

UNIVERSITY OF SOUTHAMPTON

FACULTY OF PHYSICAL AND APPLIED SCIENCES

Electronics and Computer Science

**A Framework and Checklist for Localised Web Content Accessibility  
Guidelines for Arabic University Websites in Saudi Arabia**

by

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ABSTRACT

FACULTY OF PHYSICAL AND APPLIED SCIENCES

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A FRAMEWORK AND CHECKLIST FOR LOCALISED WEB CONTENT  
ACCESSIBILITY GUIDELINES FOR ARABIC UNIVERSITY WEBSITES IN  
SAUDI ARABIA

by **Asmaa S. Alayed**

The number of government universities in Saudi Arabia has increased dramatically from 7 to 28 in the last two decades. As a result, the number of university websites has also increased, but without any clear guidelines regarding accessibility, which may hinder some disabled users from benefiting from their content. Internationally, a number of initiatives such as Web Content Accessibility Guidelines (WCAG) have been implemented to develop guidelines for web accessibility to overcome this problem. However, these guidelines were developed in Western countries and applying them to Arabic websites can raise further accessibility issues, for example, those related to culture and language. This problem has been recognised by a number of researchers who recommend adapting the guidelines to the Arabic context and there have been initiatives by different bodies to improve the status of web accessibility in this region of the world. However, their work has a number of limitations and shortcomings that need to be overcome. The Yesser document provided by the Saudi government had a number of shortcomings, which included: providing accessibility guidelines not designed for the Arabic language and issuing no apparent update since publication in 2006. The initiative to translate the web accessibility guidelines into Arabic suffered from a number of weaknesses, such as: incomplete and inconsistent translation and using unfamiliar and inaccurate Arabic words in translation. Other initiatives were very limited and did not investigate the localisation to the Arabic context and its influence on web accessibility.

The current study set out to localise the existing accessibility guidelines into a form and content acceptable and easy to use by the developers of Saudi university websites, and thus raise the accessibility and suitability of these websites for Arab users with disabilities. The plan to achieve this aim was designed in three main phases, the first phase started by developing a new framework for localising web content accessibility guidelines for university websites in Saudi Arabia (FLWCAG). This framework was derived from the literature and validated through semi-structured interviews with 18 experts, 12 of whom were Saudi university website developers, Three experts were researchers in web accessibility in Saudi universities, while the remaining three experts were Arabs working with people with special needs. Overall, the experts supported the proposed framework, and the validity of the components in the framework was assured through triangulating the literature, the quantitative results and the qualitative results.

In the second phase, FLWCAG was applied through a process of four stages to localise web content accessibility guidelines and success criteria. An online questionnaire was designed and conducted with experts in the field of the study to review the outcome from the localisation process. The results from the 60 respondents confirmed the importance of all the success criteria, after analysing the questionnaire results by a one-sample t-test.

The last phase aimed at developing a checklist, called Wosool, based on the reviewed guidelines and success criteria from Phase Two. Wosool was developed to provide support to Arab web developers in evaluating and improving the accessibility of Arabic university websites. Interviews were designed and conducted with 15 Saudi university website developers to review the checklist. The results were positive, the developers confirmed that Wosool's items were understood, clear and easy to use. The research contributes to the body of knowledge in the fields of web accessibility and localisation, theoretically, methodologically, and practically. It also confirms that the culture of the target users has an effect on web content accessibility and the guidelines required, and that following such guidelines would result in better understanding, perceiving and navigating the web content, and hence raise the accessibility levels.



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## Declaration of Authorship

I, **Asmaa S. Alayed** , declare that the thesis entitled *A Framework and Checklist for Localised Web Content Accessibility Guidelines for Arabic University Websites in Saudi Arabia* and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:

- this work was done wholly or mainly while in candidature for a research degree at this University;
- where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
- where I have consulted the published work of others, this is always clearly attributed;
- where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
- I have acknowledged all main sources of help;
- where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
- parts of this work have been published as:
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Signed:.....

Date:.....

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# List of Abbreviations

|                |  |
|----------------|--|
| <i>ADD</i>     | Attention Deficit Disorder   |
| <i>ADHD</i>    | Attention Deficit Hyperactivity Disorder                                   |
| <i>AT</i>      | Assistive Technology   |
| <i>DDA</i>     | Disability Discrimination Act  |
| <i>CAPTCHA</i> | Completely Automated Public Turing test to tell Computers and Humans Apart |
| <i>FLWCAG</i>  | Framework for Localised Web Content Accessibility Guidelines               |
| <i>KSA</i>     | Kingdom of Saudi Arabia  |
| <i>MSA</i>     | Modern Standard Arabic   |
| <i>SAV</i>     | Spoken Arabic Vernacular   |
| <i>SC</i>      | Success Criterion  |
| <i>SCs</i>     | Success Criteria   |
| <i>URL</i>     | Uniform Resource Locator   |
| <i>W3C</i>     | World Wide Web Consortium  |
| <i>WAI</i>     | Web Accessibility Initiative   |
| <i>WCAG</i>    | Web Content Accessibility Guidelines                                       |
| <i>WWW</i>     | World Wide Web   |





# Chapter 1

## Introduction

Several definitions of disability exist worldwide, with no consensus on a standard definition being established. According to the [World Health Organization \(WHO\)](#), “Disability” is a broad term that covers impairments, activity limitations, and participation restrictions. Impairment can be seen as a problem in body function or structure, an activity limitation is a struggle faced by a person in executing a task or action, while a participation restriction is a problem encountered by a person involving life situations. To alleviate the problems experienced by people with disabilities, there is the requirement to remove any kind of barriers, such as environmental, social and technical.

There have been several initiatives to overcome the barriers that people with disabilities encounter when dealing with technology, and particularly the web. A number of these initiatives have been implemented to develop guidelines for web accessibility, including the Web Accessibility Initiative (WAI), Web Content Accessibility Guidelines (WCAG 1.0) which were published by W3C in 1999 ([W3C, 1999](#)). These guidelines were revised and became WCAG 2.0 in 2008. At that time, WCAG was internationally known and respected as a ‘de facto’ standard for web accessibility ([Lewthwaite, 2014](#)). In 2012, WCAG 2.0 finally became an international standard, known as ISO/IEC 40500:2012 ([ISO, 2012](#)).

Web accessibility means that all people in the community have an equal right to access the web, regardless of their abilities or disabilities. To be more specific, web accessibility provides all people including those with disabilities and older people, with web content that they can perceive, understand, navigate and interact with, and also facilitates their contribution to that content ([Petrie et al., 2015](#); [W3C, 2008](#)). However, without suitable web accessibility guidelines and standards, the number of people excluded from obtaining the benefits of accessing the web is likely to increase. Thus, this is an important issue that needs to be taken into account when developing websites, services and content.

As well as the international guidelines, a number of governments in different countries around the world have established their own policies, laws, and legislation relating to

web accessibility, including the United States, Canada, the UK, Japan and Thailand (Chapter 2, Section 2.2.3). However, this issue has not yet received attention in Arabic countries, such as Saudi Arabia, since there is no law or enforcement to take web accessibility into account when developing Arabic websites (Akram and Sulaiman, 2017; Al-Faries et al., 2013; Osman, 2017).

## 1.1 Access Barriers

According to recent estimations, as of June 2017, there are around 185 million individuals using the Internet in the 22 Arabic-speaking countries (Internet World Stats, 2017b). Although the penetration of the Internet in the Arabic-speaking population is the lowest within the top five languages (43.8% of the population), Arabic users represent by far the fastest growing language population on the Internet (7,247.3% user growth between the years 2000 and 2017). In Saudi Arabia, the number of people using the Internet has been increasing dramatically in recent years, from 200,000 in 2000 to more than 24 million in 2017 (Internet World Users, 2017), which indicates that approximately 74% of the population of Saudi Arabia uses the Internet. Similarly, the number of online services provided to the users has significantly increased, for example, payment of bills, student registration and online shopping. People prefer to use these services due to the lower expenditure of time and effort required (Khan and Buragga, 2010). However, the subject of web accessibility has remained a problematic issue for Arabic language websites, in terms of accurately assessing whether those with disabilities are able to enjoy their use on equal terms with their peers (Al-Badi and Mayhew, 2010; Al-Faries et al., 2013; Al-Khalifa, 2010; Badawood, 2016). This is despite the fact that by 2017, disabled individuals in Saudi Arabia represented almost 7.1% of the total population (General Authority for Statistics, 2017). This means that out of every 1,000 people, there are 71 people with disabilities.

In order to raise the level of education in Saudi Arabia and offer a variety of educational opportunities to their citizens, the government of Saudi Arabia has established new universities in different regions of the country (Alamri, 2011; Ministry of Education, 2017). Therefore, the number of government universities in Saudi Arabia has grown tremendously over the past two decades, from 7 to 28 (Ministry of Education, 2017). Each of these universities has a website, usually in two versions, an Arabic version and an English version. These websites play an important role in providing information about the university, colleges, departments, academic programmes, faculty members and other details. Moreover, electronic services are provided through these websites: for example, applying to join university programmes and courses is usually done online. These websites are designed, developed, updated and maintained by experienced development teams in Information Technology centres or deanships in these universities. However, no clear guidelines are in place regarding web accessibility, which may hinder some users

from benefiting from their content. Among people with disabilities, there are individuals who are interested in or in need to access university websites, for example, prospective students, undergraduate students or simply an individual who is looking for life-long courses. Thus, university websites in Saudi Arabia need to address the barriers that might exclude people with special needs from participation in online educational, social and professional activities (Badawood, 2016; Rana et al., 2011).

As reported by Al-Faries et al. (2013) most Arabic websites have accessibility barriers that make using them difficult or impossible for many people with disabilities. The results from studies conducted by Alahmadi and Drew (2016); Rana et al. (2011) revealed that university websites in the KSA suffered from a low level of accessibility. Different reasons could contribute to this problem: firstly, lack of awareness among Saudis of the importance of giving disabled people the opportunity to engage with others through the Internet and benefit from online services (Al-Khalifa, 2012a). Moreover, there is no law or enforcement for owners or developers to take the web accessibility issue into account when developing Arabic websites (Al-Faries et al., 2013).

Secondly, the owners or developers of the websites do not have sufficient knowledge about Arabic web accessibility, especially when they do not speak any languages other than Arabic since most available web accessibility guidelines are not in Arabic. Even when there is an Arabic version of the guidelines, it is literally translated (word for word) rather than translating the meaning of the original. In addition, the translation is misleading to some extent, as some technical terms are translated into completely different terms that are not suitable to the context of the guidelines, as explained further in Chapter 3.

Thirdly, web accessibility guidelines that are developed in Western countries (North America and Western Europe) are followed when designing and developing Arabic websites (Akram and Sulaiman, 2017; Al-Badi and Mayhew, 2010). Some of these guidelines do not fit all cultures with all languages: a simple example of this is the font size and type. The acceptable font size and type in Latin-based languages would not be accepted in other languages like Arabic, as discussed in Chapter 5.

The fourth reason is related to the evaluation of Arabic website accessibility. Unfortunately, most existing web accessibility evaluation tools do not support the Arabic language (Al-Khalifa, 2012b; Osman, 2017), which makes the evaluation results confusing and does not reflect the accessibility status clearly.

## 1.2 Research Purpose and Questions

This research aims to address the gap in the area of accessibility in Arabic websites, with a focus on government university websites in Saudi Arabia. In particular, this research

aims to localise the existing international guidelines to be suitable to the Arabic context, which would enhance the accessibility of Arabic university websites.

This study addresses four main research questions, as follows:

- **RQ1: What are the challenges facing Saudi university web developers wishing to enhance the accessibility of their websites?**
- **RQ2: What is a framework that can be used to localise Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia?**

This research question was set to define a framework that identifies the important components needed to localise accessibility guidelines. Three further sub-questions needed to be answered in order to build up the answer to the second research question:

- **RQ2.1:** *How can the framework for localising Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia be developed?*
- **RQ2.2:** *How can the content of the proposed framework be validated?*
- **RQ2.3:** *What are the validated framework components, subcomponents and elements that can be used to localise Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia?*

- **RQ3: What additional/adapted localised Web Content Accessibility Guidelines are needed for Arabic university websites in Saudi Arabia?**
- **RQ4: What would need to be included in a checklist for web developers to evaluate and improve the accessibility of Arabic university websites in Saudi Arabia?**

Figure 1.1 shows a broad overview of the research phases followed in this study in order to answer the research questions.

### 1.3 Research Contributions

This study adds to the body of knowledge on web accessibility and localisation in the following ways:

- Developing and validating a new framework for localising web content accessibility guidelines for Arabic university websites in Saudi Arabia.
- Developing and reviewing a set of localised web content accessibility guidelines and success criteria for Arabic university websites in Saudi Arabia.

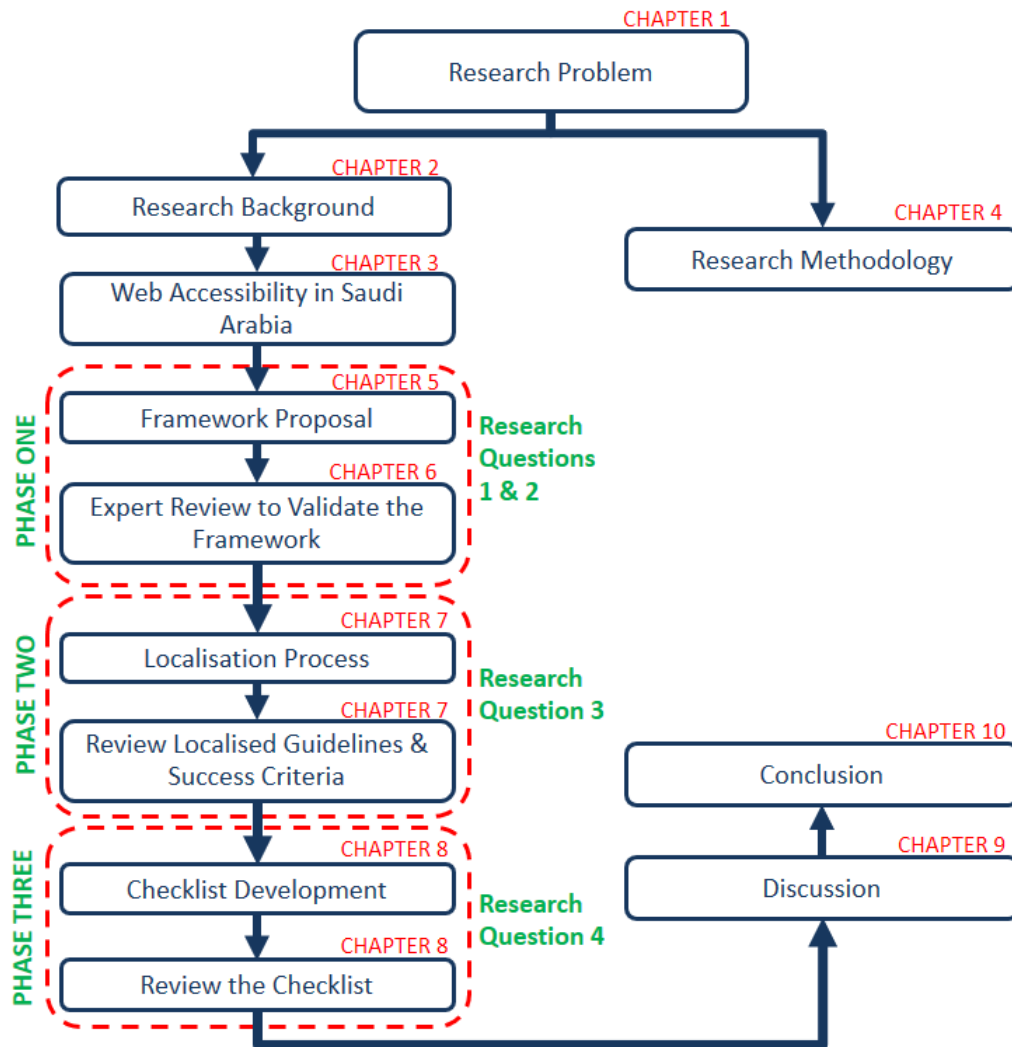


Figure 1.1: Broad Overview of the Research Process

- Developing and reviewing a checklist (Wosool) to help Arab developers who work in developing Saudi university websites in evaluating and highlighting accessibility problems.
- This study contributes to the area of web accessibility by exploring the challenges in designing and developing accessible Arabic university websites in Saudi Arabia.
- It also contributes to understanding the status of web accessibility in Saudi Arabia by reviewing previous studies investigated this issue. It also contributed to understanding the initiatives undertaken by different bodies to improve web accessibility in this region of the world by critically reviewing them.

## 1.4 Thesis Structure

The remainder of the thesis is structured as follows:

Chapter 2 provides a background overview of the web, web accessibility, culture, localisation and the impact of localisation on web accessibility.

Chapter 3 reviews the status of web accessibility in Saudi Arabia. It also presents and critically reviews the initiatives made to improve web accessibility in this area of the world.

Chapter 4 discusses research methods and gives description of the overall design of the research carried out in this thesis. The study uses sequential mixed methods. These phases are dealt with in greater detail in subsequent chapters.

Chapter 5 describes the development process of the new proposed framework in detail and the contents of the proposed framework.

Chapter 6 presents the first phase of this study, which is mainly qualitative, and in which experts in the field were interviewed to validate the initial proposed framework. The design of the interviews is explained, followed by the results and discussion.

Chapter 7 starts by describing the localisation process and its outcome. It explains the design of the online questionnaire used to review the outcome from the localisation process, followed by presentation of the results and analysis of the collected data.

Chapter 8 describes the development of a checklist (Wosool) that could help Arab web developers to evaluate the accessibility of their university websites. It then describes and explains the design of the interviews to be conducted, with the aim of gaining the opinions, thoughts and attitudes of web developers towards the proposed checklist and how it could be improved to suit them. Finally, the analysis and results of the interviews are presented.

Chapter 9 provides a more detailed discussion of the results obtained from the previous phases and draws conclusions from the findings.

Chapter 10 summarises the overall research and concludes the study by presenting the research contributions, limitations, future work, and implications and recommendations.

## 1.5 Publication List

The contributions have been published in the following forms:

- Alayed, A., Wald, M., and Draffan, E. (2016). A Framework for the Development of Localised Web Accessibility Guidelines for University Websites in Saudi Arabia. In *Universal Access in Human-Computer Interaction. Methods, Techniques, and Best Practices: 10th International Conference, UAHCI 2016, Held as Part of HCI International 2016, Toronto, ON, Canada, July 17-22, 2016, Proceedings, Part I*, pages 3-13. Springer International Publishing.
- Alayed, A., Wald, M., and Draffan, E. (2016). Developing a Framework for Localised Web Accessibility Guidelines for University Websites in Saudi Arabia. In *International Conference on Computers Helping People with Special Needs*, pages 243-250. Springer.
- Alayed, A., Wald, M., and Draffan, E. (2016). Challenges to Enhancing Web Accessibility in Saudi University Websites: An Exploratory Study. In *WEB 2016, The Fourth International Conference on Building and Exploring Web Based Environments*, pages 6-9. IARIA.
- Alayed, A., Wald, M., and Draffan, E. (2016). Towards a Framework for Localised Web Accessibility Guidelines for Saudi Arabia. In *the Proceedings of 9th Saudi Students Conference in the UK*, page 465, Birmingham, United Kingdom. The Scientific Society for Saudi Students in the UK.
- Alayed, A., Wald, M., and Draffan, E. (2015). Accessibility and Usability of Arabic University Websites. In *the Proceedings of 8th Saudi Students Conference in the UK*, London, United Kingdom. The Scientific Society for Saudi Students in the UK.





## Chapter 2

# Research Background

This chapter provides an overview of the essential background knowledge of the topics of the web, web browsing, web accessibility, culture, localisation and the impact of localisation on web accessibility. It first looks at the web and web browsing and their definitions. It then provides an overview of web accessibility starting with definitions followed by a review of standards, guidelines, policies, legislation and evaluation of web accessibility. After that, it briefly presents the definitions of culture and localisation and discusses how localisation would impact web accessibility.

### 2.1 World Wide Web and Web Browsing

The World Wide Web<sup>1</sup> (WWW, W3) was invented in 1989 when Tim Berners-Lee proposed to use hypertext in order to link different types of information as a web of nodes that can be browsed by the user and accessed via the Internet (W3C, 2016b). Document pages on the web are called web pages and may consist of videos, text, pictures and other multimedia elements. A number of related web pages under a common web address constitute a website. One or more web servers are used to host a website and are accessed through a network, for example, the Internet or local area network using an address known as a Uniform Resource Locator (URL) (Connolly, 2000). Accessing and browsing websites require a software program running on the user's computer called a web browser. There are different forms or versions of a website's appearance depending on the device used to browse the web:

- *Desktop Version* refers to the full version of a website that is displayed on a desktop/laptop screen (W3C, 2015).
- *Mobile Version* refers to the mobile version of a website on a screen of a mobile device. This version could be one of the following types (Budi, 2013):

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<sup>1</sup>For simplicity, the World Wide Web has become known as the web.

- *Native applications* are applications developed for one specific platform and benefit from all the features of the device, such as using the camera, the contacts list or the compass. These applications are downloaded onto the device itself and accessed through their icons on the device home screen. They are downloaded from an application store such as, Apple App Store or Google Play. In addition, any native application can define new gestures for the application or use the standard operating system gestures. It can also, use the device’s notification system and can work off-line.
- *Mobile web applications* are Internet-enabled applications that can be accessed through a device’s web browser. They are stored on a remote server, not on the user’s device.
- *Hybrid web-native applications* combine features from native and web applications. They are available from an application store and can take advantage of the many device features, just like native applications. At the same time, like Mobile web applications, they rely on HTML being rendered in a browser, with the caveat that the browser is embedded within the application.

As pointed out by [W3C \(2015\)](#), the word mobile is an umbrella for several wireless devices that are portable and easy to use in different situations, outdoors and indoors. Hand-held devices such as smart-phones and larger tablet devices are considered to be mobile devices. Other wearable devices are considered as mobile devices as well, examples include smart glasses, smart watches and fitness bands.

A mobile is sometimes regarded as separate from a desktop/laptop; however, there are a number of commonalities between them. For instance ([W3C, 2015](#)):

- Control via touch-screen gestures is not reserved only for mobile devices, as it is now included in many desktop/laptop devices. Moreover, a keyboard and mouse can be connected to many mobile devices,
- A mobile version of a web page can be displayed on a desktop/laptop if the web page allows the user to choose this version.
- Operating systems for mobile devices have been used for laptop devices.
- Many interface elements from desktop/laptop systems such as hyperlinks, buttons, text, tables and pop-up menus are applied in the same way to a mobile version.

## 2.2 Web Accessibility

The web is an essential resource in our lives, for example in education, communication, commerce ([Klein et al., 2014](#)) and it is crucial that everyone can access it ([Henry et al.,](#)

2014). There has been an increasing focus on the rights of disabled people to access technology, specifically the use of the web, which has been increasing (Sikos, 2014). Equal access and equal opportunity need to be provided to disabled people regardless of their disability or its severity, e.g. low vision, deafness, blindness, hard of hearing, motor or cognitive disabilities (Henry, 2006). Designing an accessible website for people with disabilities and for older people has been a topic of considerable importance since the early stages of web development (Petrie et al., 2015). However, there is no widely agreed definition of web accessibility, although there are several well-known statements, such as Berners-Lee's succinct and clear statement:

*“As we move towards a highly connected world, it is critical that the Web be usable by anyone, regardless of individual capabilities and disabilities.”*  
(Berners-Lee, 1997)

In their study, Yesilada et al. (2012) asked people involved and interested in web accessibility for their opinions on five different definitions of web accessibility (Access Board, 1996; British Standards Institute (BSI), 2010; ISO, 2008; Thatcher and Waddell, 2003; W3C, 2005). From a large number of respondents (300 valid responses), they found that the most popular definition, chosen by 45% of respondents, was the definition given by the Web Accessibility Initiative (WAI) (W3C, 2005),

*“Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the web, and that they can contribute to the web.”*

This definition includes all types of disabilities (e.g. visual, physical, speech, and hearing), as well as those experienced by elderly people with changing abilities and applies to different web technologies, such as websites, browsers, and media players. Accessible websites can help disabled people to actively engage in their societies. This means narrowing the gap between disabled people and others (Henry, 2006).

WAI (W3C, 2005) expanded this definition to include people without disabilities but who have limitations in certain circumstances, for example, a person who uses a slow Internet connection to surf the web. Such a person may turn off the video and image download and rely on text alternatives (text alternative is a web accessibility technique for describing images and videos in a meaningful way).

The limitations that the Internet user could have are categorised into two categories (Henry, 2006):

- **Functional limitations** constitute different types of disabilities whether they are permanent, temporary or changing abilities due to ageing (Farrelly, 2011; W3C, 2005).

*Permanent disabilities* could be classified into four main types:

- Visual disabilities, which include blindness, colour blindness, and low vision. There are different types of low vision, for instance, those caused by macular degeneration, glaucoma and diabetic retinopathy.
- Auditory disabilities, such as deafness or a hearing impairment.
- Cognitive disabilities or learning disabilities: this type of disability is broad, as it includes difficulties with memory, problem-solving, attention, reading, linguistic and verbal comprehension, mathematical comprehension and visual comprehension (WebAIM, 2013). People with autism, dyslexia, Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD) are examples of this category (Borg et al., 2014). Due to the diversity of this type of disability, cognitive disabilities and web accessibility is one of the topics that needs more research (Borg et al., 2014; Sanchez-Gordon and Lujn-Mora, 2014). Addressing the needs of those with cognitive impairments has only recently been discussed in more detail (W3C, 2017a).
- Motor disabilities include disabilities arising from cerebral palsy, arthritis, Parkinson’s disease, multiple sclerosis, muscular dystrophy, essential tremor, or other diseases that cause tremors or loss of fine muscle control (WebAIM, 2012).

*Temporary disabilities*, for example those experienced by people recovering after surgery (e.g. eye, ear), or trauma injuries (e.g. broken arms) (Sanchez-Gordon and Lujn-Mora, 2014; W3C, 2005).

*Progressive disabilities* due to ageing, including gradual decrease in some abilities such as vision or hearing (Sanchez-Gordon and Lujn-Mora, 2014; W3C, 2005).

- **Situational limitations** refer to the situations where Internet users are constrained in terms of the environment, device or Internet connection (Henry, 2006). For example, a person working on a desktop without a mouse, surfing the Internet through smart phone or tablet, or connecting to the Internet in a noisy place which makes hearing audio or video impossible (Henry, 2006; Henry et al., 2014).

Petrie et al. (2015) analysed a pool of web accessibility papers and extracted the following comprehensive and unified definition of web accessibility:

*“All people, particularly disabled and older people can use websites in a range of contexts of use including mainstream and assistive technologies; to achieve this, websites need to be designed and developed to support usability across these contexts.”*

Figure 2.1 illustrates all the components of the definition and how they relate to each other.

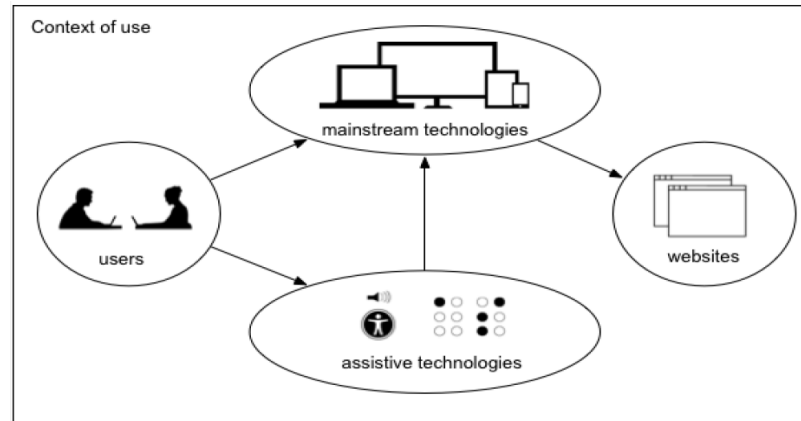


Figure 2.1: The Core Components of Web Accessibility (Petrie et al., 2015).

### 2.2.1 Relationship between Web Accessibility and Usability

It has been pointed out that the relationship between web accessibility and web usability is unclear and subject to some debate (Petrie and Kheir, 2007; Thatcher and Waddell, 2003; Yesilada et al., 2012). Usability is defined by (ISO, 1998) as:

*“The extent of which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.”*

Thus, usability means designing a user interface that is effective, efficient, and satisfying. It is worth differentiating between accessibility and usability. They are closely related, since they both improve satisfaction, effectiveness, and efficiency. In general, accessibility aims to make the website open to a wider user population in more situations, whereas usability aims to make the website more satisfying, more efficient, and more effective for its target users (Al-Badi and Mayhew, 2010). In addition, satisfaction is much less an issue with accessibility, while web usability tends to make a website more intuitive and user friendly. Therefore, although usability implies accessibility (Brajnik, 2000), the contrary is not necessarily true.

Henry (2006) makes a distinction between accessibility and usability problems. When there is a usability problem, the impact is on all users equally, regardless of ability. In other words, a user with a disability is not disadvantaged to a greater extent by usability problems than a user without a disability. In contrast, accessibility problems prevent or hinder access to a website by disabled users. This means that when a disabled user is at a disadvantage relative to a normal user, that is an accessibility issue.

Petrie and Kheir (2007) suggest that accessibility and usability problems can be seen as two overlapping sets, which would include three categories: problems that only affect

disabled people; these can be termed “*pure accessibility*” problems; problems that only affect non-disabled people; these can be termed “*pure usability*” problems; and problems that affect both disabled and non-disabled people; these can be termed “*universal usability*” problems.

### 2.2.2 Web Accessibility Standards and Guidelines

The work towards web accessibility began in the 1990s when some companies and organisations, such as IBM and the Trace Research and Development Center, provided web accessibility information (Henry, 2006). Subsequently, in 1996, the City of San Jose World Wide Web Page Disability Access Design Standards were developed (Henry, 2006). One year later, the World Wide Web Consortium (W3C) - an international association that mainly aims at developing and improving guidelines, protocols and standards for the web environment (W3C, 1997) - established the Web Accessibility Initiative (WAI). This was founded for the purpose of developing guidelines, strategies and resources that assist web developers/ designers to make their websites accessible (W3C, 2011). In 1999, the Web Content Accessibility Guidelines (WCAG) 1.0 were finalised and published as recommendations (Henry, 2006). Other accessibility guidelines were also produced by the WAI, such as Authoring Tool Accessibility Guidelines (ATAG) in 2000 and User Agent Accessibility Guidelines (UAAG) in 2002 (WAI, 2005a,b). ATAG is intended for developers of authoring tools which are used to produce web content, for example, web page authoring tools, while UAAG is for developers of user agents such as web browsers, media players and assistive technologies (WAI, 2005a,b). In this research the focus is on the web content accessibility, so the accessibility of web authoring tools and user agents are out of its scope.

WCAG 1.0 was revised to be WCAG 2.0 in 2008. At that time, it was internationally known and respected as a de facto standard for web accessibility (Lewthwaite, 2014). In 2012, WCAG 2.0 became an international standard called ISO/IEC 40500:2012 (ISO, 2012).

In Section 2.2.2.1, a brief overview of WCAG 2.0 is given. Guidance on how to apply WCAG 2.0 guidelines on the mobile web (W3C, 2015) is provided in Section 2.2.2.2.

#### 2.2.2.1 WCAG 2.0

WCAG 2.0 has been developed in order to take account of different web technologies and their future improvements (W3C, 2008). This standard constitutes four main web accessibility principles abbreviated as the acronym (POUR) with 12 guidelines, as illustrated in Table 2.1. The guidelines for each principle describe requirements for web accessibility and comprise 61 Success Criteria (SCs).

Table 2.1: Overview of WCAG 2.0 Principles and Guidelines ([W3C, 2008, 2011](#))

| Principle         | Definition  | Guidelines  |
|-------------------|---|---|
| 1. Perceivable    | Users must be able to perceive the information being presented                                  | 1.1 Provide text alternatives for non-text content.<br>1.2 Provide captions and alternatives for audio and video content.<br>1.3 Make content adaptable, and make it available to assistive technologies.<br>1.4 Use sufficient contrast to make things easy to see and hear. |
| 2. Operable       | Users must be able to operate the interface   | 2.1 Make all functionality of the keyboard accessible.<br>2.2 Give users enough time to read and use content.<br>2.3 Do not use content that causes seizures.<br>2.4 Help users navigate and find content.  |
| 3. Understandable | Users must be able to understand the information as well as the operation of the user interface | 3.1 Make text readable and understandable.<br>3.2 Make content appear and operate in predictable ways.<br>3.3 Help users avoid and correct mistakes.  |
| 4. Robust         | Users must be able to access the content as technologies advance.                               | 4.1 Maximize compatibility with current and future technologies.  |

The *guidelines* themselves are not testable, since they are considered as a framework that helps understand the success criteria and implement their related techniques. In contrast, *Success Criteria (SCs)* are testable units and represent the basis for accessibility level conformance. Some of the criteria can be automatically evaluated with software evaluation tools, whereas the others need human evaluation. Different examples of techniques or combinations of techniques to achieve the success criteria of the guidelines are offered by WCAG 2.0. In addition, guidance to evaluate conformance to WCAG 2.0 is provided in the form of sufficient techniques, advisory techniques and common failures. The techniques that are considered sufficient to meet the success criteria are called sufficient techniques. One or more of those techniques are given for each success criterion and can be used to meet the success criteria. The advisory techniques are those that can enhance accessibility but are not considered to meet the success criteria. The examples of bad practices that make web pages inaccessible are listed under common failures.

WCAG 2.0 levels of conformance are divided into (W3C, 2008): **A** which means minimum level of conformance with minimum level of accessibility, **AA** which indicates an intermediate level of conformance with enhanced level of accessibility and **AAA** which is a high level of conformance with additional accessibility enhancements.

As explained in (W3C, 2016c), there are five requirements that must be achieved for web content to conform to WCAG 2.0, as follows:

- One of the levels of conformance must be satisfied in full (A, AA or AAA). Therefore, to conform to the highest level (AAA), a web page must meet the success criteria in all levels, A, AA and AAA.
- Full web page: this means the conformance for a web page cannot be achieved if any part of a web page is not included.
- Complete processes: this means when a web page is part of a process, then all web pages or steps in the process must conform at the specified level.
- Only Accessibility-Supported Ways of Using Technologies: in order to satisfy the success criteria, only accessibility-supported ways of using technologies are used.
- Non-Interference: if web technologies are used in a way that is not accessibility supported, then they do not hinder the user's ability to access the rest of the page.

WCAG 2.0 is a well-known accessibility standard and it has been used by different web owners/developers to improve the accessibility of their websites. On one hand, the process used by W3C to develop standards is transparent as it is open with a specific period for public review, whereas other standards makers such as International Standards Organization (ISO) develop their standards in a closed way (Lewthwaite, 2014; Lewthwaite and Swan, 2013). On the other hand, this standard has received many criticisms over recent years. It has been argued that the work ignores the realities of disabled people's lives around the world (Lewthwaite, 2014). This means that a deep understanding of the disabled and their interaction with the technology is missing (Cooper et al., 2012). Actually, what this standard focuses on is the techniques and a set of scenarios for education and outreach purposes. These scenarios tend to be culturally specific, as they are framed by a Western perspective, to the exclusion of other communities and cultures (Cooper et al., 2012). There is mention of other cultures or languages in a couple of places so one cannot say they are always culturally specific, but it is very limited. For example, there is an entry in WCAG 2.0 (W3C, 2008), saying "large scale (text) with at least 18 point or 14 point bold or font size that would yield equivalent size for Chinese, Japanese and Korean (CJK) fonts". Another example is Guideline 3.1 under Readable "Using left-justified text for languages that are written left to right and right-justified text for languages that are written right-to-left".



In WCAG 2.0 (W3C, 2008), there are guidelines that are applicable to Arabic websites: for example, the guidelines on providing text alternatives, providing appropriate colour contrast levels, making all functionality available from a keyboard, providing help to users and maximising compatibility with current and future technologies. However, there are some guidelines that need modifications and specifications in order to be suitable to the Arabic context, for instance, those related to making text content - which is here Arabic - readable and in an understandable way. One of these guidelines concerns pronunciation, which requires more specification in Arabic in applying diacritical marks to raise readability levels. In addition, the use of abbreviations and how to deal with them is different in Arabic and modification is required. Section 2.4 discusses the impact of localisation on web accessibility.

### 2.2.2.2 Mobile Accessibility and WCAG 2.0

Generally, the guidelines and techniques of WCAG 2.0 are applicable to mobile web content and applications, but mobile devices have a number of accessibility issues that are different from those of desktops/laptops (W3C, 2015). Recently, W3C has extended the existing principles of WCAG 2.0 by relating them to the main accessibility issues for mobile devices and the best practices to address them<sup>2</sup> (W3C, 2015). Figure 2.2 shows the main mobile accessibility considerations in relation to the principles of WCAG 2.0. The best practices can be applied to mobile web applications, and hybrid web-native applications and most of them can be applied to native applications.

### 2.2.2.3 Draft of WCAG 2.1

WCAG 2.1 extends WCAG 2.0 and all the success criteria from WCAG 2.0 are included. WCAG 2.1 is currently a draft of the guidelines, published to allow an initial review of the structure, approach, and types of new success criteria (W3C, 2017b). There are now 21 new success criteria in WCAG 2.1, which focus on mobile devices, cognitive issues and low vision users' requirements (W3C, 2017b).

## 2.2.3 Web Accessibility Policies and Legislation

Apart from the efforts that have been made by different participants, a number of governments in different countries around the world have established their own policies, laws, and legislation relating to web accessibility. For instance, in the United States there is the Americans with Disabilities Act (United States Department of Justice Civil Rights Division, 1990) and Section 255 of the Telecommunications Act (Federal Communications Commission, 1996). In addition, Section 508 of the Rehabilitation Act (Access

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<sup>2</sup>It is still in draft form.

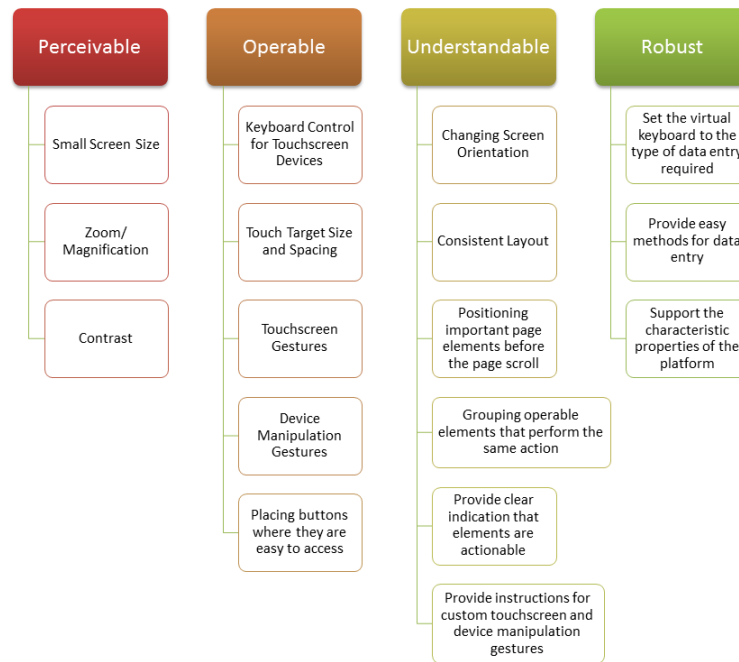


Figure 2.2: Mobile Accessibility Considerations Related to WCAG 2.0 ([W3C, 2015](#))

[Board, 1996](#)) requires all federal agencies' services to be accessible to people with disabilities ([Access Board, 1996](#)). Another act, which is the 21st Century Communications and Video Accessibility Act builds on a number of legislations relating to accessibility, including Section 508 of the Rehabilitation Act and Section 255 of the Telecommunications Act ([Level Access, 2011](#)). It focuses on ensuring that communications and media services, content, equipment, emerging technologies, and new modes of transmission are accessible to disabled users ([Level Access, 2011](#)).

In Canada, the institutions under the Financial Administration Act, are obliged to follow the web accessibility standard that has been approved by the ministers of the Treasury Board of Canada ([Treasury Board of Canada Secretariat, 2012](#)). This standard refers explicitly to WCAG 2.0 guidelines. In the United Kingdom, web accessibility is required by the Equality Act 2010 (EQA), which came into force in October 2010, replacing the Disability Discrimination Act 1995 (DDA) ([Government Equalities Office and Equality and Human Rights Commission, 2013](#)). In order to provide guidance on meeting the requirements under the EQA, British Standard 8878 (BS 8878) ([British Standards Institute \(BSI\), 2010](#)) was published by the BSI Group (the British Standards Institution)<sup>3</sup>. The standard was officially launched in December 2010 and works as a web accessibility code of practice. BS 8878 defines a process for creating and embedding a web accessibility strategy within an organisation. It is written in non-technical language and

<sup>3</sup><http://www.bsigroup.com/>

is aimed at people within an organisation who have responsibilities for web development ([British Standards Institute \(BSI\), 2010](#)).

In addition, Japan also has its own accessibility legislation programme called E-Japan Priority Policy Programme ([The Government of Japan, 2001](#)). In Thailand, the Thailand Web Content Accessibility Guidelines (Th-WCAG) have been developed as a modified version of Level 1 conformance of WCAG 2.0 to suit the profile of Thailand ([Mitsamarn et al., 2007](#)). Moreover, Saudi Arabia, as an example of Arab countries, has begun to pay attention to web accessibility, as discussed in Chapter 3.

## 2.2.4 Evaluation of Web Accessibility

Different approaches and tools are used to evaluate web accessibility, which will be briefly described in this section.

### 2.2.4.1 Approaches for Web Accessibility Evaluation

Evaluating the accessibility of a website is not as easy a process as simply validating the markup of a website, or checking the colour contrast. It includes more issues, such as the appropriateness of text alternatives and how information is organised on a website. Some features recommended by accessibility guidelines can be evaluated by automated or semi-automated tools; for example, an automated tool can evaluate whether the markup on a website is valid; but it cannot determine whether the target of each link is clearly identified. Therefore, effective evaluation requires a combination of automated and manual evaluation by an accessibility expert. Manual evaluation would be a very time consuming process and entail subjective judgment. Moreover, it could be affected by how skilful the testers are in using the tools to access the website, for example, a screen reader ([Brewer, 2004](#)).

Generally, three different approaches are used to evaluate website accessibility. They differ from each other in the effort needed and precision of the results. They are as follows:

- Preliminary Evaluation is a quick and easy check for the main accessibility issues in a web page. Examples of these issues are page titles, colour contrast ratio, image text alternative and keyboard access ([W3C, 2013](#)).
- Conformance Evaluation is an approach to check if a web page conforms to a specific accessibility standard, such as WCAG 2.0. One can run a number of different types of accessibility evaluation tools on the website. In some cases, the evaluation tools identify specific conformance problems, whereas in other cases they may point to specific features of the website that require a manual check

or generate a list of questions for remaining manual checks. However, automated web accessibility evaluation tools cannot determine conformance to all accessibility guidelines. Therefore, the intervention of manual evaluation by an expert, using a variety of approaches, is an important part of any conformance evaluation. For example, as explained in [Lutz Kubitschke and Boussios \(2007\)](#), web accessibility testing within the Measuring progress of eAccessibility in Europe (MeAC) includes both automated testing for WCAG 1.0 Level A ([W3C, 1999](#)) and follow-up manual testing, for both government and private sector websites.

It is important to point out that conformance evaluation is only as good as the accessibility guidelines and can become outdated or inappropriate ([Brewer, 2004](#)).

- Comprehensive Evaluation Including Testing by Users with Disabilities aims to identify the accessibility problems when disabled people interact with the web page, as conformance evaluation may miss some problems in the implementation of accessibility features. Therefore, a more comprehensive approach to testing a website is not only to perform conformance evaluation, but also to test the website with people with different disabilities, using different types of assistive technology ([W3C, 2010](#)). For example, [Dias \(2003\)](#) developed a structured evaluation method for assessing accessibility of Brazilian web portals. The aim was to help ensure that Brazilian government websites were accessible to a wide range of users. This method was divided into ten stages, including analysis of the “context of use” of the web portal to be evaluated; automatic accessibility testing and code validation; analysis based on the “Web Content Accessibility Guidelines”; test with graphical and textual browsers; analysis based on corporate portals’ usability heuristics; tests with users with different abilities; application of user satisfaction questionnaires; analysis of information content; data analysis; and preparing the evaluation report.

#### 2.2.4.2 Web Accessibility Evaluation Tools

Web accessibility evaluation tools are software programs or online services that help determine if a website meets specific web accessibility guidelines or standards ([W3C, 2005](#)). These tools fall into two groups ([Al-Khalifa, 2012b](#)), general tools, which evaluate almost all guidelines such as TAW 3.0 ([Fundacin CTIC, nd](#)) and [AChecker \(2011\)](#) and special tools that evaluate specific topics required by web accessibility guidelines, such as Contrast Checker ([Acart Communications Inc., nd](#)) which tests the colour contrast. The evaluation tools may require human intervention during the evaluation process, since some of the tested guidelines are subjective and cannot be automatically evaluated. Moreover, they cannot determine the accessibility of a website, but they can only assist in doing so ([W3C, 2005](#)).

Criticisms have been raised that the tools produce different results from each other. Evaluating accessibility for the same web page using different evaluation tools would

produce different results and raise different accessibility issues (Al-Khalifa, 2012a; Centeno et al., 2006). Moreover, these tools have been criticised for being biased towards Latin-based languages, since evaluating an Arabic website, for example, would result in several problems not related to the accessibility but to the language of the website content (Al-Khalifa et al., 2011; Al-Khalifa, 2012b).

Other tools such as Web2Access developed by the ECS Accessibility Team, University of Southampton work differently, since they aim mainly to help those making decisions about their use of freely available interactive and collaborative e-learning tools. It seeks to help both users and developers in their understanding of an approach to reviewing the accessibility of particular applications. It also includes generic advice to enable the process to be followed and makes an attempt to categorise the sites/applications according to what tasks are to be done.

## 2.3 Culture, Website Genre and Localisation

The notion of *culture* has long attracted attention of researchers (Frey-Ridgway, 1997), and many sociologists and anthropologists have tried to come up with a definition of culture which has yielded thousands of definitions across the literature. Hofstede et al. (2010) defined culture as common thoughts that discriminate an individual who belongs to a certain group or class. Hall (1989) and Searle (1995) explained that culture affects everything people do in their society, as it shapes their ideas, values, attitudes, and normative or expected patterns of behaviour. As individuals, we are all unique; nevertheless, individuals share similar values and experiences with those who live with them in the same society. One of the simplest definitions of culture was given by Samovar et al. (2014). They explained that culture mainly refers to shared values, attitudes, norms, beliefs, behaviours, and material objects. In a more simplified way, culture is “the rule of living and functioning in a society” (Samovar et al., 2014).

Localisation has been identified as a process of adapting a product or service to a specific locale (Cyr and Trevor-Smith, 2004; Nielsen, 1999; Sandrini, 2005). A locale means a group of people, who have commonalities such as a language, culture, a region or religion which may require a separate version of a particular product or website (Nielsen, 1999; Sandrini, 2005). A successfully localised service or product is one that appears to have been developed within the local culture. For instance, website localisation has been defined by Nielsen (1999) and Gross (2006) as a process of adapting an existing website in order to make it accessible, usable and culturally acceptable to a specific locale.

According to Kim (2013), the localisation process involves two levels of adaptation:

- *Surface or overt level*, where the adaptation to the target audience can be easily recognised and observed in a product or service, for instance translation, punctuation, and format conventions such as date, measurement and weight units, address format and currency.
- *Cultural or covert level*, where a deep understanding of the target locale is required for the adaptation, for example images and their appropriateness, colours and symbols.

In web design, [Barber and Badre \(1998\)](#) came up with the notion of cultural markers, where they were defined as interface elements and features that are acceptable and preferred within a particular cultural group. Genre or knowledge domains were defined as information types that are presented on the web and describe large categories of websites ([Barber and Badre, 1998](#)), for instance, news websites or university websites. Genre-specific cultural markers are elements and features of a specific website genre for a particular cultural group ([Barber and Badre, 1998](#)). Examples of these markers include, language, multimedia, symbols, colours, layout and navigation of websites.

## 2.4 The Impact of Localisation on Web Accessibility

The web is a global medium and it crosses national boundaries. However, for messages to be relevant, they must appeal to the specific target audience. The cultural background of users is considered one of the attributes that might affect users' performance and satisfaction while interacting with websites ([Shneiderman, 2000](#)).

People in different countries live with different lifestyles and different perspectives, which could be related to the culture of the country or the effect of the traditions or religion. Therefore, when designing a website with localisation in mind, it is crucial to understand the target users, their culture and traditions. For example, if a Saudi user navigates a website that presents a video with music in the background, he might not continue watching it and consequently quit the website. This might happen due to the fact that some people in Saudi Arabia do not listen to music and believe it is forbidden from a religious point of view, depending on how conservative they are (([Otterbeck and Ackfeldt, 2012](#)) discuss the issue of music in Islam). Although, this is not the case for all Arab users, as they differ in their beliefs and traditions, an appropriate way to deal with such a situation is needed, and this is not found in the existing guidelines. So, besides providing text alternatives for the video, the developers would provide a hint for people that there is music in the video, and/or provide another version of the video without music, if the users prefer no music.

