Tripoli (Libya), and University of Constantine (Algeria). This choice of this colour is motivated by the environment in Arab countries where the sky is always blue and the sea is blue. Blue reflects peace and tranquillity. In addition, blue symbolises masculinity in Arab countries and these countries have a high masculinity score according to Hofstede's findings (Hofstede, 2010). Moreover, there is evidence in the literature that the usage of specific colours may impact on the overall usability of the interface (Cyr, 2013). Therefore, blue is strategically selected for designing Arabic e-learning websites to reflect Arab culture.

In the following table, the guideline focuses on the effective use of colour in Arabic e-learning websites. This guideline is supported by evidence from the literature, evidence from the results from the study's participants and experts, and by the examples given below to assist in clarifying the guideline.

Table 8-2 Guideline Two: Colour

Guideline	Comments	External Sources	Strength from the users' view	Strength from the experts' view
Use blue colour as the main colour of e-learning websites as Arab users feel a strong connection to blue than any other colour.	Colour conveys different meanings from one culture to another. In the Arabic culture, blue reflects the environment where people live. On most days the sky is blue and the sea is also blue. Such an environment greatly influences the liking and choice of colours by Arab users. Therefore, Arabic culture has a strong relationship with blue as a colour.	Adams & Osgood (1973), Ballast (2002); Boyatzis and Varghese (1994), Larios (2010), Lichtle (2007), Wexner (1982), Russo and Boor (1993), Smith et al. (2004),	Qualitative data results show that the majority of participants prefer the colour blue for the Arabic version of the e-learning website (68%) and also for the English version of the e-learning website (74%).	Fuzzy TOPSIS: the experts confirmed what the participants had reported, that blue is their most favoured colour for e-learning websites.

Figure 8-3 shows a good example of the use of blue colour in an Arabic e-learning website, from the website of Taiba University (Saudi Arabia). On the other hand, figure 8-4 shows an example of the bad use of blue colour in an Arabic e-learning website (from Sfax University, Tunisia).



Figure 8-3: Taiba University, Saudi Arabia.



Figure 8-4: University of Sfax, Tunisia.

8.2.3 Font

Two key properties of text are font type and font size. Font equates to a set of characters that are printed or displayed in a specific style and size (Giese & Holmes, 2002; Mohamad Ali et al., 2013). A number of web design researchers have indicated the need to consider font when designing the overall look and feel of websites. For example, Tractinsky and Lavie (2003) linked aesthetics to various design elements including font. Nielsen and Tahir (2001) proposed the use of a flexible font size to allow users to change font size as it pleases them. In essence, a designer should use a default size that suits the majority of web users.

Leavitt and Shneiderman (2007) suggested using familiar fonts in order to achieve the best possible reading speeds, although no statistical differences were found between 12-point Times New Roman, Georgia, Arial, Helvetica or Verdana. Mohamad Ali et al. (2013) emphasised the need for web-based instructional designers to use an appropriate font to enhance the level of students' readability. Mohamad Ali et al. (2013) claimed that Verdana followed by Georgia were the best choice for displaying long text on websites. However, Times New Roman and Arial fonts provide good readability for printed media. Serif fonts, such as Times New Roman or Bookman, are used for most books, magazines and newspapers, as they are perceived as easier to read (Conover, 2003; Mohamad Ali et al, 2013). Daniel et al. (2011), and Singh and Baack (2004) indicated that font is amongst the design elements which reflect the culture of its users. Until the present time, there has been no study that shows the effect of font type and font size on Arabic websites and which font is preferred by Arab users. Generally, e-learning websites should use an appropriate font size to ensure that the content is easily readable. This is usually a minimum of a 12-point font size for western cultures. The

users should also be able to resize the font using their favourite browser. An e-learning website should use a consistent font throughout the pages of the website.

Table 8-3 Guideline Three: Font

Guideline	Comments	Other Sources	Strength from the users' view	Strength from the experts' view
<p>Use 12 or 13 point font size for Arabic e-learning websites.</p> <p>Use Traditional Arabic font type for Arabic e-learning websites.</p>	<p>The majority of the participants preferred 12 and 13 font size.</p> <p>22 participants (44%) preferred size 13 and 21 participants (42%) preferred size 12 for the font of the Arabic version. 23 participants (46%) selected Traditional Arabic and 12 participants (24%) selected Times New Roman as their favourite font type for the Arabic version.</p>	<p>Bernard, Mills, Paterson & Storrer, 2001; Brady, 1993; Bryan, 1996; Conover, 2003; Giese & Holmes, 2002; Nielsen and Tahir (2001).</p> <p>Tractinsky and Lavie (2003). Wilson, 2001.</p>	<p>The qualitative results showed that the majority of participants preferred font size 12-13 and the choice of the font type was related to Arabic culture. Maybe the name of the font type influenced their preferences.</p>	<p>Fuzzy TOPSIS: the experts were satisfied with the type and size of the font used on both e-learning websites. They believed that the font criterion is important to designing a usable system.</p>

Figure 8-5 (from Constantine University e-learning page) shows numerous font and font sizes being used in one page which affects the usability of the system. In addition, the website uses more than one language on the same page.



Figure 8-5: Constantine University e-learning page ,Algeria.

8.2.4 Learnability

The good 'learnability' factor in interactive systems is the key to their successful use. Learnability refers to the ability to learn to use a system or execute a set of tasks and the time needed to do this by a new user (Dix et al., 2004, Nielsen et al., 1994; Santos & Badre, 1995; Senapathi, 2005.). This includes using the system with minimum difficulty and issues (Nielsen, 1993). Learnability is concerned with the initial understanding of the system and the ability to maximise performance using the system (Preece et al., 2007). In general, learning can be improved through a set of features that help learners to learn quickly (Chimbo et al., 2011). Learnability can be evaluated for new users by measuring the time needed to reach a certain level of expertise (which allows them to perform specific tasks).

A new user who can quickly learn how to use a system is expected to be more productive in using the system and achieve a greater satisfaction. Bevan and Macleod (1994) suggested that learnability is linked directly to the main factors of usability such

as effectiveness, information content, and satisfaction. Systems, which are easier to learn, are expected to be systems which are more usable thus allowing the user to be more efficient, effective and satisfied (Linja-aho, 2006). Lazar et al. (2006) reported that frustrating experiences with computers can cause people to waste 40% of their time. People get frustrated when they find a system difficult to use and if it has missing features and unusable features. Such experiences reduce the users' information content and memorability.

Research stipulates that learnability relates to usability in different ways. Elliott et al. (2002) claimed that learnability is a sub-concept of usability. Learnability is strongly linked to usability, via a congruent relationship (Hadjerrouit, 2005). Similarly, Nielsen (1993) claimed that learnability is one attribute of usability. Elliott et al. (2002) concluded that some factors which contribute to usability can also contribute to learnability. On the other hand, Paymans et al. (2004) claimed that learnability and usability can sometimes be contradictory. This is the case when certain issues that enhance learnability reduce the usability of the system.

Venkatesh et al. (2003) describe, in their model, that the concept of ease of use and perceived usefulness are linked directly to the acceptance and adoption of new technologies. Ease of use was also found to contribute to the overall usability of online systems (Agarwal & Venkatesh, 2002). In a web context, Lee (2004) and Muthitacharoen et al. (2006) proposed that ease of use increases website usage and guarantees user returns.

The quality of the content is found to affect the success of a website (Palmer, 2002) and give business-to-consumer companies a competitive edge (Pearson & Pearson, 2008). Content, therefore, should be of high quality to guarantee customer satisfaction (Cooke, 2003). Apart from quality of the content, the formatting of the text is also important for

users who should be able to read and view content comfortably (Hyungsuk & Hyunseung, 2007). This is quite important in order to reduce fatigue and improve information content for the users. A few studies (Ambrose & Harris, 2006; Barth, 2008, Rabinowitz, 2006) also stress the importance of layout and the features of the text on comprehending the meaning of the content. The readability of text is dictated by spaces, font size and font type (Landa, 2011).

In respect of this research, the results in chapter five show that the questions which are related to learnability (question 2 and 6) showed statistical differences (i.e. T-tests) between the Arabic and English versions. The results showed that the English version was easier learnability-wise than the Arabic version. The researcher believes that the learnability of these two systems differed due to two factors: language and font. The translated content used in the Arabic version was deemed to be of poor quality in comparison to the text in the English version. This happened as a result of bad translations by an online automatic translation software from English to Arabic. Obviously, the translated content affected the learnability aspect and understanding of the Arabic e-learning website. Difficulties in making sense and in understanding content increases the time needed to learn the content and leads to user frustration and dissatisfaction. The researcher also believes that the usage of a small font (below 12-point) for Arabic e-learning websites influences the ability to learn to use a system quickly.

Table 8-4 Guideline Four: Learnability

Guideline	Comments	Sources	Strength from the users' view	Strength from the experts' view

<p>Learnability can be achieved by using a grammatically-correct and professional language written by an Arabic content writer, and readable font (e.g. 12-point) throughout the Arabic e-learning website. These recommendations will make the e-learning website easy to learn for new users.</p>	<p>In general, use of good language enhances understanding of the content and therefore reduces the time needed to learn to use the e-learning website. Moreover, poorly translated language imposes barriers on understanding as in the case of the Arabic e-learning website. A readable font improves the speed of reading and learning on the e-learning website.</p>	<p>Agarwal and Venkatesh, 2002. Ambrose and Harris, 2006. Barth, 2008. Hyungsuk and Hyunseung, 2007. Landa, 2011. Rabinowitz, 2006. Venkatesh et al (2003)</p>	<p>Question 2 and 6 of the usability questionnaire, which are relevant to learnability and effectiveness respectively, showed that users were less able to learn to use the Arabic website than the English website. The differences were statistically significant.</p>	<p>Experts indicated that learnability is an important criterion for e-learning websites.</p>
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As a bad example, figure 8-6 shows the use of small font and a bad translation of some part of the text (some of it designed in Arabic and some in English) which affects the user's learnability.



Figure 8-6: Iraqi library of academic lectures.

8.2.5 Language

Chomsky defined language as “a set (finite or infinite) of sentences, each finite in length, and constructed out of a finite set of elements” (Lyons, 1981; Syal & Jindal, 2007, p.7). Barthes (1977, p.56) defined language from a different perspective: "Language is an intermediate object between sound and thought: it consists in uniting both while simultaneously decomposing them".

Nantel and Glaser (2008) have claimed that no studies exist which study the link between the usability of a website and the cultural and linguistic background of its designers. However, other studies (Medhi et al., 2011; Smith et al., 2001) have shown that the usability of a user interface improves when the designer considers the native language of the user. Hillier (2003) reported that translations of the contents, culture and context influence the way people perceive and react to an e-commerce website. The translation of a website to suit other cultures may require a change to the whole design, since acceptance of the website may rely on the culturally-based needs of the users (Nantel & Glaser, 2008).

Translation needs to consider the relationship between language and culture and requires a deep understanding of the target language, especially when taking into account the differences between the composition of the Arabic and English languages. The divergence in Arab and English cultures needs to be considered as well (Lee et al., 2011). The quality in automatic translation is influenced by the morphological richness of languages and the differences in syntax of languages (Verleysen, 2013). Americans tends to focus on the left hand side of a website whilst Arabs focus on the right hand side of a website (Barber & Badre, 2009). This is linked to the direction in which the

English language (from left to right) and the Arabic language (from right to left) are written.

Translation is a means of communicating knowledge across differing cultures. Translation includes two inseparable elements: language and culture. In this respect, language has to conform to the culture of its speakers. Language expresses the meanings of items that can only be understood when considering the cultural context in which these items are used (Salehi, 2009). Cintas and Anderman (2009) suggested that a multilingual website cannot simply be translated to English without considering the local culture of the target users.

The way that language has an effect on websites is still far from clear (Cyr & Smith 2004). The quality of translation plays a decisive role when considering the internationalisation of websites. Robbins and Stylianou (2002) assessed global corporate websites demonstrating that only 7% of Anglo sites included a translation capability in contrast to 100% of Latin American and Asian sites. Cyr and Trevor-Smith (2004) declared that studies on the correlation between language, usability, and culture in the Arab world are still in their early stages. So far, there have been no attempts to conduct research to show how usability is determined by Arabic culture and language, and how usability guidelines can be constructed to help Arab users use interactive e-learning websites more competently. This research aims to bridge this gap.

The qualitative results in this study show that the quality of translation plays a major role in the usability of e-learning websites. 90% of the participants reported that the quality of the translation on the Arabic version was very poor and hard to understand. This resulted from the direct translation of the English version into Arabic using automatic translation software. The Arabic language is quite complex and grammatically rich in nature. Therefore, effective translation of Arabic requires native

speakers and domain experts who have a deep knowledge of the morphology of the language and the meanings of words. Moreover, the sentences used in a website need to consider the context and cultural values of its users in order to engage their feelings. The language used has to be culturally embedded.

Table 8-5 Guideline Five: Language

Guideline	Comments	Other Sources	Strength from the users' view	Strength from the experts' view
English e-learning websites should be translated into Arabic by expert Arabic speakers who understand the context and meaning of the words in relation to the Arabic culture. Therefore, translation should consider and reflect the cultural values and principles of the Arabic users.	Bad translation makes it difficult to understand the meaning of the text and frustrates the users, resulting in negative experiences. Therefore, machine translation should be avoided at all costs and instead replaced by human translation.	Cintas and Anderman (2009)Cyr and Smith 2004. Robbins and Stylianou (2002). (Salehi, (2009).	Although the majority of the participants prefer to use their mother tongue,, Arabic, which is perceived as a beautiful language, they complained about its poor translation. This made them prefer the English version over the Arabic version. Moreover, 64% believed that the direction of writing influences their judgment of the usability of the e-learning website.	TOPSIS Analysis: Experts indicated that language is a very important criterion to the success of e-learning websites. However, they discovered that the quality of translation is very poor in the Arabic version.

A bad example (the following website includes bad translation from English to Arabic and it contains an appropriate word in the Arabic culture, for e.g. inviting people to enjoy a wine party in a pub) is shown in figure 8-7.

موقع التعليم الإلكتروني

مرحباً بكم في موقع البوابة

مناهج البحث

يعرض من البحث هو اكتشاف الأهمية على الأسئلة من خلال تطبيق العملي الإجراءات. والهدف الرئيسي من البحث هو معرفة الحقيقة التي كانت حياء والتي لم تكن اكتشفت حتى الآن. على الرغم من كل دراسة بحثية لديها هدف محدد الخاص، يمكن أن يعكس في أهداف البحث والتوقع في عدد من التجمعات واسعة بعد:

أهداف البحث

يمكننا أن نذكر في أهداف البحث والتوقع في عدد من التجمعات واسعة بعد:

- اكتساب الألفة مع ظاهرة أو لتحقيق رؤى جديدة في ذلك (دراسات مع هذا يطلق على الكائن في طريقة العرض كما استكشافي أو formulative البحوث دراسات):
- لتصور بدقة خصائص فرد معين، أو وضع مجموعة (ومن المعروف دراسات مع هذا الكائن في طريقة العرض كما وصفي البحوث دراسات):
- لتحديد التكرار الذي يحدث شيئاً أو الذي يرتبط ذلك مع شئ آخر (ومن المعروف دراسات مع هذا الكائن في طريقته العرض كما بشخصي بحث دراسات):
- لاختبار فرضية وجود علاقة سببية بين المتغيرات (وتعرف مثل هذه الدراسات كما فرضية الاختيار البحوث والدراسات).
- لتحديد أهداف المنظمات لخطط إحاطة فريق
- لتحديد العوامل المرتبطة معاير فعالية لتسببها إحاطة فريق.
- لوضع نظرية تفسيرية أن الرغلة عوامل معينة مع فعالية خطط إحاطة فريق.
- لوصف مدى فعالية معاير للإحاطة فريق ذلك استوفيت.

الفلسفات بحث التفاهم والمناهج

فلسفة البحث الذي يعتمد على افتراضات عامة حول الطريقة التي تقوم بقرئ العالم. وسوف تدعم هذه الافتراضات استراتيجيات البحوث الخاصة بك والأساليب التي تختارها كجزء من تلك الاستراتيجية. في جزء منه، وسوف يناقش فلسفة كنت تعتمد على اعتبارات عملية. ومع ذلك، فإن التأثير الرئيسي من المرجح أن يكون يرمي قضية من العلاقة بين المعرفة والعملية التي من خلالها يتم تطويره. الباحث الذي تتعامل مع الجهالي، مثل الموارد اللازمة في عملية التصنيع، من المرجح أن يكون وجهة نظر مختلفة جدا على البحث الطريقة التي ينتهي أن يتم من الباحث العصبية مع معسائر وموافق العمال نحو متبرهم في ذلك عملية التصنيع نفسها. ليس فقط سوف الاستراتيجيات وأساليبهم ربما تختلف اختلافاً كبيراً ولكن، حتى وجهات نظرهم على ما هو مهم، وربما الأهم من ذلك، ما هو مفيد.

الملاحظة القائمة

التصفحة الرئيسية
المواد
التحذير الرئيسي
الواجبات
الإمتحانات
استفسارات
اسئلة
التعليق
ما اتصل

اعلان من اتحاد الجامعة.

"نحن نقدم مجموعة واسعة من المشروبات الكحولية وغير كحولية وسنقبل طي من العروض. يمكنك التمتع بعدة أصناف في الخرفة التي لدينا جميع الأرباح تعود إلى حفظ انخفاض الأسعار وتحسين الاتحاد الخاص. ونحن نعتبر على اختيارنا السيرة الحقيقية. ويمكننا أن نختار من وجهة نظراً أربعة اليد تسحب، لدينا حتى السيرة الخاصة بنا - Hoptimus - رئيساً هناك الكثير للمشاركة كذلك مع أباريق وأباريق كامل من الكوكيلات والسيرة ونسرب الفياج أو البوب، والكمال للجمهور بعد نسبة العسفة اليد الإضافية أو اللصن. الإمتحانات، لدينا أيضا قائمة العلامات

Figure 8-7: student portal Arabic version.

8.2.6 Satisfaction

In the context of usability, satisfaction is linked to how pleasurable the system is when used and how satisfied people are when using the system (Nielsen, 1993). Bailey and Pearson (1983) referred to satisfaction as the aggregate of a person's feelings or attitudes toward a specific situation. Satisfaction is a subjective factor and, therefore, more difficult to measure than other factors of usability. Measurement usually involves many users and is time-consuming to capture. There are different ways of measuring

user satisfaction, such as questionnaires to assess personal experiences with specific systems.