The lifestyle has an impact on accessibility, as well. Using unfamiliar symbols or metaphors that are not seen by users in their real lives can confuse them when using the website. For example, the symbol of a mail box would confuse Saudi users as they do not have these in their real lives. The language would influence accessibility, as well. For the Arabic language, it is considered an orthographic issue. For instance, Arabic script needs to be presented in larger sizes than English, both in print and electronic form (Al-Wabil et al., 2006). A significant number of Arabic words that appear as non-vowelised, when presented out of context, are homographic (Al-Wabil et al., 2006). This means each of these words can have more than one pronunciation and meaning, which is semantically and phonologically ambiguous. In some cases, the user would prefer to read the Arabic text with diacritic marks which represent the short vowels of the words and consequently ease the reading process (Further explanation of this issue is found in Chapter 5).

Lewthwaite (2014) explained that when a developer uses accessibility standards, the Western view of web accessibility -which does not correspond to the realities of disability within the developers home culture- might influence the web design. Moreover, web developers may begin to use accessibility practices that are not suitable to the context where they work, which leads to the problem of colonisation (Lewthwaite and Swan, 2013). Accessibility standards implicitly reflect Western norms and expectations concerning the nature of web access for disabled people, for instance, with expectations of literacy, assistive technologies and uninterrupted broadband internet connections (Lewthwaite and Swan, 2013). Therefore, such standards may lead to forms of web practice that actually play a role in excluding groups of disabled people who live outside the norms of Western accessibility practice (Lewthwaite, 2014).

## 2.5 Chapter Summary

This chapter has reviewed the basic background knowledge for this research, beginning with the concepts of the web and web browsing. It then moved on to the definition of web accessibility. The literature provides several definitions for this concept, one of the most popular of which was found to be the one given by the WAI (W3C, 2005). The comprehensive and unified definition of web accessibility provided by Petrie et al. (2015) was also presented. The relationship between web accessibility and usability has been clarified by presenting different opinions regarding this matter. The standards, guidelines and legislation regarding accessibility to web content were discussed, focusing on WCAG 2.0 as the most popular standard. WCAG 2.0 constitutes four main principles: Perceivable, Operable, Understandable and Robust, with 12 guidelines and 61 success criteria. Three approaches to evaluate web accessibility, preliminary, conformance and comprehensive approaches were briefly presented, along with the evaluation tools. This

chapter also explored the concepts of culture and localisation and briefly explained how localisation would affect web accessibility for both users and web developers.

Looking back at previous studies of web accessibility and the impact of localisation on web accessibility, we can see the importance of web development being carried out with accessibility and user's culture in mind. Providing web developers with web content accessibility guidelines that are localised to the target audience's cultural background and making sure these are followed would make the content more accessible, not only for people with disabilities but also for all target users who share the same cultural background. Since this research focuses on localisation of web content accessibility guidelines for Arabic university websites in Saudi Arabia, it started by developing a framework for this purpose (Chapters 5 and 6). This was followed by applying the proposed framework to obtain the localised web content accessibility guidelines (Chapter 7). Using these, web developers at Saudi universities can identify accessibility problems and improve them using a checklist called *Wosool* that was developed from the localised guidelines (Chapter 8).



## Chapter 3

# Web Accessibility in Saudi Arabia

The purpose of this chapter is to shed light on the status of web accessibility in Saudi Arabia, as a number of previous studies have focused on this issue (Section 3.1). Additionally, it presents the initiatives made to improve web accessibility in this area of the world. These vary between initiatives from governments, researchers and practitioners as will be seen in Section 3.2.

### 3.1 The Status of Web Accessibility in Saudi Arabia

The main purpose for conducting this literature review was to investigate the current status of web accessibility in Saudi Arabia through reviewing previous accessibility evaluation studies of Arabic websites in Saudi Arabia. A comprehensive web search was conducted in four digital libraries (Google Scholar, ACM Digital Library, IEEE Xplore, Science Direct). Search terms were web accessibility, accessibility, Saudi Arabia, Arabic websites, evaluation, evaluating, assessing, assessment, result, study, accessibility of website/web site, web pages, disability, disabled. No time period was set for the search, although all the papers returned were published after 2004, and most papers were published after 2010 when interest in web accessibility in this region of the world substantially increased.

A number of studies have investigated the current status of web accessibility in the Kingdom of Saudi Arabia (KSA). These studies aimed primarily to evaluate the accessibility of Arabic websites. These studies varied in their methodologies, evaluation tools and the accessibility guidelines followed, as well as the domain or category of the evaluated Arabic websites. Each study presented results and findings and provided recommendations. All the reviewed studies have been listed in chronological order, from the earliest to the most recent studies, in Table 3.1.

Studies on web accessibility in this part of the world started more than a decade ago, when [Abanumy et al. \(2005\)](#) conducted their study on e-government websites in Saudi Arabia and Oman. Since then there has been a number of studies to examine the web accessibility of Arabic websites in Saudi Arabia. The guidelines used as a basis for evaluation were WCAG 1.0 or WCAG 2.0, which showed their popularity compared to other guidelines. [Abanumy et al. \(2005\)](#); [Al-Khalifa et al. \(2011\)](#); [Alahmadi and Drew \(2016\)](#); [Alshamari \(2016\)](#) and [Rana et al. \(2011\)](#) all tended to use automatic checkers to evaluate website accessibility problems. A combination of automatic and manual evaluation was used in studies conducted by [Al-Khalifa \(2010, 2012a\)](#); [Al-Khalifa et al. \(2016\)](#) and [Khan and Buragga \(2010\)](#). The study conducted by [AlJarallah et al. \(2013\)](#) and [AlJarallah and AlShathry \(2015\)](#) proposed a new cognitive-based approach to evaluate the accessibility of e-government websites for blind users: this involved automatic evaluation, experiments and interviews with blind users, and interviews with web designers, to analyse the problems faced by blind participants. Another approach to evaluate the accessibility of the Blackboard system was proposed by [Alotaibi \(2015\)](#) and involved automatic evaluation, manual evaluation, and feedback from disabled users. The popular automated software tools used in these studies were W3C validation tools<sup>1</sup> and AChecker<sup>2</sup>. Pure manual evaluation was adopted in a study conducted by [Al-Faries et al. \(2013\)](#).

The studies by [Al-Khalifa \(2010, 2012a\)](#); [Alshamari \(2016\)](#) and [Rana et al. \(2011\)](#) evaluated only the homepages not the whole websites. [Al-Khalifa et al. \(2016\)](#); [AlJarallah and AlShathry \(2015\)](#) and [AlJarallah et al. \(2013\)](#) chose to evaluate three representative pages from the selected websites, whereas [Alahmadi and Drew \(2016\)](#) were specific and chose the home page, one course description page and one admission page from each selected university website. The remaining studies -except the last two conducted by [Akram and Sulaiman \(2017\)](#) and [Osman \(2017\)](#)- evaluated the entire contents of the selected websites.

The number of websites evaluated in these studies ranged from 1 up to 36 websites and most of them focused on evaluating the Saudi e-government websites. The studies conducted by [Alahmadi and Drew \(2016\)](#) and [Rana et al. \(2011\)](#) were the only studies found to evaluate the accessibility of university websites. The former study evaluated the websites of the top-ranking universities in the world, Oceania and the Arab region, as of 2015 (20 websites from each of the three categories, one of which was the website of King Saud University in the KSA). The latter study evaluated 21 university websites in Saudi Arabia, however, it focused on the English version of these websites not the Arabic one. Both studies drew similar conclusions regarding the low level of web accessibility of the evaluated websites.

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<sup>1</sup><https://validator.w3.org/>

<sup>2</sup><http://achecker.ca/checker/index.php>

As can be observed from Table 3.1, three of the reviewed studies, (AlJarallah and Al-Shathry, 2015; AlJarallah et al., 2013; Alotaibi, 2015) involved people with disabilities in the evaluation process. As reported by Petrie and Bevan (2009), finding groups of people with a wide range of disabilities, who are willing to participate in evaluations, is not easy. However, having a website evaluated by people with disabilities provides useful insights into the problems and barriers they come across when surfing the web.

The most recent studies, (Akram and Sulaiman, 2017; Osman, 2017) systematically reviewed the literature, with the former focusing on identifying web accessibility issues in Saudi Arabia while the latter focused on web accessibility automatic checking tools and evaluation in Saudi Arabia.

Generally, there was a strong agreement in the reviewed studies regarding the poor accessibility of the examined websites. The main violations found were: lack of text alternatives for non-text content, no keyboard accessibility, lack of compatibility and no identification of the language in the website's code. Moreover, it was reported that a number of accessibility evaluation tools highlight an additional problem. They do not recognise the Arabic language.

In order to improve the status of web accessibility in Arabic websites, recommendations were made to raise awareness and understanding of web accessibility among Arabic developers. Further recommendations included regular accessibility testing and the involvement of people with disabilities in the evaluation process. Moreover, the studies pointed out the importance of developing accessibility guidelines appropriate to Arabic users or adapting the existing guidelines to their context and culture.

Table 3.1: Studies on Web Accessibility in the KSA.

| Study                                   | Guidelines       | Methodology  | User Involvement | Tools Used   | Genre of Websites  | Results and Findings  | Recommendations   |
|---|------------------|--|------------------|--|--|---|---|
| <a href="#">Abamuyet al. (2005)</a>     | WCAG 1.0 Level A | <ul style="list-style-type: none"> <li>- Automatic evaluation.</li> <li>- Email survey to the websites' webmasters.</li> </ul>   | NO               | <ul style="list-style-type: none"> <li>- Bobby<sup>3</sup></li> <li>- Multiweb<sup>4</sup></li> <li>- LYNX<sup>5</sup>: A text browser.</li> <li>- W3C online validator<sup>6</sup></li> </ul> | E-government websites in Saudi Arabia and Oman (13 ministries' websites from Saudi Arabia and 14 from Oman). | <ul style="list-style-type: none"> <li>- None of the websites conformed to WCAG 1.0 Level A checkpoints.</li> <li>- There was lack of awareness of the importance of accessibility of websites among the developers.</li> </ul> | <ul style="list-style-type: none"> <li>- Raising awareness of equal opportunity for all users was needed.</li> <li>- The governments should adapt the existing web accessibility guidelines to their context or develop their own guidelines and policies.</li> </ul> |
| <a href="#">Khan and Buragga (2010)</a> | WCAG 1.0         | <ul style="list-style-type: none"> <li>- Manual evaluation (subjective) by 173 non-expert people,</li> <li>- Automatic evaluation, then</li> <li>- Comparison of the results.</li> </ul> | NO               | EvalAccess <sup>7</sup> , W3C CynthiaSays <sup>8</sup> , W3C validator tools, LinkChecker <sup>9</sup> and CSS Validator <sup>10</sup>   | 2 Saudi e-government websites: Saudi railway <sup>11</sup> and Saudi post <sup>12</sup>                      | <ul style="list-style-type: none"> <li>- The results were similar to each other.</li> <li>- The websites were not well equipped to provide e-services to the users.</li> </ul>  | <ul style="list-style-type: none"> <li>- The websites should conform with: technology standards, different browsers and W3C guidelines,</li> <li>- Improvement of Arabic and English versions equally was required.</li> </ul>  |

<sup>3</sup>No longer available.<sup>4</sup><http://web.archive.org/web/20011207030612/http://www.mis.deakin.edu.au/multiweb/mwindex.htm><sup>5</sup><http://www.delorie.com/web/lynxview.html><sup>6</sup><https://validator.w3.org/><sup>7</sup><http://sift07.si.edu.es/evalaccess2/index.html><sup>8</sup><http://www.cynthiasays.com/><sup>9</sup><http://www.brokenlinkcheck.com/link-checker.php><sup>10</sup><http://www.css-validator.org/><sup>11</sup>[www.saudirailways.org](http://www.saudirailways.org)<sup>12</sup>[www.sp.com.sa](http://www.sp.com.sa)

| Study                                    | Guidelines       | Methodology  | User Involvement | Tools Used   | Genre of Websites   | Results and Findings  | Recommendations  |
|--|------------------|--|------------------|--|---|---|--|
| <a href="#">Al-Khalifa (2010, 2012a)</a> | WCAG 2.0         | <ul style="list-style-type: none"> <li>- Manual evaluation of the home pages with help of some tools,</li> <li>- Measuring the download time, then</li> <li>- HTML validation.</li> </ul>                                    | NO               | WAVE toolbar <sup>13</sup> and the web developer toolbar <sup>14</sup> , YSlow Firefox add-on <sup>15</sup> and W3C validator tools. | 36 Saudi e-government websites.   | <ul style="list-style-type: none"> <li>- All websites failed the test. Major failures: no text alternatives, no keyboard access, and no language identification.</li> <li>- Existing tools, e.g., AChecker, did not accept Arabic websites.</li> </ul>  | <ul style="list-style-type: none"> <li>- Web accessibility laws and guidelines were needed in Saudi Arabia.</li> <li>- Existing web accessibility guidelines could be adapted to the context of Saudi Arabia.</li> </ul> |
| <a href="#">Al-Khalifa et al. (2011)</a> | WCAG 2.0 Level A | <ul style="list-style-type: none"> <li>- Automatic evaluation using five tools, then</li> <li>- Calculation of the number of violations.</li> <li>- Comparison of the results of the five tools for each website.</li> </ul> | NO               | ACHecker <sup>16</sup> , TAW <sup>17</sup> , Web Accessibility Assessment Tool, Worldspace <sup>18</sup> and FireEyes <sup>19</sup>  | 8 Saudi websites (government, social and educational forums and newspapers websites). | <ul style="list-style-type: none"> <li>- Different number of errors produced from the different tools.</li> <li>- Some tools were not able to identify Arabic language.</li> <li>- Some tools were biased towards Latin-based websites.</li> <li>- Some tools counted HTML errors as accessibility errors.</li> </ul> | Development of an automatic web accessibility tool that supports the evaluation of Arabic websites and generates Arabic errors and warnings reports was recommended.   |

<sup>13</sup> <https://wave.webaim.org/toolbar/><sup>14</sup> <http://chrispederick.com/work/web-developer><sup>15</sup> <http://yslow.org/><sup>16</sup> <http://achecker.ca/checker/index.php><sup>17</sup> <http://www.tawdis.net/><sup>18</sup> <http://worldspace.deque.com/FireEyes/login/auth><sup>19</sup> <http://www.deque.com/products/fireeyes/>

| Study                                   | Guidelines            | Methodology  | User Involvement | Tools Used  | Genre of Websites  | Results and Findings  | Recommendations   |
|---|-----------------------|--|------------------|---|--|---|---|
| <a href="#">Rana et al. (2011)</a>      | WCAG 1.0 and WCAG 2.0 | Automatic evaluation by different tools.   | NO               | Total Validator <sup>20</sup> , Functional Accessibility Evaluator (FAE) <sup>21</sup> and Cynthiasays. | 21 Saudi government websites (English version of the home page). If not present then evaluation for Arabic version was done. | <ul style="list-style-type: none"> <li>- None of the evaluated websites passed the WCAG 2.0 and only two websites passed WCAG 1.0.</li> <li>- Main failures were in the lack of alternative text for images and buttons.</li> </ul>   | <ul style="list-style-type: none"> <li>- Raising awareness of web accessibility among the developers was needed.</li> </ul>   |
| <a href="#">Al-Faries et al. (2013)</a> | WCAG 2.0              | <ul style="list-style-type: none"> <li>- Considering only the top 20 services websites in terms of the number of transactions executed on 12th of June 2013.</li> <li>- Manual evaluation was carried out by four evaluators.</li> </ul> | NO               | None  | Top 20 Saudi e-government services' websites.  | <ul style="list-style-type: none"> <li>- None of the websites fully complied with the WCAG 2.0 test.</li> <li>- The main violations concerned: text alternatives, keyboard accessibility and compatibility.</li> <li>- Other violations included: text resize and pronunciation.</li> </ul> | <ul style="list-style-type: none"> <li>- It was recommended to follow the existing international accessibility standards, and adapt them to their context.</li> <li>- Regular assessment of the websites was recommended.</li> <li>- Raising awareness about the guidelines and their importance was required.</li> </ul> |

<sup>20</sup> <https://www.totalvalidator.com/>

<sup>21</sup> <http://20.cita.illinois.edu/>

| Study  | Guidelines       | Methodology  | User Involvement                        | Tools Used                             | Genre of Websites   | Results and Findings  | Recommendations   |
|--|------------------|--|---|--|---|---|---|
| AlJarallah et al. (2013) and Al-Jarallah and Al-Shathry (2015) | WCAG 2.0         | <ol style="list-style-type: none"> <li>1. Automated accessibility checking,</li> <li>2. Blind users' experiment and post interview,</li> <li>3. Interview with web designers to analyse the problems faced by blind participants.</li> </ol> | Yes, blind and visually impaired users. | Cynthia Says, WAVE and AChecker        | Three web pages of the national government portal in Saudi Arabia | <ul style="list-style-type: none"> <li>- Conformance to WCAG guidelines may not be the success factor for blind user's acceptance of websites.</li> <li>- Although the selected e-Government portal conformed to all major WCAG requirements and satisfies other technical standards, it failed to satisfy the requirements of blind people, which led to user dissatisfaction.</li> <li>- Web designers assumed that blind users are ordinary users who deal with the computer through non-visual contact, without carefully considering other aspects like their cognitive load and their complex problem solving process.</li> </ul> | <ul style="list-style-type: none"> <li>- More work was required to deeply understand and analyse the cognitive process of blind users in their online interaction.</li> </ul> |
| Alotaibi (2015)  | WCAG 1.0 and 2.0 | <ul style="list-style-type: none"> <li>- Automatic evaluation,</li> <li>- Manual evaluation, and</li> <li>- Feedback from disabled users.</li> </ul>   | Yes                                     | W3C validations services <sup>22</sup> | Blackboard system at Taif University.                             | The system did not meet accessibility guidelines.   | Web accessibility needed to be improved for this system.  |

<sup>22</sup> <https://validator.w3.org/>

| Study                    | Guidelines        | Methodology   | User Involvement | Tools Used                      | Genre of Websites   | Results and Findings   | Recommendations   |
|--------------------------|-------------------|---|------------------|---------------------------------|---|--|---|
| Alahmadi and Drew (2016) | WCAG 2.0 Level AA | <ul style="list-style-type: none"> <li>- Automatic evaluation of each university's home page, one course description page and one admission page.</li> <li>- Analysis of the data gathered from each category.</li> </ul> | NO               | AChecker and SPSS <sup>23</sup> | Websites of the top university rankings in the world, Oceania and the Arab region, as of 2015 (20 websites from each of the three categories and one of them was the website of King Saud University in the KSA). | <ul style="list-style-type: none"> <li>- Accessibility issues affect university websites in both the developed and developing world, and there was no significant difference between them.</li> <li>- Access to media, document files and a lack of navigation information comprised the most influential accessibility errors.</li> </ul> | <ul style="list-style-type: none"> <li>- More attention towards accessibility issues in these websites was required.</li> <li>- Researchers and developers were recommended to focus on solving and improving the current accessibility situation based on the experience of disabled users.</li> </ul> |

<sup>23</sup> <http://www-01.ibm.com/software/analytics/spss/products/statistics/>



| Study                                    | Guidelines             | Methodology  | User Involvement | Tools Used   | Genre of Websites  | Results and Findings   | Recommendations  |
|--|------------------------|--|------------------|--|--|--|--|
| <a href="#">Al-Khalifa et al. (2016)</a> | WCAG 2.0 A, AA and AAA | <ul style="list-style-type: none"> <li>- Evaluation of three representative web pages from each website.</li> <li>- Checking HTML and CSS validity.</li> <li>- Checking presence of validation icons and conformance icons.</li> <li>- Automatic and manual accessibility evaluation.</li> </ul> | NO               | HTML Markup Validation Service, CSS Validator Service <sup>24</sup> , AChecker, Total Validator, WAVE toolbar. | 34 Saudi e-government websites.                                      | A considerable improvement in the government websites' accessibility was found compared to previous studies <a href="#">Al-Khalifa (2010, 2012a)</a> | <ul style="list-style-type: none"> <li>- More training was needed to meet accessibility requirements of a website.</li> <li>- User testing with disabled participants was recommended in the future to achieve more accurate results.</li> </ul> |
| <a href="#">Alshamari (2016)</a>         | WCAG 1.0 and WCAG 2.0  | Evaluation of the homepage of the selected websites.   | NO               | Automated tools: AChecker, TAW, Eval Access, MAUVE and FAE   | 3 popular Arabic e-commerce websites; namely SOUQ, HARAJ and NAMSHI. | There were navigation, readability, HTML, input assistance and timing errors.  | <ul style="list-style-type: none"> <li>- Improvements were needed for better web accessibility.</li> <li>- Involvement of web accessibility experts in evaluation can provide better results</li> </ul>  |

<sup>24</sup><http://jigsaw.w3.org/cssvalidator/>

| Study                                     | Guidelines            | Methodology  | User Involvement | Tools Used | Genre of Websites                                 | Results and Findings  | Recommendations   |
|---|-----------------------|--|------------------|------------|---|---|---|
| <a href="#">Osman (2017)</a>              | WCAG 2.0              | Systematic literature review of web accessibility automatic checking tools and evaluation in Saudi Arabia. | NO               | None       | Websites in the KSA.                              | <ul style="list-style-type: none"> <li>- No any single web accessibility tool was found to support the Arabic language in all aspects.</li> <li>- The tools needed to be user friendly and sufficient to help designers and developers evaluate their websites.</li> <li>- The practice of web accessibility checking in Saudi Arabia was very limited and needed to be implemented.</li> <li>- The awareness of web accessibility by disabled people in Saudi Arabia was very poor.</li> </ul> | <ul style="list-style-type: none"> <li>- The websites in Saudi Arabia needed to be improved so as to be accessible by disabled people.</li> <li>- There was a need for tools supporting the Arabic language to check websites in the KSA.</li> <li>- There was a need to further check the accessibility of websites in the KSA.</li> </ul>   |
| <a href="#">Akram and Sulaiman (2017)</a> | WCAG 1.0 and WCAG 2.0 | Systematic review of the literature to identify the web accessibility issues.                              | NO               | None       | Saudi Arabian university and government websites. | <ul style="list-style-type: none"> <li>- None of the websites followed WCAG.</li> <li>- WCAG 2.0 did not address many problems faced by users and some guidelines were not effective to avoid user problems.</li> </ul>   | <ul style="list-style-type: none"> <li>- Saudi Arabian policies related to web accessibility needed to be reviewed.</li> <li>- Saudi Arabia's own web accessibility guidelines needed to be developed according to the country context, culture and disability types.</li> <li>- Involving disabled users, web developers and policy makers would improve web accessibility.</li> </ul> |

## 3.2 The Initiatives to Improve Web Accessibility in Saudi Arabia

In order to improve web accessibility, a number of initiatives have been embarked on by different bodies. Although they have added to this area, their work has had some weaknesses and limitations. In this section these initiatives are presented and critically reviewed.

### 3.2.1 Government Initiative

In 2005, following the Saudi Arabian government's realisation of the significance of providing online services to their citizens, the Saudi Ministry of Communication and Information Technology (2005) launched an e-government programme called Yesser, in conjunction with the Ministry of Finance and Communications and Information Technology Commission (CITC). Yesser is an Arabic word that means *to make it easy*. Consequently, Yesser aims to provide online services and information easily to all Saudi nationals and residents. It serves as an enabler and facilitator for transforming the public sector into the information society, while government agencies are responsible for the actual execution of their own websites (AlSabti, 2007). The main objectives of this programme are: providing better and more easy-to-use services for individual and business users, providing the required information in a timely and accurate way and increasing the effectiveness and efficiency of the public sector. According to the National e-Government Strategy and Action Plan (2006b), the Saudi government made the following vision statement: "By the end of 2010, everyone in the Kingdom will be able to enjoy - from anywhere and at anytime world class government services offered in a seamless, user friendly and secure way by utilising a variety of electronic means".

In order to achieve these goals, the government developed a toolkit containing the Yesser best practices and as a part of this toolkit a document of guidelines for design and management of public sector websites was provided for website developers and owners (The Saudi Ministry of Communications and Information Technology, 2006a). This document provides guidelines for all phases of a website's lifecycle. One of the issues that has been addressed in this document is how to make the website accessible. In this regard, website developers were advised to adhere to the international W3C guidelines. However, these guidelines were written in English; this means that any Arabic native speaker website developer/owner who does not speak English would not be able to follow them, and they might ignore them completely. In addition, some of the links in the Yesser document are invalid or lead to web pages with contents that are no longer available, for example:

<http://www.madison.k12.wi.us/webpub/guidline.htm>

<http://jigsaw.w3.org/css-validator/validator-uri.html>

Furthermore, a number of the suggested guidelines can only be applied to an English language website rather than Arabic, for instance:

- “Headings should be in title case format”. The Arabic language does not have title case.
- “Adhere to the agency’s norm for spelling (English or American)”.

These examples show clearly that not all international guidelines can be applied to a specific context.

In this document, fonts and sizes were recommended for both languages, Arabic and English. For an Arabic website, they recommended Traditional Arabic and Simplified Arabic with size 19 and 17 points respectively. However, there was no evidence that these fonts were the best for the website in terms of accessibility.

Generally, the guidelines in the Yesser document were highly abstract and did not provide the low level details that might be needed by the developers. Moreover, the Yesser document ([The Saudi Ministry of Communications and Information Technology, 2006a](#)) was published in 2006 and there have been no updates since then. An e-mail was sent to Yesser’s contact email<sup>25</sup> asking about an update, but no answer has been received. Nevertheless, Yesser can be considered a step in the right direction, although further efforts are needed to understand the local context and its situation in order to adapt the guidelines to them. Moreover, continuous work is required to cope with the advancement of the technologies and the web.

### 3.2.2 Translation of Accessibility Guidelines

In order to improve accessibility for Arabic websites, the Arab League Educational, Cultural and Scientific Organisation, in collaboration with the Arab Center for Arabization, Translation, Authorship and Publication led a translation project. The purpose of this project was mainly translation of the W3C international standard (WCAG 2.0) ([W3C, 2008](#)) into Arabic<sup>26</sup>. It was a crucial step, aiming at providing a better understanding of the accessibility guidelines by Arabic native speaker developers; however, it suffers from a number of shortcomings.

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<sup>25</sup>See Appendix A

<sup>26</sup>Available at: <http://www.alecso.org/wcag2.0/>

An analysis of this translated document was carried out using personal knowledge of Arabic, a background in computing, and the consultation of a number of online dictionaries, Cambridge<sup>27</sup>, Almaany<sup>28</sup> and ArabDict<sup>29</sup>. The translation was found to be incomplete, because only the principles, guidelines and success criteria of WCAG 2.0 had been translated into Arabic. Further explanations for them, such as: Understanding Guideline, How to meet Success Criteria and Understanding Success Criteria (which appear as links to other web pages) were found in English. It was frustrating to click on these links hoping to understand more and see examples, only to find the web pages appeared in English.

A number of translation problems were found, and classified into the following:

- (a) Inconsistency in translation: the same English word was translated into different Arabic translations, even when these words were technical terms.
- (b) Using unfamiliar Arabic words in translation, these words could be substituted with different familiar words.
- (c) Using incorrect or inaccurate Arabic words which were, for example, inappropriate in context, especially when these words were technical terms.
- (d) Using an inappropriate form of the translated word, which were, for example, singular instead of plural or masculine instead of feminine. Figure 3.1 shows examples for the problems a, b, c and d (more examples of translation problems are in Appendix B).

| Translation Problem | English Word   | Arabic Translation                   | Suggestion          |
|---------------------|----------------|--------------------------------------|---------------------|
| a                   | Contrast ratio | نسبة التباين<br>And<br>تقرير التباين | نسبة التباين        |
| b                   | Updated        | محنة                                 | محدثة               |
| c                   | Large print    | الطباعة بحروف غليظة                  | الكتابة بأحرف كبيرة |
| d                   | Accessible     | نافذ                                 | قابل للنفاذ         |

Figure 3.1: Examples of Translation Problems Found in the Arabic Version of WCAG 2.0.

- (e) Inconsistent ways of dealing with abbreviations. They were found written in the following forms:

Form 1: They were only written as they were in English.

<sup>27</sup><https://dictionary.cambridge.org/dictionary/english-arabic/>

<sup>28</sup><http://www.almaany.com/en/dict/ar-en/>

<sup>29</sup><http://www.arabdict.com/en/english-arabic>

Form 2: Each English letter in the abbreviation was written in Arabic and/or they were written as they were in English.

Form 3: The full phrase of the abbreviation was translated and written in Arabic and/or they were written as they were in English.

Figure 3.2 shows examples of these different ways for dealing with abbreviations.

| English Abbreviation | Form 1 | Form 2       | Form 3                                     |
|----------------------|--------|--------------|--|
| HTML                 | HTML   | أتش تي أم أل | -  |
| URI                  | URI    | -            | مُعَرَّف الموارد الوحيد (URI)              |
| CJK                  | CJK    | س.ج.ك        | الخطوط الصينية، اليابانية أو الكورية (CJK) |

Figure 3.2: Examples of How Abbreviations Appear in the Arabic Version of WCAG 2.0.

Other problems in the Arabic version included spelling mistakes for some words (Figure 3.3). Moreover, in the Arabic Glossary part, the words were listed in the same order as they were in the English version (i.e. in English alphabetical order). The Arabic alphabetical order was not considered at all in listing these words, which means Arabic words were listed according to the alphabetical order of their translation in English which made the process of looking up a word in the glossary difficult and confusing.

| Correct Word | Word with spelling mistakes |
|--------------|-----------------------------|
| المقرونة     | المرفونة                    |
| الحركية      | الركحية                     |

Figure 3.3: Examples of Spelling Mistakes in the Arabic Version of WCAG 2.0.

In addition to the problems mentioned above, the Arabic translation of WCAG 2.0 showed no effort to understand the Arab people as target audiences, and consequently no localised web accessibility had been made available to them.

### 3.2.3 Other Initiatives

There has been limited research in the area of web accessibility in the KSA. Some studies have focused on specific types of disabilities and provided recommendations or a framework to suit them. For instance, a study conducted by [Al-Wabil et al. \(2006\)](#) presented recommendations for accessible web design for Arabic content based on existing guidelines on web design for dyslexic users.

In order to improve the evaluation of Arabic website accessibility, [Al-Khalifa \(2012b\)](#) designed and implemented an online Arabic web accessibility system to evaluate Arabic websites accessibility based on W3C WCAG 2.0 level A success criteria. This system recognises two types of accessibility problems: errors and warnings and produces two types of reports in Arabic: a summary report and a detailed report.

A study undertaken by [Al-Khalifa and Al-Razgan \(2014\)](#) aimed at providing Arab users with easy access to Arabic assistive technology software. A repository for Arabic assistive technology software (ACCESS - an Open Source/Freeware assistive technology software repository) was built.

It can be seen from these few studies that research around the wider Gulf Arabic region related to improving web accessibility is limited. It should also be noted that the localisation to the Saudi Arabian context and its impact on accessibility has not been investigated by these studies. More work is needed in this area to serve this part of the world, as discussed in Section 3.1, and in this research the aim is to fill this gap.

### 3.3 Chapter Summary

This chapter has presented web accessibility in Saudi Arabia in terms of the current status of accessibility of Saudi websites and the initiatives proposed to improve web accessibility. Reviewing studies conducted to evaluate web accessibility revealed that there was an agreement on the low level of web accessibility in the KSA. The previous studies recommended conducting more research into web accessibility in this region of the world. This research has also shown that cloning the existing guidelines (that have been developed in Western countries) and applying them to Arabic websites raises accessibility issues relating to culture and language.

The reviewed studies shed light on the challenges and issues in developing and improving accessibility of Arabic websites in Saudi Arabia:

- Lack of awareness among the developers of the importance of web accessibility and equal opportunities for both disabled and non-disabled.
- Lack of web accessibility guidelines, laws and policies suitable to the Saudi Arabian context.
- Existing accessibility evaluation tools, e.g., AChecker, do not work reliably with Arabic websites.
- Lack of understanding of the needs of users with disabilities when it comes to browsing the web.
- Lack of training for the developers in the field of web accessibility.

Although these challenges are present, it is still possible for web developers to incorporate those guidelines that are suitable for Arabic websites at the beginning of a development cycle rather than to check later. They can also take into account disabled users' feedback whilst paying attention to appropriate localisation needs. Finally, the successful implementation of Arabic digital accessibility would ensure more inclusive websites for the growing Arabic speaking population of internet users.

Initiatives by different bodies to improve the status of web accessibility in the region have been taken by governments and can be considered as a step in the right direction, but they have been found to suffer from mistakes and shortcomings. The Yesser document provided by the Saudi government had a number of limitations, such as providing non-Arabic web accessibility guidelines and URL links that were not valid, with no apparent update since publication in 2006. Translation of web accessibility guidelines into Arabic suffered from a number of weaknesses, including incomplete and inconsistent translation and using unfamiliar and inaccurate Arabic words in translation. Other initiatives were very limited and did not investigate the issue of localisation to the Arabic context and its influence on web accessibility. Therefore, in this research the aim is to investigate this issue by developing a framework for localising web accessibility guidelines, as explained in Chapter 5.



## Chapter 4

# Research Methodology

This chapter provides an overview of research methods, including quantitative, qualitative and mixed methods. In addition, it presents the research methodology adopted in this research.

### 4.1 Research Methods

There are three main types of research methods used in research areas such as Human Computer Interaction (HCI), which are quantitative, qualitative or mixed methods. The choice of one research method over another depends on the research problem, the personal experience of the researchers and the audience(s) for whom the report will be written ([Creswell, 2013](#)). The following sections explain the three types briefly.

#### 4.1.1 Quantitative Research Methods

Quantitative research methods involve collecting numerical data and analysing them using statistical procedures ([Creswell, 2013](#)). One of the most commonly used methods for gathering quantitative data is questionnaire ([Lazar et al., 2010](#); [Preece et al., 2001](#)), which consists of a set of questions for gathering participants' responses in a standardised manner ([Preece et al., 2001](#)). Questionnaires can be used to collect demographic data and participants' opinions. Their main advantage compared to other data collection methods is that they can easily be circulated to a large number of respondents ([Preece et al., 2001](#)).

In order to analyse quantitative data, two different techniques are used, descriptive and inferential analysis ([Preece et al., 2001](#)). Descriptive analysis is adopted when statistics, in the form of means, standard deviations and other measures, are used to describe

and present the variables or the relationships between these variables. Inferential analysis is used when inferences can be deduced by comparing group of variables to test a hypothesis. Software tools such as SPSS<sup>1</sup> can provide help in this analysis.

### 4.1.2 Qualitative Research Methods

In qualitative methods, the data collected, analysed and interpreted cannot usually be represented in numerical format (Creswell, 2013). Qualitative methods mainly aim for in-depth understanding and exploration of a research problem or phenomenon in the individuals' context rather than from theories (Creswell, 2013). According to Creswell (2013) this understanding and exploration can be done by four main methods: observation, interviews, or examinations of documents and of audio-visual materials. Therefore, the collected data and the results are not numerical. In addition, the qualitative research final report usually has a flexible structure compared to the quantitative report, since the focus is on the importance of interpreting the complexity of studied situation (Creswell, 2013). Among these four methods, the interview is the most commonly used method (Lazar et al., 2010). Interviews can be defined as a “conversation with a purpose” (Preece et al., 2001).

Interviews can be classified, based on the type of questions asked or the amount of control the interviewer has during the interview, as: unstructured, semi-structured and structured (Lazar et al., 2010; Preece et al., 2001). Interviews can also be categorised based on the number of participants (Preece et al., 2001). They can be one-to-one or through a group interview. Each of these categories has its advantages. The different categories of interviews are as follows (Lazar et al., 2010; Preece et al., 2001):

- *Unstructured interviews*: questions asked by the interviewer are not predetermined. The interviewee can answer as he/she prefers, in detail or briefly. This type of interview generates rich data, as the interviewees have the opportunity to speak about some issues that the interviewer might not have considered. On the other hand, this type of interview can be very time-consuming and difficult to analyse.
- *Semi-structured interviews*: combine features of structured and unstructured interviews and use both closed and open questions. To be consistent, the interviewer has a basic script as a guidance, so the same questions are asked to each interviewee. This type of interview can be time consuming to transcribe and analyse.
- *Structured interviews*: The same questions are asked by the interviewer with a prepared specific set of answers. Structured interviews are easier to analyse, since the study is standardised. Disadvantages of this type of interviews include limited

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<sup>1</sup><http://www-01.ibm.com/software/analytics/spss/products/statistics/>

scope for the interviewee as they cannot answer the questions in detail or in-depth. In addition, the interviewer cannot modify, add or delete questions as they like, which may affect quality.

- *Focus groups or group interviews:* usually involve between three and ten participants. This gives an opportunity for different and sensitive issues to be raised and produces rich responses and discussions. Disadvantages are that the interviewer needs to be skilful, so that time is not wasted on irrelevant issues. Moreover, it can be difficult to get interviewees together in a suitable location and time. Usually having time with any interviewees can be difficult, but this problem is compounded with focus groups because of the number of interviewees involved.

### 4.1.3 Mixed Research Methods

Mixed research methods are a combination of both quantitative and qualitative methods in a single study. This mixture provides the advantages of both methods and decreases the weaknesses of both methods. Moreover, this combination can provide a better understanding of the research problem and its related issues (Johnson and Onwuegbuzie, 2004). Using mixed methods can increase the accuracy of the data, provide a more complete picture, and they allow the researcher to develop the analysis and build on the obtained data (Denscombe, 2008). The following subsections review some of the commonly used mixed method strategies in the literature.

#### 4.1.3.1 Triangulation

Triangulation is one of the most common and well-known approaches in mixed methods research. It involves studying a problem from different points of view or using different methods. It is usually used in research to generalise the findings, and it increases the validity of a research study and provides better understanding of a problem (Creswell, 2013; Denzin, 1978; Mathison, 1988). Triangulating both qualitative and quantitative methods is very useful, because, despite the fact that qualitative data are broader and richer in nature, they are less precise than quantitative data (Runeson and Höst, 2009). The triangulation design is a one-phase design in which researchers apply the quantitative and qualitative methods during the same time-frame and with equal weight. Denzin (1978) classified triangulation into four types:

- *Data triangulation or source triangulation:* this means different data sources or people are used to collect data.
- *Investigator triangulation:* this involves collecting and analysing data by different investigators to alleviate the subjectivity of individual investigators.

- *Theoretical triangulation*: this means approaching data from different theoretical perspectives.
- *Methodological triangulation*: this is the most popular type of triangulation. It involves using different research methods to answer the research question.

Another classification of triangulation was given by [Creswell \(2013\)](#), as concurrent, concurrent nested and concurrent transformative triangulation, depending on the relative importance of the qualitative or quantitative data, as follows:

- *Concurrent triangulation design*: in this design, both quantitative and qualitative methods are used simultaneously in one phase, with the aim of confirming, cross-validating or corroborating findings within a single study. Both components are considered equally important.
- *Concurrent nested design*: it contains one data collection phase, during which both quantitative and qualitative data are collected simultaneously. However, one method (either quantitative or qualitative) must take the dominant position, and the other method should be embedded/nested within the dominant method to address a different question or to seek information at a different level.
- *Concurrent transformative design*: this combines the features of both concurrent triangulation and concurrent nested designs. Specifically, it may involve a triangulation of quantitative and qualitative components that are equally important. It is then also embedded with a supplementary method to further explore the issue. However, all data are collected at the same time in one data collection phase.

#### 4.1.3.2 Sequential Mixed Methods Research Approach

The sequential mixed methods approach is another approach, which involves conducting the research in a number of phases, sequentially, so that each phase is built on the results and findings from the previous phase in order to answer the research question. According to [Creswell \(2013\)](#) and [Peng et al. \(2011\)](#), there are different types of sequential approach depending on the nature of the research and the order of conducting each research method.

- In the *explanatory sequential mixed methods approach*, the researcher starts with the quantitative phase first, followed by a qualitative phase. In other words, this design contains two phases and is characterised by the collection and analysis of quantitative data, followed by the collection and analysis of qualitative data. Priority is given to the quantitative phase. The purpose of this design is to use qualitative results to further explore and explain the findings of a primarily quantitative study.

- In the *exploratory sequential mixed methods approach*, the researcher begins by exploring with qualitative data and analysis first, followed by the quantitative phase that builds on the results of the first phase with the aim of increasing the generality of the findings. In this design, priority is given to the qualitative phase of the study.
- Other advanced sequential mixed methods include embedded, transformative, and multiphase sequential mixed methods.
  - The *embedded sequential mixed methods approach* nests one or more forms of data, quantitative or qualitative or both within a larger design.
  - The *transformative sequential approach* comprises two phases, qualitative or quantitative, regardless of their order, and has a theoretical lens that guides a directional research question aimed at exploring a problem.
  - The *multiphase mixed methods approach* involves a number of phases and is usually adopted in long-term projects.

## 4.2 Research Methodology Applied in this Research

A mixed methods approach was applied in this research, because there were a number of different phases and each phase relied on the results and findings from the previous one. This meant that a combination of quantitative and qualitative methods were used. The reason for this choice was that, as explained in the literature, collecting different types of data offers a broader understanding of a research problem than either quantitative or qualitative data alone (Creswell, 2013; Johnson and Onwuegbuzie, 2004; Peng et al., 2011). This study aimed to answer the following main research questions:

- RQ1: What are the challenges facing Saudi university web developers wishing to enhance the accessibility of their websites?
- RQ2: What is a framework that can be used to localise Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia?
- RQ3: What additional/adapted localised Web Content Accessibility Guidelines are needed for Arabic university websites in Saudi Arabia?
- RQ4: What would need to be included in a checklist for web developers to evaluate and improve the accessibility of Arabic university websites in Saudi Arabia?

In the first phase of this research, data was collected from secondary research by reviewing related literature to build the proposed framework, as explained in Chapter 5. Finding data that is complementary is accomplished by using multiple types of sources;

so theoretical, empirical and experience-based studies were used to gather the required data. The proposed framework was validated through a qualitative study, which was an expert review through semi-structured interviews, as discussed in Chapter 6. In addition, the interviewed experts working as university website developers were asked about the challenges they face to implement the accessibility. By the end of this phase, the first and second research question (RQ1) and (RQ2) were answered.

In the second phase, the validated framework was applied through designing a localisation process of the accessibility guidelines. The result from this localisation process was localised web content accessibility guidelines for university websites in Saudi Arabia. This phase was quantitative, in which an online questionnaire was then designed for the experts to review the outcome from the localisation process. By the end of this phase, the third research question (RQ3) was answered.

In the third phase, the reviewed localised guidelines were used to develop an easy to use and understand checklist that would help Arab web developers in improving the accessibility of their websites. A qualitative phase was designed and conducted with web developers. The main issues discussed with them were the usability and clarity of the checklist. By the end of this phase, the fourth research question (RQ4) was answered.

Figure 4.1 summarises the research design showing all phases, along with their outcomes. The design and the results of each phase are explained in detail later, in Chapters 5, 6, 7 and 8.

### 4.3 Chapter Summary

In this chapter, three main research methods: quantitative, qualitative and mixed methods have been described briefly. The research methodology adopted in the current research has been presented. It has explained how the sequential mixed approach was utilised to answer the research questions through three different phases: qualitative, quantitative, and another qualitative phase. The first phase aimed to validate the proposed framework by interviewing a panel of experts. The second phase was carried out by applying the proposed framework and reviewing the resultant localised guidelines through use of an online questionnaire. The third and last phase involved developing and reviewing an easy to use checklist to help enhance the accessibility websites developed for Saudi universities.

This chapter has illustrated the overall research design, however, the design of each phase will be presented in the subsequent chapters. Chapters 5 and 6 provide the design and results of the first phase, Chapter 7 covers the second phase, and Chapter 8 covers the third and last phase.

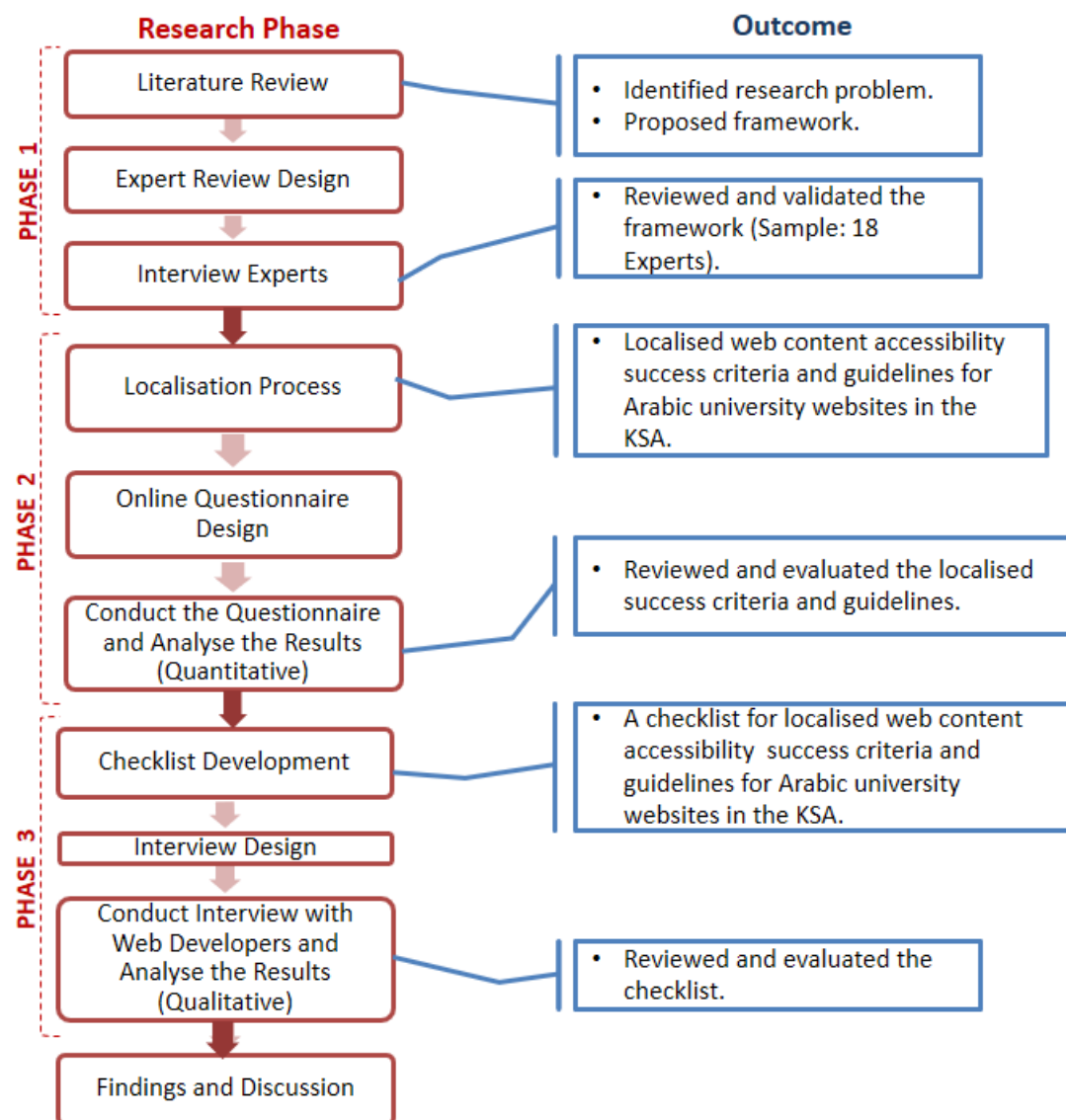


Figure 4.1: Research Phases and Outcomes





## Chapter 5

# Proposed Framework

In order to construct the framework, several research areas have been investigated. Each area has an influence on how the framework is constructed. These areas include: web accessibility, as the main context, with different guidelines that contribute to accessibility, and also cultural, technical and financial aspects and their impact on accessibility guidelines.

### 5.1 Construction of the Framework

The Framework for Localised Web Content Accessibility Guidelines (FLWCAG) for university websites in Saudi Arabia was constructed in three main stages. The purpose of the first stage was mainly to determine, from the literature, the components and aspects that need to be considered when localising web content accessibility guidelines. This determination stage involved the following steps:

1. Review of the literature concerned with the web, web accessibility and localisation.
2. Identification of the components that might have an effect on the localisation, from the reviewed literature.
3. Exclusion of the components that are irrelevant to building localised web content accessibility guidelines, such as accessibility of web authoring tools.
4. Categorisation of the components based on their meaning and scope.

The first stage resulted in the identification of seven components; namely: web content accessibility, cultural markers, genre markers, costs, user diversity, Internet infrastructure and technology variety, as illustrated in Figure 5.1.

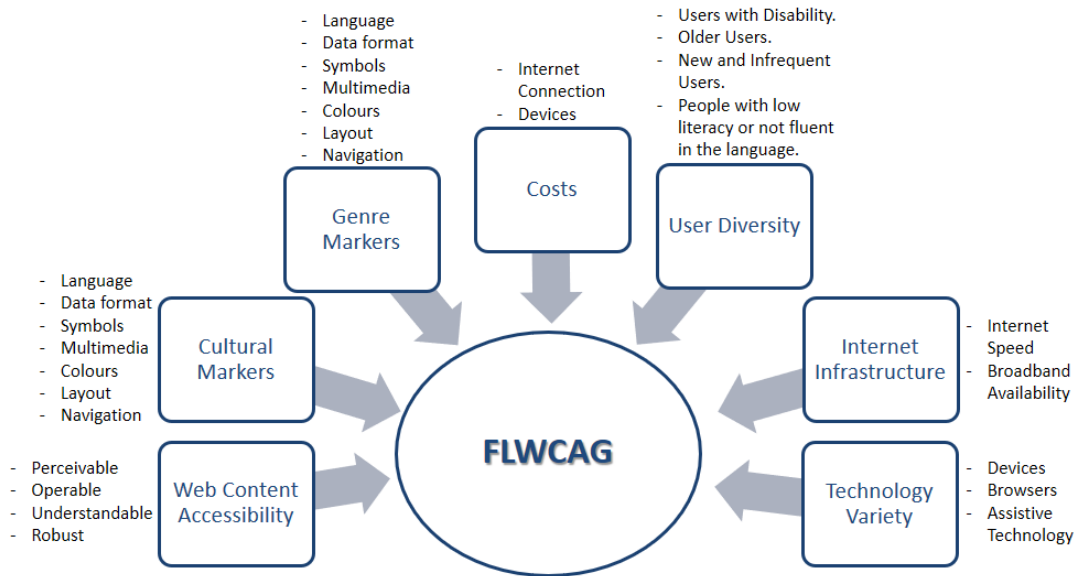


Figure 5.1: FLWCAG: A Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia, Stage 1

In the second stage, the components and all of their subcomponents and elements identified in Stage One were synthesised to form FLWCAG. This stage involved the following steps:

1. Identification of any duplication among the components, subcomponents and elements.
2. Synthesis of the components that have duplicated subcomponents and elements.

Two components were synthesised in this stage and made into one component, which became genre-specific cultural markers as illustrated in Figure 5.2.

As this research investigates localisation in a Saudi context, some of the identified components in Stage Two needed more specification. Therefore, the following steps were applied in this stage:

1. Review of the literature concerned with localisation for Saudi Arabia.
2. Identification of the components that may challenge or facilitate localisation for a Saudi context and specifically university websites.
3. Detailed specification of culturally related components and their subcomponents.

One component with its subcomponents was specified in detail in this stage: genre-specific cultural markers (Figure 5.3) as explained in Section 5.2.

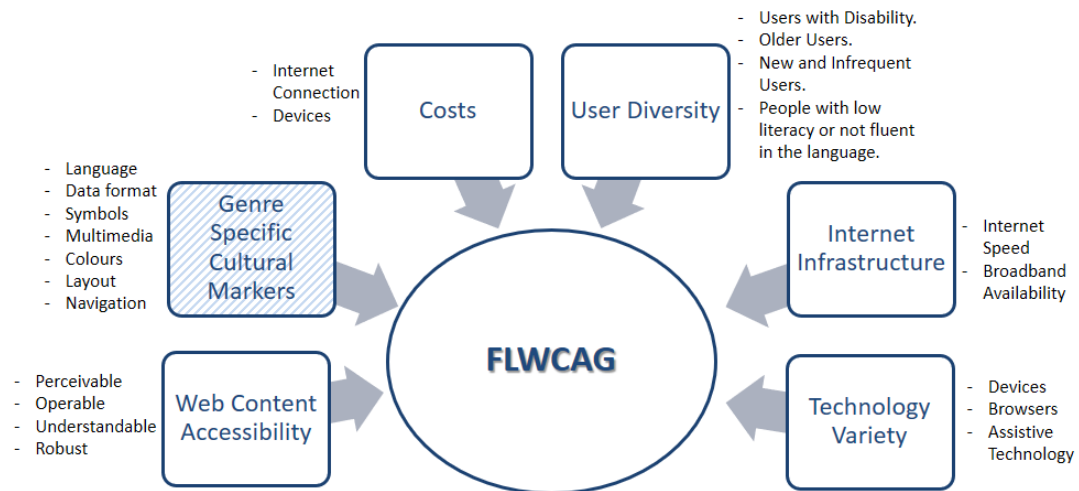


Figure 5.2: FLWCAG: A Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia, Stage 2

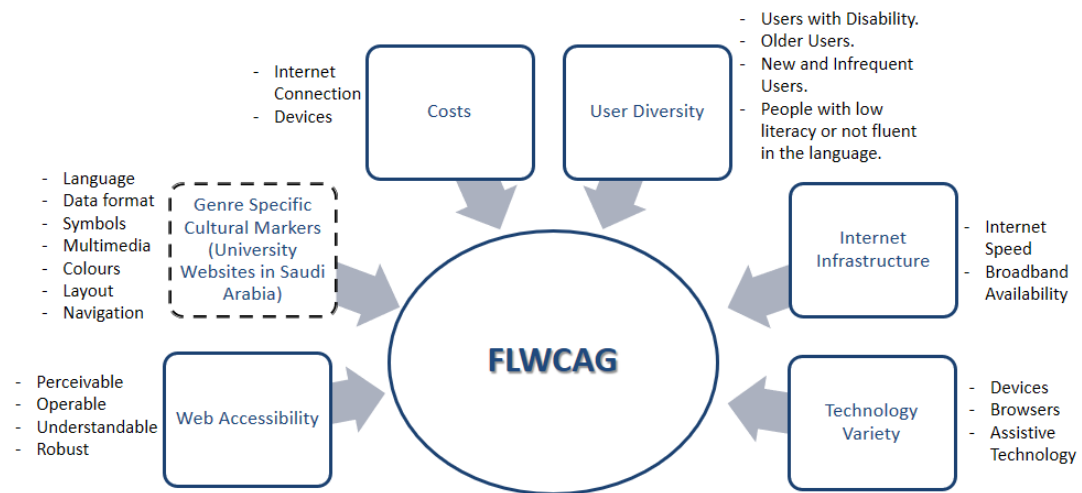


Figure 5.3: FLWCAG: A Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia, Stage 3

## 5.2 Proposed Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia

The framework comprises six components, as shown in Figure 5.3. These components cover different aspects and are described in the following sections.

### 5.2.1 Web Content Accessibility

Web content accessibility is concerned with making the content perceivable, operable, understandable and robust (W3C, 2008).

- **Perceivable:** information and user interface components must be presentable to users in ways they can perceive.
- **Operable:** user interface components and navigation must be operable.
- **Understandable:** users must be able to understand the information as well as the operation of the user interface.
- **Robust:** users must be able to access the content as technologies advance.

This means that people with disabilities can perceive, understand, navigate, and interact with the web, and that they can also contribute to the web (W3C, 2008), as explained in Section 2.2.2.1.

## 5.2.2 Genre-Specific Cultural Markers

As explained in Section 2.3, genre or knowledge domains refer to information types that are presented on the web and describe large categories of websites (Barber and Badre, 1998), for instance, news websites or university websites. Cultural markers are interface elements and features that are acceptable and preferred within a particular cultural group (Barber and Badre, 1998). Genre-specific cultural markers are elements and features of a specific website genre for a particular cultural group (Barber and Badre, 1998). Within the framework, this component contains 7 subcomponents: language, data format, symbols and icons, multimedia, colours, layout and navigation. Language comprises 13 elements and multimedia contains 3 elements.

### 5.2.2.1 Language

As the official language in Saudi Arabia is Arabic, a brief explanation of the features of this language and how it is different from other Latin-based languages is provided.

Arabic is spoken as a first language by around 300 million people, mostly in the Middle East and North Africa, and is ranked the fourth language in the world in terms of the number of native speakers (SIL International, 2017). Additionally, Arabic is used by millions of people as an additional language, mainly in the Muslim world, as it is the language of the Quran, the holy book of Islam (Mahfoudhi et al., 2011).

### Direction of Reading and Writing

The Arabic language is based on an alphabetic system consisting of 28 letters and represents 34 phonemes. It is considered as a Semitic and bi-directional language because the script is read and written from right to left, whereas numerals are read from left to right (AlGhanem and Kearns, 2015; Mahfoudhi et al., 2011).

## Uni-Case Language

Arabic is a uni-case language which means there are no upper or lower case variations (AlRowais et al., 2013).

## Formation of the Letters

Each letter may have two to four different forms depending on its position in the word: initial, medial, final or the isolated or basic form, as illustrated in the examples in Figure 5.4.

|                                      | Example 1 | Example 2 |
|--------------------------------------|-----------|-----------|
| <b>Isolated Form</b>                 | ع         | ل         |
| <b>Initial (beginning of a word)</b> | عرب       | لمس       |
| <b>Middle Form</b>                   | العرب     | القمر     |
| <b>Final Form (end of a word)</b>    | نافع      | ميل       |

Figure 5.4: Examples of Different Forms of Letters in Arabic.

Arabic letters consist of 17 base letters. The remaining letters are made up by the addition of dots that can vary in number and position (Figure 5.5). This means dots are important in Arabic script to differentiate between a large number of Arabic letters (El-beheri, 2005). As a consequence, distinguishing these letters could add to the difficulties faced by readers of Arabic (Mahfoudhi et al., 2011).

|                                     | Arabic Letters                |
|-------------------------------------|-------------------------------|
| Groups of similar shapes of letters | ب - ت - ث                     |
|                                     | ج - ح - خ                     |
|                                     | د - ذ                         |
|                                     | ر - ز                         |
|                                     | س - ش                         |
|                                     | ص - ض                         |
|                                     | ط - ظ                         |
|                                     | ع - غ                         |
|                                     | ف - ق                         |
| The other letters                   | أ - ك - ل - م - ن - ه - و - ي |

Figure 5.5: Arabic Letters and Dots.

## Cursive Form and Spaces

Arabic script is written in a cursive style with the letters being joined to each other by ligatures. Of the 28 letters, only 22 are two-way connectors, while the remaining six letters cannot be joined as they are one-way connecting letters. For this reason, an Arabic word may have one or more spaces within the same word depending on how many of these letters are used in the word (Elbeheri et al., 2006). These spaces, together with the fact that Arabic is a uni-case language can cause a problem in identifying the boundaries of the words in Arabic script, especially for poor or beginner readers. As a result, readers of Arabic script must learn to identify the spaces within a word from spaces that distinguish word boundaries in the script. Therefore, in a study conducted by Al-Wabil et al. (2006), it was recommended that spacing between words be increased.

## Diacritical Marks

Another characteristic of Arabic is that the script contains only long vowels, but no short vowels. Diacritical marks (small diagonal marks above or below letters) are used to represent short vowels and help readers in pronunciation. This means, the Arabic orthography can be shallow, i.e., short vowels appear as diacritics in writing, or deep, non-vowelised, in which diacritics are neglected (Abu-Rabia et al., 2012; Elbeheri et al., 2006). Generally, both appear in electronic materials available online, but most websites use only deep orthography. Usually, newspapers and textbooks depend on deep orthography aimed at skilled readers, whereas shallow orthography is used in children's books and religious texts such as the Quran. Reading accuracy in Arabic requires the vowelising of word endings according to their grammatical function in the sentence (for example, subject or object), which needs a high level of linguistic skills, comprising phonological and syntactical processing (Abu-Rabia et al., 2012). When diacritics appear in the script, the process of phonological decoding is easier due to the consistent letter to sound correspondence. However, websites that have content in this type of orthography are very limited, for two main reasons (Al-Wabil et al., 2006): First, the developer needs to make a huge effort to include diacritics, especially for larger websites with a high volume of text. Secondly, the correct application of diacritics needs high linguistic skills that can be daunting for the developers, even if they are native speakers.

## Homographic Language

A huge number of Arabic words which appear as non-vowelised are homographic, when appearing out of context (Elbeheri et al., 2006). This means homographic words can carry more than one pronunciation and meaning, which causes semantic and phonological ambiguity. In this case, the context is needed to ensure the correct reading for these words. This issue of using diacritic marks has been discussed by Mahfoudhi et al. (2011),

and despite increasing the complexity of the visual representation of words within text, it has been argued that diacritics have a positive impact on Arabic readers. [Al-Wabil et al. \(2006\)](#) state that when there is non-vowelised text, an additional cognitively demanding skill will be needed from the reader, since the reader has to decode short vowels that do not appear in the text.

### Gender-Specific Language

Arabic is a gender specific language, resulting in some spoken and written words having a different form based on their male or female type. Sometimes, shallow orthography is needed in text to differentiate between males and females ([AlRowais et al., 2013](#)).

### Font Type, Size and Text Emphasis

To achieve more clarity in the presented Arabic text, [Al-Wabil et al. \(2006\)](#) have made recommendations for font types, size and text emphasis. The fonts that have flowing cursive form with full and deep curves and straight and vertical uprights, such as Naskh, are much clearer than angular types, such as Koufi and Andalus. The most preferred font types were Arabic Transparent followed by Simplified Arabic Fixed. For the size of text, the preferred size was in the range of 16-20pt, which is why Arabic script usually appears in larger sizes than English, in print and electronic form. To emphasise the text, bold was preferred rather than italic or underline.

### Alignment of Text

Whenever English text is left justified, the Arabic justification of text alignment should be right justified or fully justified. Fully-justified text is not considered as a problem because in Arabic, words can be stretched to fill the width of the line instead of introducing irregular spaces between words as in English ([Benatia et al., 2006](#)). In practice, in fully justified text, continuous lines (or *kashidas*) are automatically inserted between adjoining letters. That practice was reported by [Al-Wabil et al. \(2006\)](#) as a helpful way of recognising letters and their associated diacritics, as well as providing a visual aid when reading from right to left and moving from one line to the next.

### Long Sentences

[Al-Wabil et al. \(2006\)](#) agree that shorter sentences are easier to read and understand. However, the nature of Arabic allows for longer sentences that span many lines, in contrast to English.

## Diglossic Language

Arabic is highly diglossic ([AlGhanem and Kearns, 2015](#)), which means Arab people use a localised form of spoken Arabic in their homes and neighbourhoods, a language totally different from Modern Standard Arabic (MSA). This linguistic phenomenon is called diglossia ([Ferguson, 1959](#)). Educated Arabs usually use MSA for reading, writing, and speaking when official language is appropriate. However, both educated and uneducated native Arabic speakers use the spoken language on a daily basis for everyday communication: family conversations, shopping, cultural talks, and entertainment. MSA differs in vocabulary, phonology, grammar, morphology, and syntax from the accepted spoken language, in which there is a diversity of dialects. Most Arabic-speaking countries use different dialects, and sometimes within the same country districts may have a diverse range of dialects. Although Saudis and Moroccans are Arabic native speakers, when a Moroccan speaks in his dialect he would not be understood by a Saudi at all. The same situation would occur for people living in the same country, for instance, people from the West of Saudi Arabia cannot easily understand people from the East or the centre of Saudi Arabia and vice versa. Speaking a diglossic language contributes to the difficulty the native speakers face in expressing themselves and understanding others.

### 5.2.2.2 Data Format

When designing for a specific culture, the data format needs to be familiar for the users ([Al-Badi, 2005](#)). Examples of different data formats include:

- **Date format:** differs from country to another. In terms of the calendar used, Hijri is the calendar used in Saudi Arabia but Gregorian may be used in addition to Hijri calendar ([Al-Sedrani and Al-Khalifa, 2012](#)). A long date format is usually used, however, when short date format used, the separator is / ([Microsoft, 2011](#)).
- **Time format:** mostly is in 12 hour format in Saudi Arabia. 24 hour format is rarely used ([Microsoft, 2011](#)).
- **Currency format:** Currency symbols and their placement differ for different countries and languages. In Arabic, the currency symbol is placed at the left of the number ([Microsoft, 2011](#)). The Saudi Riyal is used as a long or short format. When other currencies are used, the equivalent value in Saudi Riyal is presented ([Al-Sedrani and Al-Khalifa, 2012](#)).
- **Address formats:** these differ for different countries. The postal code may be presented in a variety of forms, a specific number of digits or a mixture of digits and letters. In Saudi Arabia, the post code consists of a five-digit number, e.g. 12345 and the P.O.Box numbers are between three to five-digit numbers ([Saudi Post, 2016](#)).



- **Phone number format:** Different countries have different formats, not only in terms of the number of digits, but also how they are displayed. For example, in Saudi Arabia the format is: +966 2-digit Area Code XXX XXXX or 3-digit Area Code starting with zero XXX XXXX. For example, +966 12 528 0637 OR 012 528 0637. Mobile numbers take the following format: +966 5XXX XXXXX.
- **Name format:** In the Western culture it is normal to think of a person's name as consisting of first name, last name, and middle initial. One difference from usual Western practice is that Arabic women do not take their husband's surnames when they marry. They retain their surnames (Notzon and Nesom, 2005). Therefore, maiden name is not used at all in Saudi Arabia. Another difference is Arabs do not usually have middle name or middle initial and they use father name to distinguish in case of similar names (Notzon and Nesom, 2005). Something very commonplace for male Arabs is to have composite names, especially ones starting with Mohammad, so first name would consist of two names and most people then use the second name to refer to that person, since Mohammad is very common name. These differences can be a source of confusion when filling in data in a web form.
- **Measurement formats:** these differ between countries (Al-Sedrani and Al-Khalifa, 2012). In Saudi Arabia the Metric system is used in measuring areas, lengths and mass. So if a website describes a direction to a place, it would be not understood if it uses units like foot or yard, as a meter is the understood unit.

### 5.2.2.3 Symbols and Icons

One of the important elements that represents a culture is the use of symbols (Marcus and Gould, 2000). Symbols can be seen as metaphors denoting actions of the user (Cyr and Trevor-Smith, 2004). Symbols differ and represent different features, such as flags, logos, navigational elements and much more (Badre, 2001; Sun, 2001). Some symbols are strongly culture-defined, because what they represent is not available in another country. Using inappropriate symbols that the user cannot recognise or with which he or she cannot identify therefore reduces the accessibility of the web product. Moreover, the use of certain symbols, icons, or images may be offensive or even against the law in some countries (Al-Badi, 2005; Al-Badi and Mayhew, 2010). For example, the celebration of Valentine's Day is punishable by law in Saudi Arabia. In addition, animal symbols have different meanings: for Islamic culture, pigs, for example, are seen as unclean and should be avoided (Al-Sedrani and Al-Khalifa, 2012). Moreover, in the same culture symbols may vary from one website genre to another (Barber and Badre, 1998).

#### 5.2.2.4 Multimedia

Multimedia means that digital information can be represented in different formats such as audio, video, graphics drawings, images and animations (Bhatnagar et al., 2004). Multimedia is another culture-sensitive factor that needs to be considered when designing a website (Cyr and Trevor-Smith, 2004). The use of multimedia in a website would differ from one culture to another (Cyr and Trevor-Smith, 2004; Sun, 2001). According to Almakky et al. (2015), Saudi users prefer to have more images and less text compared with Western countries, who prefer more text and fewer images.

Multimedia carry different cultural messages within them, so for designing Arabic websites, it is important to choose pictures and graphics that do not have an impact on a conservative society. For instance, human pictures are acceptable only under certain circumstances, e.g., men and women should only appear with their bodies fully covered (Al-Sedrani and Al-Khalifa, 2012). In addition, images of nature are considered a better way to achieve cultural acceptance (Al-Sedrani and Al-Khalifa, 2012).

Issues like music making and listening have engaged Islamic scholars in debate over the centuries Otterbeck and Ackfeldt (2012). Due to the fact that some people in Saudi Arabia do not listen to music and believe it is forbidden from a religious point of view, depending on how conservative they are, if a Saudi user navigates a website that presents a video with music in the background, for example, he might not continue watching it and consequently quit the website. Although, this is not the case for all Arab users, as they differ in their beliefs and traditions, an appropriate way to deal with such a situation is needed, and this is not found in the existing guidelines. So, besides providing text alternatives for the video, the developers would provide a hint for people that there is music in the video, and/or provide another version of the video without music if they prefer no music.

#### 5.2.2.5 Colours

Colours are related to emotional and cultural associations and can have an influence on users from different cultural backgrounds (Barber and Badre, 1998). They might produce varying emotional reactions that can impact accessibility. Colours have different meanings for different cultures and the use of colour can also be associated with religion (Barber and Badre, 1998). For instance, the Judeo-Christian tradition is associated with red, blue, white and gold; Buddhism with saffron yellow and Islam with green. It was reported by Ibrahim et al. (2013) that a white background and bright colours are more acceptable in Saudi Arabia than dark colours.

### 5.2.2.6 Layout

Page layout refers to the placement of web page interface components and display layout that guide scanning information and reflect the logical flow of the task (Cyr and Trevor-Smith, 2004; Sun, 2001). Appropriate menu design and layout will provide a website's users with a contextual and structural model for understanding and accessing information (Cyr and Trevor-Smith, 2004). Page orientation differs from one culture to another, due to text direction: for example, in Arabic websites, the top and right menus are usually used as main navigational bars, whereas the left and bottom are for extras (Barber and Badre, 1998; Mushtaha, 2012).

### 5.2.2.7 Navigation

Web navigation refers to the process of surfing the web. Without a clear and facilitated path to information, users will become lost with the web (Cardello, 2014). A number of factors, such as type of navigation tools, menu, links, search and help capabilities can improve the easiness and speed of the navigation process (Cyr and Trevor-Smith, 2004; Marcus and Gould, 2000; Yu and Roh, 2002).

Web navigation is influenced by users' cultural backgrounds (Kralisch et al., 2005; Marcus and Gould, 2000; Mushtaha, 2012). Since the direction of Arabic is from right to left, an Arabic-speaking user would start navigating a web page from the right to the left. The navigation menu should be placed on that side where readers are used to start off reading, so that the navigation menu is likely to be seen first (Salmerón et al., 2017), as discussed in Section 5.2.2.6. Moreover, it is expected that navigation controls are pointing to the left for the next page and to the right for the previous page (AlRowais et al., 2013).

### 5.2.3 Costs

Economic factors also affect the ability to buy better computers, equipment and Internet connections (Simsim, 2011), which in turn would influence accessibility. In Saudi Arabia, people with high incomes living in big cities believe that the cost of Internet connection is relatively reasonable and it has reduced in price. Actually, the Internet connection prices continue to fall. However, for people with a low income who live in cities, small towns and villages and rural areas, the cost is still high. Therefore, it is urged that the Internet service providers should offer their services at reasonable prices (Alqahtani et al., 2014). It has been reported by Aleid et al. (2009); Tashkandi and Al-Jabri (2015) that, based on the services provided and compared to other countries like the UK, the cost is still high. This would prevent users from accessing the Internet and surfing the web (Alrawabdeh, 2009; Sait et al., 2007).

#### 5.2.4 User Diversity

This concerns different users with different abilities, for example: users with disabilities, older users, new and infrequent users and people with low literacy or those not fluent in the language (Henry, 2006; Shneiderman, 2000).

The needs of users with disabilities e.g. impaired vision, deafness, blindness, loss of hearing, motor or cognitive disabilities need to be considered when designing an accessible website (Henry et al., 2014).

According to Communications and Information Technology Commission (2017), Internet usage in Saudi Arabia started in 1994, at some educational and medical institutions. In 1999, it was officially opened to access by the public. This means that people in Saudi Arabia have been using the Internet for a relatively short period compared with many Western countries. For elderly, new and infrequent users, achieving a certain level of computer literacy and knowing how to access the Internet will enhance the opportunity to find information on the web and consequently increase accessibility (Van De Watering, 2005). However, there are people who still lack the knowledge about how to use computers or surf the web (Alzahrani and O'Toole, 2017; Simsim, 2011). The results from a recent study conducted by Alzahrani and O'Toole (2017) revealed that 3.5% of 142 students at a leading Saudi university reported that they had no experience in using the Internet.

The needs of people with low literacy or those not fluent in the language need to be considered as well. According to General Authority for Statistics (2016), the percentage of people who are over 10 years old and have low literacy levels in Saudi Arabia was 11.43% of the total population by 2016, of whom 10.98% were without any disability, while only 0.45% had a disability. One of the aspects that would benefit this group is using simple and clear language (Henry, 2006).

#### 5.2.5 Internet Infrastructure

Internet infrastructure (Naveed et al., 2017; Tashkandi and Al-Jabri, 2015) is one of the components that needs consideration when localising web content accessibility guidelines. This component comprises two subcomponents: Internet speed and broadband availability, as explained below.

##### 5.2.5.1 Internet Speed

Dial-up, DSL (Digital Subscriber Line), fibre-optics and satellite are some of the broadband methods used for Internet connection. Fibre is the fastest way to access the Internet, but it is also the most expensive, whereas dial-up connection is the slowest.

Internet speed in Saudi Arabia was reported by [Alqahtani \(2015\)](#); [Naveed et al. \(2017\)](#); [Sait et al. \(2007\)](#) as one of the most important factors when it comes to Internet usage and browsing the web. According to [Simsim \(2011\)](#), different broadband methods are used in Saudi Arabia, and the most popular method is DSL, but people's satisfaction level with their current Internet speed is low. Consumers may not achieve the speed they paid for, due to the proxy limitations in Saudi Arabia ([Aleid et al., 2009](#)), this means the Internet speed is slow even if one orders a high speed connection.

In a study conducted by [Simsim \(2011\)](#) satellite was the most preferred alternative communication system for its high speed, but people could not afford its high cost. This method of Internet access, besides offering a high speed Internet connection, attracts people by providing unrestricted Internet access in comparison with other systems.

### 5.2.5.2 Availability of Broadband

The Internet infrastructure has been improved in most Saudi cities; however, users in rural areas such as small towns and villages are still surfing the web using dial-up Internet connections ([Aleid et al., 2009](#); [Naveed et al., 2017](#)). Unreliable performance of Internet connectivity ([Naveed et al., 2017](#); [Tashkandi and Al-Jabri, 2015](#)) is another problem. In the main cities people still suffer from Internet disconnection that happens from time to time, for hours or even for a whole day.

### 5.2.6 Technology Variety

The variety of technology ([Shneiderman, 2000](#)) requires that a broad range of hardware and software are supported. There is a wide range of devices and software, which means some features, such as the screen and colour resolution, computer memory, and web browser choice, type and version can influence accessibility ([Shneiderman, 2000](#); [Van Elzakker, 2000](#)).

For instance, there might be two users, the first accessing a website on the small screen of a mobile device, that only displays limited colours, and the other accessing the same website with the latest, top-of-the-range, large screen computer. Although they access the same website, the capabilities of the technologies they use can affect, firstly, the ability to access all the information, and secondly, the way in which the information is received. Limited colour resolution may change the colours to such an extent that the carried information does not display clearly. This indicates that the developer is not always in control of what the final appearance of the website will be, even if, for example, images are stored in platform-independent formats ([Van Elzakker, 2000](#)). This is due to browser settings and the individual device's (laptop, PC.etc) configuration.

**Assistive technology** that is mainly used by people with disabilities to decrease their functional limitations needs to be supported as well (W3C, 2016c). On the web, assistive technologies are employed to help users with disabilities in navigating, interacting with, and understanding web content and features (Groves, 2012). Web content includes information, such as text, images and sounds and code or markup that defines how assistive technologies understand and present the content to the disabled user.

Groves (2012); Standards Compliance (nd) and W3C (2016c) point out the importance of the standards compliance of code, so the assistive technology can hook into the web content. Standards compliance involves writing web code according to a set of published technical specifications. The internationally recognised and the most commonly accepted standards were issued by the W3C<sup>1</sup>. Compliant proper code follows strict rules and specifications and avoids any non-standard markup code. Therefore, proper codes would provide more accessible web pages for users with disabilities. For instance, there might be an image that would not be accessible to a blind user unless text alternatives for the image were provided in a way that assistive technologies, in this case screen readers, can find and present them. So, the point here is that the text alternative must be included in a way that is *Accessibility supported*, i.e., assistive technologies can understand and use. This means that “*accessibility supported*” relates to support by user agents (including assistive technologies) of particular ways of using the code of web technologies (e.g. HTML, CSS, PDF).

Developers of assistive technologies such as screen readers need to develop their software to read the code of a website. This is done by developing the software to follow the W3C standards. If the codes of web technologies that are accessibility supported are used properly and follow the standards, then assistive technologies can access the information in the content (i.e., programmatically determine the information in the content) and present it to the user. Thus, “*programmatically determined*” relates to the information in web content (W3C, 2016c).

### 5.3 Chapter Summary

This chapter has presented the process of constructing the framework for localised web content accessibility guidelines for university websites in Saudi Arabia (FLWCAG). This process involved three stages, the determination, synthesis and specification stages. The resultant framework consisted of six main components: web content accessibility, genre-specific cultural markers, costs, user diversity, Internet infrastructure and technology variety. In addition, this chapter has described the six components, subcomponents and elements of the framework.

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<sup>1</sup><https://www.w3.org/>

Chapter 6 will describe an expert review study that was conducted with the aim of confirming and refining the content of the newly proposed framework. It will also present the results and findings from the expert review and present the final refined framework.





## Chapter 6

# Expert Review Design, Results and Analysis

After constructing the framework for the development of localised web content accessibility guidelines for university websites in Saudi Arabia (FLWCAG), as explained in Chapter 5, the immediate task was to carry out an expert review study to check agreement among a number of experts on the components of the framework. The purpose of this activity was to confirm the framework and explore other unmentioned components. This chapter discusses in detail the design, analysis and results of the expert review, to help reshape the framework to an acceptable version that is useful to the web accessibility research community.

### 6.1 Expert Review Design

Usually, interviews are used to conduct an exploratory study. The interview research method was chosen here because it enables in-depth discussion and exploration. Experts were chosen for interview at this exploratory stage to ensure the findings would have more credibility than those from a sample of non-experts ([Bhattacharjee, 2012](#)). Therefore, the initial framework proposed via the desk-based study was reviewed by interviewing experts developing university websites in Saudi Arabia, Saudi university researchers working in this area or experts working with people with special needs.

The following sections describe the expert review process in detail.

#### 6.1.1 Potential Experts and the Sample Size

Different recommendations for the number of content experts have been made; for example, [Lynn \(1986\)](#) suggests a minimum of three content experts. Other researchers such

as Gable and Wolf (2012) recommend a panel of five content experts, whereas Grant and Davis (1997) suggested that the number of content experts can be predicated on the desired expertise and range of representation of the experts. Bhattacharjee (2012) suggests that qualitative studies usually depend on non-probability sampling, where participants are chosen according to non-random criteria. When recruiting experts, the choice is based on their knowledge and experience in the area being studied.

Marshall et al. (2013), in their review on sample size in qualitative research, suggest citing recommendations by qualitative methodologists as a method to justify sample size. For example, Kuzel (1992) suggested a sample size between six to eight, and Morse (2000) suggested between six to ten. Another method suggested by Marshall et al. (2013) is to use internal justification to explain data saturation within a dataset. Data saturation in qualitative research is a concept that implies gathering data until the point at which redundancy is reached when no new knowledge information is being added (Bowen, 2008; Guest et al., 2006). Therefore, sample size is directly related to the concept of saturation.

Based on the above recommendations, in this expert review, a panel of 18 content experts were interviewed. A person was considered an expert if they had at least one year's experience of university website development in Saudi Arabia, were researchers with at least one published paper in this area of research, or had at least one year's experience of work with people with special needs.

A mixture of purposeful and snowball sampling techniques was used to recruit the content experts. The purposeful sampling technique is the most common sampling technique (Marshall, 1996). In this technique, the researcher actively selects the most suitable sample to answer the research question. In this research, the web developers/designers were sought in the IT centres or through deanships' web pages in every Saudi government university website. Their contact information was used to invite them to participate.

In the snowball sampling technique, the current participants were used to recruit further participants (Marshall, 1996). This technique was useful in this research in identifying the experts who are researchers in the field and who work with people with special needs.

### 6.1.2 Interview Question Design

The expert review was based on conducting semi-structured interviews with experts, which included both closed and open questions. Thus, the analysis of both quantitative and qualitative was required. The following subsections describe both.

### 6.1.2.1 The Closed-Ended Questions

The closed questions were concerned with obtaining experts' opinions on the components and elements of the proposed framework. They were presented in the form of a questionnaire to assist in the review process. This can be justified by the following considerations: first, it was a useful tool to establish common measurable opinions from the experts; second, it was easier and faster to cover all the parts of the framework with questionnaire statements compared to open questions and discussion, which can be very difficult and time-consuming. The Likert scale is a commonly used approach to measure participants' opinions and attitudes regarding a certain statement. Therefore, the closed questions were constructed using a Likert-type scale (Likert, 1932) with the following ratings: strongly disagree = 1; disagree = 2; neutral = 3; agree = 4; and strongly agree = 5. These different ratings are known as Likert items. Table 6.1 shows the adopted Likert items, their weight and their meaning in the expert review.

Table 6.1: Likert Items with their Weight and Meaning

| Likert Item       | Weight | Meaning   |
|-------------------|--------|---|
| Strongly Disagree | 1      | This item needs to be excluded from the framework.                        |
| Disagree          | 2      | This item should be considered for possible exclusion from the framework. |
| Neutral           | 3      | Exclusion of this item does not affect the framework                      |
| Agree             | 4      | This item may need revision to be included in the framework.              |
| Strongly Agree    | 5      | This item needs to be included in the framework.                          |

### 6.1.2.2 The Open-Ended Questions

The open questions were provided to allow the proposed framework to be discussed in more depth, and to gain greater insight into the suitability of its components. There were questions about specific components, subcomponents and elements and general questions about the framework and the problem. Moreover, the open questions aimed to find further components or elements that experts recognised but were not identified by the desk-based study.

### 6.1.3 Translation of Interview Questions and its Materials

The interview questions and other materials, including the participant information sheet, consent form and proposed framework were designed and created in English. Since the intended interviewees were Arabic native speakers, the questions and the materials presented in the interview were then translated to Arabic. In order to ensure that the materials presented had the same meaning as the English version, it was important to follow robust translation methods. According to [Brislin \(1970, 1980\)](#); [Harkness and Schoua-Glusberg \(1998\)](#), there are different translation methods, including bilingual committee translation, back-translation and pre-tests. In addition, [Forsyth et al. \(2007\)](#) suggested a five-step process for translating English questionnaires into different Asian languages. The process starts with translation by a professional translator. Next, the translation is reviewed. After that, the revision is adjudicated by a bilingual adjudicator. Then a cognitive review pre-test is conducted. The last step involves the final review and adjudication.

The questions and other materials were translated into Arabic by a professional bilingual native Arabic translator who had background knowledge in Computing. This step involved consultation of number of dictionaries, Cambridge<sup>1</sup>, Almaany<sup>2</sup> and ArabDict<sup>3</sup>. The Arabic version was then reviewed by three bilingual PhD students in ECS and Linguistics at the University of Southampton and minor modifications were made. The main issue raised was the translation of some technical terms, as it was found that there was no complete agreement on their Arabic translation. To make them unambiguous, those terms were accompanied by their original English terms. Upon satisfactory review, the Arabic version of the questions and other materials were back-translated into English by another translator. The final English version was compared to the original one to check the validity of the translation. Minor variations were detected, but these did not alter the meanings. After translation was completed, a pilot study was carried out to ensure accurate understanding of the questions and the materials.

The Arabic version of the interview questions and proposed framework are available in Appendix C.2 and C.3. Appendix D.2 and F.2 show Arabic versions of the participant information sheet and consent form.

### 6.1.4 Piloting Expert Reviews

Three Saudi web science researchers were selected to pilot the interview questions and the materials presented in the interviews. This was to gather comments and recommendations regarding the questions and other material. Each was met with individually,

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<sup>1</sup><https://dictionary.cambridge.org/dictionary/english-arabic/>

<sup>2</sup><http://www.almaany.com/en/dict/ar-en/>

<sup>3</sup><http://www.arabdict.com/en/english-arabic>

and comments were made. Some questions were recommended to be deleted, and the phrasing of some questions was found to be unclear. After recording their feedback and making the necessary changes, a set of interview questions was created. By the end of the pilot study, the interview questions and other materials were ready to be presented to the experts. The final version of the interview questions, is given in Appendix C.

### 6.1.5 Ethics Approval

Since the selected research methods required people as participants, ethical approval to conduct this research was obtained from the University of Southampton (Research Ethics Number 17056). No personal data was collected at this stage; the information collected was anonymised and any identifying information removed.

### 6.1.6 Interview Procedure

After conducting the pilot study, an invitation was sent by email that requested the experts' participation. The invitation was in Arabic and included: the participant information sheet (in Appendix D), the approximate duration of the interview and a summary description of the framework. An example of the invitation is given in Appendix E.

After sending the invitation emails to the experts, 18 of them responded by agreeing to participate and informed me of their preferred form of communication. Appointments with the experts were made for the four-month period of September 2015 to December 2015. The time allocated per expert was between 45 and 60 minutes. As Table 6.2 shows, the interviews were conducted face-to-face, over the phone and online, according to the availability and location of each expert.

Table 6.2: Experts, Area of Expertise and Methods of Interviews

| No | Expert ID | Area of Expertise         | Method of Interview |
|----|-----------|---------------------------|---------------------|
| 1  | Expert A  | Senior Web developer      | Online (Tango)      |
| 2  | Expert B  | Researcher in the area    | Face to face        |
| 3  | Expert C  | Senior Web Developer      | Online (SKYPE)      |
| 4  | Expert D  | Web and Graphics Designer | Face to face        |
| 5  | Expert E  | Web Developer             | Telephone Call      |
| 6  | Expert F  | Web Developer             | Online (Tango)      |
| 7  | Expert G  | Web Designer              | Telephone Call      |
| 8  | Expert H  | Web Developer             | Online (Tango)      |
| 9  | Expert I  | Web Application Developer | Online (SKYPE)      |
| 10 | Expert J  | Web Developer             | Online (SKYPE)      |
| 11 | Expert K  | Web Designer              | Telephone Call      |
| 12 | Expert L  | Senior Web Developer      | Telephone Call      |
| 13 | Expert M  | Senior Web Developer      | Telephone Call      |

| No | Expert ID | Area of Expertise      | Method of Interview |
|----|-----------|------------------------|---------------------|
| 14 | Expert N  | Researcher in the area | Telephone Call      |
| 15 | Expert O  | Researcher in the area | Telephone Call      |
| 16 | Expert P  | Working with blind     | Face to face        |
| 17 | Expert Q  | Working with blind     | Face to face        |
| 18 | Expert R  | Working with deaf      | Face to face        |

Most of the experts (12) were web developers or designers: three of them were researchers in the area of web accessibility and the remaining three experts were working with people with special needs (two with blind people and one with deaf people). Table 6.3 shows the developers by the type of university at which they work. As can be seen, seven of them were from long-established universities and the remaining five developers were from newly emerging universities.

Table 6.3: Web Developers and Universities at which they were Working

| Expert ID | University   | Type of University          |
|-----------|--------------|-----------------------------|
| Expert A  | University A | Long-established university |
| Expert C  | University B | Long-established university |
| Expert D  | University C | Long-established university |
| Expert E  | University D | Newly emerging university   |
| Expert F  | University C | Long-established university |
| Expert G  | University E | Newly emerging university   |
| Expert H  | University B | Long-established university |
| Expert I  | University C | Long-established university |
| Expert J  | University C | Long-established university |
| Expert K  | University F | Newly emerging university   |
| Expert L  | University F | Newly emerging university   |
| Expert M  | University G | Newly emerging university   |

In each interview, the expert was presented with a consent form to sign (see Appendix F) and then given a brief explanation of the framework and how to respond to the closed questions. After that, the questions were asked and the responses audio recorded by the researcher, after obtaining permission.

## 6.2 Data Collection and Analysis

The data collected from the interviews contained both qualitative and quantitative data.

### 6.2.1 Quantitative Analysis

To analyse quantitative data statistically, the experts' responses to closed-ended questions were collected and entered into SPSS software. The one sample t-test was used to analyse the results. This helps by comparing the mean of a sample ( $\mu$ ) with a hypothesised value ( $\mu_0$ ). The hypothesised mean here, ( $\mu_0$ ) = 3, which indicates Neutral on the five point Likert-type scale. In other words, the one sample t-test involves testing the null hypothesis ( $H_0 : \mu = \mu_0$ ) against the alternative hypothesis ( $H_1 : \mu \neq \mu_0$ ). The following hypotheses were used to test each item in the framework:

- **The null hypothesis (H0):** There is no significant difference between the sample mean and the population mean; thus, the level of agreement relating to each item is equal to 3.
- **The alternative hypothesis (H1):** There is a significant difference between the sample mean and the population mean; thus, the level of agreement relating to each item is not equal to 3.

During this test, the confidence interval was set -by convention- to 95% (alpha ( $\alpha = 0.05$ )), and the level of significance was adjusted using the Bonferroni correction (Simes, 1986; Toothaker, 1993), which is highly conservative, thus making adjustments for any issues that might arise from skewed data. The new corrected significance level was calculated based on the number of significance tests (the total number of items in the questionnaire  $n = 27$ ), i.e.  $New\alpha = \frac{\alpha}{n} = \frac{0.05}{27} \approx 0.0019 \approx 0.002$ . Thus:

- If the p-value for each item is less than or equal to the  $New\alpha$  (0.002), the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted.
- If the p-value for each item is greater than the  $New\alpha$  (0.002), the alternative hypothesis (H1) is rejected and the null hypothesis is accepted.

Therefore, a result is described as statistically significant if the null hypothesis is rejected and, consequently, the alternative hypothesis is accepted. Conversely, a result is described as not statistically significant if the alternative hypothesis is rejected and, consequently, the null hypothesis is accepted.

The results of the quantitative analysis are discussed in Section 6.3.1

### 6.2.2 Qualitative Analysis

The qualitative data comprised the experts answers to the open questions and their comments on the framework components. All the interviews were conducted in Arabic and

audio recorded. The data needed to be transcribed into written format in order to conduct the analysis (Braun and Clarke, 2006). Although the transcription process seems to be time-consuming and frustrating, it is recommended that researchers transcribe the interviews themselves in order to familiarise themselves with the data (Riessman, 1993). Moreover, it has been suggested that this is a key step prior to any qualitative analysis as it is considered an interpretative act where meanings are drawn out, not simply a mechanical act of transforming spoken words into a written format (Bird, 2005). Afterwards, the transcripts were translated from Arabic to English. Arabic native-speaking researchers at the University of Southampton were able to confirm the accuracy of the translated transcripts. After the transcription phase had been completed, all transcripts were saved into NVivo<sup>4</sup>. NVivo is a software tool used to manage and understand textual data, and allow for in-depth analysis. The results of the qualitative analysis are discussed in Section 6.3.2.

## 6.3 Expert Review Results and Findings

This section discusses the results of expert review of the proposed framework. The results of the quantitative analysis of responses to the closed questions are discussed first, followed by those of the qualitative analysis of the open questions.

### 6.3.1 Results from Quantitative Analysis

In addition to the open questions and discussion, the experts were given a questionnaire to ensure full coverage of all components in the framework. The questionnaire contained 27 questions about each component, subcomponent and element in the framework. All questions were measured using a five-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) (Likert, 1932) (see Appendix C).

The results of the quantitative analysis of the experts' responses are summarised in Table 6.4. They show that the p-value for all items -except Items 2 and 14- is less than  $New\alpha$  (0.002). Consequently, the null hypothesis is rejected and the alternative hypothesis is accepted for all items with exception of 2 and 14. The mean for all items except one is more than 3. This indicates that the experts had positive attitudes toward inclusion of almost all the components in the framework, with the exception of *Costs* which falls in the disagreement side of the scale ( $\mu = 1.83$ ). This means that this component does not affect localised web content accessibility guidelines for Saudi university websites and therefore it was removed from the framework.

Although the p-value for Items 2 and 14 is greater than 0.002, the experts' attitude toward inclusion of these items in the framework was positive. Item 2 'Direction of

<sup>4</sup><http://www.qsrinternational.com/what-is-nvivo>



reading and writing’ was found in previous studies (AlGhanem and Kearns, 2015; Elkabani et al., 2015, 2016) to have an impact on readability of Arabic script. Item 14 ‘Diglossic language’ was also found to contribute to the difficulty of understanding a language (AlGhanem and Kearns, 2015; Ferguson, 1959) and this particularly applies in Arabic, since it is a highly diglossic language. Thus, these items were kept in the framework.

Table 6.4: Statistical Results for Closed-Ended Interview Questions

| No | Component                 | SubComponent      | Element  | Mean | P-Value | Statistically Significant? |
|----|---------------------------|-------------------|--|------|---------|----------------------------|
| 1  | Web Content Accessibility | -                 | -  | 4.89 | < 0.001 | Yes                        |
| 2  | Cultural Markers          | Language          | Direction of reading and writing   | 3.94 | 0.004   | No                         |
| 3  |                           |                   | Uni-case language  | 3.72 | < 0.001 | Yes                        |
| 4  |                           |                   | Formation of the letters   | 3.89 | 0.002   | Yes                        |
| 5  |                           |                   | Cursive form and spaces within and between words                                 | 4.39 | < 0.001 | Yes                        |
| 6  |                           |                   | Diacritical Marks  | 5.00 | < 0.001 | Yes                        |
| 7  |                           |                   | Homographic language   | 4.44 | < 0.001 | Yes                        |
| 8  |                           |                   | Gender-specific language   | 3.83 | < 0.001 | Yes                        |
| 9  |                           |                   | Text size  | 5.00 | < 0.001 | Yes                        |
| 10 |                           |                   | Font type  | 5.00 | < 0.001 | Yes                        |
| 11 |                           |                   | Type of text emphasis  | 5.00 | < 0.001 | Yes                        |
| 12 |                           |                   | Alignment of text  | 4.67 | < 0.001 | Yes                        |
| 13 |                           |                   | Length of sentences  | 4.39 | < 0.001 | Yes                        |
| 14 |                           |                   | Diglossic language   | 3.89 | 0.005   | No                         |
| 15 |                           | Data Format       | Understood and acceptable date format within the culture for university websites | 4.72 | < 0.001 | Yes                        |
| 16 |                           | Symbols and Icons | Understood and acceptable symbols within the culture for university websites     | 4.94 | < 0.001 | Yes                        |
| 17 |                           | Multimedia        | Multimedia appropriateness to the culture in university websites                 | 4.89 | < 0.001 | Yes                        |
| 18 |                           |                   | Incorporating music with multimedia provided on university websites              | 4.72 | < 0.001 | Yes                        |
| 19 |                           |                   | Amount of multimedia preferred in the culture for university websites            | 4.22 | < 0.001 | Yes                        |
| 20 |                           | Colours           | Acceptable and preferred colours in the culture for university websites          | 4.44 | < 0.001 | Yes                        |
| 21 |                           | Layout            | Acceptable and preferred layout in the culture for university websites           | 4.56 | < 0.001 | Yes                        |
| 22 | Cultural Markers          | Navigation        | Acceptable and preferred colours in the culture for university websites          | 4.72 | < 0.001 | Yes                        |
| 23 | Costs                     | -                 | -  | 1.83 | < 0.001 | Yes                        |
| 24 | User diversity            | -                 | -  | 4.83 | < 0.001 | Yes                        |

| No | Component               | SubComponent                  | Element | Mean | P-Value | Statistically Significant? |
|----|-------------------------|-------------------------------|---------|------|---------|----------------------------|
| 25 | Internet infrastructure | Internet speed in the country | -       | 4.94 | < 0.001 | Yes                        |
| 26 |                         | Broadband availability        | -       | 4.83 | < 0.001 | Yes                        |
| 27 | Technology variety      | -                             | -       | 4.78 | < 0.001 | Yes                        |

### 6.3.2 Results from Qualitative Analysis

This section discusses the qualitative analysis of experts' responses to the open-ended questions. Each subsection represents the results for one component of the framework. The last three subsections discuss the challenges to enhancing the accessibility of university websites, the guidelines on web content accessibility in Saudi universities, and issues emerging from the interviews with the experts.

#### 6.3.2.1 Web Content Accessibility

Question 1 asked about the WCAG components of accessibility, and the experts strongly agreed that the contents of websites must be: perceivable, operable, understandable and robust. **Expert Q** commented:

*“From my experience, I can confirm that blind people really struggle when they browse the web. I think no-one think about them when they design websites.”*

#### 6.3.2.2 Genre-Specific Cultural Markers

##### Language

To confirm the elements of Arabic language to be incorporated into the framework, 13 questions (Questions 2 to 14) were discussed with the experts. The responses confirm their inclusion. The importance of four of the elements received strong agreement from all the experts: diacritical marks; text size; font type and type of text emphasis.

As a response to Question 2, which asked about the direction of reading and writing, **Expert B** mentioned that the navigation, also, must be in the same direction. **Experts E, K** and **O** said it is important to have the direction specified clearly in the web page code. **Experts J, L** and **P** commented that the direction of a language is important if screen readers are to work effectively.

Arabic being a uni-case language was the topic of Question 3. Responses were a mixture of neutral and positive regarding this matter. **Experts A and B** commented that the effect of the text on users might depend on the text size and typeface. Due to the fact that Arabic is a uni-case language, **Expert F** pointed out that English is easier to read than Arabic.

Regarding the formation of letters, the topic of Question 4, **Experts B, C, I and O** commented that the effect depends on the size and style of the typeface. **Expert C** was specific and recommended Arial, Tahoma and Times New Roman. He pointed out the effect of the line spacing, as more space between the lines makes for easier reading and recognition of letters.

The cursive form and the spacing within and between words were the topic of Question 5. **Experts I, K, N, O, P and Q** commented that, in Arabic, this feature would affect users who have reading difficulties or are visually impaired. **Expert D** added that it would also affect everyone. **Expert B** said that the reason for there being spaces within words is the presence of disconnected letters. Small text sizes and unreadable typefaces would make the situation worse for users, as explained by **Experts C and E**. **Expert G** confirmed that Arabic is full of such words with spaces but, in time, one can become familiar with them.

Regarding the topic of diacritical marks in Question 6, all the experts recommended adopting partial diacritics in some situations to clarify the meaning or position of a word in a sentence, whether it is the subject or object, for instance. **Experts F, M and O** suggested that diacritics could be neglected in commonly-used words. **Experts C, D and N** believed that full diacritics could add more complexity to the text, making it hard to read. **Experts E, P and Q** pointed to the great reading accuracy that can be achieved by screen readers when full diacritical marks are applied.

Question 7 asked about homographic language. **Experts B, C, E, J, K and M** suggested applying diacritics on the words that had more than one meaning. **Experts D, I and R** also recommended the avoidance of these type of words, as far as possible. **Expert F** suggested:

*“A homographic word can be explained using a footnote in a web page, or pronounced when the user hovers the mouse over the word.”*

**Expert H** disagreed with inclusion of this element, arguing that the meaning of a word can be deduced from the context.

In response to Question 8, **Experts C, D, F, J and N** recommended using general language and avoiding gender-specific words, unless for females only, and this is what they do on their websites. **Experts B and E** suggested using diacritics to differentiate between the genders.