User satisfaction can be measured by assessing visual appeal, productivity and usability (Lindgaard & Dudek, 2003; Shee & Wang, 2008). Survey results have revealed that pleasurable online shopping by users is correlated with a number of factors including website features, usability, usefulness and reliability. An analysis of the results has shown that customer satisfaction is strongly linked to these factors (Karim, 2011). Similarly, a strong relationship between the design features (e.g. content, interactivity), the usability of electronic commerce applications and user satisfaction has been demonstrated (Palmer, 2002). Casaló et al. (2008) claimed that a good understanding of the content of websites improves usability and thereby has an influence on satisfaction. In the e-banking business, usability of websites is believed to have a direct and positive influence on customer satisfaction.

With regard to this research, results from questions 5, 12, 14 and 15 were significantly different (T-tests) between the Arabic and English version of the e-learning website. Question 5 focused on measuring the user's feeling of comfort. Question 12 measured how conveniently users can use the e-learning website. Question 14 measured the level of user confidence in using the e-learning website. Finally, question 15 measured the overall user satisfaction with the e-learning website. The average results for the English version were higher than the average results for the Arabic version. Qualitative feedback, in the form of negative feedback, showed that the study's users were dissatisfied with the level of translation, the quality of language and the type of pictures on the e-learning website. Further details can be found in table 5-12. These factors were also directly related to the culture of the users. In the study's case, Arab users did not

find the content of the Arabic e-learning website (e.g. pictures and text) to be appropriate as they did not respect their Arabic values and cultural principles.

Table 8-6 Guideline Six: Satisfaction

Guideline	Comments	Other Sources	Strength from the users' view	Strength from the experts' view
To increase user satisfaction, e-learning systems must respect the culture of its users with a particular focus on the type of images, quality of content, and level of translation of content.	Type of images and quality of content should conform to the principles and values of the Arab users, for instance: images of under-dressed women is unacceptable for Arab users. Similarly, announcements about night-outs and bar parties are totally unacceptable.	Bailey and Pearson, 1983. Casaló et al., 2006; Casaló et al. (2008). Karim 2011. Lindgaard and Dudek, 2003;. Luis et al 2008.Nielsen, (1993); Palmer,2002; Shee and Wang, 2008; Zviran at el 2005.	T-test results show that user satisfaction differed between the two e-learning websites, with the English version receiving the highest average rating. Qualitative data revealed dissatisfaction with the quality of the announcements and pictures on the Arabic website.	Fuzzy TOPSIS: satisfaction scored one of lowest levels which means that the users were not satisfied when using the system even though the satisfaction criteria was marked from the experts as a very important factor.

Jordan University of Science and Technology (JUST) uses a Moodle platform and have uses some translation from English into Arabic; however, the majority of text is still in English, which may confuse some students. Moreover, the website is poorly designed, contains no images and uses no colours (see figure 8-8).

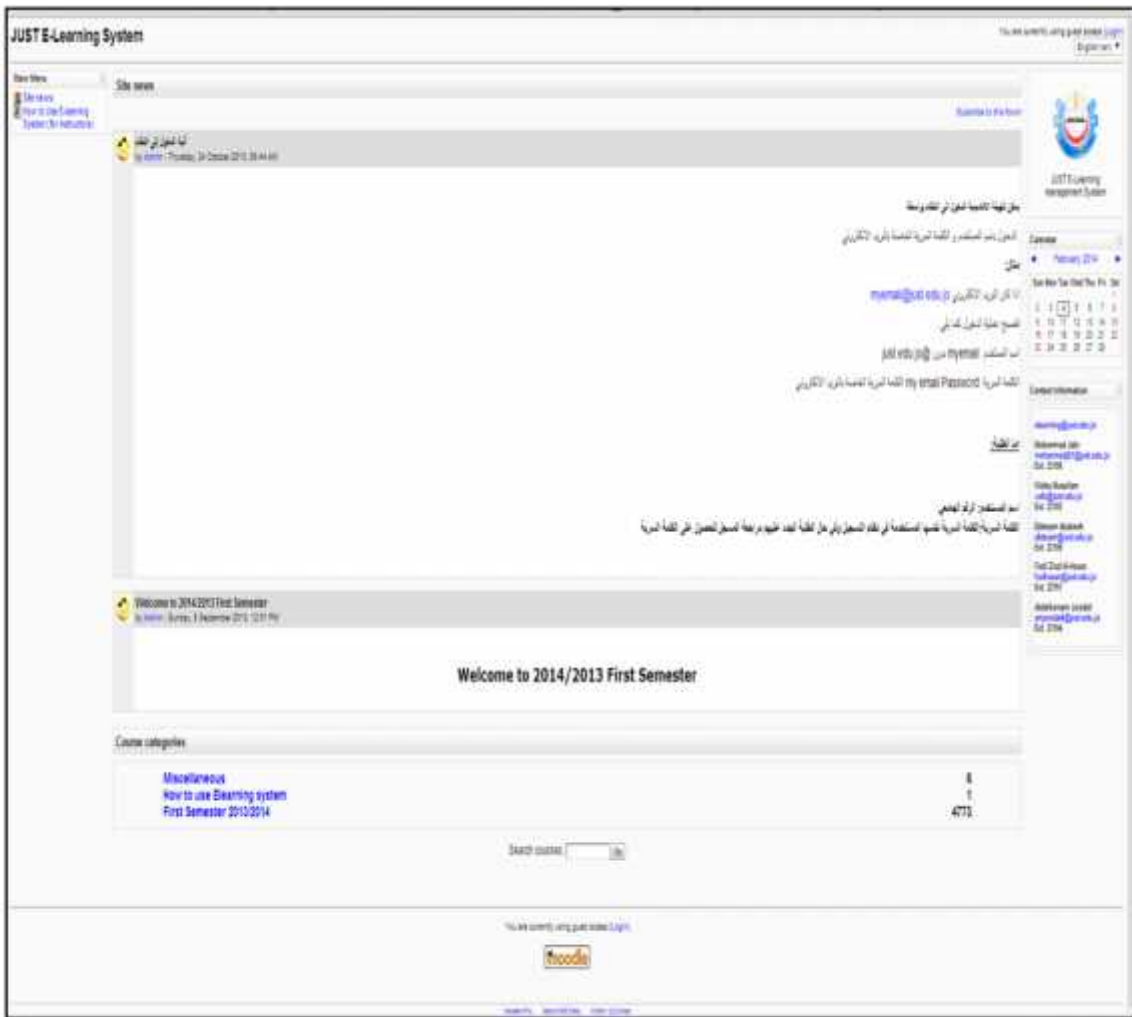


Figure 8-8: Jordan University of Science and Technology E-Learning System.

8.2.7 Information Content

Content refers to the textual information and graphic information such as pictures and videos (Zhong & Jain, 2000). Content is the backbone of any website as it provides the required information for the users to achieve their goals. Bringula and Basa (2011) studied various faculty-related factors (e.g. age, education, computer skills and use of

portal) and design-related factors (ease of navigation, content, speed, aesthetics and availability) and found that information content is the only significant predictor of the usability of web portals. The rest of the factors (e.g. aesthetics and ease of navigation) were not linked to the usability of web portals.

Garrett (2003) emphasised that ‘content is king’ for websites; it is indeed the most valuable thing that one can provide to web users. Garrett (2003) explained that content refers to the information delivered, its quality, amount and variety, as well as the mechanisms for delivering this information. Tarafdar and Zhang (2005) showed that information content influences web usability. This was confirmed by other research studies (Palmer, 2002; ; Pearson & Pearson, 2008 Tarafdar & Zhang, 2005). Forrester Research (2001) reported that 77% of the users return to content-driven sites for the reason of ease-of-use, only 22% back to use the site because the site belongs to a favourite brand.

However, Garrett (2003) suggested that images, video and audio could be more important than textual information. In general, the designer of a website needs to give the most attention to the amount of the content, the type of the content (text, video or audio) and the files to be downloaded from the website. Leavitt and Shneiderman (2007) suggested that graphics can be used to explain quantitative information, that the pages should not contain unnecessary content and that related content should be grouped together to ease navigation.

The qualitative results revealed that the participants were unsatisfied with the content of the Arabic e-learning website. They particularly complained about the bad translation and the choice of words used within the Arabic website and the inappropriate content (e.g. announcements and pictures) which did not respect their cultural views and values.

For example, pictures of under-dressed women on websites are unacceptable in the Arabic culture. Moreover, a few participants complained about the lack of audio information within the website. The case study showed that the two University websites that were analysed did not contain any pictures of women although these two websites came from two different countries belonging to two different geographic areas (i.e. Saudi Arabia and Egypt). (The case study also showed that Arabic e-learning websites use pictures which reflect the history of the country, for example Cairo University uses the logo of the Pharaohs.) Indeed, Arabic society is a masculine society that does not favour using female pictures on its websites. This is strongly linked to religious and cultural values in some instances.