Question 9 asked about preferable text sizes in Arabic. **Experts C, D, I, M, O, P and Q** suggested that the text size should be at least 16 point for the text and 20 point for headings. **Expert C** commented that the size depends on the typeface. For example, 14 point would be acceptable in Tahoma, but not other fonts. Another font-related element, typeface, was the topic of question 10. Experts recommended the use of clear typefaces such as: Medan, Nasakh and Tahoma (**Expert C**), Arial (**Experts E, F and M**) and Times New Roman (**Experts J, K and N**).

Question 11 was concerned with the method of text emphasis. **Experts A, C, E, F, J, K, N and P** strongly recommended using emboldening to emphasise the text. Underlined text was not favoured by **Experts C, H, J and Q**, due to the fact that lines under the words would strike out diacritical marks, adding further difficulty to the reading. A combination of bold and colours to emphasise words in text was preferred by **Experts C, D, H, I and L**. Italics were not favoured by **Experts A, C, E, and J**.

Alignment of text was discussed in Question 12. Full justification was preferred by **Experts C, D, K and L**, as the text is presented in a more organised fashion, without an uneven margin on the left. Right alignment was preferred by **Experts F, O and L**. **Experts B, H and I** raised the issue of excessive stretching of words when full justification is applied, especially if there are few words on the line, making the text harder to read. **Expert B** added:

*“Full justification is not suitable for some font types such as Fixed Arabic Transparent, but it works well with some other fonts and makes text much clearer. Therefore, font type is important when deciding on alignment of text.”*

The nature of Arabic’s long sentences was addressed by Question 13. **Expert C** suggested presenting information in parts and using short sentences. **Experts D and H** believed that long sentences affected the understanding of text, especially if there were no commas or punctuation. However, **Expert D** thought that people are unfamiliar with very short sentences in Arabic. **Experts E and R** commented that long sentences would have a negative impact on people who have reading difficulties or short-term memory problems. **Expert J** recommended:

*“According to Writing for Web Guidelines, no sentence should exceed 20 words and no paragraph should exceed 5 sentences.”*

The last element in Language was about Arabic as a diglossic language. All experts mentioned that Modern Standard Arabic (MSA) is used on Saudi university websites. **Experts B, D, E, O and R** recommended the use of common, simple words that are readable and in daily use. **Expert C** commented on the importance of checking and editing text before it is published.

## Data Format

Data format was the concern of Question 15. The responses to this question show that 13 of the 18 experts strongly agreed on the inclusion of data format. The experts commented on the importance of data formats, such as date, time and currency to be suitable to the Saudi culture so the target users can easily understand it.

## Symbols and Icons

Question 16 asked about symbols. All experts agreed that symbols must be understood by and acceptable to target users. In addition, they need to be inoffensive (**Experts A, B, C, O and R**) and appropriate to the content (**Experts B, K and M**). **Expert E** reported on her experience with symbols and icons:

*“We usually search for symbols and icons in the Internet. In case we do not find something suitable for what we need, we have to design them ourselves or look at other websites for international or local universities and copy them.”*

**Expert E** added that integrating software into university websites, for example, Black-Board, would exacerbate this issue since some of its symbols would not be understood. **Experts L and P** believed that symbols would present a barrier, especially to inexperienced users. **Expert J** suggested:

*“The number of symbols in a web page should be decreased. Also, their attributes should be used by developers to support assistive technology.”*

**Experts P and Q** commented that it is frustrating for blind users when they come across symbols or icons but they cannot know what they are. This is typical situation occurring when there is no text alternative associated with particular symbols or icons.

## Multimedia

Questions 17 to 19 were concerned with multimedia in Saudi university websites. The responses to Question 17 show that 16 of the 18 experts strongly agreed on the need to consider the appropriateness of multimedia in university websites for the culture of the target audience. **Expert E** commented that multimedia should be from our community and represent our people, environment, lifestyle and habits. **Experts A, B, C, M and R** said multimedia should be inoffensive. **Expert C** added:

*“Multimedia should be appropriate and suitable for the content. For example, we do not add a photo for a lecture with one of the attendees yawning.”*

**Expert D** gave an example of the acceptability of photos in university websites to the community:

*“Most female faculty members prefer not to put their photos on a university website, as this another issue regarding females in Saudi Arabia. I think personal photos can give impression about the person, but unfortunately this does not happen in our websites. Instead, a picture of a woman with veil is displayed.”*

Question 18 was concerned with the issue of incorporating music into Saudi university websites. There was a strong agreement from 13 experts on including this element in the framework. The experts pointed to the sensitivity of this issue among some people in Saudi Arabia from a religious point of view, as they see music as being forbidden in Islam. The following examples highlight this point. **Expert B:**

*“Music is a sensitive issue for some groups in our community, it would be great if we provide users with options (music or no music).”*

**Expert F** added:

*“Besides options, users would be warned if there is music.”*

**Expert D:**

*“Incorporating any type of music in the website would make some users in our society hate the website and refuse to visit it again.”*

**Expert I** reported her experience with this issue:

*“We illustrated the electronic services of our website in a form of video with a touch of music. After a while, we received complaints regarding the music and as a result we removed it.”*

A number of experts (**Experts E, G, J, K and L**) raised the issue of the distraction caused by music. **Expert E** said that this would influence users with ADHD (Attention Deficit Hyperactivity Disorder) more than others. Moreover, **Experts O** and **P** mentioned that if music does not support the content, there is no need for it. **Expert G**

pointed to the issue of changing the user's mood by the type of music. For example, sad music would make users sad and upset, even if it supported the content.

The use of multimedia was the topic of Question 19. Of the 18 experts, 15 responded positively regarding the inclusion of this element in the framework, and the remaining three were neutral. **Expert Q** commented:

*“Despite the low Internet speed in Saudi Arabia, multimedia are usually used heavily in Saudi university websites as the users prefer them. Unfortunately, no attributes are used with the multimedia elements which means no support for assistive technology.”*

**Expert I** added:

*“To present information to the users, we use infographics, animations and videos, as we know the users prefer them to the text.”*

## Colours

**Experts D, G, N, O** and **R** agreed that colours should be used wisely in a website, avoiding too many shades, so as not to distract the users. Others (**Experts A, B, I, K** and **M**) pointed out that the colours used in university websites in Saudi Arabia are the colours of the university's logo. Most of these are cold colours, such as blue and green, with a touch of grey. **Expert L** commented that the colours of the website stem from the surrounding environment, which is - in his case - the colours of the desert. **Expert F** believes that feminine colours such as pink and purple would not be acceptable to the audience of university websites in Saudi Arabia, as they tend to prefer masculine colours such as blue and green.

## Layout

Question 21 was concerned with the layout. The experts responded positively to the importance of this issue. For example, **Expert K** stated:

*“Placement of menus, banners and university logo is important and needs to be appropriate to the user, we usually place the banners and menus on top or sometimes to the right of the page and the logo to the top right corner of the page and this is where the user looks first when surfing Arabic websites.”*

Other **Experts H, J** and **O** commented on other web page's elements and their placements, for example:

- The Hijri and Gregorian date are available at the top left of the web page.
- Search box is available at the top left of the web page.
- A link to the English version is at the top left of the web page.
- Contact information, social media links and copyrights are at the bottom of the web page.

**Experts A, D and L** suggested a unified logical and structured layout for all Saudi university websites, in order to facilitate their users in locating information.

### Navigation

Question 22 asked about the inclusion of this component in the framework. All the responses were positive. **Expert A** commented that in order for the navigation to be accepted for the target users, the Arabic language has to be used in all website elements including log-in pages, error messages or CAPTCHA. Other experts, **B, C** and **L**, suggested that the navigation elements are displayed consistently through the website.

**Experts P and Q** pointed out to the importance of providing links to skip any unwanted information, especially in long web pages. **Experts H, K, P and R** emphasised that users should not be lost when they navigate and information about their location has to be provided to them. Providing help for users when they need it was an issue raised by **Experts F, G, Q and R**

#### 6.3.2.3 Costs

Costs were not considered as an important component in the framework by 15 out of the 18 experts. **Experts E and F** pointed to the support offered by Saudi universities to people with special needs. **Expert E** said:

*“I do not think the costs would have an effect, since universities support their members who have special needs and provide them with all devices and software they need.”*

Other experts believed that devices and software are affordable for most people in the country. **Expert G** commented:

*“Currently, the prices for technology have dropped, I do not think they are expensive for most people.”*



**Experts A, H, L, M, P, Q and R** suggested removing this component from the framework, since all people with special needs in Saudi Arabia receive a monthly allowance that would cover their expenses, so they do not face financial problems.

Based on the experts' opinions and their comments, it was decided to remove this component from the framework.

#### 6.3.2.4 User Diversity

Question 24 asked about the inclusion of this component in the framework. Most of the responses were positive. Regarding users with disability or special needs, **Expert O** commented:

*"They are part of our society and considering their needs when designing websites represents our respect for their rights."*

**Expert F** added:

*"Usually when we think of designing websites for people with disabilities, we consider one group of them which are blind visually impaired people. In fact, there are other disabilities that need to be addressed as well".*

**Expert M** agreed with **Expert F** in this matter.

There was agreement on the need to also consider the older users and new and infrequent users. **Expert D** mentioned:

*"Of course experienced users are different from others who are inexperienced when it comes to surfing the web."*

**Expert C** explained:

*"Generally, Arab users do not read instructions on how to browse a web site or how to fill out a form, for example, even if they are highly and well educated, for instance academic staff at university. So, if there is a form to fill out by users who do not have experience, there must be assistance by emphasising the instruction text, displaying icons or warning messages. Also, we send notifications as emails or messages to mobile phones."*

People who are not fluent in Arabic form a part of Saudi university communities. The experts agreed on the need to consider non-Arabic speaking faculty members and international students, who mostly come to Saudi universities to pursue Arabic and Islamic studies. For instance, **Expert I** stated that Arabic text on university websites has to be simple, using common words, and in Modern Standard Arabic (MSA).

### 6.3.2.5 Internet Infrastructure

This component comprises two subcomponents: Internet speed and broadband availability. This section discusses the qualitative results for experts' responses regarding these aspects.

There was an agreement among the experts on the impact of Internet speed on website accessibility. **Expert I** commented on this issue:

*"It is very important to have high Internet speed, sometimes users think that the problem is from the website not from the Internet connection which make them refuse to browse the website again."*

**Expert D** added:

*"Inexperienced users may think this happens because of their low experience in using the Internet."*

Another expert (**Expert H**) believed that low Internet speeds may discourage users from browsing the web and using the Internet. **Experts B, G, O, P** and **Q** claimed that this problem would affect users differently, and that people with special needs would suffer more than others. **Expert F** stated:

*"Low Internet speeds make users disappointed and frustrated while surfing the web."*

As pointed out by **Experts A, E, M** and **N**, a waste of users' time has the consequence of discouraging them from using the Internet in general. **Experts D, J** and **K** suggested having images, videos and animations in reasonable sizes, especially on the home page, in order to reduce the download time.

Regarding broadband availability, the experts believed it might affect web content accessibility in Saudi Arabia, owing to the fact that rural areas and villages have limited access. **Expert D** commented:

*"This is a big problem that makes using websites impossible, simply because there is no Internet connection. For example, how can prospective students in these areas apply for universities where it has to be done online through their website?"*

**Expert G** claimed that wherever mobile phones are used, there will be a 3G or 4G connection that allows the user to browse the web through their phone. Regarding this matter, **Experts E** and **O** suggested providing a mobile version of university websites.

### 6.3.2.6 Technology Variety

Question 27 asked the experts their opinion on including the variety of technology in the framework. Most experts strongly agreed on this component. Regarding the use of different devices, **Expert C** said:

*“This is very important issue. Adaptation of Responsive Web Design in university websites allows best viewing for the website across a wide range of devices.”*

**Expert D** reported a lack of Responsive Web Design in Saudi university websites and raised the issue of how users can browse the website from their smart phones, if they do not have a desktop computer or laptop.

Moreover, different web browsers have to be considered. **Expert K** mentioned that it is inappropriate to force users to use a specific web browser to surf a website. Experts reported that their websites ask users to use Internet Explorer (specifying the screen resolution) when viewing their pages, as some scripts do not work with other browsers.

**Experts E, P and Q** mentioned that assistive technologies vary both in performance and their support for Arabic. **Experts J, N, P and Q** added that designing websites with forms and tables would negatively affect the performance of assistive technology.

### 6.3.2.7 Challenges to Enhancing Web Content Accessibility in Saudi University Websites

Experts who were working as web developers were asked to identify the challenges they faced (or may face) in enhancing the accessibility of university websites. After content analysis of the question responses (Bhattacharjee, 2012), Table 6.5 was constructed to show the challenges, the number of developers who pointed out each challenge, and the developers' identities. The challenges identified would give more in-depth understanding of the obstacles that web developers encounter in regard with web content accessibility.

It is clear from Table 6.5 that the main challenge admitted by the developers is the negative attitude towards people with a disability. This attitude is reflected by the university websites and web developers, as they are part of society. Therefore, people with disabilities are usually neglected when designing university websites in Saudi Arabia, as explained by **Expert C**:

*“When we develop the website, we do not think of users with different abilities or special needs at all. I think this needs to be changed not only in terms of developing accessible websites but also in all aspects of our lives.”*

The second challenge is the lack of guidelines for university websites in Saudi Arabia. The developers mentioned the need for guidelines for all aspects of the websites, including the accessibility, usability and organisation of web pages, especially the home page, and consistency in the layout across all Saudi university websites.

The third and fourth challenges are the lack of knowledge and experience regarding web content accessibility and lack of administrative support. Developers face difficulties when looking for resources they need in Arabic. As stated by **Expert L**:

*“Due to difficulties to find technical resources in Arabic, we tend to limit ourselves to what we can find in Arabic.”*

Around 67% of the experts cited the lack of support from their bosses as one of their challenges. For example, **Expert D** stated:

*“My boss does not want me to spend time on producing accessible web elements such as text alternative for images.”*

The fifth challenge is the lack of training for developers. This has an impact on the development of their skills and adaptation to new technologies and techniques.

Lack of plans for improvement of university websites was another challenge. **Expert H** mentioned:

*“It is not easy to introduce web content accessibility in a university website, therefore a clear and realistic improvement plan is needed.”*

Lack of support for the Arabic language in assistive technology was an issue raised by over 30% of the developers. They claimed that Arabic assistive technology does not work as well as in other languages, such as English. Despite the accessibility techniques provided on websites, assistive technology could actually hinder disabled users from accessing the website. An example was given by **Expert E** for the poor performance of Arabic screen readers, which affects the experience of the blind people who use them. **Expert M** agreed on this matter and added:

*“An Arabic screen reader was added in some of the pages of our website, but the quality of reading is much lower than it should be.”*

The last challenge, also identified by a third of the developers, is integrating software systems into a website. The poor level of accessibility of some of these systems would have an influence on the whole website. They mainly pointed to the learning management systems such as Blackboard and Moodle which were used by students frequently in Saudi universities.

Table 6.5: Challenges to Accessibility in Saudi University Websites

| No | Challenge   | Count | Percentage | Developers' IDs                 |
|----|---|-------|------------|---------------------------------|
| 1  | Negative attitude toward disability and disabled people | 10    | 83.33%     | C, D, E, F, G, I, J, K, L and M |
| 2  | Lack of guidelines for university websites              | 9     | 75%        | A, C, D, F, G, H, I, J and L    |
| 3  | Lack of knowledge and experience                        | 8     | 66.67%     | A, C, D, E, I, K, L and M       |
| 4  | Lack of administrative support                          | 8     | 66.67%     | C, D, F, G, I, K, L and M       |
| 5  | Lack of training for developers                         | 7     | 58.33%     | A, C, E, I, K, L and M          |
| 6  | Lack of improvement plans for web content accessibility | 6     | 50%        | H, G, I, J, K and M             |
| 7  | Lack of support for Arabic in assistive technology      | 4     | 33.33%     | A, E, G and M                   |
| 8  | Incorporating applications into website (Integrated SW) | 4     | 33.33%     | A, E, I and L                   |

A number of the challenges identified by the developers of Arabic university websites in Saudi Arabia were also identified in the literature in (Chapter 3, Section 3.3). These challenges can be seen as common issues in developing accessible Arabic websites in Saudi Arabia for all websites genres. The challenge of negative attitudes toward disability and disabled people agreed with what was raised in the literature regarding the lack of awareness among the developers of the importance of web accessibility and equal opportunities for both disabled and non-disabled individuals. Lack of guidelines for Saudi university websites corroborated the issue concerning the lack of suitable accessibility guidelines, laws and policies for all Saudi Arabian websites. Lack of accessibility knowledge and training for developers of Saudi websites was mentioned in the literature and also identified as a challenge by the developers of Saudi university websites.

#### 6.3.2.8 Web Content Accessibility Guidelines Used in Saudi University Websites

Experts who were web developers were asked about the accessibility guidelines used for Saudi university websites. Responses from all developers indicated that no guidelines, either international or local, are used for web content accessibility. **Expert C** stated:

*“The focus is on different issues such as aesthetic and security of the website. No attention has been paid to accessibility issues.”*

**Expert D** added:

*“No accessibility guidelines are followed at all. What our boss asks us to do is copying what other local and international universities do in their websites.”*

**Expert G** explained:

*“No specific accessibility guidelines are used in our website. We are connected to a website for evaluating university websites ([www.webometrics.info](http://www.webometrics.info)). It puts different criteria for the evaluation process and being accessible is not one of these criteria. In addition, our university is an emerging university established five years ago. The population in our region and university students are low compared to other developed universities. Consequently, university members with special needs are extremely low.”*

**Expert H, I and M** mentioned that, although they do not follow any accessibility guidelines, they are at least committed to consistency across their website by applying a single theme to all of its pages.

### 6.3.2.9 Emerging Issues

Experts were asked to identify any other aspects that are not covered by the proposed framework. Their responses were used to enrich the framework.

It was suggested that the following elements should be added to the subcomponent Language:

- Numbers in Arabic websites, as their format needs to be suitable for the Arabic context. This issue was pointed out by **Expert B**. In the Arab world, the originally Arabic numbers are recognised as English numbers, whereas, the numbers that are known as Arabic-Indic, are used with Arabic words ([W3C, 2006](#)). This issue has been recognised in the literature, for example by [Muhanna and Jaser \(2014\)](#); [Zawati and Muhanna \(2014\)](#). Other issues related to numbers were raised by **Experts B, H, K and O** and discussed by [Oracle \(2015\)](#) such as:
  - The placement of positive and negative signs are on the right of the numbers in Arabic context.
  - The placement of the percentage sign is on the left.
  - Decimal separator is (,).
  - Thousand separator is not used in Arabic most of the time.

- Abbreviations and acronyms in Arabic have been raised by **Expert B**. Although they are rare, instances occur in Arabic and texts do not always use a full stop to discriminate between the abbreviated form of the words and the completed form, which confuses users ([Abu Humedi and Altai, 2013](#)). The issue of borrowed acronyms from other languages and how to deal with them has been also discussed.
- The spacing between lines and paragraphs needs to be more than in English. Line spacing is at least 2 spaces within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing. This issue was raised by **Experts C, D and F**. More vertical spacing has been justified by the need to allow more space for diacritical marks and to make the reading process easier, as discussed by [Hssini and Lazrek \(2011\)](#).

**Experts N and O** suggested web usability as a new component in the framework. They justified this by saying that usable accessibility is important, as the users are involved in the evaluation process. While technical accessibility is evaluated by tools, it does not check for usability for target users. This issue has been discussed by [Petrie and Kheir \(2007\)](#). **Experts N and O** suggested that the most important aspects of usability are effectiveness, efficiency and satisfaction. This was confirmed with the widely accepted definition of usability ([Petrie and Kheir, 2007](#)), provided by ISO-9241 ([ISO, 1998](#)):

“The extent of which a product [or website] can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”.

## 6.4 The Framework after Refinement

Based on the experts’ responses discussed above, the framework illustrated in [Figure 5.3](#) has been refined. The component of costs has been removed and web usability has been added to the framework. In addition, the subcomponent ‘Language’ was extended by including the following elements: numbers in Arabic websites, abbreviations and acronyms in Arabic and spacing between lines and paragraphs. This confirmed framework provides the basis for the development of localised guidelines for university websites in Saudi Arabia.

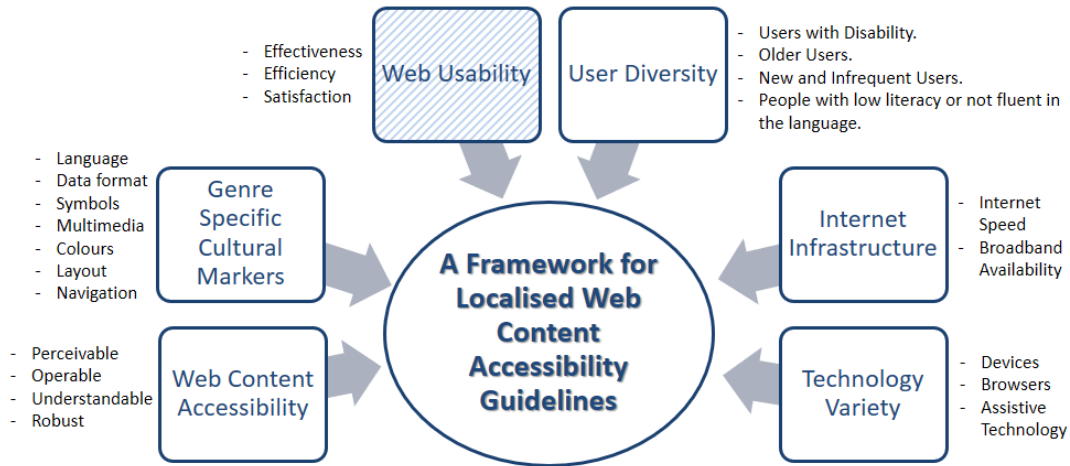


Figure 6.1: A Framework for Localised Web Content Accessibility Guidelines (FLWCAG) for University Websites in Saudi Arabia - After Refinement

## 6.5 Expert Reviews: Benefits and Issues

The responses from experts were useful and helpful in confirming the proposed framework. The interviews with the experts provided an opportunity to discuss the proposed framework and obtain feedback on ways to improve it. In addition, some of the experts were looking forward to the results of the review and requested a copy once the analysis was completed. Some difficulties arose that needed to be overcome:

- The difficulty in finding experts who are willing to take part in an expert review.
- The difficulty in arranging appointments with experts, who are usually busy and challenging to contact. Many of the invited experts asked me instead to send the questions via email in the form of a questionnaire that they would answer.

To overcome these difficulties, several actions were undertaken. First, the interviewed experts were asked to help in finding other experts willing to take part. Secondly, besides invitation emails to experts, their social media accounts and work telephone numbers were used to reach them. Finally, the experts were given the option of telephone, Skype or Tango interviews, at their convenience.

## 6.6 Chapter Summary

This chapter has presented the design and the analysis of the expert review of the components, subcomponents and elements of the proposed framework for localised web content



accessibility guidelines for Saudi university websites (described in Chapter 5). The interview was designed as a semi-structured interview, which included both closed-ended and open-ended questions. A total of 30 open and closed questions were designed to cover all aspects of the framework. This study was carried out with 18 experts, comprising web developers from Saudi universities, Arab researchers in the area of web content accessibility and Arabs who were working with people with special needs. The materials given to the experts were presented, plus the interview questions and the interview procedure. After that, the results were presented, starting with the quantitative analysis, then the qualitative analysis, with a discussion about the experts' answers on each issue. The results obtained from this phase can be summarised in the following points:

- The importance of all the items in the proposed framework, apart from one (costs), was confirmed by the results and findings of the interviews, including their statistically significant results. It is worth mentioning that although the results of two items namely, 'Direction of reading and writing' and 'Diglossic language' were statistically insignificant, they were kept in the framework. The reason behind this was that the interviewed experts had a positive attitude toward the inclusion of the three items and their importance was confirmed from previous studies.
- Triangulating between the literature, the quantitative and qualitative results assured the importance of the chosen components in the proposed framework;
- The initially proposed framework was refined by incorporating a new component (web usability). Three new elements emerged from the findings and were added to the Language subcomponent.
- Discussion with the web developers revealed some challenges they face or may face regarding the introduction of accessibility into their website, and allowed for a deep understanding of the situation.
- Discussion with web developers also revealed that no guidelines, either international or local, are used for web content accessibility.



## Chapter 7

# Localisation Process, Online Questionnaire Design and Results

Following the expert review of the framework components, a localisation process for web content accessibility guidelines for university websites in Saudi Arabia was developed. This chapter includes three main parts: first, a description of the localisation process and the outcome from this process; second, the design of the online questionnaire used to review the outcome from the first part; and finally the results and analysis of the collected data.

### 7.1 Localisation Process

As explained earlier, the main purpose of the proposed framework is to use it as a guide through the localisation process. Figure 7.1 presents an overview of this process with its four stages. Before starting the whole process, the three of the subcomponents of the component of Technology Variety namely, Devices, Browsers and Assistive Technology, were specified as follows:

- **Devices:** the produced localised guidelines are for web content browsed on desktops or laptops and not for smart phones and tablets.
- **Browsers:** the localised guidelines produced are for web content browsed by available and popular web browsers and media players.
- **Assistive Technology (AT):** the produced localised guidelines are for web content browsed with the help of the available and popular ATs that are used by Arab users.

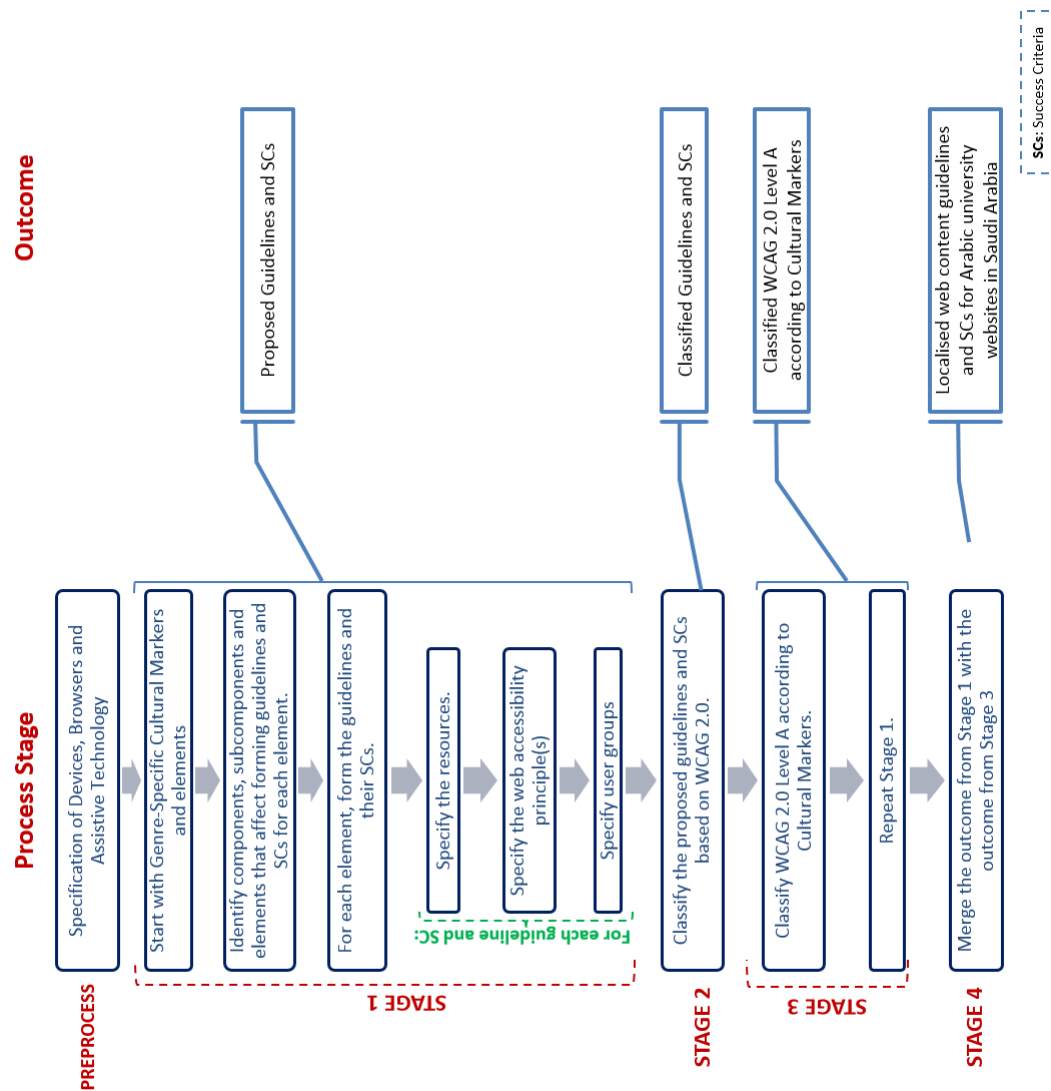


Figure 7.1: Overview of Stages of the Localisation Process and their Outcome

### 7.1.1 Stage One

After this initial specification, Stage One started with **Genre-Specific Cultural Markers**. For each marker:

- Any other framework's components, subcomponents or elements that affect the formation of the guidelines based on this marker were determined.
- For each element, the guidelines and their SCs were specified.
- The resources such as information from the interviewed experts in Phase One of the current study, previous studies or other relevant guidelines and their success criteria (SCs) were referred to and clearly specified.
- Based on the **Web Accessibility** component, the web accessibility principle(s) that are addressed by this guideline or SCs were provided.
- Based on **User Diversity** component, user groups who would benefit from applying each guideline or SCs were specified.

**The output from Stage One** was a set of proposed web content accessibility guidelines and SCs for Saudi university websites, as shown in Table [7.1](#).

Table 7.1: The Resultant Guidelines and Success Criteria from Stage One of the Localisation Process

| Sub Component | Element                             | Affected by | Resultant Guidelines   | Resultant SCs  | Principles     | Target Users  | Resources   |
|---------------|-------------------------------------|-------------|--|--|----------------|---|---|
| Language      | 1. Direction of Reading and Writing | None        | 1.1 Specify the language and its direction as right to left for any Arabic web page.                               | 1.1.1 The language and its direction of any Arabic web page are specified.   | Understandable | People who use screen readers or other technologies that convert text into speech and people who have learning or reading difficulties.   | AlRowais et al. (2013); Elkabani et al. (2015, 2016) and the interviewed experts <sup>1</sup> .   |
|               |                                     |             | 1.2 Specify the language of any non-Arabic text and its direction.   | 1.2.1 The language of any non-Arabic text and its direction are specified.   |                |   |   |
|               |                                     |             | 1.3 Check the consistency in the direction between data entry (writing) and data display (reading).                | 1.3.1 There is a consistency in the direction between data entry (writing) and data display (reading).   |                |   |   |
|               | 2. Diacritical marks                |             | 2.1 Use at least partial diacritics to clarify the pronunciation, meaning and/or position of a word in a sentence. | 2.1.1 Partial diacritics are provided in any web page as a default.<br>2.1.2. There are options for full diacritics and no diacritics in any web page. |                | People with reading disabilities, who have difficulty using context to aid understanding, who use technologies that read the words aloud, or those with low literacy or not fluent in the language. | Abu-Rabia et al. (2012); Al-Wabil et al. (2006); AlRowais et al. (2013); Elbeheri et al. (2006); Mahfoudhi et al. (2011) and the interviewed experts. |
|               |                                     |             | 3.1 Use at least partial diacritics to differentiate between homograph words.                                      | 3.1.1 Partial or full diacritics are provided to differentiate between homograph words.  |                |   |   |
|               | 3. Homographic language             |             |  |  |                |   | Al-Wabil et al. (2006); AlRowais et al. (2013); Elbeheri et al. (2006); Mahfoudhi et al. (2011) and the interviewed experts.                          |
|               | 4. Gender-specific language         |             | 4.1 Use general language and avoid gender-specific words, unless for females only.                                 | 4.1.1 General language is used where possible.   |                |   | AlRowais et al. (2013) and the interviewed experts.   |

<sup>1</sup> The interviewed experts in this table refers to the expert review conducted in Phase One of the current study

| Sub Com-<br>ponent | Element   | Affected<br>by     | Resultant Guidelines  | Resultant SC's   | Principles     | Target Users  | Resources   |
|--------------------|---|--------------------|---|--|----------------|---|---|
| Language           |   | None               | 4.2 When it is applicable, use diacritics to differentiate between the genders.   | 4.2.1 When it is applicable, partial or full diacritics are used to differentiate between genders.   |                |   |   |
|                    | 5. Font size  | Font type          | 5.1 Use readable font size.   | 5.1.1 Font size is at least 16 point for the text and 20 point for the headings.   | Perceivable    | People who have low vision, with reading or learning disabilities, with low literacy or not fluent in the language or older people.       | Abubaker and Lu (2012); Al-Wabil et al. (2006) and the interviewed experts.                 |
|                    | 6. Font type  | None               | 6.1 Use readable font type.   | 6.1.1 Fonts are readable , such as: Nasakh, Tahoma, Arial, Times New Roman, Arabic Transparent, Simplified Arabic Fixed, Simplified Arabic or Arabic Traditional |                |   | Abubaker and Lu (2012); Al-Wabil et al. (2006); Ramadan (2011) and the interviewed experts. |
|                    | 7. Cursive form and spaces within and between words | Font type and size | 7.1 Use the font type and size that make the spaces between words clear.  | 7.1.1 Spaces between words are clear.  |                |   | Al-Wabil et al. (2006); Elbeheri et al. (2006) and the interviewed experts.                 |
|                    | 8. Type of text emphasis                            | None               | 8.1 To emphasise text, use bold or a combination of bold and colour.  | 8.1.1 Bold or a combination of bold and colour is applied to emphasise the text.   |                | Al-Wabil et al. (2006) and the interviewed experts.   |   |
|                    | 9. Alignment of text                                | Font type          | 9.1 Use appropriate alignment for the font type (right justified or fully justified), however, it is preferable to apply right justification. | 9.1.1 Text is either right justified (better) or fully justified.  |                | People who have low vision, with reading or learning disabilities.  | Al-Wabil et al. (2006); Benatia et al. (2006) and the interviewed experts.                  |
|                    | 10. Long sentences                                  | None               | 10.1 Write short sentences and paragraphs.  | 10.1.1 NO sentence exceeds 20 words and NO paragraph exceeds 5 sentences.  | Understandable | People with language, reading or learning difficulties, who have limited memory or with low literacy or those not fluent in the language. | Al-Wabil et al. (2006) and the interviewed experts.   |
|                    | 11. Diglossic language                              |                    | 11.1 Use simple readable Modern Standard Arabic (MSA).  | 11.1.1 Readable MSA with common and simple words is used.  |                |   | AlGhanem and Kearns (2015) and the interviewed experts.                                     |

| Sub Component | Element                                       | Affected by | Resultant Guidelines  | Resultant SCs   | Principles     | Target Users  | Resources  |
|---------------|---|-------------|---|---|----------------|---|--|
| Language      |   | None        | 11.2 Provide other readable and understandable alternatives for advanced or not readable content. | 11.2.1 Other readable and understandable alternatives for advanced or not readable content are provided.                              |                |   |  |
|               | 12. Numbers                                   |             | 12.1 Use Arabic-Indic numbers in Arabic context.  | 12.1.1 Arabic-Indic Numbers are used in Arabic context.   | Perceivable    | ALL   | Muhamma and Jaser (2014); W3C (2006); Zawati and Muhamma (2014) and the interviewed experts. |
|               |   |             | 12.2 Use appropriate Number format for Arabic context.  | 12.2.1 Positive and negative signs are at the right of the number.  |                |   |  |
|               |   |             |   | 12.2.2 Percentage sign is at the left of the number.  |                |   |  |
|               |   |             |   | 12.2.3 Decimal separator is (.)   |                |   |  |
|               |   |             |   | 12.2.4 Thousand separators are not used in Arabic most of the time.   |                |   |  |
|               | 13. The spacing between lines and paragraphs. |             | 13.1 Use more spacing between lines and between paragraphs.                                       | 13.1.1 Line spacing is at least 2 spaces within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing. |                | People with low vision, reading disabilities, with low literacy or those not fluent in the language.  | Hssini and Lazrek (2011) and the interviewed experts.  |
|               | 14. Abbreviations and acronyms in Arabic      |             | 14.1 Avoid abbreviations and acronyms if possible.  | 14.1.1 There is no use of abbreviations or acronyms.  | Understandable | People who have difficulty decoding words, rely on screen magnifiers, have limited memory, or difficulty using context to aid understanding, with low literacy or not fluent in the language. | Abu Humedi and Altai (2013) and the interviewed experts.                                     |



| Sub Component | Element                                     | Affected by | Resultant Guidelines  | Resultant SCs   | Principles     | Target Users   | Resources  |
|---------------|---|-------------|---|---|----------------|--|--|
| Language      | 14.<br>Abbreviations and acronyms in Arabic | None        | 14.2 Clarify the abbreviations and acronyms when they are used. | <p>14.2.1 When abbreviations are used, they could be 1) Arabic abbreviations: 1.a) There are spaces between the letters in initials, and/or there are full stops between the letters in initials. OR 1.b) The expanded form of the abbreviation is available. 2) Borrowed abbreviations from other languages: 2.a) Untranslated: Acronyms are written and pronounced in Arabic as they are in the other languages. Explanations of the untranslated abbreviations may be provided. OR 2.b) Translated: Arabic pronunciation of the abbreviation and/or its expansion are available.</p> <p>14.2.2 When abbreviations are used, expansions or explanations are available: a) at the first occurrence if there is one meaning through the web page, or b) Every time if there is more than one meaning.</p> | Understandable | People who have difficulty decoding words, use screen magnifiers, have limited memory, difficulty using context to aid understanding, with low literacy or those not fluent in the language. | Abu Humedi and Altai (2013) and the interviewed experts. |

| Sub Component | Element   | Affected by | Resultant Guidelines   | Resultant SCs   | Principles                     | Target Users | Resources   |
|---------------|---|-------------|--|---|--------------------------------|--------------|---|
| Data Format   | 15. Understood and acceptable data format within the culture for university websites. | None        | 15.1 Use data format that can be understood and acceptable within the culture for university websites. | <p>15.1.1 Hijri calendar is used but in case that Gregorian is used, Hijri calendar is provided as well.</p> <p>15.1.2 Long date format is used.</p> <p>15.1.3 When short date format is used, the separator is (/).</p> <p>15.1.4 Time is in 12-hour format with AM and PM. 24-hour format is rarely used.</p> <p>15.1.5 Time separator is (:).</p> <p>15.1.6 For currency, Saudi Riyal is used as a long or short format</p> <p>15.1.7 The currency is located at the left of the number.</p> <p>15.1.8 When other currencies are used, the equivalent value in Saudi Riyal is presented.</p> <p>15.1.9 When postal code is used, it is a 5-digit number.</p> <p>15.1.10 When phone numbers are used, the format is +966 2-digit Area Code XXX XXXX for land line and +966 5XXX XXXXX for mobile phone.</p> <p>15.1.11 When names are used, first name, father's, grandfather's and family names are the accepted and understood name format.</p> | Perceivable and Understandable | ALL          | <p>Al-Badi (2005);</p> <p>Al-Sedrani and Al-Khalifa (2012); Microsoft (2011);</p> <p>Notzon and Nesom (2005);</p> <p>Saudi Post (2016) and the interviewed experts.</p> |

| Sub Component     | Element   | Affected by | Resultant Guidelines   | Resultant SCs  | Principles                     | Target Users                               | Resources  |
|-------------------|---|-------------|--|--|--------------------------------|--|--|
| Symbols and Icons | 16. Understood and acceptable symbols and icons within the culture for the university websites.                           | None        | 16.1 Use symbols and icons that can be understood and acceptable within the culture for university websites.   | 15.1.12 Middle initial, middle or maiden names are not used.   | Perceivable and Understandable |  |  |
|                   |   |             |  | 15.1.13 For measurement format, metric system is used.   |                                |  |  |
|                   |   |             |  | 16.1.1 Symbols and icons are understood by target users.   | Perceivable                    | ALL , especially new and infrequent users. | Barber and Badre (1998); Marcus and Gould (2000) and the interviewed experts.                            |
| Multimedia        | 17. Multimedia appropriateness to the culture<br>18. Incorporating music with multimedia provided on university websites. | None        | 17.1 Use multimedia appropriate in the culture for university websites.<br>18.1 Use multimedia appropriate and preferred in the culture for university websites. | 16.1.2 Symbols and icons are inoffensive and acceptable to target users.   |                                | ALL  | Al-Badi (2005); Al-Badi and Mayhew (2010); Al-Sedrani and Al-Khalifa (2012) and the interviewed experts. |
|                   |   |             |  | 16.1.3 Symbols and icons are appropriate to the content.   | Understandable                 |  |  |
|                   |   |             |  | 17.1.1 Multimedia elements are appropriate to the culture and to the university websites.  | Perceivable                    | ALL  | Al-Sedrani and Al-Khalifa (2012); Cyr and Trevor-Smith (2004); Sun (2001) and the interviewed experts.   |
|                   |   |             |  | 18.1.1 All multimedia incorporating music that is presented to the user provides: a hint that there is music in the multimedia and/or another version without music. |                                |  |  |

| Sub Component | Element  | Affected by                            | Resultant Guidelines  | Resultant SCs  | Principles               | Target Users | Resources  |
|---------------|--|--|---|--|--------------------------|--------------|--|
| Multimedia    | 19. Amount of multimedia preferred in the culture for university websites.   | Internet infrastructure in the country | 19.1 Use amount of multimedia appropriate and preferred in the culture for university websites. | 19.1.1 The total size of the web page including its multimedia elements is suitable to the internet speed in the country of its target users.                    | Perceivable and Operable | ALL          | <a href="#">Almakky et al. (2015)</a> ; <a href="#">Mustafa and Al-Zoua'bi (2008)</a> and the interviewed experts.   |
| Colours       | 20. Acceptable and preferred colours in the culture for university websites. | None                                   | 20.1 Use acceptable and preferred colours in the culture for university websites.               | 20.1.1 Masculine colours such as blue, green and grey are used and feminine colours such as pink are avoided.  | Perceivable              | ALL          | <a href="#">Barber and Badre (1998)</a> ; <a href="#">Khanum et al. (2012)</a> ; <a href="#">Marcus and Hamoodi (2009)</a> and the interviewed experts.  |
|               |  |  |   | 20.1.2 The colours of the website stem from the university's logo, or the surrounding environment, for example, the colours of the desert, or the national flag. |                          |              | <a href="#">Al-Sedrani and Al-Khalifa (2012)</a> and the interviewed experts.  |
| Layout        | 21. Acceptable and preferred layout in the culture for university websites   | None                                   | 21.1 Provide acceptable and preferred layout in the culture for university websites.            | 21.1.1 The orientation of any web page is right to left.   | Perceivable              | ALL          | <a href="#">Al-Sedrani and Al-Khalifa (2012)</a> ; <a href="#">Barber and Badre (1998)</a> ; <a href="#">Cyr and Trevor-Smith (2004)</a> ; <a href="#">Mushtaha (2012)</a> ; <a href="#">Sun (2001)</a> and the interviewed experts. |
|               |  |  |   | 21.1.2 University logo is at the top right-hand corner.  |                          |              |  |
|               |  |  |   | 21.1.3 The banner is at the top of the web page.   |                          |              |  |
|               |  |  |   | 21.1.4 The menu is at the top and/or right of the web page.  |                          |              |  |
|               |  |  |   | 21.1.5 The date is available at the top left of the web page.  |                          |              |  |

| Sub Component | Element  | Affected by      | Resultant Guidelines   | Resultant SCs   | Principles     | Target Users  | Resources  |
|---------------|--|------------------|--|---|----------------|---|--|
| Layout        | 21. Acceptable and preferred layout in the culture for university websites     | None             | 21.1 Provide acceptable and preferred layout in the culture for university websites.             | 21.1.6 Search box is available at the top left of the web page.   | Perceivable    | ALL   | Al-Sedrani and Al-Khalifa (2012); Barber and Badre (1998); Cyr and Trevor-Smith (2004); Mushtaha (2012); Sun (2001) and the interviewed experts.   |
|               |  |                  |  | 21.1.7 A link to the English version is at the top left of the web page.  |                |   |  |
| Navigation    | 22. Acceptable and preferred navigation in the culture for university websites | Language, Layout | 22.1 Provide acceptable and preferred website navigation in the culture for university websites. | 21.1.8 Contact information, social media links and copy rights are at the bottom of the web page.               | Understandable | People with cognitive and intellectual disabilities, with low vision and who are blind.                                   | AlRowais et al. (2013); Cardello (2014); Cyr and Trevor-Smith (2004); Kralisch et al. (2005); Marcus and Gould (2000); Mushtaha (2012); Salmerón et al. (2017); Yu and Roh (2002) and the interviewed experts. |
|               |  |                  |  | 22.1.1 Navigation elements are displayed consistently through the website.                                      |                |   |  |
|               |  |                  |  | 22.1.2 Arabic language is used throughout the Arabic website including log in pages, error messages or CAPTCHA. | Operable       | ALL   |  |
|               |  |                  |  | 22.1.3 More than one way to skip unwanted content.  |                | People who are blind or with vision impairment who depend on screen readers, screen magnifiers or keyboard in navigation. |  |
|               |  |                  |  | 22.1.4 Information is provided for users about their location in the website.                                   |                | People with short attention span or new and infrequent users  |  |
| General       | 23. Usability  |                  | 22.1.5 Help is provided for users when they need it.   | 22.1.1 The web content is usable for all users.   | Understandable | Users with writing, reading and intellectual disabilities. Older users, or new and infrequent users.                      | Nielsen and Mack (1994); Petrie and Kheir (2007) and the interviewed experts.  |
|               |  |                  |  |   | ALL            | ALL   |  |

### 7.1.2 Stage Two

In Stage Two, the resultant guidelines and their success criteria from Stage One were matched with WCAG 2.0, as shown in Table 7.2.

Table 7.2: The Resultant Proposed Guidelines and Success Criteria from Stage One of the Localisation Process

| Sub Component     | Element   | Proposed Guidelines | Proposed SCs | Change to WCAG 2.0, New or Already in WCAG 2.0? |
|-------------------|---|---------------------|--------------|---|
| Language          | 1. Direction of reading and writing   | 1.1                 | 1.1.1        | Change to WCAG 3.1.1                            |
|                   |   | 1.2                 | 1.2.1        | Change to WCAG 3.1.2                            |
|                   |   | 1.3                 | 1.3.1        | New   |
|                   | 2. Diacritical marks  | 2.1                 | 2.1.1        | Change to WCAG 3.1.6                            |
|                   |   |                     | 2.1.2        |   |
|                   | 3. Homographic language   | 3.1                 | 3.1.1        | New   |
|                   | 4. Gender-specific language   | 4.1                 | 4.1.1        | New   |
|                   |   | 4.2                 | 4.2.1        | New   |
|                   | 5. Font size  | 5.1                 | 5.1.1        | New   |
|                   | 6. Use readable font type.  | 6.1                 | 6.1.1        | New   |
|                   | 7. Cursive form and spaces within and between words.  | 7.1                 | 7.1.1        | New   |
|                   | 8. Type of text emphasis.   | 8.1                 | 8.1.1        | New   |
|                   | 9. Alignment of text.   | 9.1                 | 9.1.1        | Change to WCAG 1.4.8 (3)                        |
|                   | 10. Long sentences.   | 10.1                | 10.1.1       | New   |
|                   | 11. Diglossic language  | 11.1                | 11.1.1       | Change to WCAG 3.1.3                            |
|                   |   | 11.2                | 11.2.1       | Change to WCAG 3.1.5                            |
|                   | 12. Numbers   | 12.1                | 12.1.1       | New   |
|                   |   | 12.2                | 12.2.1       | New   |
|                   |   |                     | 12.2.2       | New   |
|                   |   |                     | 12.2.3       | New   |
|                   |   |                     | 12.2.4       | New   |
|                   | 13. The spacing between lines and paragraphs.   | 13.1                | 13.1.1       | Change to WCAG 1.4.8 (4)                        |
|                   | 14. Abbreviations and acronyms in Arabic.   | 14.1                | 14.1.1       | Change to WCAG 3.1.4                            |
|                   |   | 14.2                | 14.2.1       | Change to WCAG 3.1.4                            |
|                   |   |                     | 14.2.2       | Change to WCAG 3.1.4                            |
| Data Format       | 15. Understood and acceptable data format within the culture for university websites.       | 15.1                | 15.1.1       | New   |
|                   |   |                     | 15.1.2       | New   |
|                   |   |                     | 15.1.3       | New   |
|                   |   |                     | 15.1.4       | New   |
|                   |   |                     | 15.1.5       | New   |
|                   |   |                     | 15.1.6       | New   |
|                   |   |                     | 15.1.7       | New   |
|                   |   |                     | 15.1.8       | New   |
|                   |   |                     | 15.1.9       | New   |
|                   |   |                     | 15.1.10      | New   |
|                   |   |                     | 15.1.11      | New   |
|                   |   |                     | 15.1.12      | New   |
|                   |   |                     | 15.1.13      | New   |
| Symbols and Icons | 16. Understood and acceptable symbols and icons within the culture for university websites. | 16.1                | 16.1.1       | New   |
|                   |   |                     | 16.1.2       | New   |
|                   |   |                     | 16.1.3       | New   |

| Sub Component | Element  | Proposed Guidelines | Proposed SCs | Change to WCAG 2.0, New or Already in WCAG 2.0? |
|---------------|--|---------------------|--------------|---|
| Multimedia    | 17. Multimedia appropriateness to the culture                                  | 17.1                | 17.1.1       | New   |
|               | 18. Incorporating music with multimedia provided on university websites.       | 18.1                | 18.1.1       | New   |
|               | 19. Amount of multimedia preferred in the culture for university websites.     | 19.1                | 19.1.1       | New   |
| Colours       | 20. Acceptable and preferred colours in the culture for university websites.   | 20.1                | 20.1.1       | New   |
|               |  |                     | 20.1.2       | New   |
| Layout        | 21. Acceptable and preferred layout in the culture for university websites.    | 21.1                | 21.1.1       | New   |
|               |  |                     | 21.1.2       | New   |
|               |  |                     | 21.1.3       | New   |
|               |  |                     | 21.1.4       | New   |
|               |  |                     | 21.1.5       | New   |
|               |  |                     | 21.1.6       | New   |
|               |  |                     | 21.1.7       | New   |
|               |  |                     | 21.1.8       | New   |
| Navigation    | 22. Acceptable and preferred navigation in the culture for university websites | 22.1                | 22.1.1       | Already in WCAG 2.0, Equivalent to WCAG 3.2.3   |
|               |  |                     | 22.1.2       | New   |
|               |  |                     | 22.1.3       | Already in WCAG 2.0, Equivalent to WCAG 2.4.1   |
|               |  |                     | 22.1.4       | Already in WCAG 2.0, Equivalent to WCAG 2.4.8   |
|               |  |                     | 22.1.5       | Already in WCAG 2.0, Equivalent to WCAG 3.3.5   |
| General       | 23. Usability  | 23.1                | 23.1.1       | New   |

The outcome is a list of guidelines and SCs classified into three groups (Figure 7.2), a group involving changes to WCAG 2.0, another group comprising new suggested guidelines and SCs to add to WCAG 2.0 and a third group consisting of guidelines and SCs already in WCAG 2.0.