Table 8-7 Guideline Seven: Information Content

Guideline	Comments	Other Sources	Strength from the users' view	Strength from the experts' view
Use familiar language and words to enhance user understanding of the information on the e-learning website. The content (e.g. text and pictures) has to comply with the cultural background and value of Arab users. The Arabic content writer	Arab users appreciate websites which respect their beliefs and cultural background. Words or sentences which are not compatible with Arabic culture may cause users to stop using the e-learning website. Example of words which	Garrett (2003). Leavitt and Shneiderman (2007); Palmer (2002), Ruffini (2001), Seethamraju (2006). Tarafdar & Zhang (2005).	The qualitative results showed that Arab users pay attention to the type of content on e-learning websites and its appropriateness. In the user study, participants perceived negatively the images of women and some announcements, as these did not	Fuzzy TOPSIS: The experts indicated that content is very important to the usability of e-learning websites. However, the content of the Arabic version of

<p>should use short sentences and paragraphs to enhance user understanding of content.</p>	<p>are unacceptable in the Arabic culture include: wine, pig, bar, beer, boyfriend and girlfriend. Pictures of women may be avoided in e-learning websites; However if necessary, the designer may use pictures of women with Hijab, which it is the most acceptable form of dress for women in the Arabic culture.</p>		<p>reflect Arabic culture.</p>	<p>the e-learning website was rated poorly by the experts. This confirms the findings of the user study and the case study.</p>
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A bad example (inviting people to enjoy a wine party in a pub) is shown in figure 8-9.

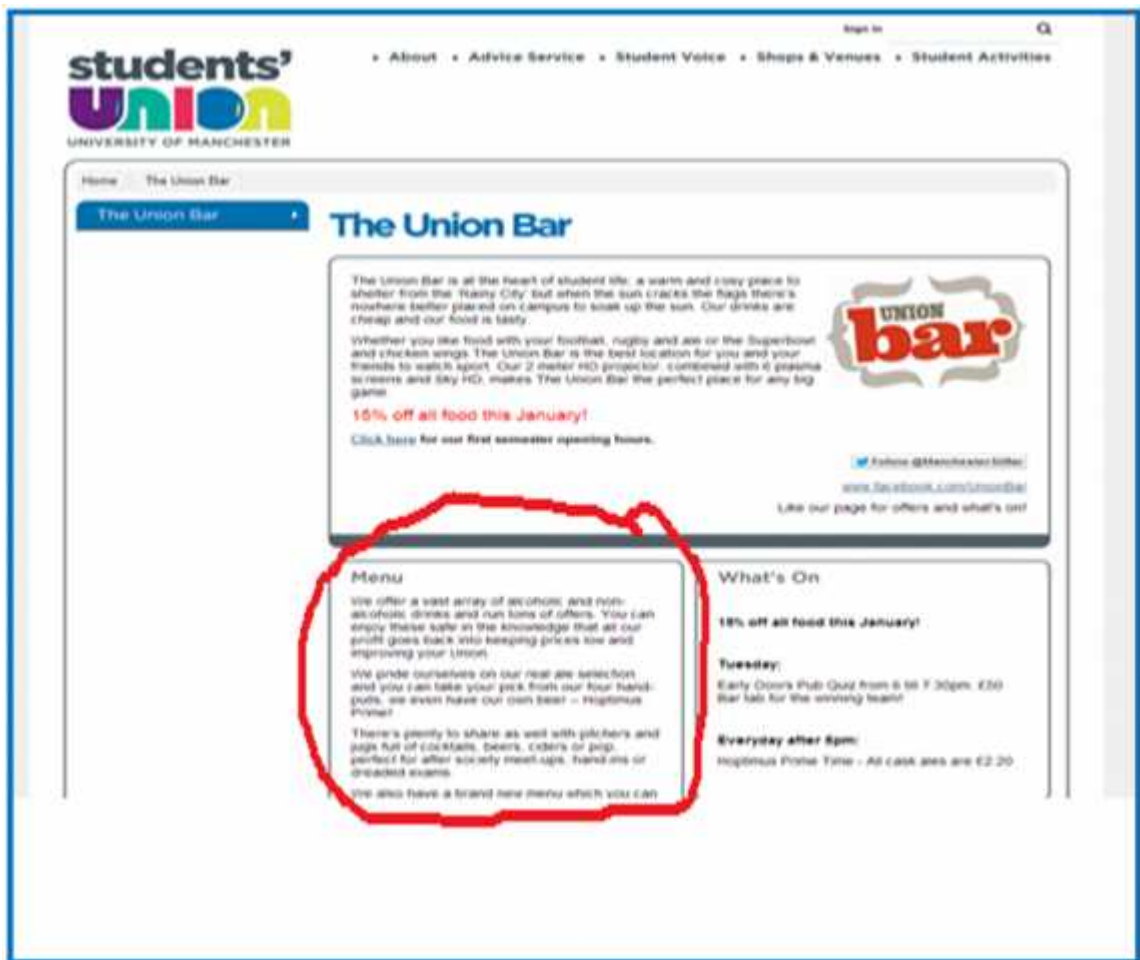


Figure 8-9: Students' Union, Manchester University.

8.2.8 Efficiency

Nielsen (1993) refers to efficiency as the element that concentrates on how quickly the user can complete tasks. ISO 9241-11 (1998, p.7) defines efficiency as “The resources expended in relation to the accuracy and completeness with which users achieve goals.”. Nielsen (1993) suggested that interactive systems should be sufficient to use as that high level of productivity can be achieved. In other words, efficiency refers to the efforts required to perform a task when using a system.

Nikmeh and Doroodchi (2008) emphasised the need to design software that is efficient and effective to use which can be achieved by eliminating technical issues. Engaging

learners requires meaningful and appropriate content. Moreover, the learner should focus on the content of the e-learning website rather than on the ways of accessing it (Costabile et al., 2005). In this regard, the e-learning platform must ensure easy interaction with the users and hide any technical complexities to guarantee efficiency (Guo et al, 2009).

Nantel and Glaser (2011) claimed that there are no studies that have investigated the link between the efficiency of websites and the cultural background of its designers.

Statistical analysis of the performance results showed that the completion time for tasks 4, 5 and 7 differed significantly between the Arabic and English versions of the e-learning websites (t-tests). Users finished these tasks faster using the English version than the Arabic version. This may be attributed to the quality of the Arabic language used and thus the users' weak understanding of the content. In fact, the Arabic website used translated content, which was negatively perceived by the users as shown by the qualitative data.

Table 8-8 Guideline Eight: Efficiency

Guideline	Comments	Other sources	Strength from the users' view	Strength from the experts' view
To ensure a e-learning website is efficient the designer has to use a language which respects the Arabic culture, grammatically	Clear and well-translated content enables users to understand the information well. This allows them to achieve their tasks	Nikmeh and Doroodchi (2008). Singh and Matsuo, 2004. Yuqing Guo et. al (2009).	Completion time from the performance data showed that users were faster in completing their tasks in the English version than in the Arabic version (T-tests).	Fuzzy TOPSIS: experts' results showed that the efficiency of the Arabic website is quite poor and

<p>correct, and translated correctly into Arabic. Moreover, the designer has to use font size 12/13 for text and layout content from right to left.</p>	<p>efficiently. The navigation menu should be placed on the right hand side of e-learning websites.</p>			<p>that it is fair on the English e-learning website, although efficiency scored as an important criterion</p>
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As a bad example, figure 8-10 shows that the structure used in this website employs an English style (e.g. menu on left hand side) although it is designed for Arab users. Moreover, this page is inconsistent in the language used; some sentences are written in Arabic and others in English. This causes confusion amongst the users.



Figure 8-10: Zarqa University

8.2.9 Aesthetics

Tractinsky (2000, p.128) referred to aesthetics in websites in the following sentence. “The concepts of aesthetics and usability represent two orthogonal dimensions of HCI. Whereas aesthetics usually refers often to non-quantifiable, subjective and affect-based experience of system use, usability is commonly measured by relatively objective means and sets efficiency as its foremost criterion”.

Aesthetics is a key design criterion in interactive systems (Salem & Rauterberg, 2005) and in industrial design (Benyon, 2010). The aesthetics of interactive systems was overlooked until initial research and findings were reported by Kurosu and Kashimura (1995) and Tractinsky et al. (2000). Their key finding stipulated that the aesthetics of a user interface affect its perceived ease of use. Moreover, aesthetics is related to consumer decision-making as it may affect the perceived usability of products and their actual use (Sauer & Sonderegger, 2009). For instance, Tractinsky (1997) found that aesthetically pleasing products are perceived as more usable. Crilly et al. (2004) showed that aesthetics might be influenced by factors (other than interface design factors) such as age, personality and cultural background.

Lavie and Tractinsky (2004) reported high correlations between usability and aesthetics. Hartmann et al. (2008) and Hassenzahl and Monk (2010) also reported a strong relationship between usability and the beauty (attractiveness) of a website. Wang et al. (2010) found that aesthetics influenced positively the intention to buy and the use of search engines on websites. Moreover, Banati et al. (2006) reported a link between aesthetics and the usability of websites (Bringula & Basa, 2011). However, Tuch et al. (2012) claimed that aesthetics do not influence perceived usability. Instead, the usability of a system influences perceived aesthetics (Lin et al., 2013). Moreover, some studies

(Van Schaik & Ling, 2009) found no link between the construct of aesthetics and perceived usability.

Those designing graphics, visual elements and information should consider the end user. Indeed, in a study users who were instructed to predict the easiest to use websites (Bringula & Basa, 2011) ranked websites with good aesthetics as the highest. Interestingly, colour was reported to be a key factor for improving aesthetic appeal. Aesthetics need to consider the amount of graphics to use on websites as lots of, or few, graphics may disorient users and reduce the responsiveness of websites (Lin et al., 2013). Websites should use the right balance of text, images and white space to improve their perceived aesthetics (Saade & Otrakji, 2007). Tractinsky and Lavie (2003) showed that aesthetics is concerned with website design elements (layout, picture, colour, icons and font) as a whole instead of looking at them as separate elements. Li and Yeh (2010) concluded that design aesthetics do not only show the beauty (attractiveness) of a website but directly influences the characteristics of a website.

Although aesthetics is believed to be important in designing new websites and products (Li & Yeh, 2010), studies of it in websites has received little attention in the literature (Juric et al., 2003; Lavie & Tractinsky, 2004; Tuch et al., 2010). The studies undertaken in this research aimed at shedding light on aesthetics in e-learning websites. In this research, participants were asked to complete an aesthetics questionnaire to gauge their impressions. Perceived aesthetics focus on two main parts, the classical characteristics and the expressive characteristics of a website (Lavie & Tractinsky, 2004). Classical characteristics measure the cleanness (clarity) of a website whereas expressive characteristics measure the originality and creativity of a website.

In general, aesthetics received high scores for both versions of the e-learning websites. The highest rated elements of aesthetics were 'clear, pleasant and clean'. These quantitative results were confirmed by the qualitative data whereby the participants reported on the following positive themes: clear structure, appealing design and good use of colours. However, the results of the aesthetics questionnaire revealed no statistical differences between the Arabic and English versions of the e-learning websites. Similarly, qualitative results revealed no differences in the perception of the two versions in respect to aesthetics.

Table 8-9 Guideline Nine: Aesthetics

Guideline	Comments	Other Sources	Strength from the users' view	Strength from the experts' view
To create aesthetically pleasing e-learning websites, a designer has to use blue colour as the main colour on the Arabic e-learning website because it reflects the Arabic environment. The design has to use a clear structure (e.g. simple) and a clean design (e.g. uncluttered) for Arabic e-learning	The results of this study show no strong link between aesthetics and the Arabic culture of the participants (or maybe Arab users give less importance to aesthetics when evaluating e-learning websites). However, further studies are needed to investigate the relationship	Bringula and Basa, 2011; Juric et al., 2003 ; Lavie and Tractinsky, 2004;. Li and Yeh (2010). Saade and Otrakji, 2007. Tuch et al., 2010 ; Van Schaik and Ling, 2009.	The quantitative and the qualitative results showed that Arab users were satisfied with the aesthetics of both versions of the e-learning websites. Users focused on the structure, use of colours, and the cleanness of the websites.	Fuzzy TOPPIS: Experts evaluated both sites as good in general even though they believe that the aesthetics criterion is less important than other criteria.

websites.	between aesthetics and Arab culture in the future.			
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The figure below shows a bad example of the use of aesthetics in an Arabic e-learning website. This is the website for the University of Baghdad, Iraq. The website uses a strong colour with a blurry background that may tire the eyes. Moreover, the font is quite difficult to read and the website contains many tabs.

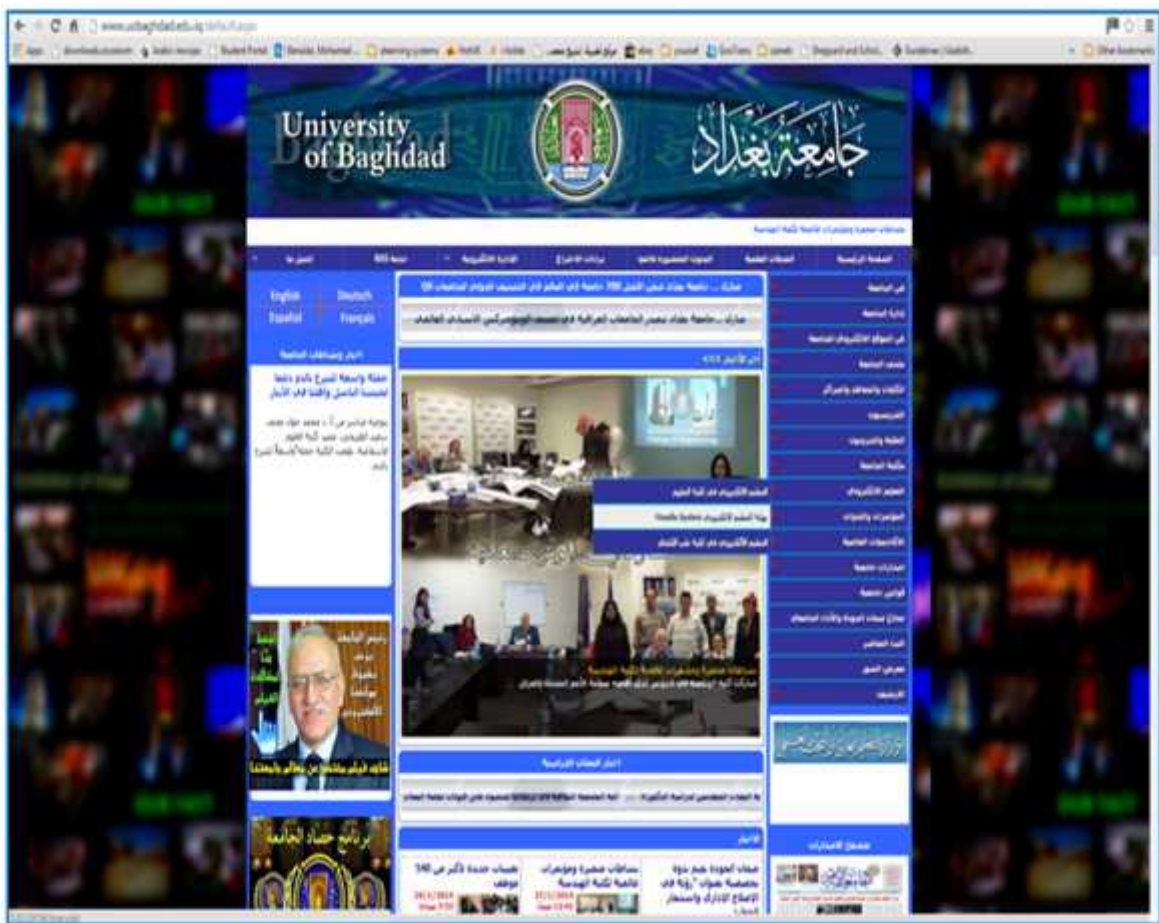


Figure 8-11: The University of Baghdad, Iraq.

The figure below provides a good example of the use of aesthetics in an Arabic e-learning website. This is the website for the University of Moulay Ismail, Morocco. The website uses a combination of good colours, structured layout and clean design.



Figure 8-12: University of Moulay Ismail, Morroco.

8.3 Summary

This chapter gave further details on the usability guidelines proposed for designing Arabic e-learning websites by undertaking an experiment and a case study. The discussion focused primarily on nine guidelines that aim to assist in creating effective and usable e-learning websites that fulfil the needs of Arab users.

Arab users prefer e-learning websites that contain pictures that evoke their feelings and interest. However, these images need to respect the cultural background and religious values of the Arab users. Arab users prefer the use of the colour blue on e-learning websites. Blue is the most favoured colour for Arab users as it reflects the environment

where they live (e.g. it is the colour of the sky and the sea). Indeed, Arabic culture has a strong relationship with the colour blue. Arab users prefer the use of font size 12 or 13 for Arabic e-learning websites. Readable font improves the usability of e-learning websites. Arab users prefer font type Traditional Arabic for Arabic e-learning websites. In general, Arabic e-learning websites need to be easy to use by Arab users. High learnability can be achieved by ensuring that the type of language and font used throughout an e-learning website meet the expectation of Arab users.

To enhance the understanding of Arab users, Arabic e-learning websites need to use suitable language which should be written by an expert Arabic content writer. Although translation software applications may produce syntactically correct content, the meaning may not be appropriate for the intended culture. Arabic e-learning websites should pay considerable attention to the type of content they contain (e.g. text and images). In fact, content is a crucial factor for the acceptance or rejection of an Arabic e-learning website. Such content needs to conform to the cultural values and principles of Arab users. A high quality of content can be achieved by using familiar language and words and short sentences.

To produce Arabic e-learning websites that are efficient, designers need to pay particular attention to the quality of language used, the size and type of font and structure. These design elements allow the Arabic user to complete their tasks quickly and efficiently. This research showed no strong link between aesthetics and the Arabic culture of the participants. Therefore, more research is required to investigate the effect of Arabic culture on the aesthetics of e-learning websites. Finally, in order to increase the user satisfaction of Arab users with Arabic e-learning websites, web designers must

respect Arabic culture and should place particular emphasis on the type of images, the quality of the content and the level of translation.

9 Chapter Nine: Conclusions and Future Work

9.1 Introduction

This chapter summarises the studies undertaken to answer the main research questions of this thesis. It also presents the main findings and the contribution made by this research. It also highlights the limitations of the study and sketches a future research plan. The following table shows the research questions, the research objectives and the chapter, which provides information for each of them.

The following table shows the research questions, the research objectives and the chapter, which provides information for each of them.