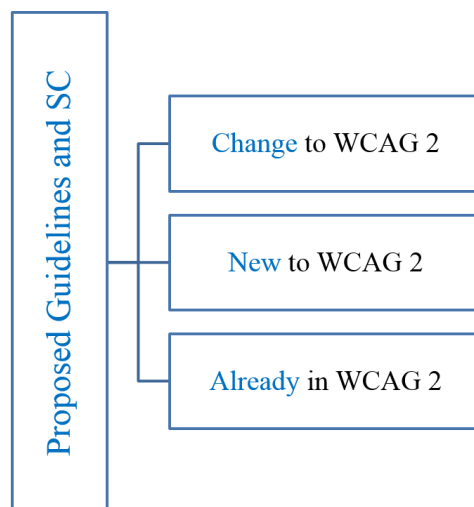


Figure 7.2: Classification of Proposed Guidelines and their Success Criteria

Table 7.3 shows the number of guidelines and success criteria in each group. As can be seen, there are nine guidelines and 11 SCs with suggested changes to WCAG 2.0, 20 guidelines and 45 SCs new to WCAG 2.0 and four SCs which were already in WCAG 2.0.

Table 7.3: Number of Proposed Guidelines and Success Criteria in Each Group

|                              | Change to<br>WCAG 2.0 | New to WCAG<br>2.0 | Already in<br>WCAG 2.0 |
|------------------------------|-----------------------|--------------------|------------------------|
| Proposed<br>Guidelines       | 9                     | 20                 | 0                      |
| Proposed Success<br>Criteria | 11                    | 45                 | 4                      |

### 7.1.3 Stage Three

The basic level of WCAG 2.0 (Level A) was considered in this research. Enhanced level of accessibility would be introduced in future. Therefore, in Stage Three, each WCAG 2.0 Level A was classified according to the cultural markers, for example, WCAG 1.4.1. was classified to be under Colours. Table 7.4 shows WCAG 2.0 guidelines and SCs Level A under the cultural markers they belong to.



Table 7.4: WCAG 2.0 Guidelines and Success Criteria Level A classified according to cultural markers

| Sub Component | Element           | Affected by   | WCAG 2.0 Guidelines  | WCAG 2.0 SCs   | Principles  | Target Users  | Resources  |
|---------------|-------------------|---|--|--|---|---|--|
| Multimedia    | Text alternatives | None  | Provide text alternatives for any non-text content <sup>2</sup> .  | All non-text content that is presented to the user has a descriptive text alternative that serves the equivalent purpose.            | Perceivable   | Users who are blind or with visual impairment, users who are deaf or hard of hearing, users who are deaf-blind, users who have difficulty understanding the non-text content. | WCAG 1.1.1   |
|               | Time-based Media  |   | Provide alternatives for time-based media.   | A descriptive text transcript is provided for recorded web-based audio.  |   |   | WCAG 1.2.1   |
|               |                   |   |  | A text or audio description is provided for recorded web-based video-only.   |   |   | WCAG 1.2.1   |
|               | Audio control     |   |  | Synchronized captions are provided for recorded, web-based video.  |   | Users who are blind or with visual impairment, users who have difficulty perceiving or understanding videos.<br>Users who are deaf or hard of hearing.                        | WCAG 1.2.2   |
|               |                   |   |  | A descriptive text transcript OR audio description is provided for recorded web-based video.   |   |   | WCAG 1.2.3   |
| Colours       | Seizures          |   | Make it easier for users to hear or control audio content.   | A mechanism is provided to stop, pause, mute, or adjust volume for audio that automatically plays on a page for more than 3 seconds. | Operable  | Users who rely on screen readers or users who have difficulty concentrating on content while audio is playing.  | WCAG 1.4.2   |
|               |                   | Do not design content in a way that is known to cause seizures. | No page content flashes more than 3 times per second unless that flashing content is sufficiently small and the flashes are of low contrast and do not contain too much red. | WCAG 2.3.1   |   |   |  |
|               |                   | Use of colour   | None   | Make it easier for users to see the content.   | Colour is not used as the sole method of conveying content or distinguishing visual elements. | Perceivable   | Users with partial sight, users who have colour-blindness, some older users, people using Braille displays or other tactile interfaces that can detect text cues by touch and people using text-only, limited colour, or monochrome displays may be unable to access colour-dependent information. |

<sup>2</sup> Any non-text including Symbols and Icons

| Sub Component | Element             | Affected by | WCAG 2.0 Guidelines   | WCAG 2.0 SCs   | Principles  | Target Users   | Resources  |
|---------------|---------------------|-------------|---|--|-------------|--|------------|
| Layout        | Adaptable layout    | None        | Create content that can be presented in different ways (for example: simpler layout) without losing information or structure. | Content information, structure, and relationships conveyed through the web page can be determined through the web page code or are available in text.  | Perceivable | Users with different disabilities such as users who are blind (using a screen reader) or who are deaf-blind using braille (text).  | WCAG 1.3.1 |
|               |                     |             |   | The reading and navigation order (determined by code order) is presented in logical and meaningful way.  |             | Users who rely on assistive technologies that read content aloud.  | WCAG 1.3.2 |
|               |                     |             |   | Instructions do not only rely upon shape, size, visual location or sound.  |             | Users who are blind or have low vision.  | WCAG 1.3.3 |
| Navigation    | Keyboard accessible | None        | Make all functionality available from the keyboard.   | All page functionality is available using the keyboard, unless the functionality cannot be accomplished in any known way using a keyboard (e.g., free hand drawing).   | Operable    | Users who are blind, with low vision, some users with hand tremors or some older users.  | WCAG 2.1.1 |
|               |                     |             |   | Keyboard focus is never locked or trapped at one particular page element. The user can navigate to and from all navigable page elements using only a keyboard.   |             | Users who depend on a keyboard or keyboard interface to use the web such as blind users and users with physical disabilities.  | WCAG 2.1.2 |
|               |                     |             |   | If a page or application has a time limit, the user is given options to turn off, adjust, or extend that time limit. This is not a requirement for real-time events (e.g., an auction), where the time limit is absolutely required, or if the time limit is longer than 20 hours. |             | Users with physical disabilities, with low vision, who are blind and using screen readers, who are deaf, or users with reading disabilities, cognitive limitations, and learning disabilities. Users with low literacy or not fluent in the language. New and infrequent users. Older users. | WCAG 2.2.1 |
|               | Enough time         |             | Provide users enough time to read and use content.  | Automatically moving, blinking, or scrolling content that lasts longer than 5 seconds can be paused, stopped, or hidden by the user.   |             | Users with low literacy, reading and intellectual disabilities, or users with attention deficit disorders.   | WCAG 2.2.2 |

| Sub Component | Element     | Affected by | WCAG 2.0 Guidelines  | WCAG 2.0 SCs   | Principles     | Target Users  | Resources  |
|---------------|-------------|-------------|--|--|----------------|---|------------|
| Navigation    |             |             |  | Automatically updating content can be paused, stopped, or hidden by the user or the user can manually control the timing of the updates.   |                |   |            |
|               | Navigable   | None        | Provide ways to help users navigate, find content, and determine where they are. | The web page has a descriptive and informative page title.   | Operable       | ALL users and especially users with visual disabilities, with limited short-term memory and reading disabilities, users with severe mobility impairments whose mode of operation relies on audio when navigating between web pages. | WCAG 2.4.2 |
|               |             |             |  | The navigation order of links, form elements, etc. is logical and intuitive.   |                | Users with mobility impairments who rely on keyboard for operating a page, users with visual impairments, or people using a screen magnifier.   | WCAG 2.4.3 |
|               |             |             |  | The purpose of each link can be determined from the link text alone, or from the link text and its context.  |                | Users with visual disabilities, cognitive limitations, or users with motion impairment.   | WCAG 2.4.4 |
|               | Predictable | None        | Make Web Pages appear and operate in predictable ways.                           | When a page element receives focus, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user.   | Understandable | Users with visual disabilities, cognitive limitations, motor impairments or new and infrequent users.   | WCAG 3.2.1 |
|               |             |             |  | When a user inputs information or interacts with a control, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user unless the user is informed of the change ahead of time. |                | Users who are blind, with low vision, with reading and intellectual disabilities, or new and infrequent users.  | WCAG 3.2.2 |

| Sub Component | Element          | Affected by | WCAG 2.0 Guidelines   | WCAG 2.0 SCs  | Principles     | Target Users  | Resources  |
|---------------|------------------|-------------|---|---|----------------|---|------------|
| Navigation    | Input assistance | None        | Help users avoid and correct mistakes.  | The error in user input is clearly identified; user is allowed to easily fix the error and resubmit the form. | Understandable | Users who are blind or colour-blind, users with cognitive, language, and learning disabilities. New and infrequent users.   | WCAG 3.3.1 |
|               |                  |             |   | Labels, cues, and instructions for required user input are provided.  |                | Users with motor, cognitive, language and learning disabilities. Keyboard only users. Users who rely on screen reader or screen magnifiers. New and infrequent users. | WCAG 3.3.2 |
| General       | Compatible       | None        | Maximize compatibility with current and future user agents, including assistive technologies. | Web page code validation and parsing according to specification are implemented with no errors.               | Robust         | People who use assistive technology.  | WCAG 4.1.1 |
|               |                  |             |   | Web page code is created in a way that supports accessibility and assistive technology.                       |                |   | WCAG 4.1.2 |

#### 7.1.4 Stage Four

In this stage, WCAG 2.0 guidelines and SCs (Level A) in Table 7.4 were added to and merged with the proposed guidelines and SCs presented in Table 7.1 above.

The outcome from this stage and from the whole localisation process was a set of localised web content accessibility guidelines and SCs for university websites in Saudi Arabia as shown in Appendix H.

## 7.2 Online Questionnaire Design

The outcome from the localisation process described above was reviewed by experts. An online self-administered questionnaire technique was chosen for this stage of the research, since it is easy to manage and distribute among a large population compared to other data collection techniques. However, the design of a questionnaire needs to be considered very carefully, because the quality and accuracy of the responses are highly dependent on its structure and content (Brace, 2013). This section presents the different aspects of the questionnaire design, including its development, validity and reliability, the translation into Arabic and the pilot study.

### 7.2.1 Questionnaire Development

The questionnaire was an online self-administered questionnaire. The self-administered questionnaire enabled the respondent to answer the questions independently without the presence of the researcher (Brace, 2013). It consisted of nine pages and a welcome page explaining the research purpose and providing all the information needed required by the participants. At the end of the welcome page, the participant had to tick a box as an indication of consent to participate and this would take the participant to the beginning of the questionnaire. Part 1 included a few questions to obtain demographic information about type and years of expertise. Part 2 covered questions on accessibility of Arabic language while Parts 3 and 4 covered accessibility of the data format and the symbols and icons, respectively. Accessibility of multimedia were covered in Part 5. Parts 6, 7 and 8 covered accessibility of colours, page layout and navigation respectively. Finally, Part 9 covered other issues related to the use of accessibility support techniques. The iSurvey tool<sup>3</sup>, which is provided by the University of Southampton, was used to generate the online survey. The complete questionnaire is given in Appendix I.

The online questionnaire contained two types of questions: closed-ended and open-ended questions. The closed-ended questions form Parts 2 to 9, used a five-point Likert scale to measure the level of importance of the success criteria, as well as to serve

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<sup>3</sup><https://www.isurvey.soton.ac.uk/>

as a quantitative research method. The optimum range of the Likert scale has been discussed in the literature (Brace, 2013) and it was found that when five and seven-point Likert scales were rescaled, the result was equal mean scores (Dawes, 2008). Shorter scales such as five-point scales are recommended by Foddy (1994) and O'Muircheartaigh et al. (1997) in situations where an absolute decision is sought. The response ratings used in the questionnaire were: Unimportant (1), Of little importance (2), Moderately important (3), Important (4) and Very Important (5) (Berk and Theall, 2006; McLeod, 2008). Illustrative examples were added to a number of SCs that might need more clarification and the target users who would benefit from applying each success criterion were specified.

Open-ended questions were also incorporated in the questionnaire and the data obtained from these questions was used in the qualitative textual analysis. The open-ended questions at the end of each page (from Page 2 to Page 9) helped to provide feedback or suggestions about the success criteria.

### 7.2.2 Questionnaire Translation

The online questionnaire was created in English and was then translated into Arabic following the same procedure explained in Section 6.1.3. After translation was completed, a pilot study was carried out to ensure accurate understanding of the questions.

### 7.2.3 Piloting the Questionnaire

It is always advisable to pilot the questionnaire before the survey goes live. There are several ways of piloting a questionnaire, such as an informal pilot and a dynamic pilot (Brace, 2013). The informal pilot is usually conducted with a small number of colleagues to identify any errors in the questions or in the responses. Although piloting the questionnaire with colleagues might pick up potential problems it is not enough to show how real respondents in the field would respond to the questions. Therefore, one-to-one interviews with a few respondents from the survey population are very useful. In the case of an online questionnaire, the researcher sits with the respondents as they fill in the survey and follow a talk-aloud protocol to allow them to 'think out loud' so they can talk about how they understand the questions and why they responded the way they did. Moreover, it is dynamic which means that the questionnaire is reviewed and improved after each interview. The resultant improved questionnaire is then used for the next interview, after which it is reviewed and improved -if needed- again (Brace, 2013).

As depicted in Figure 7.3, an informal pilot was conducted first with three colleagues from the research lab at the Electronics and Computer Science (ECS) School at the

University of Southampton. Then this was followed by dynamic pilot with five experts from ECS and Education. Notes were taken by the researcher during all the steps and a few amendments and improvements were made to the questionnaire. At the end, the feedback from this was positive, as experts found the questionnaire to be clear and easy to follow.

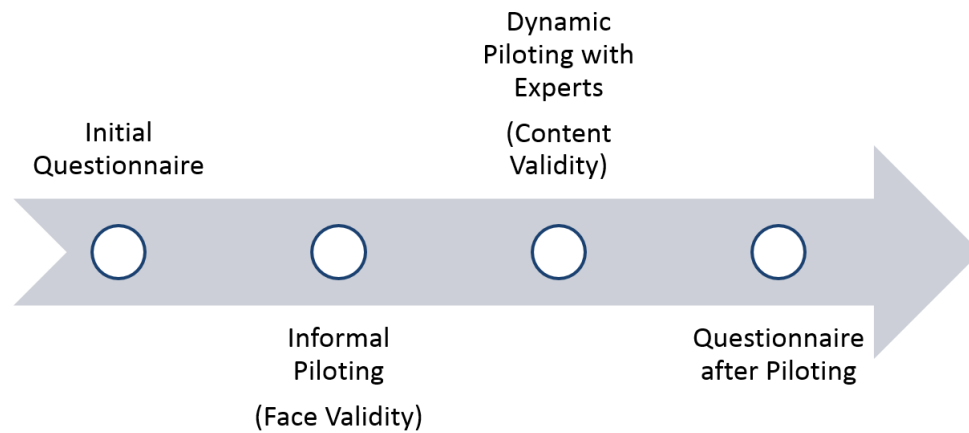


Figure 7.3: Stages of Questionnaire Piloting

#### 7.2.4 Questionnaire Validity

According to [Brace \(2013\)](#); [Mark Saunders and Thornhill \(2009\)](#) a questionnaire is considered valid if it measures what the researcher intends to measure. Face validity gives an indication that the questionnaire appears to be valid. Therefore, as a starting point, a face validation was carried out after developing the questionnaire. After that, content validation (of logical validity) was conducted with five experts, as explained in Section 7.2.3 and Figure 7.3. Content validity is another type of validity and is defined as a judgement of how appropriate the items seem to a panel of reviewers who have knowledge of the subject matter ([Litwin, 1995](#)).

#### 7.2.5 Questionnaire Reliability

Reliability refers to the consistency of a measure. A questionnaire is reliable if it produces the same or similar results under the same conditions ([Field, 2013](#)). Reliability can be measured in aspects of stability, internal consistency or equivalence. Stability is usually used to ensure that same results are obtained when used consecutively for two or more times. In this case, a test-retest method is used. Internal consistency is used to ensure that all sub-parts of the instrument measure the same characteristic, i.e., its homogeneity. Inter-rater equivalence reliability is used when two observers study a single phenomenon simultaneously ([Rattray and Jones, 2007](#)). In the current study, the stability of the questionnaire's results was the main concern, so a test-retest method was

used. [Allen and Yen \(2001\)](#) point out that a short time interval between the two tests would have the effect of the respondent remembering the answers from the first test, whereas, with a long time interval, the information given by participants would change, which would affect the stability of the results.

In order to measure the questionnaire's reliability, 15 participants agreed to answer the questionnaire twice with an approximately 15 days' time interval between the first and second participation. The scores from the two tests were then compared and calculated by using the correlation coefficient formula (Pearson), which is used to measure the degree of relationship between two sets of scores. The resulting reliability score can range from -1 to +1 where zero means there is no relationship; thus, the larger the absolute value of the reliability score, the stronger the relationship between the sets ([Allen and Yen, 2001](#)). In the current study, the average of reliability scores for the two tests for the 15 participants were calculated. The results revealed a strong relationship between the scores which indicates high reliability (Table 7.5).

Table 7.5: Online Questionnaire Test-Retest Reliability Results

| Item | Mean First Time | Mean Second Time | Correlation |
|------|-----------------|------------------|-------------|
| 1.1  | 3.53            | 3.67             | 0.843       |
| 1.2  | 4.07            | 4.13             | 0.984       |
| 1.3  | 4.53            | 4.53             | 1           |
| 1.4  | 3.67            | 3.6              | 0.969       |
| 1.5  | 2.8             | 2.87             | 0.983       |
| 1.6  | 4               | 4                | 1           |
| 1.7  | 3.47            | 3.53             | 0.981       |
| 1.8  | 3.8             | 3.87             | 0.984       |
| 1.9  | 4.2             | 4.2              | 1           |
| 1.10 | 4.13            | 4.2              | 0.966       |
| 1.11 | 4.67            | 4.73             | 0.853       |
| 1.12 | 4.33            | 4.4              | 0.915       |
| 1.13 | 4.2             | 4.27             | 0.891       |
| 1.14 | 4.13            | 4.13             | 1           |
| 1.15 | 3.6             | 3.67             | 0.981       |
| 1.16 | 3.93            | 4.07             | 0.914       |
| 1.17 | 3.93            | 3.93             | 1           |
| 1.18 | 4               | 4                | 1           |
| 1.19 | 4.2             | 4.27             | 0.943       |
| 1.20 | 3.93            | 3.93             | 1           |
| 1.21 | 4               | 4.07             | 0.961       |
| 1.22 | 3.73            | 3.8              | 0.97        |
| 1.23 | 3.93            | 3.87             | 0.946       |
| 1.24 | 4               | 4                | 1           |
| 1.25 | 3.93            | 4.07             | 0.984       |
| 2.1  | 4.53            | 4.6              | 0.953       |
| 2.2  | 3.53            | 3.67             | 0.97        |
| 2.3  | 3.73            | 3.87             | 0.893       |
| 2.4  | 4.07            | 4.13             | 0.975       |
| 2.5  | 4.2             | 4.27             | 0.925       |
| 2.6  | 3.93            | 4                | 0.972       |
| 2.7  | 3.8             | 3.87             | 0.98        |



| Item | Mean First Time | Mean Second Time | Correlation |
|------|-----------------|------------------|-------------|
| 2.8  | 3.93            | 4.07             | 0.927       |
| 2.9  | 3.93            | 4                | 0.93        |
| 2.10 | 4.27            | 4.33             | 0.968       |
| 2.11 | 4.27            | 4.33             | 0.932       |
| 2.12 | 3.6             | 3.73             | 0.98        |
| 2.13 | 3.73            | 3.87             | 0.949       |
| 3.1  | 4.53            | 4.6              | 0.942       |
| 3.2  | 4.33            | 4.4              | 0.987       |
| 3.3  | 4.6             | 4.67             | 0.994       |
| 4.1  | 4.6             | 4.53             | 0.918       |
| 4.2  | 3.87            | 3.87             | 1           |
| 4.3  | 4.4             | 4.47             | 0.939       |
| 4.4  | 4.13            | 4.13             | 0.964       |
| 4.5  | 4.2             | 4.2              | 1           |
| 4.6  | 4.13            | 4.07             | 0.97        |
| 4.7  | 4               | 4.07             | 0.983       |
| 4.8  | 4               | 4.07             | 0.986       |
| 4.9  | 4.27            | 4.27             | 0.955       |
| 4.10 | 3.93            | 3.87             | 0.977       |
| 5.1  | 3.47            | 3.53             | 0.976       |
| 5.2  | 3.67            | 3.73             | 0.985       |
| 5.3  | 4.4             | 4.47             | 0.873       |
| 6.1  | 3.53            | 3.6              | 0.873       |
| 6.2  | 4.27            | 4.2              | 0.954       |
| 6.3  | 3.87            | 3.93             | 0.972       |
| 6.4  | 4.47            | 4.4              | 0.952       |
| 6.5  | 3.47            | 3.47             | 0.961       |
| 6.6  | 4               | 4.07             | 0.975       |
| 6.7  | 4.13            | 4.13             | 1           |
| 6.8  | 3.8             | 3.73             | 0.974       |
| 6.9  | 4.27            | 4.33             | 0.935       |
| 6.10 | 4.13            | 4.2              | 0.869       |
| 6.11 | 4.07            | 4.07             | 1           |
| 7.1  | 4.53            | 4.53             | 0.807       |
| 7.2  | 4.13            | 4.2              | 0.986       |
| 7.3  | 4               | 3.93             | 0.946       |
| 7.4  | 4.67            | 4.67             | 1           |
| 7.5  | 4.13            | 4.2              | 0.971       |
| 7.6  | 3.93            | 4                | 0.982       |
| 7.7  | 4.33            | 4.4              | 0.866       |
| 7.8  | 4.4             | 4.47             | 0.919       |
| 7.9  | 4.27            | 4.33             | 0.932       |
| 7.10 | 4               | 4.07             | 0.963       |
| 7.11 | 4.13            | 4.13             | 0.915       |
| 7.12 | 4.2             | 4.2              | 1           |
| 7.13 | 4               | 4                | 1           |
| 7.14 | 4               | 4.07             | 0.984       |
| 7.15 | 4.47            | 4.33             | 0.902       |
| 7.16 | 4.73            | 4.67             | 0.853       |
| 7.17 | 4.47            | 4.47             | 0.861       |
| 8.1  | 4.73            | 4.73             | 0.659       |
| 8.2  | 4.33            | 4.47             | 0.955       |
| 8.3  | 3.6             | 3.73             | 0.739       |

### 7.2.6 Ethical Approval

The ethical approval for the questionnaire was obtained from the Ethics Committee at the University of Southampton (Research Ethics Number 24842). Participants were provided with a participant information sheet and they were informed that their participation was voluntary and could be terminated any time during the study and that all collected data was anonymous and would be analysed as a group.

### 7.2.7 Identifying Potential Experts as Participants and Sample Size

As mentioned in the previous phase of this study, a person was considered an expert if:

- they were web developers or designers and had at least one year's experience in developing university websites in Saudi Arabia;
- they were Arab researchers in the area of web accessibility with at least one published paper in this area of research, or
- they were working with or close to people with special needs, with at least one year of experience.

Different recommendations for the number of experts have been made; for example, [Lynn \(1986\)](#) suggests a minimum of three content experts. Other researchers, such as [Gable and Wolf \(2012\)](#), recommend a panel of five content experts, whereas [Grant and Davis \(1997\)](#) suggest that the number of content experts can be predicated on the desired expertise and range of representation of the experts. Therefore, the required expertise may control the number of experts participating in this study.

### 7.2.8 Conducting the Questionnaire

After finalising the pilot and acquiring the ethics approval, the questionnaire was carried out over a period of four month between 20 December 2016 and 20 April 2017. A mixture of purposeful and snowball sampling techniques was used to recruit the participants. The purposeful sampling technique is the most common sampling technique ([Marshall, 1996](#)). In this technique, the researcher actively selects the most suitable sample to answer the research question. In this research, the web developers/designers were sought in the IT centres or through deanships' web pages in every Saudi government university website. Their contact information was used to invite them to participate.

In the snowball sampling technique, the current participants were used to recruit further participants ([Marshall, 1996](#)). This technique was useful in this research in identifying the experts who were researchers in the field and those who were working with people with special needs.

### 7.2.9 Data Analysis Method Used in the Study

The one sample t-test was used to analyse the results. This helps by comparing the mean of a sample ( $\mu$ ) with a hypothesised value ( $\mu_0$ ). The hypothesised mean here, ( $\mu_0$ ) = 3, indicates ‘Moderately Important’ on the five point Likert-type scale. In other words, the one sample t-test involves testing the null hypothesis ( $H_0 : \mu = \mu_0$ ) against the alternative hypothesis ( $H_1 : \mu \neq \mu_0$ ). The following hypotheses were used to test each item in the questionnaire:

- **The null hypothesis (H0):** There is no significant difference between the sample mean and the population mean; thus, the level of agreement relating to each item is equal to 3.
- **The alternative hypothesis (H1):** There is a significant difference between the sample mean and the population mean; thus, the level of agreement relating to each item is not equal to 3.

To make such a decision, the statistical significance level ( $\alpha$ ) was set -by convention- to 0.05 for a 95% confidence level. The Bonferroni correction, as discussed in Section 6.2.1, was used to calculate a new significance level. For the questionnaire, the total number of tests of significance (the total number of items in the questionnaire) was 85, i.e.  $New\alpha = \frac{\alpha}{n} = \frac{0.05}{85} \approx 0.0006 \approx 0.001$ . Then:

- If the p-value for each item is less than or equal to the  $New\alpha$  (0.001), the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted.
- If the p-value for each item is greater than the  $New\alpha$  (0.001), the alternative hypothesis (H1) is rejected and the null hypothesis is accepted.

Therefore, a result is described as statistically significant if the null hypothesis is rejected and, consequently, the alternative hypothesis is accepted. Conversely, a result is described as not statistically significant if the alternative hypothesis is rejected and, consequently, the null hypothesis is accepted.

Appendix J presents the questionnaire results for all the questionnaire items. The results of the quantitative analysis are discussed in Section 7.3.3.

## 7.3 Online Questionnaire Results

In this section, the results and data analysis are presented in four parts: data preparation, through checking missing data and normality prior to the analysis; the sample description; results from the quantitative analysis, and finally, results from the qualitative analysis.

### 7.3.1 Data Preparation for Analysis

To analyse the quantitative data statistically, the experts' responses to the closed-ended questions were collected and entered into SPSS software. As a preparation step for analysis, the data was screened for reverse coding and missing data. No items were reverse coded and no data was found to be missing. Moreover, the data was proof-read against the original data in the questionnaires in order to verify that the data was correctly imported to SPSS.

Before conducting the one sample t-test, the data needed to be examined for normality (Field, 2013). Normality is the degree to which the distribution of the data corresponds to a normal distribution (Hair, 2010). Normality can be tested by using graphical and statistical methods. Graphically, normal refers to a bell-shaped density curve presented by a histogram (Field, 2013). A symmetrical distribution of the data indicates that the data distribution is normal (Field, 2013; Pallant, 2016). Normality would be also represented by a normal probability plot (known as Q-Q plot in SPSS) (Field, 2013). Statistically, normality can be assessed by the kurtosis and skewness of a distribution (Field, 2013; Ghasemi and Zahediasl, 2012). Skewness is asymmetry in a statistical distribution, where the bell-shaped curve appears distorted or skewed either to the left or to the right. Positive values of skewness mean a pile-up of data on the left of the distribution, whereas negative values indicate a pile-up on the right (Field, 2013). Kurtosis is used to measure the peakedness or flatness of a distribution when compared with a normal distribution. A positive value of kurtosis means a relatively peaked distribution, whereas a negative value means a relatively flat distribution (Hair, 2010). The values of skewness and kurtosis should be zero in a normal distribution. The further the value is from zero, the more likely it is that the data are not normally distributed (Field, 2013).

The values of skewness (S) and kurtosis (K) and their respective standard errors (SE) -produced by SPSS- are used to calculate Z scores, as follows (Field, 2013):

$$Z_{Skewness} = \frac{S}{SE_{Skewness}} \text{ and } Z_{Kurtosis} = \frac{K}{SE_{Kurtosis}}$$

This allows a simple rule of thumb to be applied. If the result is in the range of -1.96 to +1.96, it suggests that the sample data are normal with respect to that statistic. This approach was followed in this research; the results showed that, although some of the collected data from the questionnaire were somewhat skewed, almost all of them were still in the range of -1.96 and +1.96.

### 7.3.2 Sample Description

The total number of responses to the questionnaire was 60. Table 7.6 shows the number of participants, based on the nature of their expertise. Approximately half of the participants were university web developers, followed by web accessibility researchers (20%) and experts working with people with special needs (18.33%). Interestingly, 11.67% of participants had joint expertise as web developers and web accessibility researchers and one participant was a web accessibility researcher and worked with people with special needs.

Table 7.6: Number of Participants by Type of Expertise

| Nature of Expertise   | No. of Experts | Percentage |
|---|----------------|------------|
| Saudi university web developer or designer  | 29             | 48.33%     |
| Researcher in the area of web accessibility   | 12             | 20%        |
| Working with or close to people with special needs  | 11             | 18.33%     |
| Saudi university web developer or designer <b>AND</b> Researcher in the area of web accessibility         | 7              | 11.67%     |
| Researcher in the area of web accessibility <b>AND</b> Working with or close to people with special needs | 1              | 1.67%      |
| <b>TOTAL</b>  | 60             | 100%       |

As Table 7.7 shows, the experience of participating web developers ranged from those with experience between 2 years and less than 5 years (around 53%), followed by those with more than 10 years of experience. The experience of participating experts who were working with people with special needs ranged from those with experience between 1 year and less than 2 years (33.33%), followed by those with experience between 2 years and less than 5 years and those with experience between 5 years and less than 10 years (at 25% each). In addition, none of the participating experts in both categories have experience less than one year.

Table 7.7: Years of Experience of Participating Web Developers and Experts Working with People with Special Needs

| Years of Experience                    | Web Developers |            | Experts who Work with People with Special Needs |            |
|--|----------------|------------|---|------------|
|  | Frequency      | Percentage | Frequency                                       | Percentage |
| Less than a year                       | 0              | 0%         | 0   | 0%         |
| From one year to less than two years   | 5              | 13.89%     | 4   | 33.33%     |
| From two years to less than five years | 19             | 52.78%     | 3   | 25%        |
| From five years to less than ten years | 4              | 11.11%     | 3   | 25%        |
| Ten years or more                      | 8              | 22.22%     | 2   | 16.67%     |
| <b>TOTAL</b>                           | 36             | 100%       | 12  | 100%       |

Web developers were asked about the university at which they work. The results in Table 7.8 show that the majority, 63.89%, are from 11 newly emerging universities and the remainder (36.11%) from 6 long-established universities. This would be possibly

explained by the fact that there are only 7 long-established universities in Saudi Arabia, whereas the number of newly-emerging universities is more than twice this number.

Table 7.8: Participating Web Developers and their Universities

| University Type               | No. of Universities | No. of Web Developers | Percentage of Web Developers |
|-------------------------------|---------------------|-----------------------|------------------------------|
| Long-established universities | 6                   | 13                    | 36.11%                       |
| Newly emerging universities   | 11                  | 23                    | 63.89%                       |
| <b>TOTAL</b>                  | 17                  | 36                    | 100%                         |

Experts who work with people with special needs were asked about the type of disability of those people. Table 7.9 shows the responses to this questions.

Table 7.9: Type of Disability of People the Participating Experts had been Working with

| Type of Disability   | No. of Experts | Percentage |
|--|----------------|------------|
| Visual disabilities including blindness colour blindness and low vision.                                       | 3              | 25%        |
| Auditory disabilities such as deafness or a hearing impairment.  | 3              | 25%        |
| Cognitive disabilities or learning disabilities.   | 2              | 16.67%     |
| Motor disabilities.  | 1              | 8.33%      |
| Progressive disabilities due to ageing including gradual decrease in some abilities such as vision or hearing. | 3              | 25%        |
| Other  | 0              | 0%         |
| <b>TOTAL</b>   | 12             | 100%       |

The second category of experts (researchers) were asked about their publications. Table 7.10 shows that half of them had published two papers in the area web accessibility, followed by 30% who had published between 3 and 5 papers. The remaining 20% had published one paper only.

Table 7.10: Participating Researchers and their Publications

| Number of Published Papers | No. of Researchers | Percentage |
|----------------------------|--------------------|------------|
| None                       | 0                  | 0%         |
| One paper                  | 4                  | 20%        |
| Two papers                 | 10                 | 50%        |
| Between 3 and 5 papers     | 6                  | 30%        |
| Between 6 and 8 papers     | 0                  | 0%         |
| More than 8 papers         | 0                  | 0%         |
| <b>TOTAL</b>               | 20                 | 100%       |

In addition, 55% of the participating researchers indicated they were interested in web accessibility in general, whereas 45% of them focused on web accessibility for Arabic users.

### 7.3.3 Results from the Quantitative Analysis

Based on the results of the one sample t-test presented in Table 7.11 below, overall all questionnaire items except two appear to be statistically significant. The items that are statistically insignificant are **Items 1.5** and **5.1**. These items were supported by the experts and their means are higher than 3. **Item 1.5** was also supported by previous studies (Al-Wabil et al., 2006; AlRowais et al., 2013), as was **Item 5.1** (Khanum et al., 2012; Marcus and Hamoodi, 2009). Therefore the two items were kept.

Table 7.11: T-test Results for the Questionnaire

| Section  | Item No | Item  | Mean | P-Value | Statistically Significant? |
|----------|---------|---|------|---------|----------------------------|
| Language | 1.1     | The language and its direction of any Arabic web page are specified in the web page code.                       | 3.38 | < 0.001 | Yes                        |
|          | 1.2     | The language of any non-Arabic text in an Arabic web page and its direction are specified in the web page code. | 4.05 | < 0.001 | Yes                        |
|          | 1.3     | There is a consistency in the direction between data entry (writing) and data display (reading).                | 4.30 | < 0.001 | Yes                        |
|          | 1.4     | Partial diacritics are provided in any web page as a default.   | 3.65 | < 0.001 | Yes                        |
|          | 1.5     | There are options for users for full diacritics and no diacritics in any web page.                              | 3.43 | 0.004   | <b>No</b>                  |
|          | 1.6     | Partial or full diacritics are provided to differentiate between homograph words.                               | 3.95 | < 0.001 | Yes                        |
|          | 1.7     | General language is used where possible.  | 3.53 | < 0.001 | Yes                        |
|          | 1.8     | When it is needed, partial or full diacritics are used to differentiate between genders.                        | 3.63 | < 0.001 | Yes                        |
|          | 1.9     | Font size is at least 16 point for the text and 20 point for the headings.                                      | 3.93 | < 0.001 | Yes                        |
|          | 1.10    | Fonts are clear and readable.   | 4.40 | < 0.001 | Yes                        |
|          | 1.11    | Spaces between words are clear and readable.  | 4.27 | < 0.001 | Yes                        |
|          | 1.12    | Bold or a combination of bold and colour is applied to emphasise the text.                                      | 4.03 | < 0.001 | Yes                        |
|          | 1.13    | Arabic text is either right justified (better) or fully justified.  | 3.92 | < 0.001 | Yes                        |
|          | 1.14    | NO sentence exceeds 20 words and NO paragraph exceeds 5 sentences.  | 3.78 | < 0.001 | Yes                        |
|          | 1.15    | Readable Modern Standard Arabic with common and simple words is used.   | 4.07 | < 0.001 | Yes                        |
|          | 1.16    | Other readable and understandable alternatives for advanced or not readable content are provided.               | 3.83 | < 0.001 | Yes                        |
|          | 1.17    | Arabic-Indic Numbers are used in Arabic context.  | 3.68 | < 0.001 | Yes                        |
|          | 1.18    | Positive and negative signs are at the right of the number.   | 3.95 | < 0.001 | Yes                        |
|          | 1.19    | Percentage sign is at the left of the number.   | 3.92 | < 0.001 | Yes                        |
|          | 1.20    | Decimal separator is (,)  | 3.83 | < 0.001 | Yes                        |
|          | 1.21    | Thousand separators are not used in Arabic most of the time.  | 3.42 | < 0.001 | Yes                        |
|          | 1.22    | There is no use of abbreviations or acronyms.   | 3.77 | < 0.001 | Yes                        |

| Section           | Item No | Item   | Mean | P-Value | Statistically Significant? |
|-------------------|---------|--|------|---------|----------------------------|
| Language          | 1.23    | When abbreviations are used, they could be 1) Arabic abbreviations: 1.a) There are spaces between the letters in initials, and/or there are full stops between the letters in initials. OR 1.b) The expansion form of the abbreviation is available. 2) Borrowed abbreviations from other languages: 2.a) Untranslated: Acronyms are written and pronounced in Arabic as they are in the other languages. Explanations of the untranslated abbreviations may be provided. OR 2.b) Translated: Arabic pronunciation of the abbreviation and/or its expansion are available. | 3.72 | < 0.001 | Yes                        |
|                   | 1.24    | When abbreviations are used, expansions or explanations are available: a) at the first occurrence if there is one meaning through the web page, or b) Every time if there is more than one meaning.  | 3.85 | < 0.001 | Yes                        |
|                   | 1.25    | Line spacing is at least 2 spaces within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing.   | 3.85 | < 0.001 | Yes                        |
| Data Format       | 2.1     | Hijri calendar is used, but in the case that Gregorian is used, Hijri calendar is provided as well.  | 3.97 | < 0.001 | Yes                        |
|                   | 2.2     | Long date format is used.  | 3.57 | < 0.001 | Yes                        |
|                   | 2.3     | When short date format is used, the separator is (/).  | 3.58 | < 0.001 | Yes                        |
|                   | 2.4     | Time is mostly in 12-hour format with AM and PM. 24-hour format is rarely used.  | 3.80 | < 0.001 | Yes                        |
|                   | 2.5     | Time separator is (:).   | 3.88 | < 0.001 | Yes                        |
|                   | 2.6     | For currency, Saudi Riyals is used as a long or short format.  | 3.58 | < 0.001 | Yes                        |
|                   | 2.7     | The currency is located at the left of the number.   | 3.73 | < 0.001 | Yes                        |
|                   | 2.8     | When other currencies are used, the equivalent value in Saudi Riyal is presented.  | 3.83 | < 0.001 | Yes                        |
|                   | 2.9     | When postal code is used, it is a 5-digit number.  | 3.85 | < 0.001 | Yes                        |
|                   | 2.10    | When phone numbers are used, the format is +966 2-digit Area Code XXX XXXX for land line and +966 5XXX XXXXX for mobile phone.   | 3.97 | < 0.001 | Yes                        |
|                   | 2.11    | When names are used, first name, father's, grandfather's and family names are the accepted and understood name format.   | 4.02 | < 0.001 | Yes                        |
|                   | 2.12    | Middle initial, middle or maiden names are not used.   | 3.62 | < 0.001 | Yes                        |
|                   | 2.13    | For measurement format, metric system is used.   | 3.85 | < 0.001 | Yes                        |
| Symbols and Icons | 3.1     | Symbols and icons are understood by target users.  | 4.28 | < 0.001 | Yes                        |
|                   | 3.2     | Symbols and icons are inoffensive and acceptable to target users.  | 4.27 | < 0.001 | Yes                        |
|                   | 3.3     | Symbols and icons are appropriate to the content.  | 4.30 | < 0.001 | Yes                        |
| Multimedia        | 4.1     | Multimedia elements are appropriate to the culture and to the university websites.   | 4.37 | < 0.001 | Yes                        |
|                   | 4.2     | All multimedia incorporating music that is presented to the user provide a hint that there is music in the multimedia and/or another version without music.  | 3.80 | < 0.001 | Yes                        |
|                   | 4.3     | A maximum number of three multimedia elements are presented to the user in any web page AND the total size of the web page including its multimedia elements is suitable to the internet speed in the country of its target users.   | 4.08 | < 0.001 | Yes                        |



| Section    | Item No | Item   | Mean | P-Value | Statistically Significant? |
|------------|---------|--|------|---------|----------------------------|
| Multimedia | 4.4     | All non-text content that is presented to the user has a descriptive text alternative that serves the equivalent purpose.  | 4.13 | < 0.001 | Yes                        |
|            | 4.5     | A descriptive text transcript is provided for recorded web-based audio.  | 4.28 | < 0.001 | Yes                        |
|            | 4.6     | Text or audio description is provided for recorded web-based video-only.   | 4.27 | < 0.001 | Yes                        |
|            | 4.7     | Synchronized captions are provided for recorded, web-based video.  | 4.22 | < 0.001 | Yes                        |
|            | 4.8     | A descriptive text transcript OR audio description is provided for recorded web-based video.   | 4.20 | < 0.001 | Yes                        |
|            | 4.9     | A mechanism is provided to stop, pause, mute, or adjust volume for audio that automatically plays on a page for more than 3 seconds.   | 4.27 | < 0.001 | Yes                        |
|            | 4.10    | No page content flashes more than 3 times per second unless that flashing content is sufficiently small and the flashes are of low contrast and do not contain too much red.     | 4.07 | < 0.001 | Yes                        |
| Colours    | 5.1     | Masculine colours such as blue, green and grey are used and feminine colours such as pink are avoided.   | 3.15 | 0.327   | No                         |
|            | 5.2     | The colours of the website stem from the university's logo, or the surrounding environment, for example, the colours of the desert, or the national flag.                        | 3.55 | < 0.001 | Yes                        |
|            | 5.3     | Colour is not used as the sole method of conveying content or distinguishing visual elements.  | 4.02 | < 0.001 | Yes                        |
| Layout     | 6.1     | The orientation of any web page is right to left.  | 3.40 | < 0.001 | Yes                        |
|            | 6.2     | University logo is at the top right corner.  | 3.90 | < 0.001 | Yes                        |
|            | 6.3     | The banner is at the top of the web page.  | 3.75 | < 0.001 | Yes                        |
|            | 6.4     | The menu is at the top and/or right of the web page.   | 4.03 | < 0.001 | Yes                        |
|            | 6.5     | The date is available at the top left of the web page.   | 3.38 | < 0.001 | Yes                        |
|            | 6.6     | Search box is available at the top left of the web page.   | 3.75 | < 0.001 | Yes                        |
|            | 6.7     | A link to the English version is at the top left of the web page.  | 3.83 | < 0.001 | Yes                        |
|            | 6.8     | Contact information, social media links and copyrights are at the bottom of the web page.  | 3.80 | < 0.001 | Yes                        |
|            | 6.9     | Content information, structure, and relationships conveyed through presentation can be determined through the web page code or are available in text.                            | 4.07 | < 0.001 | Yes                        |
|            | 6.10    | When the sequence in which content is presented affects its meaning, a correct reading sequence for the content can be determined in the web page's code.                        | 3.98 | < 0.001 | Yes                        |
|            | 6.11    | Instructions given to understand and operate the content do not only rely upon sensory characteristics of components such as shape, size, visual location, orientation or sound. | 3.83 | < 0.001 | Yes                        |
| Navigation | 7.1     | Navigation elements are displayed consistently throughout the website.   | 4.25 | < 0.001 | Yes                        |
|            | 7.2     | Arabic language is used through the Arabic website including log in pages, error messages or CAPTCHA.  | 4.02 | < 0.001 | Yes                        |
|            | 7.3     | More than one way to skip unwanted content.  | 4.13 | < 0.001 | Yes                        |
|            | 7.4     | Information is provided for users about their location.  | 4.20 | < 0.001 | Yes                        |
|            | 7.5     | Help is provided for users when they need it.  | 4.22 | < 0.001 | Yes                        |
|            | 7.6     | All page functionality is available using the keyboard, unless the functionality cannot be accomplished in any known way using a keyboard (e.g., free hand drawing).             | 4.15 | < 0.001 | Yes                        |

| Section    | Item No | Item   | Mean | P-Value | Statistically Significant? |
|------------|---------|--|------|---------|----------------------------|
| Navigation | 7.7     | Keyboard focus is never locked or trapped at one particular page element. The user can navigate to and from all navigable page elements using only a keyboard.   | 4.20 | < 0.001 | Yes                        |
|            | 7.8     | If a page or application has a time limit, the user is given options to turn off, adjust, or extend that time limit. This is not a requirement for real-time events (e.g., an auction), where the time limit is absolutely required, or if the time limit is longer than 20 hours.                                 | 4.27 | < 0.001 | Yes                        |
|            | 7.9     | Automatically moving, blinking, or scrolling content that lasts longer than 5 seconds can be paused, stopped, or hidden by the user.   | 4.12 | < 0.001 | Yes                        |
|            | 7.10    | Automatically updating content can be paused, stopped, or hidden by the user or the user can manually control the timing of the updates.   | 4.07 | < 0.001 | Yes                        |
|            | 7.11    | The web page has a descriptive and informative page title.   | 4.10 | < 0.001 | Yes                        |
|            | 7.12    | The navigation order of links, form elements, etc. is logical and intuitive even if they are navigated using the keyboard.   | 4.08 | < 0.001 | Yes                        |
|            | 7.13    | The purpose of each link can be determined from the link text alone, or from the link text and its context.  | 3.97 | < 0.001 | Yes                        |
|            | 7.14    | When a page element receives focus, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user.   | 4.02 | < 0.001 | Yes                        |
|            | 7.15    | When a user inputs information or interacts with a control, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user unless the user is informed of the change ahead of time. | 4.23 | < 0.001 | Yes                        |
|            | 7.16    | The error in user input is clearly identified; user is allowed to easily fix the error and resubmit the form.  | 4.37 | < 0.001 | Yes                        |
|            | 7.17    | Labels, cues, and instructions for required user input are provided.   | 4.22 | < 0.001 | Yes                        |
| General    | 8.1     | Web page code validation and parsing according to specification are implemented with no errors.  | 4.23 | < 0.001 | Yes                        |
|            | 8.2     | Web page code is created in a way that supports accessibility and assistive technology.  | 4.20 | < 0.001 | Yes                        |
|            | 8.3     | The web content is usable for target users.  | 3.38 | < 0.001 | Yes                        |

In order to specify the best font in terms of readability, all the participants who agreed on the importance of **Item 1.10** were asked about the best font for Arabic, from their point of view. The participants were provided with the same text with different font types as Figure 7.4 shows.

|                    |                           |
|--------------------|---------------------------|
| Tahoma             | سهولة الوصول لمحتوى الويب |
| Arial              | سهولة الوصول لمحتوى الويب |
| Times New Roman    | سهولة الوصول لمحتوى الويب |
| Simplified Arabic  | سهولة الوصول لمحتوى الويب |
| Traditional Arabic | سهولة الوصول لمحتوى الويب |

Figure 7.4: Examples for Different Font Types

Times New Roman received the highest percentage (36.78%), followed by Arial (around 23%), as illustrated in Figure 7.5. Two font types were suggested by participants who selected Other Font Types. They are Naskh and Droid Arabic Kufi.

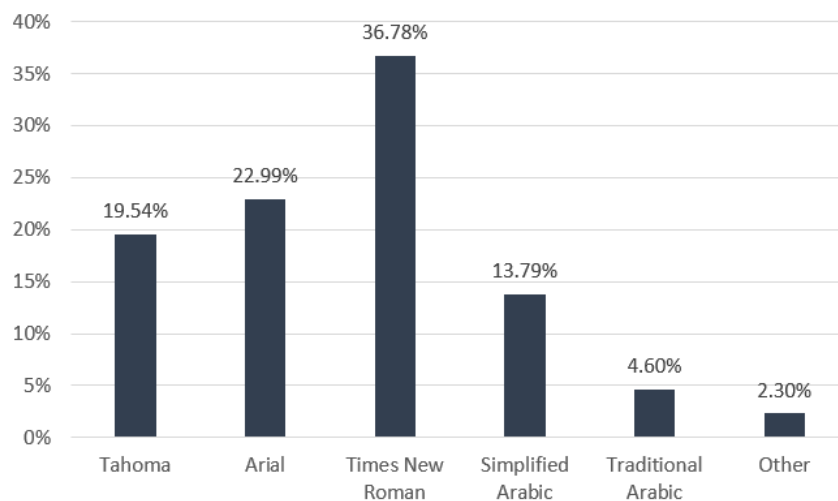


Figure 7.5: Percentages of Font Types based on their Clarity and Readability

Similarly, to specify the best spacing between words, all the participants who agreed on the importance of **Item 1.11** were asked about the word spacing that would provide more readability for Arabic script, from their point of view. According to [Bear \(2017\)](#), the normal blank space between words, created by pressing the space bar, is around  $1/4$  the size of an em = 0.25em. An em is a measurement unit in the field of typography, equal to the currently specified point size. For instance, one em in a 12-point font is 12 points. The participants were provided with the same text with different word spacing as seen in Figure 7.6:

إزداد عدد الجامعات ليشمل مناطق جدو في أنحاء المملكة. **افتراضي**  
 ١ إزداد عدد الجامعات ليشمل مناطق جدو في أنحاء المملكة.  
 ٢ إزداد عدد الجامعات ليشمل مناطق جدو في أنحاء المملكة.  
 ٣ إزداد عدد الجامعات ليشمل مناطق جدو في أنحاء المملكة.