Table 9-1: Research questions and their answers

Research Question	Research Objective	Chapter
What are the differences in the usability perception of Arab users between Arabic e-learning websites and English e-learning websites?	Reviewing the current usability guidelines for English websites and Arabic websites.	One, Two.
	Understanding the link between culture, language, web design features and usability perception by web users.	Two.
	Exploring the differences between Arabic culture and English culture using Hofstede's dimensions.	Two.
	Designing and implementing an Arabic and an English e-learning website.	Three, Four.
	Performing an experiment with Arab users to investigate the link between culture, language, e-learning and usability.	Four, Five.
What are the main barriers and challenges that Arab web users	Defining key challenges and barriers concerning the successful use of Arabic e-learning websites.	Five, Six.

face when using Arabic e-learning websites?	Validating the model through a follow-up case study using fuzzy set theory.	Six, Seven.
What usability guidelines can be developed to improve the usability of Arabic e-learning websites?	Suggesting usability guidelines for Arabic e-learning websites to ensure barriers are minimised for students pursuing education in Arabic.	Eight.

9.2 Hypotheses Results

There are nine hypotheses tested using statistical analysis in Chapter five. These hypotheses are summarised in the below table, along with the test results of either being rejected or supported by the findings from the experiment. These test results are also supported by the case study and fuzzy set theory analysis in Chapter six and seven respectively.

Table 9-2: Hypotheses test results

Hypothesis	Test Results
H01: There is no difference between the effect of images on usability for English and Arabic e-learning websites	REJECTED
H02: There is no difference between the effect of colour on usability for English and Arabic e-learning websites	REJECTED
H03: There is no difference between the effect of font on usability for English and Arabic e-learning websites	REJECTED
H04: There is no difference between the effect of Learnability on usability for English and Arabic e-learning websites	REJECTED
H05: There is no difference between the effect of language on usability for English and Arabic e-learning websites	REJECTED
H06: There is no difference between the effect of satisfaction on usability for English and Arabic e-learning websites.	REJECTED

H07: There is no difference between the effect of content on usability for English and Arabic e-learning websites	REJECTED
H08: There is no difference between the effect of efficiency on usability for English and Arabic e-learning websites	REJECTED
H09: There is no difference between the effect of Aesthetics on usability for English and Arabic e-learning websites	ACCEPTED

9.3 Theoretical Contributions of this Research

This research undertook the challenge of investigating the perception of Arab users towards Arabic and English e-learning websites. This research contributes to the body of knowledge by addressing the following items:

- Established the differences between Arabic language and English language and their effects on usability of e-learning websites. This was achieved by analysing the reactions of 50 users towards two versions of the e-learning website.
- Identified specific elements and features which can enhance the usability of Arabic websites. This included analysing the effects of colour, font size and type, images, and language.
- Identified the main barriers and challenges that the Arab users face when using e-learning websites (culture, religion, language, technology...). This included cultural beliefs and principles.
- Developed nine Arabic usability guidelines that can improve the usability of Arabic e-learning websites. These guidelines are discussed in detail in Chapter eight.
- Established methodology for carrying similar experiments for comparing between other languages.

- Understood the relationship between culture, language, usability, web design and e-learning.

9.4 Practical Implications

The guidelines focus on following primary areas:

- Use images that respect Arabic culture. For example, when using female pictures, the designer of the e-learning website should avoid pictures of underdressed women since hijab is the most acceptable form of clothing for women in the Arab world. Moreover, the design should use pictures of a group of people, which reflect the collectivism nature of Arabic society.
- Use the colour blue for e-learning websites. In the Arabic culture, blue reflects the environment where people live. On most days, the sky is blue and the sea is also blue. Such an environment greatly influences the liking and choice of colours by Arab users. Therefore, Arabic culture has a strong relationship with blue as a colour.
- Use 12 or 13-point font size and use Traditional Arabic font type in Arabic e-learning websites. Readable text allows users to quickly scan the content of e-learning websites.
- Avoid language translation. Instead, hire an expert content writer to write the content and do not mix two languages on the same page. Bad translation makes it difficult to understand the meaning of the text and frustrates the users, resulting in negative experiences. However, when translation is the cheapest option, the translator has to be a Arabic native speaker and knowledgeable of the cultural values of the Arabic society.

- Use content (e.g. text, images, and videos), which respect the cultural background and religious values of Arab users. Example of words which are not acceptable in the Arabic culture include: wine, pig, bar, beer, boyfriend and girlfriend.
- Enhance learnability by ensuring the content is of good quality and that the font is readable. In general, use of good language enhances understanding of the content and therefore reduces the time needed to learn to use the e-learning website. In addition, poorly translated language imposes barriers on understanding as in the case of the Arabic e-learning website. A readable font (e.g. size 12 or 13 point) improves the speed of reading and learning on the e-learning website.
- Improve the efficiency of e-learning websites by paying considerable attention to the language used, the structure of the website (navigation bar), and font size. Clear and well-translated content enables users to understand the information well. This allows them to achieve their tasks efficiently. The navigation menu should be placed on the right hand side of Arabic e-learning websites.
- This research did not show a strong impact of aesthetics on the judgment of Arab users. This subject requires further investigation in the future.
- The satisfaction of Arab users with e-learning websites is strongly dependent on the respect shown for their cultural values and religious principles. Moreover, the satisfaction of Arab users can be increased by improving the quality of the content and the standard of translation (in cases where translation is required).

These guidelines are described and discussed in more detail in chapter eight.

9.5 Conclusions

This chapter summarises the key theoretical contributions of this research, as well as the practical implications for designers of Arabic e-learning websites. The concluding points of this research include:

- Use the appropriate images that respect Arabic culture.
- Use the colour that is preferred by Arabic users for e-learning websites.
- Use the font size and font type that are favoured by the Arabic users in e-learning websites.
- Avoid language translation. Instead, hire an expert content writer to write the content and do not mix two languages on the same page.
- Use content (e.g. text, images, and videos), which respect the cultural background and religious values of Arab users.
- Enhance learnability by ensuring the content is of good quality and that the font is readable.
- Improve the efficiency of e-learning websites by paying considerable attention to the language used, and the structure of the website.
- The satisfaction of Arab users with e-learning websites is strongly dependent on the respect shown for their cultural values and religious principles.
- This research did not show a strong impact of aesthetics on the judgment of Arab users.
- This research offer usability guidelines for designers, companies, universities to build usable websites and systems that can fulfill the needs of the Arabic users.
- This research provides an understanding to researchers on how e-learning websites may be affected by language and culture.

- Arabic users have a different culture, a different language and a different religion that should be respected to build usable e-learning websites
- Arabic users have a different background to the western users. This implies that they need a different e-learning website and different content that respect all factors discussed in this thesis.

9.6 Limitations of this Research

This research has a number of limitations that do not invalidate the findings of the study. Its limitations include the following points.

This research tested e-learning websites instead of commercial e-learning systems. Initially, the researcher aimed to investigate realistic commercial e-learning systems such as Blackboard. However, as these e-learning systems are closed environments and require access to be able to evaluate them, the researcher decided not to focus on commercial e-learning systems. Instead, the researcher took on the challenge to create experimental e-learning websites in both Arabic and English. Moreover, the researcher required an e-learning system which contained a number of elements to test such as Arabic and English languages, images, colour and specific content (e.g. announcements on forthcoming parties).

There have been no previous studies on Arabic e-learning websites and on guidelines. This research would have been stronger if there had been earlier studies to suggest possible relationships and links between the areas of e-learning, culture, usability and language in the Arabic society.

The research included a total of 50 Arab users which may not be a sufficient number to generalise the findings of the experiment. However, recruiting an acceptable number of

participants would require a longer period to collect the data and analyse it. The findings of the experiment were supported by undertaking a case study and fuzzy set theory analysis. This allowed the researcher to validate the guidelines using two approaches: an experiment and a case study.

The Arabic guidelines for e-learning websites proposed here are preliminary and require further investigation by the research community. This research is only a first step towards establishing robust guidelines for Arabic e-learning websites. Further research will require substantial studies and resources (e.g. funds, experts, knowledge, e-learning systems, and so on).

This research focused on studying the links between culture, language, e-learning and usability. However, it did not investigate the effect of some design elements such as navigation, layout and videos on the perception of Arab users.

9.7 Recommendations for Further Research

In the future, the researcher plans to continue exploring the link between certain design elements, culture, language and e-learning systems. Of particular interest are the following design elements: navigation, layout and video. This further exploration will be achieved by conducting numerous experiments using e-learning systems, such as Blackboard and Moodle. The number of participants will be higher in future experiments. In addition, the researcher plans to explore how the culture of different Arab countries influences the perceived usability of e-learning websites. Finally, the researcher plans to investigate the effect of religion on the evaluation of e-learning websites.

APPENDICES

Appendix A: Experiment Questionnaires

List of Tasks for the Arabic Website

Task One

- Download the second year timetable.
- حمل الجدول الزمني السنة الثانية
- Task Two
- Download exam paper ‘number three’
-
- Task Three
- Download ‘research philosophy pdf file’ from the research methods module
-
- Task Four
- Upload your assessment file
- حمل ملف التقييم الخاص بك

Task Five

- Fill in the enquiry form and submit your enquiry
- املأ نموذج الاستفسار وتقديم استفسارك
- Task Six
- Download “Cultural Influences on Immigrant.pdf” course

- حمل ملف تأثير الثقافة على المهاجرين من صفحة المواد
- Task Seven
- Fill “questionnaire “
- املأ الاستبيان الموجود على صفحة الاسئلة

Evaluation of Website

Website in general

What did you like about the Arabic website?