Figure 7.6: Examples for Different Word Spacing

The text with word spacing of 0.40em, which is more than 1.5 times larger than the default spacing, received the highest percentage (53.3%), followed by the text with 0.30em spacing (around 20%), as illustrated in Figure 7.7.

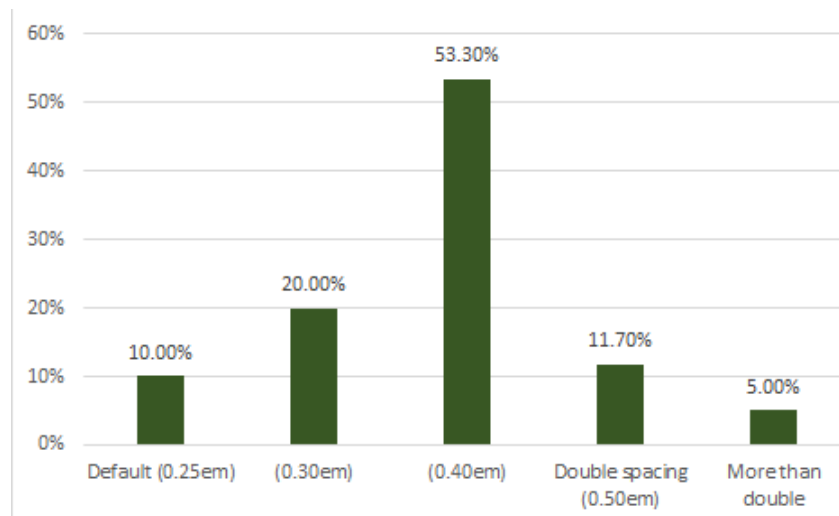


Figure 7.7: Percentages of Word Spacing based on their Clarity and Readability

### 7.3.4 Results from the Qualitative Analysis

This section presents the qualitative analysis of participants' responses to the open-ended questions. The open-ended questions were intended to provide feedback or suggestions about the success criteria at the end of each section. However, only a few participants gave feedback and mostly it was confirmation and repetition of what was already in their questionnaire answers. No one provided any comments in the sections on Data Format, Colours, Layout, Navigation and General. The details of the feedback given in the other sections are as follows:

- **Language:** One of the web developers commented that language editors are responsible of checking and reviewing the language before being published on their website. Another one pointed out that some universities buy special fonts and use them on their websites.

- **Symbols and Icons:** One participant commented that the order of icons in the icon bar in a website sometimes differs from page to page, which may cause confusion to the website users. The issue of consistency was investigated in Section Navigation in the questionnaire, Item 7.1.
- **Multimedia:** One participant commented that usually government websites do not pay attention to text alternatives for non-text elements. Another participant commented that the home pages of university website are usually full of multimedia and this should be reduced.

## 7.4 Chapter Summary

This chapter has presented a complete description of the localisation process, online questionnaire design, analysis, and results of the second phase of this research. It has explained the process of localising web content accessibility guidelines for university websites in Saudi Arabia as comprising four stages. Stage One proposed guidelines and SCs when applying the framework FLWCAG. Stage Two classified the outcomes of Stage One into: guidelines and SCs that were entirely new, and those that either made changes to or were equivalent to those in WCAG 2.0. There were 20 new guidelines and 45 new SCs and nine guidelines and 11 SCs involved changes to WCAG 2.0, while only four SCs were already in WCAG 2.0. In Stage Three, WCAG 2.0 Level A were categorised according to the cultural markers, and Stage Four merged the outcomes from Stages One and Three.

The design of an online questionnaire for the experts to review the outcome from the localisation process was then described, and its validation through informal and dynamic pilots. The translation of the questionnaire into Arabic, following procedures suggested in the literature, was also explained. After that, the process of gaining permission from the University of Southampton Ethics Committee and the participant information provided with the questionnaire were described. The calculation of reliability scores to make sure the questionnaire was reliable was also explained. Besides the demographic questions regarding the experience of participants, a total of 85 closed questions were designed to cover all SCs resulted from the localisation process. In addition, there were eight open questions to the participants to comment and provide feedback.

After conducting the questionnaire, the total number of responses to the questionnaire was 60. Approximately half of the participants were university web developers, followed by web accessibility researchers (20%) and then experts who worked with people with special needs (18.33%). Moreover, it was found that some participants (11.67%) had joint expertise both as web developers and web accessibility researchers and one participant as a web accessibility researcher and worked with people with special needs. The importance of all the SCs was confirmed after analysing the questionnaire results by a

one sample t-test, including the statistical significance of their results. No modifications were made to the SCs based on analysis of the qualitative data resulting from the open questions. The reviewed SCs will be used to develop a checklist that could help web developers in Saudi universities in their work, as explained in the next chapter.

## Chapter 8

# Proposed Checklist (Wosool), Interview Design and Results

Chapter 7 presented the localisation process of accessibility guidelines and success criteria (SCs). It also discussed the review procedure for these guidelines conducted with experts and the results of the process. This chapter explains how the reviewed localised success criteria were used to develop a checklist that could help Arab web developers to evaluate the accessibility of their university websites. Interviews were then designed with the aim of gaining the opinions, thoughts and attitudes of web developers towards the proposed checklist and how it could be improved to suit them. This chapter presents the design, analysis and results of the interviews.

### 8.1 Checklist Development

Based on the proposed framework (FLWCAG) (Chapter 6) and the outcome of applying it, localised guidelines and SCs (Chapter 7), a checklist was developed in order to provide support to Arab web developers in evaluating and improving the accessibility of their websites. The checklist was developed in a stepwise approach, as illustrated in Figure 8.1. I called this checklist (Wosool) which means *access* in Arabic.

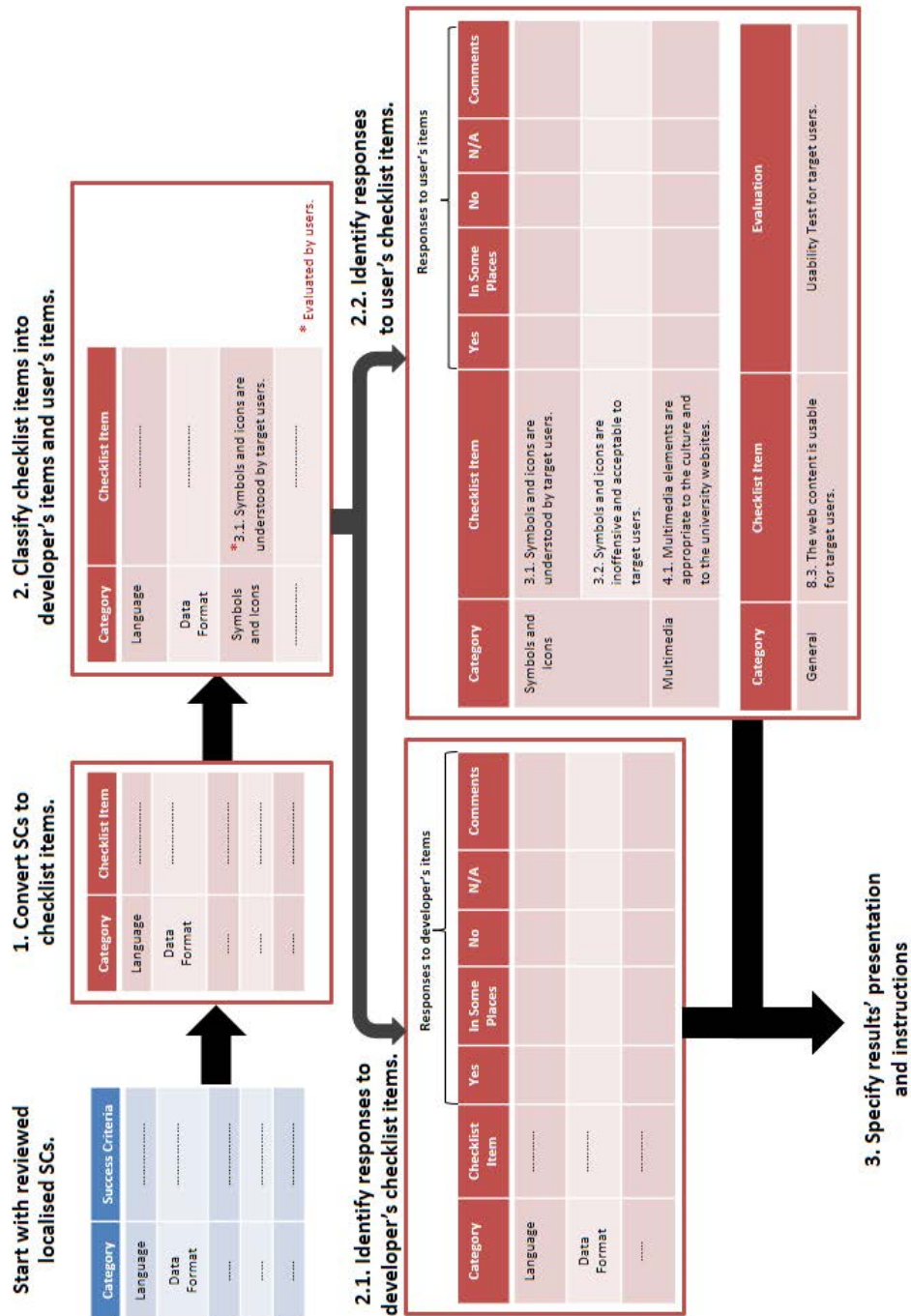


Figure 8.1: The Checklist Development Process



The checklist was developed in the following steps:

1. The development process started with the localised reviewed success criteria presented in Table 7.11. These success criteria were converted to checklist items under the same categories: Language, Data Format, Symbols and Icons, Multimedia, Colours, Layout, Navigation and General.
2. Although this checklist was constructed with developers in mind, users participate in the website evaluation. This was reflected in a number of items that could not be evaluated by developers. These items were:

*Item 3.1.* Symbols and icons are understood by target users.

*Item 3.2.* Symbols and icons are inoffensive and acceptable to target users.

*Item 4.1.* Multimedia elements are appropriate to the culture and to the university websites.

*Item 8.3.* The web content is usable for target users.

The users' items were highlighted by an asterisk (\*). After that, the responses for all items were identified as follows:

- (a) Responses to developer's items were identified to be: **Yes, No, In Some Places** and **Not Applicable (N/A)**. They also were given a space to comment on each item.
- (b) Responses to user's items -except the last one (Item 8.3)- were identified to be: **Yes, No, In Some Places** and **Not Applicable (N/A)**. They also were given a space to comment on each item.

To evaluate *Item 8.3*, usability testing had to be conducted with target users. In this regard, users were asked to grade the usability of the websites using the System Usability Scale (SUS) (Brooke et al., 1996). This scale was chosen because it is a very easy scale to administer to participants, can be used on small sample sizes with reliable results and is valid which means it can effectively differentiate between usable and unusable websites (Sauro and Lewis, 2011; Tullis and Stetson, 2004). It was adapted by replacing the word "system" in every question with website. Each question is a statement and a rating on a five-point scale of Strongly Disagree to Strongly Agree, as follows: (Brooke et al., 1996)

(1) *I think that I would like to use this website frequently.*

(2) *I found the website unnecessarily complex.*

(3) *I thought the website was easy to use.*

(4) *I think that I would need the support of a technical person to be able to use this website.*

(5) *I found the various functions in this website were well integrated.*

(6) *I thought there was too much inconsistency in this website.*

- (7) *I would imagine that most people would learn to use this website very quickly.*
- (8) *I found the website very cumbersome to use.*
- (9) *I felt very confident using the website.*
- (10) *I needed to learn a lot of things before I could get going with this website.*

3. The following were then specified:

- (a) The presentation of the results from developer's evaluation and user's evaluation, and
- (b) How to use these results.

For the developer's evaluation, any item ticked as NO, indicates there is a need for improvements.

For the user's evaluation,

- (a) For *items: 3.1, 3.2 and 4.1*: the percentage has to be Zero in (**In Some Places**) and (**No**) for all participating users. In the case that they are greater than Zero, this means these items were violated and there is a need for an improvement.
- (b) As suggested by [Brooke et al. \(1996\)](#); [Sauro and Lewis \(2012\)](#), results of responses to Item 8.3 are calculated as follows (Figure 8.2):

Users will have ranked each of the 10 survey statements from 1 (Strongly Disagree) to 5 (Strongly Agree). Then, for odd statements: subtract 1 from the user response and for even-numbered statements: subtract the user responses from 5. This scales all values from 0 to 4 (with four being the most positive response). The converted responses for each user will be added up and that total will be multiplied by 2.5. This converts the range of possible values from 0 to 100 instead of from 0 to 40.

The average score for all participating users will be calculated. The description of the average score will be one of the following:

- 80.3 or higher: A, people love the website and will recommend it to their friends.
- 68 or thereabouts: C, good but could improve.
- 51 or under: F, make usability your priority now and fix this fast.

4. Prior to using the checklist, it is important for the developer to specify the web browser and assistive technology used in the evaluation.

The checklist is available in [Appendix K.1](#).

5. In order to be used by Arab developers, the checklist was translated into Arabic using the procedure described in Section 7.2.2 in Chapter 7. The Arabic version of the checklist is available in [Appendix K.2](#).

| No     | Statement   | Response (Number between 1 and 5) | Calculation  | Result |
|--------|---|-----------------------------------|--------------|--------|
| 1.     | I think that I would like to use this website frequently.                                   |                                   | (Response)-1 |        |
| 2.     | I found the website unnecessarily complex.  |                                   | 5-(Response) |        |
| 3.     | I thought the website was easy to use.  |                                   | (Response)-1 |        |
| 4.     | I think that I would need the support of a technical person to be able to use this website. |                                   | 5-(Response) |        |
| 5.     | I found the various functions in this website were well integrated.                         |                                   | (Response)-1 |        |
| 6.     | I thought there was too much inconsistency in this website.                                 |                                   | 5-(Response) |        |
| 7.     | I would imagine that most people would learn to use this website very quickly.              |                                   | (Response)-1 |        |
| 8.     | I found the website very cumbersome to use.   |                                   | 5-(Response) |        |
| 9.     | I felt very confident using the website.  |                                   | (Response)-1 |        |
| 10.    | I needed to learn a lot of things before I could get going with this website.               |                                   | 5-(Response) |        |
| TOTAL: |   |                                   |              |        |

Figure 8.2: Calculation of Usability Test (Item 8.3)

The checklist (Wosool) developed above was then reviewed by interviewing Arab web developers as explained in the next section.

## 8.2 Interview Design

The interview was designed as a semi-structured interview. As pointed out in the literature, semi-structured interviews are widely used and popular than the other types. In addition, the interviewees have the opportunity to talk and express their viewpoints openly (Lazar et al., 2010; Preece et al., 2001).

### 8.2.1 Sample Size

As discussed previously in Chapter 6, one way to determine the sample size in qualitative research can be by seeking recommendations from qualitative methodologists (Marshall et al., 2013). For example, Kuzel (1992) suggests a sample size between six to eight, and Morse (2000) suggests a size between six and ten. Another way, suggested by Marshall et al. (2013), is by linking the sample size to the concept of data saturation. Atran et al. (2005) estimated that a minimum of ten participants is needed to show consensus, while Guest et al. (2006) argue that a sample size of six could be sufficient if there is a homogeneity among the participants in the sample. In the present study, saturation was reached after interviewing ten participants; however, five more participants were recruited in order to explore the data in more depth and confirm that saturation had been reached.

A purposeful sampling technique, which is common in qualitative research (Marshall, 1996), was used to recruit participants. In this technique, the researcher actively selects specific participants who have characteristics relevant to the study and who would be most informative. In this phase of the study, the web developers were sought in the IT centres or through deanships' web pages in every Saudi government university website. Their contact information was used to invite them to participate.

### 8.2.2 Interview Questions

The interview questions were mainly aimed to discuss how Arab developers evaluate their websites and obtain their opinions on the proposed checklist, as Table 8.1 shows.

Table 8.1: Second Interview's Questions

| Closed Questions  |    |          |     |
|---|----|----------|-----|
| 1. What is the university you work at?  |    |          |     |
| 2. For how many years have you been working as a web developer?                                     |    |          |     |
| Open-Ended Questions  |    |          |     |
| 3. What do you usually evaluate in your website before being published and How?                     |    |          |     |
| 4. What do you think about the proposed checklist (Wosool)?   |    |          |     |
| 5. Do you suggest any modifications to this checklist?  |    |          |     |
| Closed-Ended Questions  | No | Somewhat | Yes |
| 6. Do you think the items in the checklist (Wosool) are easy to understand?                         |    |          |     |
| 7. Do you think the checklist (Wosool) is easy to use?  |    |          |     |
| 8. Do you think using the checklist (Wosool) would save your time?                                  |    |          |     |
| 9. Do you think using the checklist (Wosool) would enhance the accessibility of Arabic web content? |    |          |     |
| 10. Do you think using the checklist (Wosool) would enhance the usability of Arabic web content?    |    |          |     |

Then, the questions were translated into Arabic using the same procedure described in Chapter 6 (Section 6.1.3). The Arabic version of the interview questions are available in Appendix L.

### 8.2.3 Interview Pilot

Interview questions were checked with three researchers from the Web and Internet Science Group at the University of Southampton. Improvements to the wording of the questions were made after the pilot and before starting the actual interviews with the participants.

### 8.2.4 Interview Procedure

Participants were invited to participate by email. Arabic versions of the participant information sheet and consent form (see Appendix M.2 and N.2) were attached, along

with the purpose of the interview. A total of 15 web developers responded by agreeing to participate and informed me of their preferred form of communication. The interviews were conducted face-to-face or over the phone, according to the availability and location of each expert. They gave their consent prior to the interview by signing the consent form and participant information sheet, or by replying with a written consent via email. All participants were assigned a code to preserve anonymity.

Table 8.2 shows the participating web developers, interview methods, universities where they worked and experience. As can be seen, the length of experience of the participating developers ranged between 2 and 13 years and 60% of them were working at newly emerging universities. In each interview, the expert was given a brief explanation of the checklist and how to use it. After that, the questions were asked and the responses audio-recorded by the researcher, after obtaining permission.

Table 8.2: Web Developers, Interview Methods, Universities they Were Working at and Experience

| Web Developer ID | Method of Interview | University   | Type of University          | Experience |
|------------------|---------------------|--------------|-----------------------------|------------|
| WD1              | Face to face        | University A | Long-established university | 3 Years    |
| WD2              | Face to face        | University B | Long-established university | 4 Years    |
| WD3              | Telephone call      | University B | Long-established university | 3 Years    |
| WD4              | Telephone call      | University C | Newly emerging university   | 7 Years    |
| WD5              | Telephone call      | University D | Long-established university | 6 Years    |
| WD6              | Telephone call      | University E | Newly emerging university   | 6 Years    |
| WD7              | Telephone call      | University F | Newly emerging university   | 4 Years    |
| WD8              | Telephone call      | University G | Newly emerging university   | 10 Years   |
| WD9              | Face to face        | University A | Long-established university | 2 Years    |
| WD10             | Telephone call      | University H | Newly emerging university   | 11 Years   |
| WD11             | Telephone call      | University A | Long-established university | 13 Years   |
| WD12             | Telephone call      | University I | Newly emerging university   | 3 Years    |
| WD13             | Telephone call      | University F | Newly emerging university   | 4 Years    |
| WD14             | Telephone call      | University F | Newly emerging university   | 4 Years    |
| WD15             | Telephone call      | University G | Newly emerging university   | 6 Years    |

### 8.2.5 Ethics Approval

The ethics approval of the interviews was obtained from the Ethics Committee at the University of Southampton (Research Ethics Number: 26389). No personal data was collected in the expert reviews and all collected information was anonymised: as seen in Table 8.2, the developers were assigned the codes WD1 to WD15.

### 8.2.6 Data Collection and Analysis

All the interviews were conducted in Arabic and audio recorded. The data needed to be transcribed into written format in order to conduct the analysis (Braun and Clarke, 2006). Although the transcription process seems to be time-consuming and frustrating, it is recommended that researchers transcribe the interviews themselves in order to familiarise themselves with the data (Riessman, 1993). Moreover, it has been suggested that it is a key step prior to any qualitative analysis, as it is considered an interpretative act where meanings are drawn out, not simply a mechanical act of transforming spoken words into a written format (Bird, 2005). Afterwards, the transcripts were translated from Arabic to English. Arabic native-speaking researchers at the University of Southampton were able to confirm the accuracy of the translated transcripts. After the transcription phase had been completed, all transcripts were saved into NVivo<sup>1</sup>. NVivo is a software tool used to manage and understand textual data, and allow for in-depth analysis.

## 8.3 Interview Results

This section discusses the results of the developers' interviews. The results of the qualitative analysis of the open questions are discussed first, followed by those of the quantitative analysis of responses to the closed questions.

### 8.3.1 Results for Open-Ended Questions

Question 3 was concerned about the evaluation of Saudi Arabian university websites. Developers were asked about what they evaluate in their websites and how. Due to the rich responses to this question, thematic analysis was used. Six steps were followed, as suggested by Braun and Clarke (2006). These steps are:

1. Familiarisation with data, typically by transcription;
2. Generating initial codes;

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<sup>1</sup><http://www.qsrinternational.com/what-is-nvivo>

3. Searching for themes among codes;
4. Reviewing themes;
5. Defining and naming themes;
6. Producing the final report.

After the thematic analysis had been completed, a thematic network analysis was employed to better illustrate and visualise the data. Thematic network analysis is a way of organising a thematic analysis of qualitative data (Attride-Stirling, 2001). Generally, it has three types of nodes (Attride-Stirling, 2001):

- The lowest-order premises (Basic Themes),
- Categories of basic themes grouped together (Organising Themes), and
- Super-ordinate themes encapsulating the whole text (Global Themes).

Three organising themes were obtained from the thematic analysis. Each theme will be explained and examples provided in the following subsections. The themes are also presented in Figure 8.3.

### **Types of Evaluation/Test:**

The organising themes addresses the types of evaluation that have been conducted in Saudi universities websites as explained by their developers. Its underlying basic themes include the following:

- *Compatibility Test:* Developers explained that they tested the website on different devices including smart phones, desktops and tablets, and on different popular browsers -in Saudi Arabia- such as: Google Chrome, Safari, MS Internet Explorer.
- *Usability Test:* Developers who had experience in conducting usability tests in their university explained that the test involves tasks and then post-survey. One developer stated that on top of that, they also conducted interviews with users.
- *Online User's Survey:* A number of developers mentioned that universities obtained user's feedback regarding their websites through online surveys.
- *Code Testing:* Developers mentioned that testing codes and using debugging tools was the most important test.
- *Evaluation of Website's Appearance:* This theme encapsulated the evaluation of the web page's appearance. Developers prioritised that aspect depending on the type of web page. They gave the high priority to the main page, followed by service pages, information pages and faculty members' pages.

### Evaluators:

This theme includes types of evaluators who evaluate Saudi university's websites as explained by the interviewed developers. They are as follows:

- *One developer*: for pages that have lower priority, such as information pages.
- *Discussion with a group of developers*: for high importance pages such as the main page.
- *Users*: the whole website, especially service pages.
- *Yesser E-Government Programme*<sup>2</sup>: as mentioned by developers, sometimes universities apply to the Yesser programme for the website's evaluation, then results and recommendations are sent back to the universities.

### Evaluation Criteria:

- *Common Sense*: Developers admitted that they judge web pages by how they feel about them.
- *University's Local Recommendations*: Developers mentioned that these recommendations are very abstract and lack details.
- *Yesser Recommendations*: Developers explained that sometimes the local and Yesser recommendations (2006a) contradict each other, which confuses the developers.
- *Comparison with Other International and Local Universitys Websites*: Developers stated that their bosses asked them to compare their pages with other local or international universities.

The following table shows examples for each of the organising themes described above.

Table 8.3: Examples for the Themes

| Theme              | Example  |
|--------------------|--|
| Type of Evaluation | <p><b>Developer WD2:</b></p> <p><i>"We usually test the usability of our websites in our labs. We ask students to volunteer and we give them a number of tasks to do, when they finish we ask them to answer a survey about their experience with the website and how usable it was."</i></p> <p><b>Developer WD11:</b></p> <p><i>"The first and important thing I usually do is testing and validating the code I wrote."</i></p> |

<sup>2</sup><http://www.yesser.gov.sa>



| Theme               | Example   |
|---------------------|---|
| Evaluators          | <p><b>Developer WD15:</b></p> <p><i>“Sometimes, if the page has higher priority like the main page, we conduct the evaluation by discussing it with the other developers in our development team. If the web page has lower priority like information page, one developer would be enough to evaluate.”</i></p> <p><b>Developer WD7:</b></p> <p><i>“From my point of view, users and their opinions are very important to improve our website. We usually conduct usability test by asking users (students and university staff) to perform a number of tasks, then complete a usability survey. We also conduct one-to-one interviews to allow them to express their feelings and experience.”</i></p>   |
| Evaluation Criteria | <p><b>Developer WD1:</b></p> <p><i>“I tend to evaluate how the website looks. It is look and feel, and common sense evaluation. My experience allows me to judge any website once I look at it.”</i></p> <p><b>Developer WD3:</b></p> <p><i>“My boss always asks us to compare our website with other high quality local and international university websites, and copy them.”</i></p> <p><b>Developer WD14:</b></p> <p><i>“In our university, we have local recommendations but they are broad. When we develop, we bear in mind these recommendations.”</i></p> <p><b>Developer WD4:</b></p> <p><i>“We follow Yasser recommendations and our local recommendations, however, we feel confused as there are contradictions in some of these recommendations.”</i></p> |

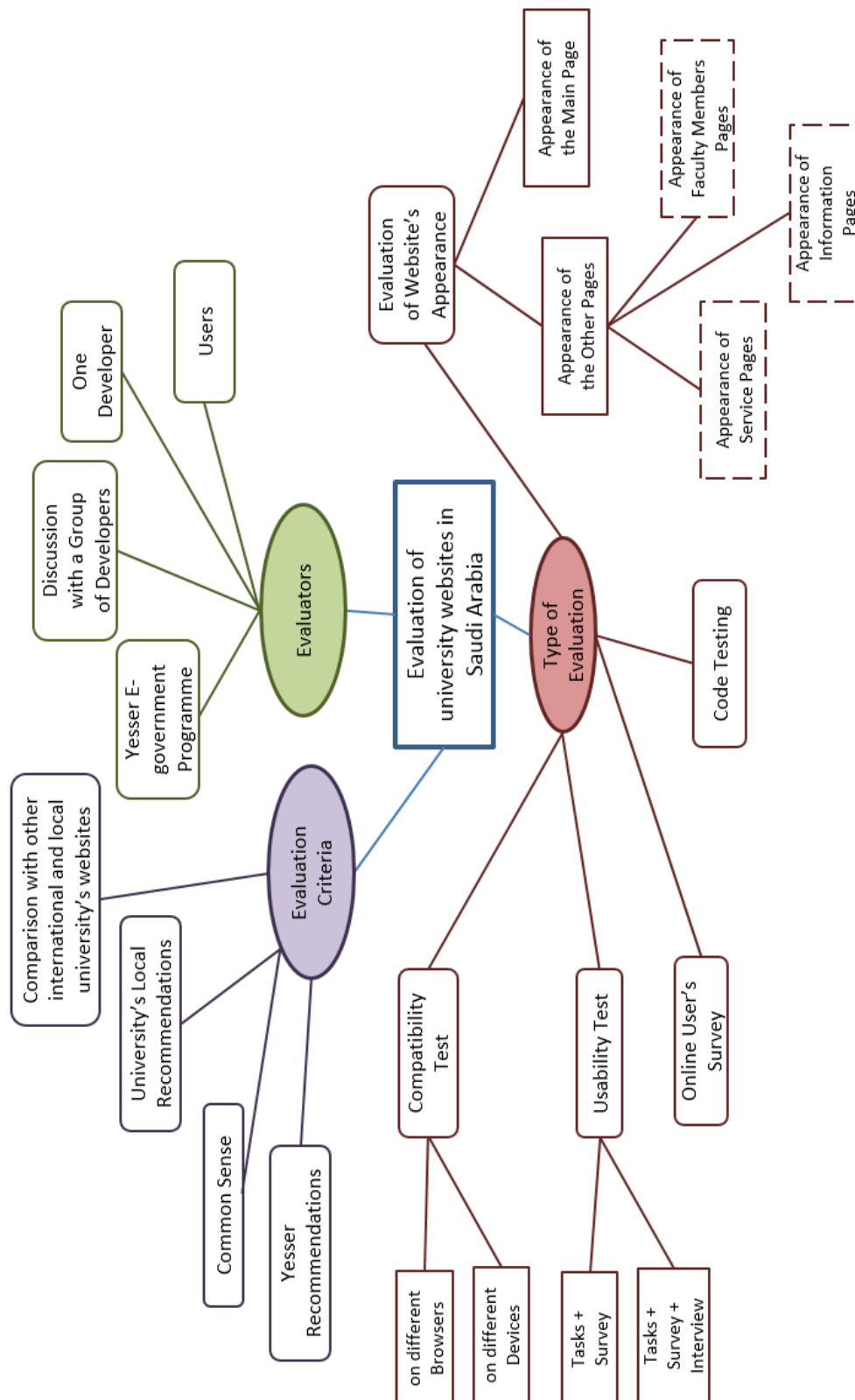


Figure 8.3: Thematic Network Analysis for Responses to Question 3

Question 4 asked the developers what they thought about the checklist and allowed them to express their opinions on it. Almost all interviewed developers commented that the checklist was comprehensive and it covered several important aspects. Other thoughts from the developers are listed in Table 8.4.

Table 8.4: Developers' Thoughts about the Proposed Checklist

| Thought                                | Developers   | Example  |
|--|--|--|
| Comprehensive                          | WD2, WD3, WD7, WD8, WD9, WD11, WD12, WD14 and WD15 | <b>Developer WD15:</b><br><br><i>"I think the checklist is comprehensive and it covers several important aspects in any Arabic website such as language, multimedia, colours and others."</i>  |
| Excellent                              | WD1, WD2, WD4, WD5, WD7, WD9, WD12 and WD13        | <b>Developer WD1:</b><br><br><i>"I believe this checklist is an excellent tool to measure Arabic websites quality and accessibility."</i>  |
| Inclusion of user testing              | WD2 and WD4  | <b>Developer WD2:</b><br><br><i>"User testing -in my opinion- is very important and I am happy to see it in the proposed checklist."</i>   |
| Applicability to other Arabic websites | WD2, WD5 and WD13                                  | <b>Developer WD5:</b><br><br><i>"This checklist would be used to evaluate other Arabic websites not just university websites. I am sure they will be much better in terms of accessibility and usability."</i>   |
| Evaluation of Arabic content           | WD4 and WD8  | <b>Developer WD4:</b><br><br><i>"Evaluation of Arabic content is so crucial. Arabic language specifies our identity and who we are, but unfortunately our websites do not pay attention to it as it should be."</i><br><br><b>Developer WD8:</b><br><br><i>"Arabic content is usually weak in our websites, I believe that one of the reasons that contribute to this problem is that non-Arabic native speakers are developing our websites, plus we do not care about our language which makes the situation worse. Therefore, using the checklist would improve the quality level of Arabic content in our websites."</i> |
| Arabs with different abilities in mind | WD6 and WD8  | <b>Developer WD6:</b><br><br><i>"Good to see the consideration of Arabs with all abilities. I admit that as a developer I do not think about them or their needs are when I code."</i>   |

| Thought                               | Developers | Example  |
|---------------------------------------|------------|--|
| Guide for Arabic websites' developers | WD2        | <p><b>Developer WD2:</b></p> <p><i>“This checklist is a guide for developers of Arabic websites. Introducing such a checklist in our work would make developers stop doing whatever they want in our website.”</i></p> |

The developers were then asked if they had any suggestions to improve the checklist. The responses to Question 5 were mainly about providing a checklist as a semi-automated tool that would require little or no developer intervention. One developer went further, by suggesting an automated version, that can evaluate the whole website with all guidelines, in order to support Arabic websites. The semi-automated version of the checklist would be considered as future work, as discussed in Section 10.5. Developer WD4 pointed out that service pages, which provide services to users such as the university's admission application, have higher priority than other information pages. So, he suggested that the evaluation should start with service pages first then information pages.

### 8.3.2 Results for Closed-Ended Questions

As mentioned earlier in this chapter, after the developers had answered the last two open questions, which were: “*What do you think about the proposed checklist (Wosool)?*” and “*Do you suggest any modifications to this checklist?*”, further questions were asked that were directed by the last research questions. Developers were invited to answer a number of questions using the following three options: Yes, Somewhat or No, to better summarise and classify their answers. All answers are shown in Table 8.5.

Table 8.5: Statistical Results for Closed-Ended Interview Questions

| Closed-Ended Questions  | No  | Somewhat | Yes   |
|---|-----|----------|-------|
| 6. Do you think the items in the checklist (Wosool) are easy to understand?                         | -   | 26.7%    | 73.3% |
| 7. Do you think the checklist (Wosool) is easy to use?  | -   | 6.7%     | 93.3% |
| 8. Do you think using the checklist (Wosool) would save your time?                                  | 40% | 13.3%    | 46.7% |
| 9. Do you think using the checklist (Wosool) would enhance the accessibility of Arabic web content? | -   | -        | 100%  |
| 10. Do you think using the checklist (Wosool) would enhance the usability of Arabic web content?    | -   | -        | 100%  |

As can be observed in Question 6, three-quarters of the developers considered the checklist items as easy to understand. The remaining quarter justified their less positive

answers by suggesting examples for the checklist items along with each item, instead of having the explanation and examples in a separate file. **Developer WD1** commented:

*“The items are clear, but I would prefer to have examples added along with them to make them more understood.”*

In terms of usability of the checklist, more than 90% answered **Yes** to Question 7. **Developer WD9** commented:

*“Using the checklist is very easy and it is written in a very clear language -no jargon or weird words- which allows anyone, even if he does not have a good background in web development, to use it, Except, of course, a few details that need a developer to evaluate.”*

**Developer WD5** suggested having the checklist as a software PlugIn and thought using the PlugIn would be much easier, especially with a huge number of web pages - thousands of web pages- in any university website. **Developer WD2** admitted that the checklist was easy to use; however, she suggested using it prior to and during the web development rather than waiting to the end of the development process.

Question 8 was concerned with saving time when using the checklist. For 40% of the interviewed developers the answer was No. **Developer WD11** commented:

*“It would not save my time, it would consume my time but it will allow for a high quality and accessible website. It will significantly improve Arabic websites.”*

**Developer WD15** agreed and added:

*“Although my time would be wasted, the results will be better. I think with time, I would be familiar with the checklist and consider it during the development stage, which may save my time in the end.”*

Around half of interviewed developers agreed that the checklist would save their time. **Developer WD10** justified this, saying:

*“I do not think using the checklist would consume my time as a developer. I would prefer to build a web page based on solid foundation and being professional rather than developing without following any criteria which would make me enter an infinite loop of modification and coding to reach a level that would be acceptable for a university website.”*

Questions 9 and 10 were concerned with enhancing the accessibility and usability when the checklist is used. All the interviewed developers agreed on this matter and made comments. Examples of the interviewed developers' comments on these two questions are shown in Table 8.6.

Table 8.6: Examples for Responses to Question 9 and 10

| Question    | Examples  |
|-------------|---|
| Question 9  | <p><b>Developer WD13:</b></p> <p><i>"Yes, definitely the accessibility will be enhanced significantly with all of these criteria for Arab users with special needs."</i></p> <p><b>Developer WD5:</b></p> <p><i>"I am sure that the accessibility level will be way better. Our website at the moment would not serve Arab users with special needs, for example, blind people. We are trying to add a screen reader to the website but we have problems in reading Arabic text."</i></p> <p><b>Developer WD2:</b></p> <p><i>"The accessibility will be increased which may reduce the frustration and shock the users would have as a results of browsing our website."</i></p> <p><b>Developer WD4:</b></p> <p><i>"Yes. Especially with the cultural aspects like format of date, numbers, phone numbers and time. With following the checklist, there will be consistency in university websites."</i></p> |
| Question 10 | <p><b>Developer WD3:</b></p> <p><i>"Yes. The checklist concerns the usability of the website and provides feedback to developers, which would help them to make improvements that are suitable to their target users."</i></p> <p><b>Developer WD5:</b></p> <p><i>"Yes. I hope we can conduct usability tests with users in future because we have not thought about it before."</i></p> <p><b>Developer WD4:</b></p> <p><i>"Yes. I am talking about our university, if it followed the criteria in the checklist, this means we have one mechanism to evaluate the website. As a result, the website's identity will become clearer and more specific which makes browsing the website much easier."</i></p>   |

## 8.4 Chapter Summary

This chapter has described the final phase of this study, which involved developing a checklist for evaluating web content accessibility in Arabic university websites in the KSA (Wosool), and reviewing this checklist by consulting the Arab web developers who develop these websites. The checklist development process started by converting

the reviewed success criteria to checklist items in the same categories (Language, Data Format, Symbols and Icons, Multimedia, Colours, Layout, Navigation and General), which were then further categorised into developer's items and user's items. In the third step, the presentation of the results and how to use them were specified. In order to be used by Arab developers, last step was translating the checklist into Arabic.

The interviews were designed to give a wider understanding of website evaluation in Saudi universities, and to review the proposed checklist (Wosool). The sample included 15 Saudi university website developers, with experience ranging between 2 and 13 years. The qualitative analysis was performed following the approach of [Braun and Clarke \(2006\)](#), and then illustrated using a thematic network ([Attride-Stirling, 2001](#)). The obtained themes explained different types of evaluation carried out in Saudi university websites, who evaluated them and the evaluation criteria used. Examples were also provided to illustrate each theme. It was found that accessibility evaluation and users with special needs were not considered at all. Basically, they evaluated only compatibility, usability, online user's feedback, the website's code and the general appearance of a web page.

The interviewed developers reported that they found Wosool to be comprehensive, clear, excellent and applicable to other Arabic websites. The inclusion of user testing, evaluation of Arabic content and consideration of Arab users with different abilities were pointed out as positive aspects of Wosool. A number of the developers suggested providing a semi-automated version of Wosool. One developer went further by suggesting an automated version. These suggestions are discussed as future work in Section [10.5](#).

In the responses to the closed-ended questions, around 74% found Wosool items were easy to understand while 94% of them thought Wosool was easy to use. All the interviewed developers believed that Wosool would enhance the accessibility and usability of Arabic university websites.





## Chapter 9

# Discussion

This chapter presents a discussion of the results obtained from the previous research phases. The discussion tries to link the three phases of the research together and compares the results with previous literature.

### 9.1 Current Practice to Evaluate Accessibility of Saudi University Websites

Reviewing the literature revealed a consensus on the low accessibility levels of Arabic websites and a lack of awareness of the impact on people with disabilities (Chapter 3). In order to gain a deeper understanding of the accessibility situation in Saudi university websites and how they were evaluated by their developers, the participating developers were asked how they usually evaluated the websites and what they usually focus on, as described in Chapter 8. The results from their interviews (Section 8.3.1) showed that accessibility was neither evaluated nor a matter of concern when developing Saudi university websites. Actually, they tended to evaluate different aspects, such as the appearance and aesthetic of the website, comparability and code. These results corroborated the results achieved from previous studies on accessibility of websites in the KSA (for example: [Abanumy et al. \(2005\)](#); [AlJarallah and AlShathry \(2015\)](#); [AlJarallah et al. \(2013\)](#)), where it was found that web developers, designers and webmasters did not consider web accessibility as an important issue. These findings would explain the low accessibility levels of Saudi university websites in studies conducted by [Rana et al. \(2011\)](#), [Alahmadi and Drew \(2016\)](#) and [Akram and Sulaiman \(2017\)](#). They also agreed with the results from Phase One of the current study (Section 6.3.2.8), where the participating developers stated that no accessibility guidelines, either international or local, were followed when developing the websites.

In order to analyse why accessibility was neglected in these websites, the participating web developers were asked to identify the challenges and obstacles they faced (or may face) that would hinder adopting the accessibility, as discussed in the next section (Section 9.2).

## 9.2 Challenges Identified by Web Developers

Different challenges and obstacles which contribute to this problem and hinder the implementing of accessibility principles and practices were identified in Section 6.3.2.7. In general, these challenges vary, as they concern different issues, such as awareness, as well as technical and administrative issues.

A number of studies have discussed disability in Saudi Arabia, (e.g., [Al-Jadid \(2013\)](#); [AlGain and Al-Abdulwahab \(2002\)](#)). They have reported the negative attitude of the community toward those with disabilities as a challenge in conducting research involving the disabled or improving services for them. The findings from the current research agree with their findings, since around 83.33% of the web developers cited this issue as a main challenge in enhancing web accessibility. As reported by [Al-Abdulwahab and Al-Gain \(2003\)](#), the main reason for negative attitudes was the lack of knowledge about those with disabilities, which could be improved by an increased level of knowledge and education about disability issues. A number of previous studies on web accessibility in the KSA were in line with this finding. They recommended raising the awareness of equal opportunities for all users, among web developers of government websites in general ([Abanumy et al., 2005](#)), and university websites in particular ([Rana et al., 2011](#)).

Lack of guidelines for university websites in general and accessibility issues in particular was another obstacle. This result corroborated previous studies ([Abanumy et al., 2005](#); [Akram and Sulaiman, 2017](#); [Al-Khalifa, 2010, 2012a](#)) that recommended developing guidelines appropriate for Arabic websites in Saudi Arabia and/or adapting the existing web accessibility guidelines to the local context. In addition, legal enforcement by decision makers to follow the guidelines in these universities was also recommended.

Other issues regarding lack of training, knowledge and experience show a pressing need to raise the developers' skills by training them on up-to-date technologies. Lack of training was also pointed out as a challenge faced by web developers and webmasters in the USA ([Lazar et al., 2004](#)). To overcome this issue in Saudi Arabia, [Al-Khalifa et al. \(2016\)](#) recommended more training for developers and this would result in improvement of the accessibility situation. Moreover, technical Arabic resources need to be enriched by translating the resources from foreign languages into Arabic. Lack of accessibility knowledge was a common finding between the current study and a previous study carried out by [Trewin et al. \(2010\)](#) with IBM developers in the USA.

The results showed that attitudes at administrative levels and lack of support for developers added to accessibility problems. Negative attitudes towards disabled people and a lack of awareness of their needs might be a reason for being unsupportive. Spreading awareness about accessibility and its importance should start from the managers, who then can spread it to their developers. Lack of managerial support was also an issue for American webmasters, as discussed by Lazar et al. (2004).

Lack of improvement plans was another challenge that might be overcome by developing strategic, stepwise and realistic plans for the adoption of web accessibility. In addition, more work in the area of assistive technology is needed to support Arabic language (Zetterström, 2012), as most of these technologies do not satisfy Arabic users.

Accessibility of integrated systems was identified as another challenge that would be resolved by investigating their accessibility before integrating them into the website. An example of these integrated systems given by the developers was Learning Management Systems (LMSs) such as Blackboard and how their accessibility levels would affect the accessibility of the website they fit into. This challenge was corroborated by the results of a study conducted by Alotaibi (2015), to investigate the accessibility of Blackboard at Taif university in Saudi Arabia. The results showed that the Blackboard system did not meet accessibility guidelines and would add to the accessibility problems of the website.

It was noticed that lack of time and budget was revealed as a finding from two studies (Lazar et al., 2004; Trewin et al., 2010); however, these factors were not revealed as obstacles in this study. The present results indicate that the financial and time resources are available and would help to improve the accessibility situation.

Identification of the challenges above by web developers working at Saudi universities provided more insight into the accessibility issues and what obstacles they faced that hindered accessibility. Although the number of the interviewed developers was only 12, the interviews were useful and beneficial as they shed light on challenges that would not have been identified by merely reviewing the literature.

### 9.3 The Localised Web Content Accessibility Guidelines and Success Criteria (SCs)

In the first phase of this study, the framework for localising web content accessibility guidelines for university websites in Saudi Arabia (FLWCAG) was constructed. The next step was to review the framework's components, through an expert review, as described in Chapter 6. The result of this expert review was shown in Figure 6.1. The second phase involved a localisation process for web content accessibility guidelines, by applying the proposed framework (FLWCAG). The outcome of the localisation process was then reviewed and analysed. Figure 9.1 summarises the outcome as a Venn Diagram: Circles

(A) and (C) represent WCAG 2.0 and the proposed guidelines, respectively, while the intersection of the two circles represents a group of the proposed guidelines that required changes to WCAG 2.0 or suggested guidelines that are already in WCAG 2.0 (see Section 7.1). The guidelines and their SCs were classified according to the genre-specific cultural markers, as specified in FLWCAG, in Figure 6.1. The following subsections discuss the proposed guidelines based on those markers.

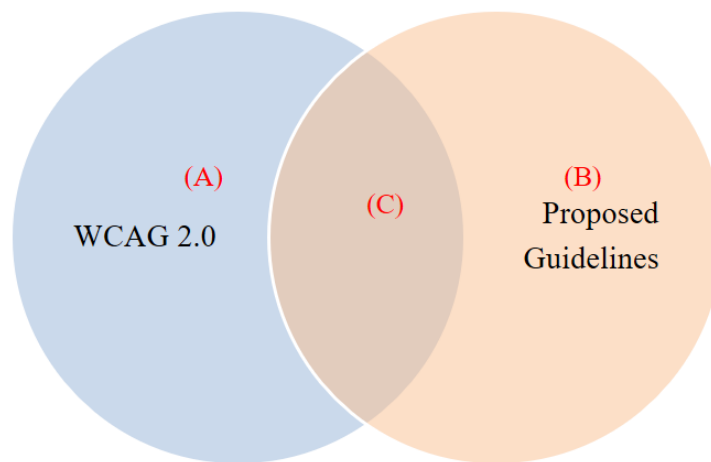


Figure 9.1: The Outcome of the Localisation Process

### 9.3.1 Language Guidelines and SCs

Language was the main and most important aspect that would affect the accessibility principles of understanding and perceiving the web content, as Table H.1 in Appendix H shows. To be more specific, the guidelines and SCs on direction of the language, diacritical marks, homographic and gender specific language, long sentences and abbreviations contribute to understanding the Arabic web content, whereas the guidelines and SCs on font size, type, cursive form and spaces within and between words, type of text emphasis, alignment of text, spacing between lines and paragraphs and numbers would make the Arabic web content more perceivable. As Table 7.11 shows, all language SCs except one were statistically significant, as explained in Section 7.3.3.

In terms of language and direction of reading and writing, the results confirmed the importance of specifying the language and its direction for the whole Arabic web page (*SC 1.1.1*) or for the part that contains non-Arabic text (*SC 1.1.2*). These SCs made changes to those in *WCAG 3.1.1* and *3.1.2*, where they focused only on specifying the language. Language specification is useful, for example, for screen readers or other technologies that convert text into synthetic speech to render text more accurately. Visual web browsers can display characters and scripts correctly and media players can present captions properly. As a result, users with disabilities will be better able to understand the content. However, besides language, specification of language direction

is also important (Elkabani et al., 2015, 2016) for either the whole page or the non-Arabic part, as this would make the content presented to the user as expected, which results in easy understanding of the web content (W3C, 2011).

A new SC was proposed under the Direction of Reading and Writing, which is: *SC 1.3.1 There is a consistency in the direction between data entry (writing) and data display (reading)*, which obtained a high mean of 4.30. This result corroborated the results from previous studies on Arabic content accessibility, such as Al-Wabil et al. (2010); AlRowais et al. (2013); Elkabani et al. (2015, 2016). The examples in Figure 9.2 show why web developers should be careful when they design for Arabic websites, in terms of the direction of data display and data entry, whether they are text or numerals. This would especially benefit users who rely on screen readers to convert text into speech or those with dyslexia, as discussed by AlRowais et al. (2013).

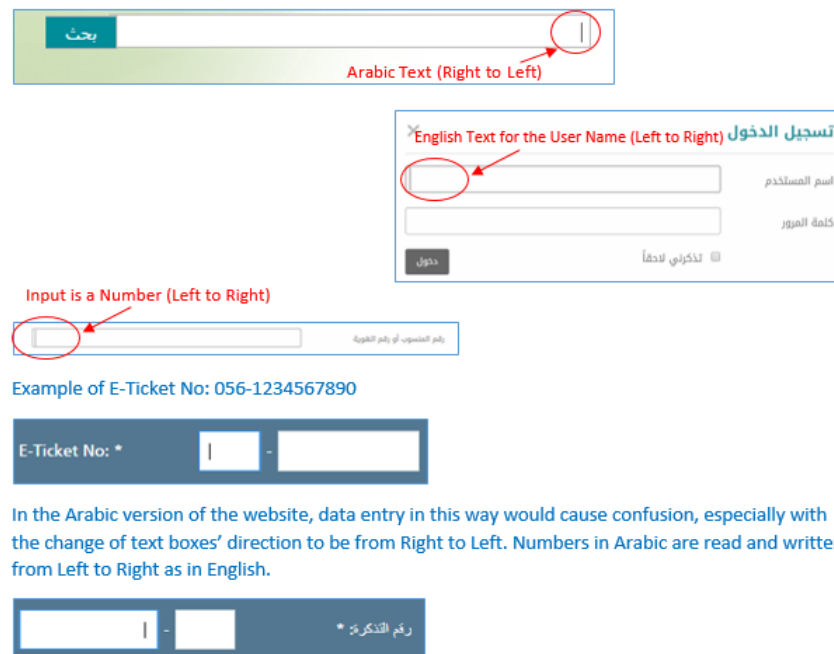


Figure 9.2: Consistency in the Direction between Data Entry and Data Display

Using diacritical marks makes reading easier for people with reading difficulties who use screen readers or users with low literacy levels. They are also used to distinguish homographic words and differentiate between the genders. Although there are two ways to use diacritical marks, full or partial, full diacritical marks were not recommended in previous studies (Al-Wabil et al., 2010, 2006) and in Phase One of this study (Section 6.3.2.2). The reason behind this would be that full diacritics could add more complexity to the text, making it hard to read; however, a greater reading accuracy would be achieved by screen readers when full diacritics are applied. Therefore, *SC 2.1.1* and *2.1.2* were proposed to provide partial diacritics as a default and also allow options for full or no diacritics to suit different user needs.

The results of *SC 5.1.1* regarding the font size with *at least 16-point for the text and 20-point for the headings* showed strong agreement on its importance and corroborated previous studies on reading Arabic from a screen (Abubaker and Lu, 2012; Al-Wabil et al., 2006). This indicated the importance of specifying font size in the accessibility guidelines in order to provide more perceivable content to the user.

Font type was the topic of *SC 6.1.1*, which received the highest importance rating amongst the Language SCs. The preferred readable font types, as rated by the participants, were Times New Roman followed by Arial, Tahoma, and Simplified Arabic, while the least preferred font was Traditional Arabic. This result was different from those in previous studies conducted by Al-Wabil et al. (2006); Alsumait et al. (2009); Ramadan (2011), in which the preferred text font types, were Arabic Transparent followed by Simplified Arabic Fixed (Al-Wabil et al., 2006) and Simplified Arabic (Alsumait et al., 2009; Ramadan, 2011). Although there was a difference in the font type preference, the rated fonts were clear and readable, with deep curves and straight and vertical uprights which make the reading process easier.

The importance of clarity and differentiation between spaces within words and spaces between words in Arabic have been discussed in the literature that focuses on difficulties of reading in Arabic and dyslexia (Al-Wabil et al., 2006; AlRowais et al., 2013; Elbeheri et al., 2006). The availability of disconnected letters and the absence of capital letters in Arabic add to the problem of identifying the word boundaries in Arabic text, as explained in Section 5.2.2.1. As discussed in Section 7.3.3, more than half of the participants in Phase Two of the study voted for the word spacing to be slightly more than 1.5 times the normal spacing and this spacing can be easily configured in the website code. These results were in line with the studies by Al-Wabil et al. (2006); AlRowais et al. (2013) where increasing spaces between words was recommended.

In terms of emphasising text, the results for *SC 8.1.1* showed agreement on the importance of using bold or a combination of both bold and colour. This result corroborated the results obtained in Phase One of the research, in the expert reviews (Section 6.3.2.2), where a number of experts recommended a combination of bold and colours to emphasise words in text. In addition, this result was supported by the result obtained from a previous study that investigated the preferred type of text emphasis in Arabic (Al-Wabil et al., 2006). Using colours can increase the possibility that the information will be retained in the long term memory. Underlined text as a way of emphasis would strike out diacritical marks, which might make the reading difficult, therefore it was not favoured by **Experts C, H, J and Q** in Phase One of the research (Section 6.3.2.2).

As for Arabic text alignment, *WCAG 1.4.8 (3): Text is not justified (aligned to both the left and the right margins)* was changed to *SC 9.1.1 Text is either right justified (better) or fully justified*. The results in Table 7.11 showed the importance of having text alignment from right to left, due to the nature of the script, or having fully justified

text. Full justification of Latin script based texts is considered as a problem, since it is carried out by handling of hyphenation, insertion of inconsistent spaces between words or inter-word glue, which can be stretched or shrunk to some extent (Benatia et al., 2006; Hssini and Lazrek, 2011). Some authors (Al-Wabil et al., 2006; Benatia et al., 2006; Hssini and Lazrek, 2011) have explained that fully justified text is not seen as a problem, because the Arabic script is cursive: words can be stretched by Kashida to cover more space, and can be forced by the use of the ligatures where letters are superposed on one another. Moreover, full justification would make the Arabic script more organised, without an uneven margin on the left. However, sometimes full justification makes the perception harder, especially when there are few words on the line because of excessive stretching of words. Moreover, full justification is not suitable for all font types. For example, full justification with word stretching does not work well with Fixed Arabic Transparent, as explained by **Expert B** in the first phase of this study, “*font type is important when deciding on alignment of text.*”. Therefore, in this research, text justification was connected to font type.

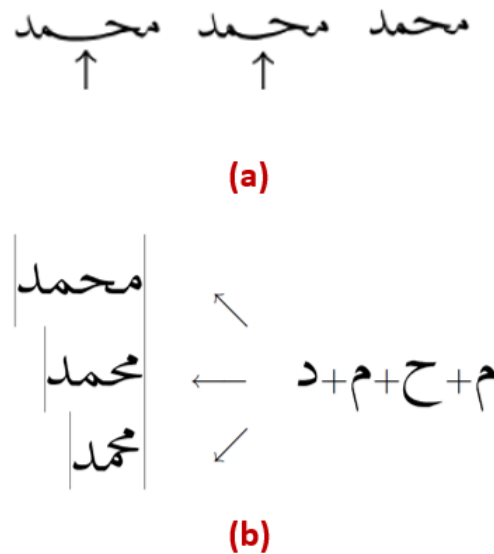


Figure 9.3: Effect of Full Justification in the Arabic Script, (a) An Arabic Word with Kashida; (b) Various Levels of Ligatures (adopted from Benatia et al. (2006)).

The use of long sentences was the topic of *SC 10.1.1* and the result supported the importance of having short sentences and paragraphs. This result agreed with the result from the previous research carried out by Al-Wabil et al. (2006). As **Experts D** and **H** pointed out in Section 6.3.2.2, long sentences would influence the understanding and comprehension of the text, especially if there were no commas or punctuation. Having shorter sentences and paragraphs would provide an easy to understand text to the user; however, adhering to this SC might be difficult, since the nature of the Arabic language allows for longer sentences that span many lines.



Arabic is highly diglossic, meaning that speakers use both MSA and a spoken Arabic vernacular (SAV). MSA is used in formal situations, whereas SAV is spoken informally and learned by children from their families (AlGhanem and Kearns, 2015; Saiegh-Haddad, 2005; Saiegh-Haddad and Henkin-Roitfarb, 2014). The contents of university websites were deemed to be formal and had to be suitable for academic websites; therefore, using readable MSA with common and simple words was proposed in *SC 11.1.1* and *SC 11.2.1*. The results in Table 7.11 showed the importance of this matter and corroborated the recommendations from the experts in Phase One in this study and the literature on Arabic language (AlGhanem and Kearns, 2015; Saiegh-Haddad, 2005; Saiegh-Haddad and Henkin-Roitfarb, 2014). How to decide which are the common words and what constitutes simple language is a real issue for developers and those writing for web pages, particularly if they are writing pages that might be read by those with poor literacy skills and cognitive impairment. Clear language for all web content is an important accessibility principle. However, if the user does not understand words, the whole website often becomes unusable. This issue of how hard to test the related SCs in WCAG is being discussed in the latest WCAG COGA (COGNitive and learning disabilities Accessibility) discussions (W3C, 2016a).

Another new SC that would impact the perception of Arabic content is numbers, as their format needs to be suitable for the Arabic context. The results showed the importance of using the Arabic-Indic numeral system -which is usually used in Eastern Arab countries, such as Saudi Arabia and Jordan, with Arabic content (W3C, 2006). This result corroborated the result from Zawati and Muhanna (2014) who found using Arabic numbers -that are usually used in Western countries with Latin-based languages- or mixing them with Arabic-Indic ones was a challenge for many Arab web users.

Users with reading difficulties or low vision find it difficult to track text where the lines are close together. Line spacing was another important factor that facilitates reading perception and the result of *SC 13.1.1* showed its importance. *WCAG 1.4.8(4)* suggests *at least space-and-a-half within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing*. However, more vertical spacing in the Arabic script would provide more clarity, due to the need to allow more space for diacritical marks (Hssini and Lazrek, 2011). Therefore, in *SC 13.1.1* recommended line spacing is increased to be at least 2 spaces within paragraphs and 1.5 times larger than line spacing between paragraphs.

Using abbreviations and acronyms in Arabic properly was another important aspect that supports understanding of the Arabic content. The result of *SC 14.1.1* to avoid using abbreviations and acronyms in Arabic websites showed its importance. Although using the full form of the abbreviations would make the text longer, it would be much easier to understand, with no effort from users to decode abbreviations and acronyms. This result was consistent with Arabic textbooks and with what Arab people are familiar with.



According to [Abu Humedi and Altai \(2013\)](#) Arabic textbooks do not use acronyms, since Arab linguists consider dealing with acronyms as borrowed from Latin-based languages.

Where the abbreviations and acronyms are used, they could be Arabic or borrowed from other languages, as proposed in *SC 14.2.1* and *SC 14.2.2* which provide more specifications and details for Arabic abbreviations and acronyms. The results in Table 7.11 show their importance and corroborated the recommendations from the literature on Arabic abbreviations ([Abu Humedi and Altai, 2013](#)).

### 9.3.2 Guidelines and SCs for Data Format, Symbols and Icons, Multimedia and Colours

Data format was another cultural marker that would influence the perception and understanding of the web content. The results showed the importance of data formats and their role in providing more understandable and perceived content which would benefit all target users. For example, the results showed the importance of using Hijri calendar in Saudi university websites, since the target users are not familiar with other types of calendars, such as Gregorian. Currency was another example of data format, and it should be presented as Saudi Riyals in order for the users to perceive the price easily. The results agreed with those of previous studies that investigated similar issues ([Al-Badi and Mayhew, 2010](#); [Al-Sedrani and Al-Khalifa, 2012](#); [Ibrahim et al., 2013](#)) and with what the experts pointed to in Phase One of the current study. Figure 9.4 gives examples of how a number of Saudi university websites were developed without consideration of some cultural aspects such as data formats. This would be possibly explained by the fact that not all web developers in Saudi universities are Arabic-native speakers, as explained by **Developer WD8** in the third phase of the current study:

*“Arabic content is usually weak in our websites, I believe that one of the reasons that contribute to this problem is that non-Arabic native speakers are developing our websites.”*



Figure 9.4: Examples of Mistakes in Data Format in Saudi University Websites.

Symbols might be the most subtle and powerful representations of cultural thought and acquire meaning through convention and practice (Singh, 2002). Some symbols and icons may be completely acceptable in one country, but trigger negative reactions in another country (Barber and Badre, 1998). This would affect the perception and understanding of the web content, and hence its accessibility. The results for the new proposed SCs under the cultural marker Symbols and Icons showed the importance of using appropriate symbols that the user can recognise, perceive and understand easily, which would raise the accessibility of the web content. These results corroborate the results from the literature on localisation, such as those of Al-Sedrani and Al-Khalifa (2012) and Brandon (2001). Figure 9.5 represents examples of symbols and icons that would not be easy to understand by target users, especially those who are new to the web or inexperienced.

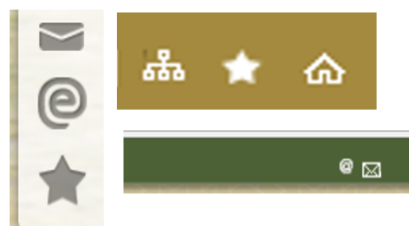


Figure 9.5: Examples of Symbols and Icons in Saudi University Websites.

The use of multimedia, including video, audio, images and pictures, is another cultural marker that would influence the accessibility of the web content. Appropriateness of multimedia in university websites for a conservative culture such as Saudi culture was rated to be highly important, as shown in Table 7.11. For example, the use of pictures of women on university 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 Saudi university websites. Using images of nature is considered a better way to gain cultural acceptance. In addition, most pictures in Arabic university websites focus on university buildings (Marcus and Hamoodi, 2009). Incorporating music with multimedia was another example of a sensitive issue for some people in the society. For this reason, a different option for music was proposed to the users which included providing a hint that there is music and/or providing version without music.

**Experts Q and I** in Phase One of this study (Section 6.3.2.2) and also Almakky et al. (2015) pointed out that users in Saudi Arabia prefer multimedia such as videos and images to text so there was widespread use of multimedia in university websites. However, there was no consideration of other culture-related issues, such as Internet speed in the country and broadband availability (Naveed et al., 2017; Tashkandi and Al-Jabri, 2015). Therefore, a new SC was proposed regarding this issue to limit the size of multimedia items including images, on any web page to be suitable for the current Internet infrastructure. One might suggest that users can turn off multimedia in the case where there

is poor connectivity; however, the aim was to cater for user's needs and situations with minimal action from them.

The high-rated results for the proposed SCs in multimedia in Table 7.11 agreed with previous studies on localisation of websites for Saudi context (Al-Badi and Mayhew, 2010; Al-Sedrani and Al-Khalifa, 2012; Ibrahim et al., 2013; Naveed et al., 2017; Tashkandi and Al-Jabri, 2015), and with the expert review in the first phase. This confirmed that multimedia on Saudi university websites should respect the user's culture, which is governed by cultural values and religious principles.

Colour is an essential feature of appearance that is influenced by culture (Marcus and Hamoodi, 2009). The results for a new proposed SC on the type of colours to use in Saudi university websites revealed that there was agreement on the importance of using masculine colours such as blue and green and avoiding feminine colours. This result aligns with similar results from a study conducted by Khanum et al. (2012) and also one by Marcus and Hamoodi (2009) where they found that most users of Arabic university websites would like to see blue and grey colours in the websites. The result for the SC that suggested the colours of university websites should be derived from the surrounding environment, the university's logo or the national flag showed the agreement among the experts on its importance. This result corroborates the findings from a study conducted by Barber and Badre (1998), where they noticed that the colours of the national flags were usually used by government websites in almost all the countries they studied, including Saudi Arabia. The result also agreed with the findings from Cyr et al. (2010), where they elaborated on the role of the surrounding environment on colour preference.

Colour contrast plays an important role in perceiving web content for colour-blind users and has an effect on other users as well, for example, those with low contrast sensitivity, which is common in older people. Besides providing culturally appropriate colours, colours must have sufficient contrast between text colour and its background (Ramadan, 2011), and colours in images, icons, and buttons. In addition, colours used to convey information on diagrams, maps, and other types of images must be distinguishable (W3C, 2008). There are tools to help check and select appropriate colour combinations, such as Contrast Checker (Acart Communications Inc., nd). This would be ideally done during the early design stage and the selection of colour palettes (W3C, 2016d).

### 9.3.3 Layout and Navigation Guidelines and SCs

The layout of the web pages and navigation scheme identify the cultural preferences and can affect website accessibility in terms of providing web content and components that are perceivable, understandable and operable. The results of the new proposed SCs for layout, in Table 7.11 showed their importance among the participating experts. This indicates that appropriate placement of interface elements and page direction can

provide the website's users with a structural model for perceiving and accessing the web content. These results were aligned with the findings from previous studies on Arabic website layout and culture (e.g., [Al-Badi and Mayhew \(2010\)](#); [Al-Sedrani and Al-Khalifa \(2012\)](#); [Khanum et al. \(2012\)](#); [Salmerón et al. \(2017\)](#)).

Users' cultural backgrounds can influence their navigation patterns in terms of time and perception of information ([Kralisch et al., 2005](#); [Petrie et al., 2009](#)). *SC 22.1.2* on language consistency when navigating Arabic university websites was proposed. Figure 9.6 represents an example of a sudden language change from Arabic to non-Arabic which might cause confusion to the users, especially for those who do not have any background in the language presented, and inexperienced users. Another example is the use of CAPTCHA or reCAPTCHA<sup>1</sup> in Arabic websites. CAPTCHA and reCAPTCHA are security measures that guard web applications against automated robot abuse by presenting a random auto-generated distorted text for users to solve. These challenges have to be devised to be hard on computers, yet easily solved by humans. For example, blind users are required to recognise the text within a restricted time frame by listening to the audio reading of the text ([Almurayh and Semwal, 2013](#)). Although reCAPTCHA exists in other languages, no Arabic reCAPTCHA service is available to the public yet ([Abubaker et al., 2017](#); [Almurayh and Semwal, 2013](#)). This could be the reason why developers have adopted reCAPTCHA in English. However, if this reCAPTCHA text is not written or spoken in a language which the user knows, it will become a considerable barrier to access the web content or navigate further. This could be time consuming for a blind user who has to wait for a while to listen to the text before submission. So for those who are unfamiliar with the language presented in reCAPTCHA, they may have to guess the words several times. Consequently, the users could be blocked automatically by the system after several failed attempts as the system would consider failed attempts, as spamming mechanisms ([Almurayh and Semwal, 2013](#)). As an attempt to overcome this issue, [Abubaker et al. \(2017\)](#) proposed a cloud-based Arabic reCAPTCHA service that can be used by website developers to provide protection for Arabic websites against automated abuse. Therefore, it would not be easy for developers to meet *SC 22.1.2* if they use reCAPTCHA, since the area of reCAPTCHA and Arabic support still needs further improvements.

## 9.4 The Checklist (Wosool)

The guidelines and success criteria discussed in Section 9.3 were primarily developed and localised to tackle one of the challenges identified by web developers in Saudi universities, which was the lack of guidelines for Arabic university websites in Saudi Arabia. In Chapter 8, an Arabic checklist called Wosool was developed by converting the localised

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<sup>1</sup>An improvement of the CAPTCHA system and uses another type of Human Interactive Proofs (HIPs)

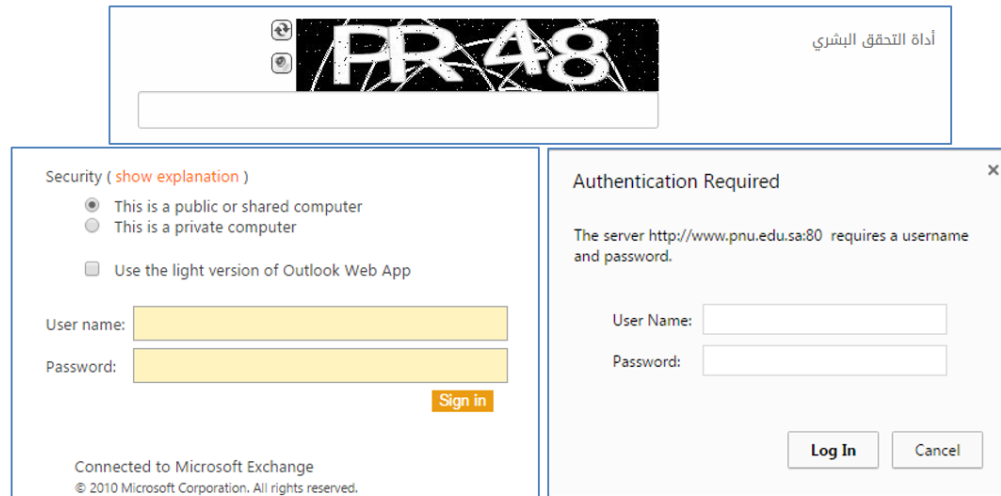


Figure 9.6: Examples of Language Inconsistency in Saudi University Websites.

SCs into checklist items to help the developers identify the basic accessibility problems in the website. A total of 15 Saudi university website developers, with experience ranging between 2 and 13 years were interviewed to review Wosool. The results revealed that around 74% of the participating developers found the Wosool items were easy to understand while 94% of them thought Wosool was easy to use. In addition, the interviewed developers reported that they found Wosool to be comprehensive, clear and applicable to other Arabic websites.

All the interviewed developers believed that Wosool would enhance the accessibility and usability of Arabic university websites. As explained in Section 8.1, a number of the items in the proposed checklist Wosool need to be assessed by users with different disabilities. The inclusion of user testing, evaluation of Arabic content and consideration of Arab users with different abilities were pointed out as positive aspects of Wosool. Usability should be regarded as integral to accessibility concepts in evaluating the accessibility of university websites (Alahmadi and Drew, 2017). Moreover, the satisfaction of the target users, for example, students with disabilities should be the top priority in ensuring accessibility. In addition, having a website evaluated by people with disabilities would give useful insights into the problems and barriers they come across when surfing the web. However, finding groups of people with a wide range of disabilities, who are willing to participate in evaluations, is not easy (Petrie and Bevan, 2009).

One of the main criticisms of Wosool was the time it would take to perform the evaluation. This time consuming aspect was connected to the fact that almost all the checklist items require manual checks. However, the participating developers confessed that using Wosool would save time in the long-term, once they had got used to the checks that could be taken into consideration during all development stages.

As for evaluating the Arabic content, one of the participating developers commented that language editors should be responsible for checking and reviewing the language before content was published on the website. This would be essential, especially when it comes to some language rules, such as applying diacritics, which can be daunting for the developers, even if they are native speakers. However, not all universities have language editors in their development team, as commented by **Developer WD4**:

*“Although the importance of presenting edited and correct Arabic content on our website, there is no language editor in our development team. Fortunately, my linguistic skills are high so I can check and edit the Arabic content.”*

Previous work by [Al-Khalifa \(2012b\)](#), contributed to the area of evaluation of Arabic websites’ accessibility by developing a tool that displays the evaluation results in Arabic to the Arab developers. However, WCAG 2.0 guidelines and SCs were adopted as they were, and no localisation to suit the Arabic context was carried out. In the current research, the localisation of WCAG 2.0 to be suitable to the Arabic context and especially university websites in the KSA was a priority. Although Wosool is in its first stages and would consume developers’ time, it could provide the target users with websites that would be accessible, usable and suitable to their culture.

## 9.5 Importance of Feedback from the Experts who Work with People with Disabilities

In the first phase of this study, three experts working with disabled people were interviewed, two of them were working with blind people and one was working with deaf individuals. Discussions with them were useful and helpful in explaining and clarifying how Arab users with disabilities suffer when surfing the web. They explained that the main difficulties blind Arab users face when they browse Arabic websites were with the images, where most of the time there were no text alternatives to describe what the images contain, and even if there were alternatives they were uninformative and meaningless. The experts pointed out the importance of applying full diacritical marks in a correct way in order for the screen readers to read and pronounce the text appropriately. Reading pdf documents was another difficulty blind people usually struggled with. The experts emphasised that Arabic blind users can use different assistive technology, such as screen readers and Braille devices to access the web easily; however, the Arabic websites were not designed to make blind users enjoy their experience in browsing the web in the same way as their peers.

The expert who was working with deaf Arab users explained that deaf users usually look for images and videos when they browse the web, but sometimes cannot enjoy their

experience due to the low Internet speed in the country. She also pointed out that deaf users do not pay attention to text, especially if the words are not common. This is because their linguistic, reading and understanding skills are usually low.

More weight can be given to feedback from those experts, as they provide more insight into the situation of Arab people with disabilities and help to understand their needs. Deep understanding of people with different disabilities is recommended and one way to do so is obtaining feedback from people who work with them on daily basis.

## 9.6 Chapter Summary

This chapter has presented a discussion of the findings of the research study. The results of the research phases were discussed and linked to the literature and other research phases, when appropriate. The chapter started by discussing the current practice to evaluate accessibility of Saudi university websites, and it was concluded that accessibility was neglected in these websites, and what they focused on was other aspects, such as the appearance of the website. Section 9.2 discussed the challenges that would hinder the developers of these websites from adopting accessibility and linked them to previous studies. The challenges vary between attitudes towards disability, the lack of training, expertise, knowledge, or guidelines for university websites and also administrative issues. The discussion of the localised guidelines and SCs was provided by linking them to previous studies, results from other research phases and accessibility principles (Section 9.3). Section 9.4 discussed the results obtained from the interviewed developers regarding the developed checklist, *Wosool*. Clarity, comprehensiveness, being culture-sensitive and user testing were the main positive aspects of *Wosool* mentioned by the participants, whereas being time consuming was the main negative aspect.





## Chapter 10

# Conclusion and Future Work

This chapter presents an overview of the research, summarising its phases and key findings. An overview of the research contribution and limitations are then provided. Finally, future work and research implications and recommendations are discussed.

### 10.1 Research Overview

The literature on web accessibility of the Arabic websites in the KSA showed their low accessibility levels and a lack of awareness of its impact on people with disabilities (Chapter 3). Browsing Arabic websites by disabled users would be a challenge and would require them to ask for assistance from people around them, which would decrease their independence and their self-esteem. One of the reasons contributing to this accessibility problem is that the existing web accessibility guidelines, such as WCAG, have been developed in Western countries (North America and Western Europe). Merely cloning the existing guidelines and applying them to Arabic websites would raise more accessibility issues related to culture and language. Some of these guidelines are not suitable for all cultures with all languages: a simple example of this is the font size and type. The acceptable font size and type in Latin-based languages would not be accepted in other languages like Arabic. The specific issue of localisation of the accessibility guidelines to suit the Arabic context and its influence on accessibility has not been comprehensively investigated by previous studies. However, several researchers have touched on the subject in different ways. These studies recommend conducting more research into web accessibility in the Arab region, as was described in Chapter 3.

To make this research more achievable, the study focused on one Arabic country, which was Saudi Arabia and one website genre, which was university websites. Saudi Arabia was considered the leader of the Arabic and Islamic countries. This is because it is the land of the two holy mosques. Moreover, by 2017, the number of Internet users

in Saudi Arabia was the second largest in an Arabic-speaking country ([Internet World Stats, 2017a](#)). University websites in Saudi Arabia have been chosen for two reasons. Firstly, there has been an increase in the number of universities in Saudi Arabia, in the last two decades, and consequently their websites. Secondly, without clear accessibility guidelines, they suffer from low accessibility levels ([Akram and Sulaiman, 2017](#); [Rana et al., 2011](#)).

The current study set out to localise the existing accessibility guidelines into a form and content acceptable and easy to use by the developers of Saudi university websites. Moreover, applying these localised accessibility guidelines on Saudi university websites would raise their accessibility and adequacy for Arab users with disabilities. The plan to achieve this aim was designed in three main phases: the first phase started by developing a new framework for localising web content accessibility guidelines for university websites in Saudi Arabia (FLWCAG). Interviews were then conducted with 18 experts, aimed at validating the proposed framework. The results from the interviews included both quantitative and qualitative questions. Overall, the experts supported the proposed framework, and the validity of the components in the framework was assured through triangulating the literature, the quantitative and the qualitative results. Another outcome from this phase was the modification of the initial proposed framework to be as shown in Figure 6.1.

In the second phase, covered in Chapter 7, a localisation process for web content accessibility guidelines and SCs was carried out by applying FLWCAG. An online questionnaire was then designed and conducted to review the outcome from the localisation process. The complete list of the guidelines and their SCs is found in (Appendix H).

The last phase of the study, covered in Chapter 8, aimed at developing a checklist, called *Wosool*, in order to provide support to Arab web developers in evaluating and improving the accessibility of Arabic university websites. Interviews were designed and conducted with 15 university website developers to review the checklist. The results were positive: the developers confirmed that *Wosool*'s items were understood, clear, and easy to use. The checklist is available in Appendix K.

## 10.2 Research Questions

This research study addressed four main research questions, as follows:

- **RQ1: What are the challenges facing Saudi university web developers wishing to enhance the accessibility of their websites?**

The interview was conducted with 12 web developers from 7 universities and different challenges and obstacles that contribute to this problem and hinder the

implementation of accessibility were identified. In general, they pointed out that these challenges vary, as they concern different issues, including awareness, as well as technical and administrative issues. It appeared that a better understanding of these challenges would help to inform suggestions and solutions for improving accessibility.

• **RQ2: What is a framework that can be used to localise Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia?**

This research question sought to define a framework to identify the important components to localise accessibility guidelines. Three further sub-questions needed to be answered in order to build up the answer to the second research question:

- **RQ2.1:** *How can the framework for localising Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia be developed?*
- **RQ2.2:** *How can the content of the proposed framework be validated?*
- **RQ2.3:** *What are the validated framework components, subcomponents and elements that can be used to localise Web Content Accessibility Guidelines for Arabic university websites in Saudi Arabia?*

In the first phase, the initial proposed framework (FLWCAG) (Figure 5.3) was gradually built up by reviewing and investigating the literature in several research areas including: web accessibility, cultural, technical and financial aspects and their impact on accessibility guidelines. As described in Chapter 5, the development process involved three main phases: determination, synthesis and specification. The resultant framework consisted of six main components: web accessibility, genre-specific cultural markers, costs, user diversity, Internet infrastructure and technology variety. The development of FLWCAG answered the first sub-question (RQ2.1).

An expert review and validation was conducted to review and validate the content of the framework, as described in Chapter 6. The interview was designed as a semi-structured interview which included both closed-ended and open-ended questions. A total of 30 open and closed questions were designed to cover all aspects of the framework. The study involved 18 experts, 12 of whom were university website developers, three experts were researchers in web accessibility in Saudi universities, while the remaining three experts were Arabs who were working with people with special needs.

The experts' review and validation were found to be beneficial in terms of enriching the content of the proposed framework. They pointed out the importance of incorporating a new component, web usability, into the framework. Three new elements emerged from interviewing the experts and were added to the Language subcomponent. These elements concern the format of numbers in Arabic websites (Arabic or Arabic-Indic), abbreviations and acronyms in Arabic and the spacing

between lines and paragraphs in Arabic websites. It was suggested that the component concerning the costs of the Internet access and devices should be removed. This was seen as an unimportant component, since the prices of technology have dropped, and due to the financial support that people with disabilities receive from the Saudi government. The reviewed and validated framework contains six main components: web accessibility, genre-specific cultural markers, web usability, user diversity, Internet infrastructure and technology variety. The expert review and the completion of the refined and validated framework (FLWCAG) answered the second and third sub-questions (RQ2.2) and (RQ2.3).

- **RQ3: What additional/adapted localised Web Content Accessibility Guidelines are needed for Arabic university websites in Saudi Arabia?**

The validated framework, from Phase One was applied through designing a localisation process. This process went through four stages, Stage One proposed guidelines and SCs when applying the framework, FLWCAG. In Stage Two, the outcomes of Stage One were classified into: guidelines and SCs that were entirely new, and those that either made changes to or were equivalent to those in WCAG 2.0. In total, there were 20 new guidelines and 45 new SCs and 9 guidelines and 11 SCs involved changes to WCAG 2.0, while only 4 SCs were already in WCAG 2.0. In Stage Three, WCAG 2.0 Level A were categorised according to the cultural markers, and Stage Four merged the outcomes from Stages One and Three. The result from this process was a set of localised web content accessibility guidelines and SCs for university websites in Saudi Arabia. An online questionnaire was then designed for the experts to review the outcome from the localisation process. After piloting, translating the questionnaire into Arabic and calculating reliability, the questionnaire was conducted. The total number of responses was 60; approximately half of the participants were university web developers from 17 universities, followed by web accessibility researchers (20%) and then experts who worked with people with special needs (18.33%). The results revealed the importance of all the SCs after analysing the questionnaire results by a one sample t-test, including the statistical significance of their results. No changes were made to the SCs based on analysis of the qualitative data resulting from the open questions. The third research question (RQ3) was answered and the set of localised guidelines and SCs is presented in Appendix H.

- **RQ4: What would need to be included in a checklist for web developers to evaluate and improve the accessibility of Arabic university websites in Saudi Arabia?**

A checklist called (Wosool) was first developed by converting the reviewed SCs in Appendix H to checklist items in the same culture-based categories (Language, Data Format, Symbols and Icons, Multimedia, Colours, Layout, Navigation and General), which were then further categorised into developer's items and user's

items. The checklist was then translated into Arabic in order to be used by Arab developers. After that, the checklist *Wosool* was reviewed by interviewing 15 Arab web developers who develop these websites and with experience ranging between 2 and 13 years. Although the time needed was a concern, as discussed in Section 9.4, the results showed the interviewees positive attitudes towards the use of the checklist. They also pointed out how easy it was to understand the items in *Wosool*. The involvement of users with different abilities was also considered positive. The fourth research question (RQ4) was answered and the reviewed checklist, *Wosool*, can be seen in Appendix K.

### 10.3 Research Contributions

This study contributes to the body of knowledge in the fields of web accessibility, usability, localisation and culture as follows:

The main contribution of the study is the framework (FLWCAG) for localising web content accessibility guidelines for Arabic university websites in Saudi Arabia. The study constructed, proposed, reviewed, validated and refined this framework. It also confirmed the inclusion of six components in order to perform the localisation, namely web accessibility, genre-specific cultural markers, costs, user diversity, Internet infrastructure and technology variety.

The second contribution that was achieved by applying FLWCAG was a set of localised web content accessibility guidelines and success criteria for Arabic university websites in Saudi Arabia. It was then reviewed by Arab experts in the field of this research and confirmed to be important for its intended purpose.

The third contribution, which was built on the previous ones, was a checklist (*Wosool*) for Arab developers of Saudi university websites. *Wosool* allows the developers to evaluate and highlight the accessibility problems and also improve usability by engaging users from different abilities to take part in the evaluation process. User testing requires some resources such as sufficient time, experienced testers and a carefully chosen testing environment. User testing is usually considered the most precise evaluation method, as it reveals the various difficulties that actual users may face (de Carvalho et al., 2014).

This study has provided an insight into the challenges that were faced by the developers of Saudi university websites. Identification of these challenges contributes to a better understanding of the situation and can lead to appropriate solutions and plans to raise the accessibility level.

Furthermore, this study has contributed to an understanding of the status of web accessibility in Saudi Arabia by reviewing previous studies which investigated this issue.

It also contributed to understanding the initiatives made by different bodies to improve web accessibility in this region of the world by critically reviewing them.

In addition, this study contributes to the area of web accessibility by assessing, analysing and critically reviewing the Arabic version of WCAG 2.0 <sup>1</sup>. It also identified and classified the translation problems and made corrections for them. Addition of the incomplete parts in the Arabic version were provided by this study.

## 10.4 Research Limitations

The findings of this study were impacted by several limitations; some of these are as follows:

- Due to the time, financial, and some physical constraints, one-to-one interviews were not possible with all participants. The researcher felt that some questions would have had different results if there had been the opportunity to interview more experts in face to face situations. The experts in Phases One and Three were very busy and could not afford more time for discussion; in some cases the researcher had to rearrange the interview with them several times. Although finding an expert who was willing to participate in this research was very time consuming, interviewing those experts was found to be useful in exploring some aspects that had not appeared in previous studies, for example, whether they follow any accessibility guidelines when developing the websites. In addition, finding experts who have expertise in web accessibility was a hard task, the researcher felt that there was lack of knowledge about this matter and this would justify the refusal to participate.
- Not all government universities in Saudi Arabia were covered in this study. In Phase One, the participants were from seven universities, in Phase Two, from 17 universities and from nine universities in Phase Three. However, in all phases the participants were from both newly emerging universities and long-established universities.

## 10.5 Future Work

The section highlights some recommendations for future research as follows:

- This study focused on only one culture, Saudi Arabian culture, and one website genre which was university websites. The proposed framework (FLWCAG) could

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<sup>1</sup>Available at: <http://www.alecso.org/wcag2.0/>

be extended to other Arabic and non-Arabic cultures and other websites genres. It would be useful if future research were undertaken to explore such extension, as the proposed framework was designed to be flexible, in order to allow modifications that suit the target culture and website genre, as there was one component dedicated for genre-specific cultural markers, as illustrated in Figure 6.1 in Chapter 6.

- The current study covers the basic accessibility guidelines and SCs, combining WCAG 2.0 Level A with the proposed ones. Although a number of the proposed guidelines and SCs made changes to a number of WCAG 2.0 Level AA and Level AAA and replaced them, the study did not go further to combine other higher level guidelines and SCs. It would be interesting to extend the accessibility guidelines and success criteria to cover higher levels of accessibility. Furthermore, the guidelines proposed in this study covered only desktop version websites. They could be extended to cover guidelines for different devices and platforms. This research is only a first step towards establishing robust guidelines for Arabic university websites. Further research will require substantial studies and resources (e.g. funds, experts, knowledge, time).
- All the items in Wosool have the same level of priority. However, for the purpose of reducing costs and prioritising some aspects, it might be helpful to conduct future research regarding prioritising Wosool items and how this would affect the time required to use it. Additionally, providing Wosool in the form of a semi-automated tool that requires little or no developer intervention, in future, would help in saving developers' time.
- Submissions to the Accessibility Guidelines Working Group (AGWG)<sup>2</sup> to enable the suggested SCs to become part of forthcoming versions of WCAG and other international accessibility standards<sup>3</sup>.
- There also needs to be a definitive translation of WCAG into Arabic to include the techniques and other guidance in order to better support Arab web developers.
- Applying the proposed localised accessibility guidelines on University websites in Saudi Arabia to improve their accessibility levels. The plan is to start with the university I work at (Umm AlQura University) by:
  - First, raising awareness of equal opportunity for all users and importance of web accessibility among the developers and decision makers.
  - Second, improving developers' skills by training them on up-to-date accessibility technologies. Different dissemination strategies would be adopted, such as seminars, workshops and conferences. For example, the SWING

<sup>2</sup><https://www.w3.org/WAI/GL/>

<sup>3</sup><https://www.iso.org/accessing-my-world.html>

- project<sup>4</sup> transfers accessibility best practices and provides different dissemination strategies with developers, such as training and conferences. This project aims to create sustainable policies in universities in order to enable disabled students to have equal access to learning environments and programmes.
- Third, developing strategic and realistic plans for the adoption of web accessibility.
  - Fourth, explaining the proposed localised guidelines and how to use the checklist Wosool to the university's website developers.

Through the experience gained from conducting this research, working with the ECS accessibility team at the university of Southampton, studying accessibility guidelines and techniques with a focus on Arabic websites and discussing accessibility issues with Arab experts in the field and people who work with people with disabilities, the author of this thesis will certainly have moved towards becoming an accessibility expert. The author also attended several accessibility conferences, and published and presented her work in a number of conferences. This was a demonstration of the willingness and ability of the researcher to communicate and share knowledge with other professionals in the field. Attending conferences was very fruitful in terms of obtaining feedback on current research and seeing what others were doing in the area. It was also useful for building a good network of links with other personnel and institutes. In addition, the author received emails from developers of Saudi university websites asking about the guidelines and how to improve the accessibility of Arabic content, which confirmed the significance of this research.

## 10.6 Research Implications and Recommendations

Implications from this study include a set of recommendations that would raise the accessibility levels of Arabic websites.

Universities and decision makers need to understand the challenges involved in making their websites accessible and should adopt the appropriate solutions to improve them. They have to spread the awareness of the importance of accessible websites by developing and improving appropriate and enforceable policies. They should also work on raising awareness among their developers and webmasters regarding the importance of meeting accessibility requirements and then provide technical support and training, for example, workshops and seminars.

Web developers should work towards improving their knowledge concerning accessibility, and incorporate website accessibility at the beginning of the website development

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<sup>4</sup><http://elearning.swingproject.eu/>



process, in order to reduce the cost associated, as opposed to doing that at a later stage. Furthermore, they should take into account users' feedback and needs and pay more attention to delivering web content that is suitable to what they are familiar with in their culture. The successful implementation of website accessibility would enable people with different abilities to get involved directly in the community, thus making it better for all.

Organisations and institutions caring for disabled people have a responsibility to spread awareness amongst other organisations, such as schools, universities and colleges. They should work on spreading awareness among the community of the need for equal opportunities and rights for all people, disabled and non-disabled.

Finally, this study has shown that more work to enrich the Arabic content in the field of information technology is required. There are many valuable technical resources that would be beneficial for Arab developers -whose English language level may be low- if they were translated. It would also be valuable if the translators and IT experts worked together to produce unified Arabic translations for the technical terms. For this reason, Arabic technical articles usually tend to provide the technical terms in English between brackets, so the reader can understand the exact meaning of the term. Even the word "accessibility" can be translated in different ways in Arabic which can cause further confusion.



# Appendix A

## The Question E-mail

Reply Reply All Forward         

### Questions about Guidelines for Design and Management of Public Sector Websites

Alayed A.S.I.

To: [egov@yesser.gov.sa](mailto:egov@yesser.gov.sa)

Monday, January 12, 2015 11:08 AM

I'm doing a research on accessibility and usability for Arabic websites, and I have questions regarding the document: "Guidelines for Design and Management of Public Sector Websites"

- Is there any update for this document as it was published in 2006?
- Who are the authors of this document?
- Are there any studies you referred to in determining the best Arabic fonts and size?

Many thanks.

Regards,  
Asmaa Alayed  
Lecturer at Umm AlQura University, Makkah.  
PhD student at the University of Southampton, UK.



## Appendix B

# List of Translation Problems in the Arabic Version of WCAG 2.0

| Translation Problem | English Word          | Arabic Translation  | Suggestion                                | Location in the Document   |
|---------------------|-----------------------|---|---|--|
| b                   | Updated               | محدثة   | محدثة                                     | Abstract   |
| a                   | Components            | عناصر<br>and<br>مكونات  | عناصر<br>or<br>مكونات                     | WCAG 2.0 Supporting Documents<br>Introduction<br>Glossary                              |
| c                   | User agents           | وسائط الاستخدام   | وسائط المستخدم                            | Introduction   |
| a                   | Informative           | إعلامي<br>and<br>إخباري   | إخباري<br>or<br>تثقيفي<br>or<br>مكتف      | Introduction<br>WCAG 2.0 Layers of Guidance<br>Glossary                                |
| a                   | Overview              | نظرة<br>and<br>لمحة   | نظرة<br>or<br>لمحة                        | Introduction<br>WCAG 2.0 Supporting Documents  |
| a                   | User agents           | وسائط الاستخدام<br>and<br>وسائط المستخدم<br>and<br>وسائط المستعمل<br>and<br>المستخدمين<br>and<br>وكلاء المستخدم | وسائط المستخدم                            | Introduction<br>Important Terms in WCAG 2.0  |
| a                   | Operable              | قابلية الإكمال<br>and<br>قابلية التوظيف<br>and<br>إمكانية التحكم<br>and<br>قابلية الاستخدام                     | قابلية الإكمال<br>or<br>قابلية التشغيل    | Introduction<br>WCAG 2.0 Guidelines – Principle 2<br>WCAG 2.0 Guidelines – Principle 4 |
| a, c                | Code                  | كود مصدري<br>and<br>شفرة المصدر   | شفرة                                      | WCAG 2.0 Layers of Guidance<br>WCAG 2.0 Supporting Documents                           |
| a                   | Conform               | يطابق<br>and<br>يوافق   | يطابق                                     | WCAG 2.0 Layers of Guidance<br>Important Terms in WCAG 2.0                             |
| d                   | Levels of conformance | مستويات المطابق   | مستويات المطابقة<br>or<br>مستويات التطبيق | WCAG 2.0 Layers of Guidance  |
| a, d                | Accessible            | دقيق<br>and<br>قابل للنقل   | قابل للنقل<br>or<br>سهل الوصول            | WCAG 2.0 Layers of Guidance  |
| c                   | Education             | تربوي   | تعليمي<br>or<br>تثقيفي<br>or<br>تدريب     | WCAG 2.0 Supporting Documents  |
| c                   | Business case         | إنتاجية   | دراسة جدوى<br>or<br>حالة عمل              | WCAG 2.0 Supporting Documents  |
| a, b                | Glossary              | مصدر<br>and<br>الثبت  | قاموس المصطلحات                           | Important Terms in WCAG 2.0<br>Glossary  |
| d                   | Understanding         | فهما  | فهم                                       | Important Terms in WCAG 2.0  |
| c                   | Relied upon           | مرتبطة  | تعتمد عليها                               | Important Terms in WCAG 2.0<br>Glossary  |

| Translation Problem | English Word               | Arabic Translation                                    | Suggestion                  | Location in the Document  |
|---------------------|----------------------------|---|-----------------------------|---|
| c                   | Information                | المعلومة المندرجة                                     | المعلومة                    | WCAG 2.0 Guidelines – Principle 1   |
| c                   | Large print                | الطباعة بحروف غليظة                                   | الكتابة بأحرف كبيرة         | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.1   |
| a                   | CAPTCHA                    | كابيتشا<br>and<br>كابيتشا                             | كابيتشا                     |   |
| a                   | Time-based media           | وسائط مؤقتة<br>and<br>وسائل الاعلام الزمنية           | وسائط مؤقتة                 | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.2   |
| a, c                | Media                      | وسائط<br>and<br>وسائل الاعلام<br>and<br>وسائل الاتصال | وسائط                       | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.2<br>WCAG 2.0 Guidelines – Principle 1 – Guideline 2.2                  |
| a, c                | extended audio description | وصف صوتي إضافي<br>and<br>وصف السمعيات الموسعة         | وصف صوتي إضافي              | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.2<br>Glossary   |
| a, c                | audio description          | وصف صوتي<br>and<br>وصف السمعيات                       | وصف صوتي                    | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.2<br>Glossary   |
| a                   | Contrast ratio             | نسبة التباين<br>and<br>تقرير التباين                  | نسبة التباين                | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.4<br>Glossary   |
| c                   | Coding                     | نص مصدري  | ترميز                       | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.4   |
| d                   | Programmatic               | برنامج  | مبرمج<br>or<br>وفقا لبرنامج |   |
| c                   | Significant                | دال   | مهم                         |   |
| b                   | Logotypes                  | أنماط الشارة  | شعارات                      |   |
| a                   | Visual presentation        | تقديم بصري<br>and<br>عرض مرئي                         | عرض مرئي                    | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.4   |
| a                   | Presentation               | تقديم<br>and<br>عرض                                   | عرض                         | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.3, 1.4<br>WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2<br>Glossary |
| a                   | Image of text              | صورة النص<br>and<br>النص كصورة                        | النص كصورة                  | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.4<br>Glossary   |
| a                   | Speech                     | كلام<br>and<br>خطاب<br>and<br>صوت مركب                | كلام<br>or<br>حديث          | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.4<br>Glossary   |
| a                   | Foreground                 | واجهة أمامية<br>and<br>المستوى الظاهر<br>and<br>واجهة | واجهة أمامية                | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.4   |
| a                   | User                       | مستخدم<br>and<br>مستعمل                               | مستخدم                      | All parts   |

| Translation Problem | English Word             | Arabic Translation  | Suggestion                                      | Location in the Document  |
|---------------------|--------------------------|---|---|---|
| c                   | Scroll                   | استرسل  | تمرير   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2   |
| a                   | Stop                     | إيقاف<br>and<br>وقف كلي<br>and<br>وقف   | إيقاف   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2 Conformance   |
| a                   | Pause                    | توقف مؤقت<br>and<br>توقف  | إيقاف مؤقت                                      | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2 Conformance   |
| a                   | Hide                     | إخفاء<br>and<br>حجب   | إخفاء   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2 Conformance   |
| c                   | Emergency                | طوارئ<br>and<br>ضرورة قصوى  | طوارئ<br>or<br>ضرورة قصوى                       | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2 Glossary  |
| c                   | Preload                  | التحميل   | مقابل التحميل                                   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2   |
| a, c                | Real-time event          | التوقيت الحقيقي<br>للحدث<br>and<br>الزمن الحقيقي<br>للحدث<br>and<br>الحدث في الوقت<br>الحقيقي | الحدث الفوري<br>or<br>الحدث في الوقت<br>الحقيقي | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2 Glossary  |
| c                   | Interruptions            | انقطاعات  | مقاطعات   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.2   |
| c                   | Below Threshold          | مستوى أقل   | أقل من المستوى                                  | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.3   |
| c                   | Three flashes            | ثلاث ومضات<br>متتالية   | ثلاث ومضات                                      | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.3   |
| c                   | Navigable                | القدرة على<br>التصفح  | قابلية التصفح                                   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |
| a                   | Navigate                 | تصفح<br>and<br>ابحار  | تصفح  | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |
| c                   | Sequentially             | تتم على مراحل   | بشكل متسلسل                                     | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |
| c                   | Sequences                | مراحل   | تسلسل   | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |
| b                   | Focus                    | المبهر<br>and<br>المؤشر   | مركز<br>or<br>تركيز                             | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4<br>WCAG 2.0 Guidelines – Principle 2 – Guideline 3.2 Glossary |
| a                   | Link purpose             | هدف الرابط<br>and<br>وظيفة الرابط   | هدف الرابط<br>or<br>وظيفة الرابط                | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4 Glossary  |
| c                   | Link text                | رابط النص   | نص الرابط                                       | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |
| b, d                | Focus visible            | المبهر مرئي   | وضوح التركيز<br>or<br>مرئية التركيز             | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |
| b, c                | Keyboard focus indicator | إشارة المبهر  | مؤشر تركيز لوحة<br>المفاتيح                     | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4   |

| Translation Problem | English Word          | Arabic Translation                                   | Suggestion                             | Location in the Document   |
|---------------------|-----------------------|--|--|--|
| a, c                | Idiom                 | تعبير خاص<br>and<br>تعبير مجازي                      | تعبير مجازي                            | WCAG 2.0 Guidelines – Principle3 – Guideline 3.1 Glossary  |
| b                   | Readable              | مقروئية  | قابلية القراءة<br>or<br>قابل للقراءة   | WCAG 2.0 Guidelines – Principle3 – Guideline 3.1   |
| a                   | Readable              | مقروئية<br>and<br>قابل للقراءة                       | قابلية القراءة<br>or<br>قابل للقراءة   | WCAG 2.0 Guidelines – Principle3 – Guideline 3.1   |
| a                   | Jargon                | لغة خاصة<br>and<br>لغة مشوهة                         | لغة اصطلاحية                           | WCAG 2.0 Guidelines – Principle3 – Guideline 3.1 Glossary  |
| a                   | Abbreviation          | مختصرات<br>and<br>اختصارات                           | اختصارات                               | WCAG 2.0 Guidelines – Principle3 – Guideline 3.1 Glossary  |
| a                   | Predictable           | التكهن<br>and<br>المنتظر                             | قابل للتنبؤ أو التوقع<br>or<br>المتوقع | WCAG 2.0 Guidelines – Principle3 – Guideline 3.2   |
| c                   | On focus              | في المؤشر  | في التركيز<br>or<br>تحت التركيز        | WCAG 2.0 Guidelines – Principle3 – Guideline 3.2   |
| c                   | Setting               | مقاييس   | اعدادات                                | WCAG 2.0 Guidelines – Principle3 – Guideline 3.2   |
| a, c                | Consistent            | منسجم<br>and<br>متناسق                               | متماثل<br>Or<br>ثابت                   | WCAG 2.0 Guidelines – Principle3 – Guideline 3.2   |
| a                   | Labels                | تسميات<br>and<br>علامات                              | تسميات                                 | WCAG 2.0 Guidelines – Principle 2 – Guideline 2.4<br>WCAG 2.0 Guidelines – Principle3 – Guideline 3.2 Glossary |
| a                   | Input error           | ادخال خاطئ<br>and<br>مدخل خاطئ<br>and<br>ادخال مغلوط | مدخل خاطئ                              | WCAG 2.0 Guidelines – Principle3 – Guideline 3.3 Glossary  |
| a                   | Tag                   | علامة<br>and<br>وسم                                  | وسم                                    | WCAG 2.0 Guidelines – Principle 4  |
| c                   | Script                | بريمج  | سكريبت                                 | WCAG 2.0 Guidelines – Principle 4  |
| d                   | Links                 | روابط  | روابط                                  | WCAG 2.0 Guidelines – Principle 4  |
| c                   | Form elements         | أشكال العناصر  | مكونات النموذج                         | WCAG 2.0 Guidelines – Principle 4  |
| a, c                | Accessibility support | دعم النفاذية<br>and<br>حامل النفاذية                 | دعم النفاذية                           | Conformance  |
| a                   | Captions              | تعليقات<br>and<br>عنونة موازية                       | تعليقات                                | WCAG 2.0 Guidelines – Principle 1 – Guideline 1.2 Glossary   |
| c                   | learning disabilities | محدودي التعليم                                       | صعوبات تعلم                            | Glossary   |
| a                   | Viewport              | منفذ عرض<br>and<br>فضاء عرض                          | منفذ عرض                               | Glossary   |
| c                   | Players               | أنواع القراءة  | مشغلات                                 | Glossary   |



| Translation Problem | English Word                             | Arabic Translation   | Suggestion                           | Location in the Document   |
|---------------------|--|--|--------------------------------------|--|
| c                   | Contrast ratio                           | تقرير التباين  | نسبة التباين                         | Glossary   |
| a                   | Relative luminance                       | التناوب الضوئي<br>and<br>الإضاءة النسبية<br>and<br>نسبة الإضاءة                              | الإضاءة النسبية                      | Glossary   |
| a, b, c             | Bold                                     | عُثِنَ<br>and<br>غليظ  | عريض                                 | Glossary   |
| a                   | Lower secondary education level          | المرحلة الأولى من<br>التعليم الثانوي<br>and<br>الدورة الأولى من<br>التعليم الثانوي           | المرحلة الأولى من<br>التعليم الثانوي | WCAG 2.0 Guidelines –<br>Principle3 – Guideline 3.1<br>Glossary  |
| a                   | Media alternative for text               | وسائط بديلة للنص<br>and<br>وسائل تعويض<br>النص   | وسائط بديلة للنص                     | WCAG 2.0 Guidelines – Principle<br>1 – Guideline 1.2<br>Glossary   |
| d                   | Full screen                              | كاملة الشاشة   | كامل الشاشة                          | Glossary   |
| c                   | Programmatically determined              | محددة بواسطة<br>برنامج إعلامية   | محدد برمجيا                          | Glossary   |
| a                   | Programmatically determined              | محددة بواسطة<br>برنامج إعلامية<br>and<br>محدد برمجيا<br>and<br>محدد بواسطة<br>برنامج كمبيوتر | محدد برمجيا                          | Important Terms in WCAG 2.0<br>WCAG 2.0 Guidelines – Principle<br>1- Guideline1.3, Principle 2 –<br>Guideline 2.4, Principle 3 –<br>Guideline 3.1, Principle 4<br>Glossary |
| a, c, d             | Programmatically determined link context | رابط سياق محدد<br>برمجيا<br>and<br>سياق الرابط يحدد<br>بواسطة برنامج<br>إعلامية              | سياق رابط محدد<br>برمجيا             | WCAG 2.0 Guidelines – Principle<br>2 – Guideline 2.4<br>Glossary   |
| a, c                | Programmatically set                     | وضع برمجي<br>And<br>المحدد بواسطة<br>البرمجة   | تعيين برمجي                          | WCAG 2.0 Guidelines – Principle<br>4<br>Glossary   |
| a                   | Structure                                | بنية<br>and<br>هيكل  | بنية<br>or<br>هيكل                   | WCAG 2.0 Guidelines – Principle<br>1 – Guideline 1.3<br>Glossary   |
| b, d                | Portal                                   | بوابة  | بوابة                                | Statement of Partial Conformance -<br>Third Party Content<br>Glossary  |