What did you dislike about the Arabic website?

Evaluation Questionnaire (Arabic Version)

General questions

1. Specify your age?

2. Specify your gender?

Male

Female

Images

1. In general the use of images of the Arabic website give you different feelings

Yes

No

Why?

2. Do you think it's important to use images?

Yes

No

Why?

3. Are you happy about the images that you find through the Arabic version?

Yes

No

Why?

4. Do you feel that there is consistency between images?

Yes

No

Why?

Colour

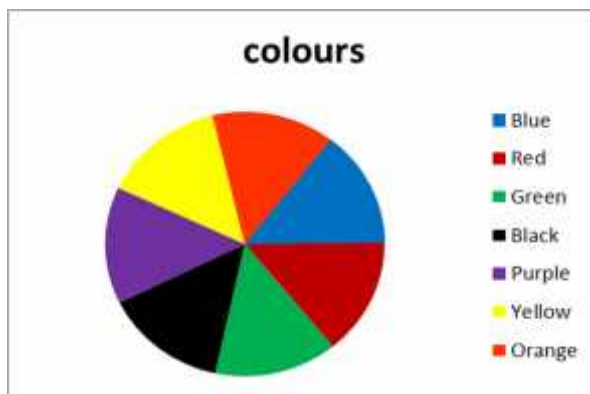
1. Do you think we need to change the colour of the website?

Yes

No

Why?

2. Which is the best scheme colour for the Arabic version e-learning website?



Write your answer:

3. What is your least favourite colour?

4. What is your most favourite colour?

5. Do you have any additional comments (please write below)

Language

1. In order of preference, which one you enjoyed using

Arabic

English

Justify your choice

2. Does the direction of writing (i.e. from right to left) in the Arabic website affect your judgment of the e-learning website?

Yes

No

Justify why and how?

3. What is your native language?

Please list any other languages that you know below. For each, rate how well:

	Not Good	1	2	3	4	5	Very Good
Language	Speaking	Listening	Writing	Reading	Grammar	Pronunciation	
1							
2							

3						
4						

4. What do you think the level of the translation used on the site

Not Good 1 2 3 4 5 Very Good

Why?

Font

1. Which size from the following options do you favour?

- 11
- 12
- 13
- 14

2. Which type of font do you favour for Arabic websites?

- Times New Roman
- Arial
- Verdana
- Tahoma
- Cambria
- Calibri
- Traditional Arabic
- Others (please write below)

3. Do you have any additional comments (if yes, please write below)

List of Tasks for the English Website

Task One

- Download the second year timetable.

Task Two

- Download exam paper “number three”

Task Three

- Download “research philosophy pdf file” from the research methods module courses page.

Task Four

- Upload your assessment file.

Task Five

- Fill in the enquiry form and submit your enquiry.

Task Six

- Download “Cultural Influences on Immigrant.pdf” course.

Task Seven

- Fill “questionnaire”.

Evaluation of Website

Website in general

What did you like about the English website?

What did you dislike about the English website?

Evaluation Questionnaire(English Version)

General questions

1. Specify your age?

2. Specify your gender?

Male

Female

Images

1. In general the use of images of the English website give you different feelings

Yes

No

Why?

2. Do you think it's important to use images?

Yes

No

Why?

3. Are you happy about the images that you find through the English version?

Yes

No

Why?

4. Do you feel that there is consistency between images?

Yes

No

Why?

Colour

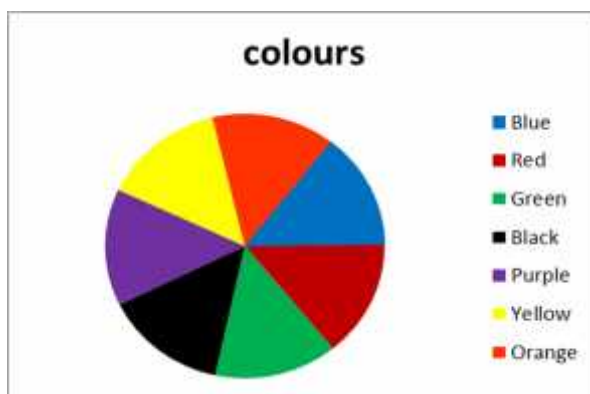
1. Do you think we need to change the colour of the website?

Yes

No

Why?

2. Which is the best scheme colour for the English version e-learning website?



Write your answer:

3. What is your least favourite colour?

4. What is your most favourite colour?

5. Do you have any additional comments (please write below)

Language

1. What is your native language?

2. In order of preference, which one you enjoyed using

Arabic

English

Justify your choice

3. Does the direction of writing (i.e. from left to right in the English website affect your judgment of the e-learning website?

Yes

No

Justify why and how?

Font

1. Which size from the following options do you favour?

- 11
- 12
- 13
- 14

2. Which type of font do you favour for English websites?

- Times New Roman
- Arial
- Verdana
- Tahoma
- Cambria
- Calibri
- Traditional Arabic
- Others (please write below)

3. Do you have any additional comments (if yes, please write below)

Appendix B: E-learning Participants Questionnaire

Section A: Information about your technology use

Q1: Approximately, how many years have you been using a computer for?

Q2: I normally use a computer (please tick one)

Every day A few times a week Occasionally Rarely/never

Q3: I have access to a networked computer (please tick all that apply)

At home/student residence At work At University/College/Learning Centre

Other Location (please state)

Q4: I normally access email and/or the Internet (please tick one)

Every day A few times a week Occasionally Rarely/never

Q5: How many hours a week do you spend at home or somewhere else on the Internet
(for work, recreational and educational purpose)?

Q6: When I use a computer, I customise it to suit my personal preferences e.g. background colours, icon sizes, mouse buttons, menu items, size of print on screen:

a) Yes No

If yes, please briefly list the changes you most often make:

b)

Section B: Use of online tools

Q7: I use social networks (E.g. MySpace, Flickr, Facebook)

a) Yes No

If yes:

b) Which do you use?

c) How often do you use your social networks? (please tick one)

Every day A few times a week Occasionally Rarely/never

Q8: I use synchronous chat tools (E.g. Instant messaging, chat rooms, IP telephony)

a) Yes No

If yes:

b) Which do you use?

c) How often do you use synchronous chat tools? (please tick one)

Every day A few times a week Occasionally Rarely/never

Q9: I use messaging and discussion tools (E.g. Email, forums, phone texting)

a) Yes No

If yes:

b) Which do you use?

c) How often do you use messaging and discussion tools? (please tick one)

Every day A few times a week Occasionally Rarely/never

Q10: I play online games or use virtual worlds and talk to other players (E.g. World of War Craft, Battlefield 2, Sims Online, Second Life)

a) Yes No

If yes:

b) Which do you use?

c) I use the following to communicate in-game or in the virtual world

(please tick all that apply)

Voice over IP (E.g. TeamSpeak, Ventrilo) In game chat (typing)

Another form of communication (E.g. MSN messenger) Rarely/never

d) How often do you play online games or use virtual worlds (please tick one)

Every day A few times a week Occasionally Rarely/never

Q11: I have an online personal space other than a social network(E.g. Web pages, blogs)

a) Yes No

If yes:

b) Which do you use?

c) How often do you use your online personal space? (please tick one)

Every day A few times a week Occasionally Rarely/never

Q12: I use other social and communication tools online (E.g. Online dating.)

a) Yes No

If yes:

b) Which do you use?

c) How often do you use your other social and communication tools online? (please tick one)

Every day A few times a week Occasionally Rarely/never

Appendix C: Usability Questionnaire

This questionnaire is based on the computer system usability questionnaire 1995

Please rate the usability of the Student Portal.

- Try to respond to all the item
- Optionally provide comments in the box.

			1	2	3	4	5	6	7	
1.	It was simple to use this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
2.	I can effectively complete my work using this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
3.	I am able to complete my work quickly using this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
4.	I am able to efficiently complete my work using this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
5.	I feel comfortable using this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
6.	It was easy to learn to use this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
7.	The Student Portal gives error messages that clearly tell me how to fix problems	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
8.	The information provided with this Student Portal is clear	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
9.	It is easy to find the information I needed	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
10.	It was easy to navigate through this Student Portal	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
11.	The organization of information on the Student Portal screens is clear	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

12. It was convenient to use this Student Portal strongly disagree strongly agree
13. I found this Student Portal unnecessarily complex strongly disagree strongly agree
14. I felt confident using this Student Portal. strongly disagree strongly agree
15. Overall, I am satisfied with this Student Portal strongly disagree strongly agree

			1	2	3	4	5	6	7	
--	--	--	---	---	---	---	---	---	---	--

Post-test interview: After participants completed the tasks, we asked them a series of summative questions about their experiences using the studentportal

List the most **negative** aspect(s) about the Student Portal.

1.
2.
3.

List the most **negative** aspect(s) about the Student Portal.

1.
2.
3.

Appendix D: Aesthetics Questionnaire

English Version (Tractinsky Questionnaire)

Please see “Assessing dimensions of perceived visual aesthetics of websites” Noam Tractinsky

Please rate the usability of the Student Portal.

- Try to respond to all the items.

Optionally provide comments in the box.

			1	2	3	4	5	6	7	
1.	Aesthetic design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
2.	Pleasant design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
3.	Clear design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
4.	Clean design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
5.	Symmetric design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
6.	Creative design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
7.	Fascinating design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
8.	Use of special effects	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
9.	Original design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
10.	Sophisticated design	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
11.	Feel joyful	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
12.	Feel pleasure	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
13.	Feel gratified	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
14.	Site contains no mistakes	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
15.	Site provides reliable information	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
			1	2	3	4	5	6	7	

List the most **positive** aspect(s) about the Student Portal (English version):

1.

2.

3.

List the most **negative** aspect(s) about the Student Portal (English version):

1.

2.

3.

Comments:

Aesthetics Questionnaire for Arabic Version

(Tractinsky questionnaire)

Please see “Assessing dimensions of perceived visual aesthetics of websites” Noam Tractinsky

Please rate the usability of the Student Portal.

- Try to respond to all the items.

Optionally provide comments in the box.

			1	2	3	4	5	6	7	
1.	Aesthetic design جمالية التصميم	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
2.	Pleasant design لطافة التصميم او كم هي لطافة التصميم	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
3.	Clear design وضوح التصميم	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
4.	Clean design مدى اناقة التصميم	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
5.	Symmetric design تصميم متماثل	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
6.	Creative design تصميم مبتكر	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
7.	Fascinating design تصميم مذهش	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
8.	Use of special effects	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
9.	Original design التصميم الأصلي	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
10.	Sophisticated design تصميم متطور	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
11.	Feel joyful	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
12.	Feel pleasure	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
13.	Feel gratified	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
14.	Site contains no Mistakes الموقع لا يحتوي اخطاء	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree
15.	Site provides reliable information الموقع يوفر معلومات موثوقة	strongly disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	strongly agree

List the most **positive** aspect(s) about the Student Portal (Arabic version):

1.

2.

3.

List the most **negative** aspect(s) about the Student Portal (Arabic version):

1.

2.

3.

Comments:

Appendix E: Paired samples test performance data

Paired Samples Test									
	Paired Differences					t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	TaskOneArabic - TaskOneEnglish	1.46000	13.52429	1.91262	-2.38356	5.30356	.763	49	.449
Pair 2	TaskTwoArabic - TaskTwoEnglish	-2.38000	15.94748	2.25531	-6.91222	2.15222	-1.055	49	.296
Pair 3	TaskThreeArabic - TaskThreeEnglish	2.65306	14.52663	2.07523	-1.51947	6.82560	1.278	48	.207
Pair 4	TaskFourArabic - TaskFourEnglish	9.59184	30.05753	4.29393	.95631	18.22537	2.234	48	.030
Pair 5	TaskFiveArabic - TaskFiveEnglish	22.21277	57.45393	8.38052	5.34366	39.08187	2.651	46	.011
Pair 6	TaskSixArabic - TaskSixEnglish	2.95556	16.42608	2.44866	-1.97939	7.89050	1.207	44	.234
Pair 7	TaskSevenArabic - TaskSevenEnglish	75.68000	133.71771	18.91054	37.67785	113.68215	4.002	49	.000

Appendix F: Average Usability Rating of Arabic and English Version

(7-point Likert scale, * statistical significance)

	Average Rating (on a 7-point Likert scale)		Significance
	Arabic	English	
It was simple to use this Student Portal	6.14	6.26	
I can effectively complete my work using this Student Portal	5.84	6.16	*
I am able to complete my work quickly using this Student Portal	5.72	6.06	*
I am able to efficiently complete my work using this Student Portal	5.72	5.88	
I feel comfortable using this Student Portal	5.06	5.74	*
It was easy to learn to use this Student Portal	5.62	5.96	*
The Student Portal gives error messages that clearly tell me how to fix problems	4.78	5.44	*
The information provided with this Student Portal is clear	5.7	5.86	
It is easy to find the information I needed	5.72	5.86	
It was easy to navigate through this Student Portal	5.82	5.96	
The organization of information on the Student Portal screens is clear	5.92	5.98	
It was convenient to use this Student Portal	4.88	5.62	*
I found this Student Portal unnecessarily complex	1.96	1.54	
I felt confident using this Student Portal.	5.08	5.9	*

Overall, I am satisfied with this Student Portal	4.76	6.02	*
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Usability questionnaire t-test results

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	SimpleToUse - SimpleToUseEnglish	-.16000	.71027	.10045	-.36186	.04186	-1.593	49	.118
Pair 2	EffectivelyCompleteWork - EffectivelyCompleteWorkEnglish	-.36000	.72168	.10206	-.56510	-.15490	-3.527	49	.001
Pair 3	CompleteWorkQuickly - CompleteWorkQuicklyEnglish	-.34000	.93917	.13282	-.60691	-.07309	-2.560	49	.014
Pair 4	EfficientlyCompleteWork - EfficientlyCompleteWorkEnglish	-.16000	.99714	.14102	-.44338	.12338	-1.135	49	.262
Pair 5	FeelComfortable - FeelComfortableEnglish	-.68000	1.11465	.15764	-.98678	-.36322	-4.314	49	.000
Pair 6	EasyToLearn - EasyToLearnEnglish	-.38000	.92339	.13059	-.64243	-.11757	-2.910	49	.005
Pair 7	ErrorMessages - ErrorMessagesEnglish	-.62000	1.21033	.17117	-.96397	-.27603	-3.622	49	.001
Pair 8	ClearInformation - ClearInformationEnglish	-.18000	.96235	.13610	-.45350	.09350	-1.323	49	.192
Pair 9	EasyToFindInformation - EasyToFindInformationEnglish	-.16000	.91160	.12692	-.41907	.09907	-1.241	49	.220
Pair 10	EasyToNavigate - EasyToNavigateEnglish	-.16000	.81716	.11556	-.38224	.07224	-1.385	49	.172
Pair 11	OrganisationOfInformation - OrganisationOfInformationEnglish	-.06000	.81841	.11574	-.28259	.17259	-.518	49	.607
Pair 12	ConvenientToUse - ConvenientToUseEnglish	-.64000	1.24146	.17557	-.96282	-.28718	-3.645	49	.001
Pair 13	UnnecessarilyComplex - UnnecessarilyComplexEnglish	.42000	1.75068	.24758	-.07754	.91754	1.696	49	.096
Pair 14	FeelingConfident - FeelingConfidentEnglish	-.86000	.96911	.13705	-1.13542	-.58458	-6.275	49	.000
Pair 15	Satisfied - SatisfiedEnglish	-1.28000	.92670	.13106	-1.54037	-1.01663	-9.767	49	.000

Appendix G: Average Rating Scores for the Aesthetics Questionnaire

(7-point Likert Scale)

Average Rating (on a 7-point Likert scale)		
	Arabic	English
Aesthetic design	5.54	5.68
Pleasant design	5.78	5.9
Clear design	5.88	6.06
Clean design	5.74	5.7
Symmetric design	5.12	5.52
Creative design	5.20	4.94
Fascinating design	4.94	4.58
Use of special effects	3.62	3.76
Original design	5.32	5.00
Sophisticated design	4.76	5.30
Feel joyful	5.32	5.42
Feel pleasure	5.42	5.32
Feel gratified	4.94	4.94
Site contains no Mistakes	5.52	5.32

Site provides reliable information	6.12	5.92
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Appendix H : Aesthetics questionnaire t-test results

Paired Samples Test									
		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Aesthetics - AestheticsEnglish	-.14000	1.16075	.16416	-.46988	.18988	-.853	49	.398
Pair 2	Pleasant - PleasantEnglish	-.12000	1.15423	.16323	-.44803	.20803	-.735	49	.466
Pair 3	Clear - ClearEnglish	-.18000	1.45251	.20542	-.59280	.23280	-.876	49	.385
Pair 4	Clean - CleanEnglish	.04000	1.59028	.22490	-.41195	.49195	.178	49	.860
Pair 5	Symmetric - SymmetricEnglish	-.40000	1.39971	.19795	-.79779	-.00221	-2.021	49	.049
Pair 6	Creative - CreativeEnglish	.26000	1.66366	.23528	-.21281	.73281	1.105	49	.275
Pair 7	Fascinating - FascinatingEnglish	.36000	1.79296	.25356	-.14955	.86955	1.420	49	.162
Pair 8	SpecialEffects - SpecialEffectsEnglish	-.14000	2.48267	.35110	-.84557	.56557	-.399	49	.692
Pair 9	Original - OriginalEnglish	.32000	1.97370	.27912	-.24092	.88092	1.146	49	.257
Pair 10	Sophisticated - SophisticatedEnglish	-.54000	1.97133	.27879	-1.10024	.02024	-1.937	49	.059
Pair 11	Joyful - JoyfuEnglish	-.10000	1.96136	.27738	-.65741	.45741	-.361	49	.720
Pair 12	Pleasure - PleasureEnglish	.10000	1.55511	.21993	-.34196	.54196	.455	49	.651
Pair 13	Gratified - GratifiedEnglish	.00000	2.32115	.32826	-.65966	.65966	.000	49	1.000
Pair 14	NoMistakes - NoMistakesEnglish	.20000	2.20389	.31168	-.42634	.82634	.642	49	.524
Pair 15	ReliableInformation - ReliableInformationEnglish	.20000	1.51186	.21381	-.22967	.62967	.935	49	.354

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