# Appendix C

## First Interview Questions

### C.1 English Version

#### PART ONE

To what extent do you agree that the following are important to localise web accessibility guidelines for university websites in Saudi Arabia: **(strongly disagree = 1; disagree = 2; neutral =3; agree =4; and strongly agree = 5)**, and **please explain WHY?**

| Component, Subcomponent OR Element   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--|-------------------|----------|---------|-------|----------------|
| <b>Web Accessibility</b>   |                   |          |         |       |                |
| 1: The content of the website must be: Perceivable, Operable, Understandable and Robust.   |                   |          |         |       |                |
| <b>Genre-Specific Cultural Markers</b>   |                   |          |         |       |                |
| <i>Language (Arabic)</i>   |                   |          |         |       |                |
| 2: Direction of reading and writing.   |                   |          |         |       |                |
| 3: Uni-case language.  |                   |          |         |       |                |
| 4: Formation of the letters.   |                   |          |         |       |                |
| 5: Cursive form and spaces within and between words.   |                   |          |         |       |                |
| 6: Diacritical Marks.  |                   |          |         |       |                |
| 7: Homographic language.   |                   |          |         |       |                |
| 8: Gender-specific language.   |                   |          |         |       |                |
| 9: Font size.  |                   |          |         |       |                |
| 10: Font type.   |                   |          |         |       |                |
| 11: Type of text emphasis.   |                   |          |         |       |                |
| 12: Alignment of text.   |                   |          |         |       |                |
| 13: Long sentences.  |                   |          |         |       |                |
| 14: Diglossic language.  |                   |          |         |       |                |
| <i>Data Format</i>   |                   |          |         |       |                |
| 15: Understood and acceptable data format (date, time, currency, address, phone numbers, name format and measurements) within the culture for university websites. |                   |          |         |       |                |

| Component, Subcomponent OR Element  | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|-------------------|----------|---------|-------|----------------|
| <i>Symbols and Icons</i>  |                   |          |         |       |                |
| 16: Understood and acceptable symbols within the culture for university websites.                       |                   |          |         |       |                |
| <i>Multimedia</i>   |                   |          |         |       |                |
| 17: Multimedia appropriateness to the culture in university websites.                                   |                   |          |         |       |                |
| 18: Incorporating music with multimedia provided on university websites.                                |                   |          |         |       |                |
| 19: Amount of multimedia preferred in the culture for university websites.                              |                   |          |         |       |                |
| <i>Colours</i>  |                   |          |         |       |                |
| 20: Acceptable and preferred colours in the culture for university websites.                            |                   |          |         |       |                |
| <i>Layout</i>   |                   |          |         |       |                |
| 21: Acceptable and preferred layout in the culture for university websites.                             |                   |          |         |       |                |
| <i>Navigation</i>   |                   |          |         |       |                |
| 22: Acceptable and preferred navigation in the culture for university websites.                         |                   |          |         |       |                |
| <i>Costs</i>  |                   |          |         |       |                |
| 23: Costs of Internet connection and devices.   |                   |          |         |       |                |
| <i>User Diversity</i>   |                   |          |         |       |                |
| 24: Various Users: disabled, older, inexperienced users and low literacy or not fluent in the language. |                   |          |         |       |                |
| <i>Internet Infrastructure</i>  |                   |          |         |       |                |
| 25: Internet speed in the country.  |                   |          |         |       |                |
| 26: Broadband availability.   |                   |          |         |       |                |
| <i>Technology Variety</i>   |                   |          |         |       |                |
| 27: Technology variety including software, hardware and assistive technology.                           |                   |          |         |       |                |

## PART TWO

### Questions for Developers ONLY:

28: What are the challenges to enhancing web accessibility that face the developers of Saudi university websites?

29: Which web accessibility guidelines do you follow in your university website?

### Question for All Experts:

30: Do you suggest any modification or addition to the framework?

## C.2 Arabic Version

### الجزء الأول:

إلى أي مدى تتفق مع أهمية العناصر أدناه لتوطين المبادئ التوجيهية لتسهيل الوصول للويب بحيث تكون ملائمة للتطبيق على مواقع الجامعات السعودية ( ١ = لا أوافق بتاتاً، ٢ = لا أوافق، ٣ = محايد، ٤ = أوافق، ٥ = أوافق بشدة)؟ ولماذا؟ يرجى الشرح.

| أوافق بشدة   | أوافق | محايد | لا أوافق | لا أوافق بتاتاً | مكون أو جزء من مكون أو عنصر  |
|--|-------|-------|----------|-----------------|--|
| <b>سهولة الوصول للويب</b>                                |       |       |          |                 |  |
|  |       |       |          |                 | ١ محتويات الويب يجب أن يكون قابلة للتلقي والتشغيل والفهم وأن تكون متينة متوافقة مع تطور التقنية.                           |
| <b>العلامات المحددة لنوع موقع الويب وانتمائه الثقافي</b> |       |       |          |                 |  |
| <b>اللغة</b>   |       |       |          |                 |  |
|  |       |       |          |                 | ٢ اتجاه القراءة والكتابة في اللغة العربية.   |
|  |       |       |          |                 | ٣ كون العربية لغة موحدة الحالة. (لا يوجد أحرف كبيرة وصغيرة).   |
|  |       |       |          |                 | ٤ شكل الأحرف.  |
|  |       |       |          |                 | ٥ تشكل الخطوط والمسافات بين الكلمات.   |
|  |       |       |          |                 | ٦ حركات تشكيل الحرف.   |
|  |       |       |          |                 | ٧ وجود كلمات لها نفس الشكل ولكن تختلف في المعنى وربما في النطق.  |
|  |       |       |          |                 | ٨ الخطاب في اللغة يختلف حسب جنس الموجه له الخطاب.  |
|  |       |       |          |                 | ٩ حجم الخط.  |
|  |       |       |          |                 | ١٠ نوع الخط.   |
|  |       |       |          |                 | ١١ نوع التركيز على النص.   |
|  |       |       |          |                 | ١٢ محاذاة النص.  |
|  |       |       |          |                 | ١٣ الجمل الطويلة.  |
|  |       |       |          |                 | ١٤ وجود لهجة عامية وفصحى.  |
| <b>تنسيق البيانات</b>                                    |       |       |          |                 |  |
|  |       |       |          |                 | ١٥ تنسيق البيانات (التاريخ، الوقت، العملة، أرقام الهواتف، الأسماء ووحدات القياس) في مواقع الجامعات وملائمتها لثقافة البلد. |
| <b>الرموز والأيقونات</b>                                 |       |       |          |                 |  |
|  |       |       |          |                 | ١٦ استخدام الرموز المفهومة والمقبولة في مواقع الجامعات السعودية.   |
| <b>الوسائط المتعددة</b>                                  |       |       |          |                 |  |
|  |       |       |          |                 | ١٧ ملائمة الوسائط في مواقع الجامعات السعودية لثقافة المجتمع.   |
|  |       |       |          |                 | ١٨ ادخال الموسيقى مع الوسائط المتعددة في مواقع الجامعات.   |
|  |       |       |          |                 | ١٩ كمية الوسائط المتعددة المفضلة في مواقع الجامعات السعودية.   |
| <b>الألوان</b>   |       |       |          |                 |  |
|  |       |       |          |                 | ٢٠ تقبل وتفضيل ألوان معينة في مواقع الجامعات السعودية من قبل المجتمع.  |
| <b>مخطط صفحة الويب</b>                                   |       |       |          |                 |  |
|  |       |       |          |                 | ٢١ تقبل وتفضيل مخطط معين في مواقع الجامعات السعودية.   |
| <b>تصفح الويب</b>  |       |       |          |                 |  |
|  |       |       |          |                 | ٢٢ تصفح للويب مقبول ومفضل عند المجتمع في مواقع الجامعات.   |
| <b>التكلفة</b>   |       |       |          |                 |  |
|  |       |       |          |                 | ٢٣ تكاليف الانترنت والأجهزة.   |
| <b>تنوع المستخدمين</b>                                   |       |       |          |                 |  |
|  |       |       |          |                 | ٢٤ فئات متنوعة يجب أن تناسبها مواقع الجامعات السعودية: ذوي الإعاقة أو الاحتياجات الخاصة، كبار السن، الجدد وقليلو           |

|                                |  |  |  |  |  |
|--------------------------------|--|--|--|--|--|
|                                |  |  |  |  | الاستخدام للويب والذين يعانون نوعاً من الأمية أو غير ملمين باللغة.   |
| <b>البنية التحتية للإنترنت</b> |  |  |  |  |  |
| ٢٥                             |  |  |  |  | سرعة الانترنت في المملكة.  |
| ٢٦                             |  |  |  |  | توفر البرودباند أو اتصال بالإنترنت في مختلف المناطق.   |
| <b>تنوع التقنية</b>            |  |  |  |  |  |
| ٢٧                             |  |  |  |  | عند تصميم موقع، جميع التقنيات المستخدمة من قِبل المستخدم في تصفح الموقع سواء كانت متصفحات أو برامج أو أجهزة. |

## **الجزء الثاني:**

### **أسئلة لمطوري الويب فقط:**

٢٨: ما هي التحديات التي تواجه مطوري مواقع الويب في الجامعات السعودية وتعوقهم من تطوير سهولة الوصول لمواقع الجامعات؟

٢٩: ما هي المبادئ التوجيهية لسهولة الوصول للويب التي تتبعونها عند تطوير مواقع الجامعات؟

### **أسئلة للجميع:**

٣٠: هل تقترح أي تعديل أو إضافة للإطار البحثي؟

### C.3 Arabic Version of the Proposed Framework

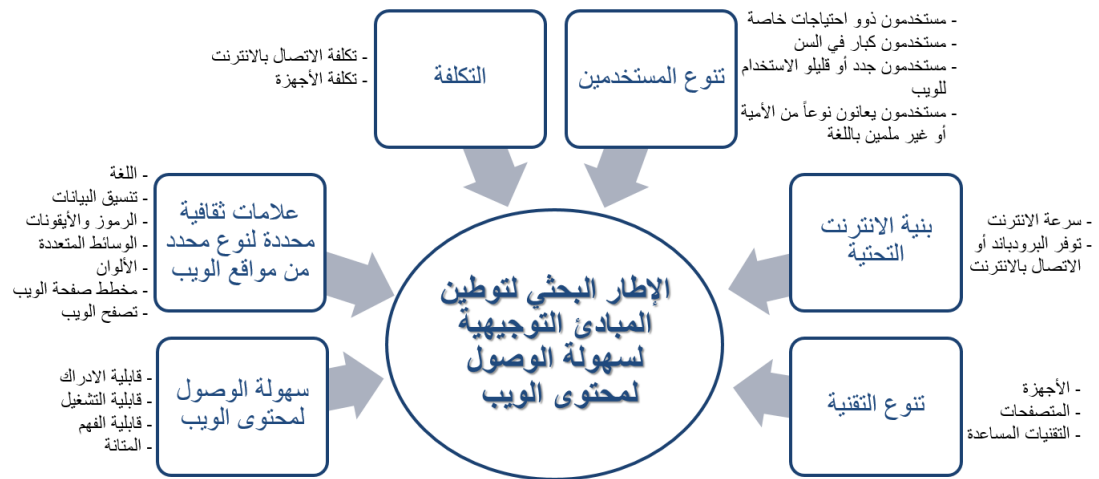


Figure C.1: Arabic Version of the Proposed Framework





## Appendix D

# Participants Information Sheet for the First Interview

### D.1 English Version

**Study Title:** A Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia

**Researcher:** Asmaa Alayed

**Supervisors:** Prof. Mike Wald and Mrs. E. A. Draffan.

**Ethics reference:** ERGO/FPSE/17056

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

#### **What is the research about?**

This research is required as part of the researcher's PhD degree in Computer Science. The main aims of this research are:

- To investigate different factors that would affect the accessibility of Arabic websites, to be specific, those in Saudi Arabia. These factors should be taken into account when designing a website targeting people in this region.
- To build a framework for the development of a localised accessibility guidelines comprising all factors that need to be considered in the design of Arabic websites.

This research is under the supervision of the School of Electronics and Computer Science, University of Southampton, UK, and is fully funded by Saudi Arabian Cultural Bureau.

#### **Why have I been chosen?**

You are invited to participate in this study because your opinion and expertise as an expert in web accessibility and/or development or design of Arabic university websites, or you have been working with Arab people with special needs. This will help me to validate and confirm the proposed research framework.

**What will happen to me if I take part?**

I will first ask you to sign a consent form, and then I am going to review the research framework with you, and after that I will start to collect data from you by an interview with open-ended questions about the framework. I will record your voice during the interview only.

**Are there any benefits in my taking part?**

This research is not designed to help you personally, but your feedback as an expert will help me to validate my research framework and probably gather more useful information around it.

**Are there any risks involved? No.****Will my participation be confidential?**

Yes. Your information will be stored and used on secure systems and will be used for the purpose of this study only, your responses are voluntary, and will not be linked to your name or to your organisations name. All responses will be compiled and analysed together.

**What happens if I change my mind?**

You have the right to terminate your participation in the research, at any stage, you do not need to give any reasons, and without your legal rights being affected. Any data collected from you will be immediately destroyed.

**What happens if something goes wrong?** In the unlikely case of concern or complaint, please contact Research Governance Manager (02380 595058, [rgoinfo@soton.ac.uk](mailto:rgoinfo@soton.ac.uk)).

**Where can I get more information?**

For further details, please contact either myself Asmaa Alayed ([asia1g14@soton.ac.uk](mailto:asia1g14@soton.ac.uk)) or my research supervisors, Professor Mike Wald ([mw@ecs.soton.ac.uk](mailto:mw@ecs.soton.ac.uk)) and Mrs. E. A. Draffan ([ead@ecs.soton.ac.uk](mailto:ead@ecs.soton.ac.uk)).

## D.2 Arabic Version

### دليل المعلومات للمشاركين في الدراسة

**عنوان الدراسة:** الإطار البحثي لتوطين المبادئ التوجيهية لتسهيل الوصول لمحتوى الويب لمواقع الجامعات السعودية  
**اسم الباحث:** أسماء العايد  
**الرقم المرجعي للجنة أخلاقيات البحث:** ERGO/FPSE/17056

يرجى قراءة هذه المعلومات بعناية قبل اتخاذ القرار بالمشاركة في هذا البحث. إذا كنت سعيداً بالمشاركة سيطلب منك وضع علامة صح للموافقة في بداية الاستبيان.

#### ما هو هدف البحث؟

تهدف الدراسة لاستكشاف العوامل المؤثرة على سهولة الوصول للويب في المواقع العربية وتحديد مواقع الجامعات السعودية؛ حيث أن هذه العوامل يجب أن تؤخذ في الاعتبار عند تصميم مواقع للسعوديين. هذه العوامل تشكل إطار عمل لتطوير المبادئ التوجيهية لتسهيل الوصول للويب بحيث تكون هذه المبادئ ملائمة للمجتمع السعودي بشكل خاص. هذا البحث يعتبر استكمالاً لمتطلبات الحصول على درجة الدكتوراه في علوم الحاسب من كلية علوم الحاسب والهندسة - جامعة ساوثهامبتون - المملكة المتحدة.

#### لماذا تم اختياري؟

لتحقيق أهداف الدراسة تأمل الباحثة في التواصل معكم كونكم من أهل الخبرة والاختصاص ولما لوجهة نظركم من أهمية بالغة في نجاح هذا البحث

#### ما الذي سيحدث إذا شاركت؟

سأطلب منك التوقيع على استمارة الموافقة على المشاركة، ومن ثم سأقوم بإعطائك

#### هل هناك أي فائدة لي من المشاركة؟

لم يتم تصميم هذا البحث لإفادتك شخصياً ولكن خبرتك ستعود على البحث بالنفع الكبير وتسهم في التأكد من صحة الإطار البحثي المقترح وتطويره.

#### هل هناك أي مخاطر التي تنطوي على مشاركتي؟

لا.

#### هل ستكون مشاركتي سرية؟

نعم بالطبع. وسيتم تخزين المعلومات الخاصة بك واستخدامها على أنظمة آمنة وسوف تستخدم لأغراض هذه الدراسة فقط، مشاركتك تطوعية وليست إجبارية، وسيتم تجميع جميع الردود وتحليلها معاً كمجموعة.

#### ماذا سيحدث إن قمت بتغيير رأيي؟

لديك الحق في إنهاء مشاركتك في البحث في أي مرحلة، ولن تحتاج إلى إعطاء أي مبرر، وحقوقك القانونية لن تتأثر. سيتم حذف البيانات الخاصة بك مباشرة إذا قررت الانسحاب في أي وقت.

#### ماذا إن حدث خطأ ما؟

من غير المرجح أن يحدث أي خطأ، وبإمكانك الاتصال بمدير إدارة البحوث (rgoinfo@soton.ac.uk, 02380 595058).

#### أين يمكنني الحصول على مزيد من المعلومات؟

للمزيد من التفاصيل، يرجى الاتصال إما بالباحثة أو بالمشرفين:

أسماء العايد ([asia1g14@soton.ac.uk](mailto:asia1g14@soton.ac.uk)).

برفيسور مايك والد ([mw@ecs.soton.ac.uk](mailto:mw@ecs.soton.ac.uk)) Prof. Mike Wald

الأستاذة اي إيه درافان ([ead@ecs.soton.ac.uk](mailto:ead@ecs.soton.ac.uk)) Mrs. E. A. Draffan



## Appendix E

# Invitation Email to the First Interview

السلام عليكم ورحمة الله وبركاته

وبعد

تقوم الباحثة بإجراء دراسة بعنوان:

### A Framework for Localised Content Web Accessibility Guidelines for University Websites in Saudi Arabia

وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه في علوم الحاسب من كلية علوم الحاسب والهندسة - جامعة ساوثهامبتون - بريطانيا. حيث تهدف الدراسة لاستكشاف العوامل المؤثرة على سهولة الوصول للويب في المواقع العربية وتحديداً مواقع الجامعات السعودية؛ حيث أن هذه العوامل يجب أن تؤخذ في الاعتبار عند تصميم مواقع للسعوديين. هذه العوامل تشكل إطار عمل لتطوير المبادئ التوجيهية لسهولة الوصول للويب بحيث تكون هذه المبادئ ملائمة للمجتمع السعودي بشكل خاص.

ولتحقيق أهداف الدراسة تأمل الباحثة في التواصل معكم كونكم من أهل الخبرة والاختصاص ولما لوجهة نظرهم من أهمية باللغة في نجاح هذا البحث. سيكون التواصل عبر الهاتف في الوقت المناسب لكم وسوف يكون الوقت المقدر للمكالمة والاجابة عن الاسئلة أقل نصف ساعة.

أمل منكم التكرم بالموافقة بالتواصل معكم في أقرب فرصة مناسبة لكم الأمر الذي سيسهم - بإذن الله تعالى - في تحقيق أهداف الدراسة. علماً بأن ما ستدلون به من اجابات سوف يحظى بالسرية التامة، ولن يستخدم إلا لأغراض البحث العلمي.

وأرجو منكم حال الموافقة على المشاركة في البحث التكرم بإرسال رقم الهاتف والوقت المناسب للاتصال. أرجو منكم أيضاً توقيع نموذج الموافقة على المشاركة في البحث (موجود في المرفقات باسم Consent\_Form.pdf).

في حال عدم رغبتكم في التواصل هاتفياً أرجو إبلاغي بأنسب وسيلة للتواصل.

شاكراً لكم تعاونكم.

ومقدرة لكم وقتكم الثمين.

الباحثة: أسماء العايد



## Appendix F

# Consent Form for the First Interview

### F.1 English Version

**Study title:** A Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia

**Researcher name:** Asmaa Alayed

**Supervisors:** Prof. Mike Wald and Mrs. E. A. Draffan.

**Ethics reference:** ERGO/FPSE/17056

**Please sign below if you agree with the statements:**

- I have read and understood the information sheet (Version 3 dated 2015-08-31) and have had the opportunity to ask questions about the study.
- I agree to take part in this research.
- I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.
- I agree to record my voice during my participation in this study.

#### Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

**Name of participant (print name):**

**Signature of participant:**

**Date:**

## F.2 Arabic Version

### استمارة الموافقة على المشاركة

عنوان الدراسة: الإطار البحثي لتوطين المبادئ التوجيهية لتسهيل الوصول لمحتوى الويب لمواقع الجامعات السعودية  
اسم الباحث : أسماء العايد  
الرقم المرجعي للجنة أخلاقيات البحث: ERGO/FPSE/17056

**Study title:** A Framework for Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia

**Ethics reference:** ERGO/FPSE/17056

الرجاء وضع علامة ( √ ) في المربعات أمام الجمل الآتية إذا تمت الموافقة على محتوى هذه الجمل:

- ☐ لقد قرأت وفهمت استمارة معلومات المشارك ومُنحت الفرصة لطرح أسئلة عن الدراسة.
- ☐ أنا موافق على المشاركة في هذه الدراسة وأوافق على استخدام بياناتي من أجل هذه الدراسة.
- ☐ أن على علم أن مشاركتي هي تطوعية وأنني أستطيع الانسحاب في أي وقت دون أي عواقب وأن بياناتي سوف يتم مسحها إذا انسحبت في أي وقت بعد الانسحاب.
- ☐ أوافق على التسجيل الصوتي خلال مشاركتي في هذه الدراسة.

### حماية البيانات

أنا أعلم أن المعلومات التي جمعت عني أثناء مشاركتي بهذه الدراسة سوف تُخزن في كمبيوتر محمي بكلمة سر وأن هذه المعلومات سوف تستخدم فقط من أجل هذه الدراسة. جميع الملفات التي بها بيانات شخصية سوف تكون غير معلنة.

اسم المشارك.....  
توقيع المشارك.....  
التاريخ.....





## Appendix G

# SPSS Results for the Experts Interviews

| One-Sample Statistics   |    |      |                   |                 |
|---|----|------|-------------------|-----------------|
|   | N  | Mean | Std. Deviation    | Std. Error Mean |
| The content of the website must be: Perceivable, Operable, Understandable and Robust. | 18 | 4.89 | .323              | .076            |
| Direction of Reading and Writing  | 18 | 3.94 | 1.211             | .286            |
| Uni-case language   | 18 | 3.72 | .575              | .135            |
| Formation of the letters  | 18 | 3.89 | 1.023             | .241            |
| Cursive form and spaces within and between words                                      | 18 | 4.39 | 1.037             | .244            |
| Diacritical Marks   | 18 | 5.00 | .000 <sup>a</sup> | .000            |
| Homographic language  | 18 | 4.44 | .922              | .217            |
| Gender-specific language  | 18 | 3.83 | .786              | .185            |
| Font size   | 18 | 5.00 | .000 <sup>a</sup> | .000            |
| Font type   | 18 | 5.00 | .000 <sup>a</sup> | .000            |
| Type of text emphasis   | 18 | 5.00 | .000 <sup>a</sup> | .000            |
| Alignment of text   | 18 | 4.67 | .594              | .140            |
| Long sentences  | 18 | 4.39 | .850              | .200            |
| Diglossic language  | 18 | 3.89 | 1.183             | .279            |
| Understood and acceptable data format within the culture for university websites      | 18 | 4.72 | .461              | .109            |
| Understood and acceptable symbols within the culture for university websites          | 18 | 4.94 | .236              | .056            |
| Multimedia appropriateness to the culture in university websites                      | 18 | 4.89 | .323              | .076            |
| Incorporating music with multimedia provided on university websites                   | 18 | 4.72 | .461              | .109            |
| Amount of multimedia preferred in the the culture for universirt websites             | 18 | 4.22 | .732              | .173            |
| Acceptable and preferred colours in the culture for university websites               | 18 | 4.44 | .784              | .185            |
| Acceptable and preferred layout in the culture for university websites                | 18 | 4.56 | .511              | .121            |
| Understood and acceptable Navigation within the culture for university websites       | 18 | 4.72 | .461              | .109            |
| Costs   | 18 | 1.83 | .707              | .167            |
| User diversity  | 18 | 4.83 | .383              | .090            |
| Internet speed in the country   | 18 | 4.94 | .236              | .056            |
| Broadband availability  | 18 | 4.83 | .383              | .090            |
| Technology Variety  | 18 | 4.78 | .428              | .101            |

a. t cannot be computed because the standard deviation is 0.

### One-Sample Test

Test Value = 3

|   | t      | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |       |
|---|--------|----|-----------------|-----------------|---|-------|
|   |        |    |                 |                 | Lower                                     | Upper |
| The content of the website must be: Perceivable, Operable, Understandable and Robust. | 24.782 | 17 | .000            | 1.889           | 1.73                                      | 2.05  |
| Direction of Reading and Writing  | 3.308  | 17 | .004            | .944            | .34                                       | 1.55  |
| Uni-case language   | 5.333  | 17 | .000            | .722            | .44                                       | 1.01  |
| Formation of the letters  | 3.688  | 17 | .002            | .889            | .38                                       | 1.40  |
| Cursive form and spaces within and between words                                      | 5.683  | 17 | .000            | 1.389           | .87                                       | 1.90  |
| Homographic language  | 6.648  | 17 | .000            | 1.444           | .99                                       | 1.90  |
| Gender-specific language  | 4.499  | 17 | .000            | .833            | .44                                       | 1.22  |
| Alignment of text   | 11.902 | 17 | .000            | 1.667           | 1.37                                      | 1.96  |
| Long sentences  | 6.934  | 17 | .000            | 1.389           | .97                                       | 1.81  |
| Diglossic language  | 3.189  | 17 | .005            | .889            | .30                                       | 1.48  |
| Understood and acceptable data format within the culture for university websites      | 15.854 | 17 | .000            | 1.722           | 1.49                                      | 1.95  |
| Understood and acceptable symbols within the culture for university websites          | 35.000 | 17 | .000            | 1.944           | 1.83                                      | 2.06  |
| Multimedia appropriateness to the culture in university websites                      | 24.782 | 17 | .000            | 1.889           | 1.73                                      | 2.05  |
| Incorporating music with multimedia provided on university websites                   | 15.854 | 17 | .000            | 1.722           | 1.49                                      | 1.95  |
| Amount of multimedia preferred in the the culture for universirt websites             | 7.083  | 17 | .000            | 1.222           | .86                                       | 1.59  |
| Acceptable and preferred colours in the culture for university websites               | 7.818  | 17 | .000            | 1.444           | 1.05                                      | 1.83  |
| Acceptable and preferred layout in the culture for university websites                | 12.907 | 17 | .000            | 1.556           | 1.30                                      | 1.81  |
| Understood and acceptable Navigation within the culture for university websites       | 15.854 | 17 | .000            | 1.722           | 1.49                                      | 1.95  |
| Costs   | -7.000 | 17 | .000            | -1.167          | -1.52                                     | -.82  |
| User diversity  | 20.283 | 17 | .000            | 1.833           | 1.64                                      | 2.02  |
| Internet speed in the country   | 35.000 | 17 | .000            | 1.944           | 1.83                                      | 2.06  |
| Broadband availability  | 20.283 | 17 | .000            | 1.833           | 1.64                                      | 2.02  |
| Technology Variety  | 17.631 | 17 | .000            | 1.778           | 1.57                                      | 1.99  |



## Appendix H

# Localised Web Content Accessibility Guidelines for University Websites in Saudi Arabia

A complete list of localised guidelines success criteria for university websites in Saudi Arabia is found in Table [H.1](#).

Table H.1: Web Content Accessibility Guidelines and Success Criteria for University Websites in Saudi Arabia

| Sub Component | Element                             | Affected By | Resultant Guidelines   | Resultant SCs   | Principles     | Target Users  | Resources   |
|---------------|-------------------------------------|-------------|--|---|----------------|---|---|
| Language      | 1. Direction of Reading and Writing | None        | 1.1 Specify the language and its direction as right to left for any Arabic web page.                               | 1.1.1 The language and its direction of any Arabic web page are specified.  | Understandable | People who use screen readers or other technologies that convert text into speech and people who have learning or reading difficulties.   | AlRowais et al. (2013); Elkabani et al. (2015, 2016) and the interviewed experts.   |
|               |                                     |             | 1.2 Specify the language of any non-Arabic text and its direction.   | 1.2.1 The language of any non-Arabic text and its direction are specified.  |                |   |   |
|               |                                     |             | 1.3 Check the consistency in the direction between data entry (writing) and data display (reading).                | 1.3.1. There is a consistency in the direction between data entry (writing) and data display (reading).   |                |   |   |
|               |                                     |             | 2.1 Use at least partial diacritics to clarify the pronunciation, meaning and/or position of a word in a sentence. | 2.1.1 Partial diacritics are provided in any web page as a default.<br>2.1.2 There are options for full diacritics and no diacritics in any web page. |                |   |   |
|               | 2. Diacritical marks                |             |  |   |                | People with reading disabilities, who have difficulty using context to aid understanding, who use technologies that read the words aloud, or those with low literacy or not fluent in the language. | Abu-Rabia et al. (2012); Al-Wabil et al. (2006); AlRowais et al. (2013); Elbeheri et al. (2006); Mahfoudhi et al. (2011) and the interviewed experts. |
|               | 3. Homographic language             |             | 3.1 Use at least partial diacritics to differentiate between homograph words.                                      | 3.1.1 Partial or full diacritics are provided to differentiate between homograph words.   |                | People with reading disabilities, who have difficulty using context to aid understanding, who use technologies that read the words aloud, or those with low literacy or not fluent in the language. | Al-Wabil et al. (2006); AlRowais et al. (2013); Elbeheri et al. (2006); Mahfoudhi et al. (2011) and the interviewed experts.                          |
|               | 4. Gender-specific language         |             | 4.1 Use general language and avoid gender-specific words, unless for females only.                                 | 4.1.1 General language is used where possible.  |                |   | AlRowais et al. (2013) and the interviewed experts.   |
|               |                                     |             | 4.2 When it is applicable, use diacritics to differentiate between the genders.                                    | 4.2.1 When it is applicable, partial or full diacritics are used to differentiate between genders.  |                |   |   |

| Sub Component | Element   | Affected By        | Resultant Guidelines  | Resultant SCs  | Principles   | Target Users  | Resources   |
|---------------|---|--------------------|---|--|--|---|---|
| Language      | 5. Font size  | Font type          | 5.1 Use readable font size.   | 5.1.1 Font size is at least 16-point for the text and 20-point for the headings.                                     | Perceivable  | People who have low vision, with reading or learning disabilities, with low literacy or not fluent in the language or older people.       | Abubaker and Lu (2012); Al-Wabil et al. (2006) and the interviewed experts.                 |
|               | 6. Font type  | None               | 6.1 Use readable font type.   | 6.1.1 Fonts are clear and readable. The highly recommended fonts are: Times New Roman, followed by Arial and Tahoma. |  |   | Abubaker and Lu (2012); Al-Wabil et al. (2006); Ramadan (2011) and the interviewed experts. |
|               | 7. Cursive form and spaces within and between words | Font type and size | 7.1 Make sure that the spaces between words are clear and readable.   | 7.1.1 Spaces between words equal to 0.40em.  |  |   | Al-Wabil et al. (2006); Elbeheri et al. (2006) and the interviewed experts.                 |
|               | 8. Type of text emphasis                            | None               | 8.1 To emphasise text, use bold or a combination of bold and colour.  | 8.1.1 Bold or a combination of bold and colour is applied to emphasise the text.                                     |  |   | Al-Wabil et al. (2006) and the interviewed experts.   |
|               | 9. Alignment of text                                | Font type          | 9.1 Use appropriate alignment for the font type (right justified or fully justified), however, it is preferable to apply right justification. | 9.1.1 Text is either right justified (better) or fully justified.  | People who have low vision, with reading or learning disabilities. | Al-Wabil et al. (2006); Benatia et al. (2006) and the interviewed experts.  |   |
|               | 10. Long sentences                                  | None               | 10.1 Write short sentences and paragraphs.  | 10.1.1 NO sentence exceeds 20 words and NO paragraph exceeds 5 sentences.  | Understandable   | People with language, reading or learning difficulties, who have limited memory or with low literacy or those not fluent in the language. | Al-Wabil et al. (2006) and the interviewed experts.   |
|               | 11. Diglossic language                              |                    | 11.1 Use simple readable Modern Standard Arabic (MSA).  | 11.1.1 Readable MSA with common and simple words is used.  |  | AlGhanem and Kearns (2015) and the interviewed experts.   |   |
|               |   |                    | 11.2 Provide other readable and understandable alternatives for advanced or not readable content.   | 11.2.1 Other readable and understandable alternatives for advanced or not readable content are provided.             |  |   |   |

| Sub Component                            | Element                                       | Affected By   | Resultant Guidelines  | Resultant SCs   | Principles     | Target Users   | Resources  |
|--|---|---|---|---|----------------|--|--|
| Language                                 | 12. Numbers                                   | None  | 12.1 Use Arabic-Indic numbers in Arabic context.  | 12.1.1 Arabic-Indic Numbers are used in Arabic context.             | Perceivable    | ALL  | <a href="#">Muhanna and Jaser (2014)</a> ; <a href="#">W3C (2006)</a> ; <a href="#">Zawati and Muhanna (2014)</a> and the interviewed experts. |
|  |   |   | 12.2 Use appropriate Number format for Arabic context.  | 12.2.1 Positive and negative signs are at the right of the number.  |                |  |  |
|  |   |   |   | 12.2.2 Percentage sign is at the left of the number.                |                |  |  |
|  |   |   |   | 12.2.3 Decimal separator is (,)                                     |                |  |  |
|  | 13. The spacing between lines and paragraphs. | 13.1 Use more spacing between lines and between paragraphs. | 13.1.1 Line spacing is at least 2 spaces within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing. | 12.2.4 Thousand separators are not used in Arabic most of the time. | Understandable | People with low vision, reading disabilities, with low literacy or those not fluent in the language. | <a href="#">Hssini and Lazrek (2011)</a> and the interviewed experts.  |
| 14. Abbreviations and acronyms in Arabic |   |   |   | 14.1 Avoid abbreviations and acronyms if possible.                  |                |  |  |



| Sub Component | Element                                  | Affected By | Resultant Guidelines  | Resultant SCs  | Principles     | Target Users   | Resources  |
|---------------|--|-------------|---|--|----------------|--|--|
| Language      | 14. Abbreviations and acronyms in Arabic | None        | 14.2 Clarify the abbreviations and acronyms when they are used. | <p>14.2.1 When abbreviations are used, they could be 1) Arabic abbreviations: 1.a) There are spaces between the letters in initialism, and/or there are full stops between the letters in initialism. OR 1.b) The expansion form of the abbreviation is available.</p> <p>2) Borrowed abbreviations from other languages: 2.a) Untranslated: Acronyms are written and pronounced in Arabic as they are in the other languages. Explanations of the untranslated abbreviations may be provided. OR 2.b) Translated: Arabic pronunciation of the abbreviation and/or its expansion are available.</p> <p>14.2.2. When abbreviations are used, expansion or explanation are available: a) at the first occurrence if there is one meaning through the web page, or b) Every time if there is more than one meaning.</p> | Understandable | People who have difficulty decoding words, use screen magnifiers, have limited memory, difficulty using context to aid understanding, with low literacy or those not fluent in the language. | Abu Humedi and Altai (2013) and the interviewed experts. |

| Sub Component | Element   | Affected By | Resultant Guidelines   | Resultant SCs   | Principles                     | Target Users | Resources   |
|---------------|---|-------------|--|---|--------------------------------|--------------|---|
| Data Format   | 15. Understood and acceptable data format within the culture for university websites. | None        | 15.1 Use data format that can be understood and acceptable within the culture for university websites. | <p>15.1.1 Hijri calendar is used but in case that Gregorian is used, Hijri calendar is provided as well.</p> <p>15.1.2 Long date format is used.</p> <p>15.1.3 When short date format is used, the separator is (/).</p> <p>15.1.4 Time is in 12 hour format with AM and PM. 24 hour format is rarely used.</p> <p>15.1.5 Time separator is (:).</p> <p>15.1.6 For currency, Saudi Riyal is used as a long or short format</p> <p>15.1.7 The currency is located at the left of the number.</p> <p>15.1.8 When other currencies are used, the equivalent value in Saudi Riyal is presented.</p> <p>15.1.9 When postal code is used, it is a 5-digit number.</p> <p>15.1.10 When phone numbers are used, the format is +966 2-digit Area Code XXX XXXX for land line and +966 5XXX XXXXX for mobile phone.</p> | Perceivable and Understandable | ALL          | <p><a href="#">Al-Badi (2005)</a>;<br/> <a href="#">Al-Sedrani and Al-Khalifa (2012)</a>; <a href="#">Microsoft (2011)</a>;<br/> <a href="#">Notzon and Nesom (2005)</a>;<br/> <a href="#">Saudi Post (2016)</a> and the interviewed experts.</p> |

| Sub Component     | Element   | Affected By | Resultant Guidelines   | Resultant SCs  | Principles                        | Target Users                         | Resources   |
|-------------------|---|-------------|--|--|-----------------------------------|--------------------------------------|---|
| Data Format       | 15. Understood and acceptable data format within the culture for university websites.       | None        | 15.1 Use data format that can be understood and acceptable within the culture for university websites.       | 15.1.1.11 When names are used, first name, father, grandfather and family names are the accepted and understood name format.<br>15.1.1.12 Middle initial, middle or maiden names are not used.<br>15.1.1.13 For measurement format, metric system is used. | Perceivable and Understandable    | ALL                                  | Al-Badi (2005); Al-Sedrani and Al-Khalifa (2012); Microsoft (2011); Notzon and Nesom (2005); Saudi Post (2016) and the interviewed experts.   |
| Symbols and Icons | 16. Understood and acceptable symbols and icons within the culture for university websites. | None        | 16.1 Use symbols and icons that can be understood and acceptable within the culture for university websites. | 16.1.1 Symbols and icons are understood by target users.<br>16.1.2 Symbols and icons are inoffensive and acceptable to target users.<br>16.1.3 Symbols and icons are appropriate to the content.   | Perceivable<br><br>Understandable | New and infrequent users.<br><br>ALL | Barber and Badre (1998); Marcus and Gould (2000) and the interviewed experts.<br>Al-Badi (2005); Al-Badi and Mayhew (2010); Al-Sedrani and Al-Khalifa (2012) and the interviewed experts.<br>The interviewed experts. |
| Multimedia        | 17. Multimedia appropriate-ness to the culture  | None        | 17.1 Use multimedia appropriate in the culture for university websites.                                      | 17.1.1 Multimedia elements are appropriate to the culture and to the university websites.  | Perceivable                       | ALL                                  | Al-Sedrani and Al-Khalifa (2012); Cyr and Trevor-Smith (2004); Sun (2001) and the interviewed experts.  |

| Sub Component | Element  | Affected By                            | Resultant Guidelines  | Resultant SCs   | Principles               | Target Users  | Resources  |
|---------------|--|--|---|---|--------------------------|---|--|
| Multimedia    | 18. Incorporating music with multimedia provided on university websites.   | None                                   | 18.1 Use multimedia appropriate and preferred in the culture for university websites.           | 18.1.1 All multimedia incorporating music that is presented to the user provides: hint that there is music in the multimedia and/or another version without music.  | Perceivable              | ALL   | <a href="#">Otterbeck and Ackfeldt (2012)</a> and the interviewed experts.   |
|               | 19. Amount of multimedia preferred in the culture for university websites. | Internet infrastructure in the country | 19.1 Use amount of multimedia appropriate and preferred in the culture for university websites. | 19.1.1 A maximum number of three multimedia elements are presented to the user in any web page AND the total size of the web page including its multimedia elements is suitable to the internet speed in the country of its target users. | Perceivable and Operable | ALL   | <a href="#">Almakky et al. (2015)</a> ; <a href="#">Mustafa and Al-Zoua'bi (2008)</a> and the interviewed experts. |
|               | 20. Text alternatives  | None                                   | 20.1 Provide text alternatives for any non-text content (including symbols and icons).          | 20.1.1 All non-text content including symbols and icons, that is presented to the user has a descriptive text alternative that serves the equivalent purpose.   | Perceivable              | Users who are blind or with visual impairment, users who are deaf or hard of hearing, users who are deaf-blind, users who have difficulty understanding the non-text content. | WCAG 1.1.1   |
|               | 21. Time-based Media   |  | 21.1 Provide alternatives for time-based media.   | 21.1.1 A descriptive text transcript is provided for recorded web-based audio.  |                          |   | WCAG 1.2.1   |
|               |  |  |   | 21.1.2 A text or audio description is provided for recorded web-based video-only.   |                          |   | WCAG 1.2.1   |
|               |  |  |   | 21.1.3 Synchronized captions are provided for recorded, web-based video.  |                          |   | WCAG 1.2.2   |

| Sub Component | Element  | Affected By | Resultant Guidelines  | Resultant SCs   | Principles  | Target Users   | Resources   |
|---------------|--|-------------|---|---|-------------|--|---|
| Multimedia    |  | None        |   | 21.1.4 A descriptive text transcript OR audio description is provided for recorded web-based video.   | Perceivable | Users who are deaf or hard of hearing.   | WCAG 1.2.3  |
|               | 22. Audio control  |             | 22.1 Make it easier for users to hear or control audio content.                   | 22.1.1 A mechanism is provided to stop, pause, mute, or adjust volume for audio that automatically plays on a page for more than 3 seconds.   |             | Users who rely on screen readers or users who have difficulty concentrating on content while audio is playing. | WCAG 1.4.2  |
|               | 23. Seizures   |             | 23.1 Do not design content in a way that is known to cause seizures.              | 23.1.1 No page content flashes more than 3 times per second unless that flashing content is sufficiently small and the flashes are of low contrast and do not contain too much red. | Operable    | Users with photosensitive epilepsy or other photosensitive seizure disorders.                                  | WCAG 2.3.1  |
| Colours       | 24. Acceptable and preferred colours in the culture for university websites. | None        | 24.1 Use acceptable and preferred colours in the culture for university websites. | 24.1.1 Masculine colours such as blue, green and grey are used and feminine colours such as pink are avoided.   | Perceivable | ALL  | Barber and Badre (1998); Khanum et al. (2012); Marcus and Hamoodi (2009) and the interviewed experts. |
|               |  |             |   | 24.1.2 The colours of the website stem from the university's logo, or the surrounding environment, for example, the colours of the desert, or the national flag.                    |             |  | Al-Sedrani and Al-Khalifa (2012) and the interviewed experts.   |

| Sub Component | Element  | Affected By | Resultant Guidelines   | Resultant SCs   | Principles  | Target Users  | Resources  |
|---------------|--|-------------|--|---|-------------|---|--|
| Colours       | 25. Use of colour  | None        | 25.1 Make it easier for users to see the content.                                    | 25.1.1 Colour is not used as the sole method of conveying content or distinguishing visual elements.  | Perceivable | Users with partial sight, users who have colour-blindness, some older users, people using Braille displays or other tactile interfaces can detect text cues by touch and people using text-only, limited colour, or monochrome displays may be unable to access colour-dependent information. | WCAG 1.4.1   |
| Layout        | 26. Acceptable and preferred layout in the culture for university websites | None        | 26.1 Provide acceptable and preferred layout in the culture for university websites. | 26.1.1 The orientation of any web page is right to left.<br>26.1.2 University logo is at the top right corner.<br>26.1.3 The banner is at the top of the web page.<br>26.1.4 The menu is at the top and/or right of the web page.<br>26.1.5 The Hijri and Gregorian date are available at the top left of the web page.<br>26.1.6 Search box is available at the top left of the web page.<br>26.1.7 A link to the English version is at the top left of the web page.<br>26.1.8 Contact information, social media links and copy rights are at the bottom of the web page. | Perceivable | ALL   | Al-Sedrani and Al-Khalifa (2012); Barber and Badre (1998); Cyr and Trevor-Smith (2004); Mushtaha (2012); Sun (2001) and the interviewed experts. |

| Sub Component | Element  | Affected By      | Resultant Guidelines   | Resultant SCs   | Principles     | Target Users  | Resources  |
|---------------|--|------------------|--|---|----------------|---|--|
| Layout        | 27. Adaptable layout   | None             | 27.1 Create content that can be presented in different ways (for example: simpler layout) without losing information or structure. | 27.1.1. Content information, structure, and relationships conveyed through presentation can be determined through the web page code or are available in text. | Perceivable    | Users with different disabilities such as users who are blind (using a screen reader) or who are deaf-blind using braille (text). | WCAG 1.3.1   |
|               |  |                  |  | 27.1.2 The reading and navigation order (determined by code order) is presented in logical and meaningful way.  |                | Users who rely on assistive technologies that read content aloud.   | WCAG 1.3.2   |
|               |  |                  |  | 27.1.3 Instructions do not only rely upon shape, size, visual location or sound.  |                | Users who are blind or have low vision.   | WCAG 1.3.3   |
| Navigation    | 28. Acceptable and preferred navigation in the culture for university websites | Language, Layout | 28.1 Provide acceptable and preferred website navigation in the culture for university websites.                                   | 28.1.1. Navigation elements are displayed consistently through the website.   | Understandable | People with cognitive and intellectual disabilities, with low vision and who are blind.   | <a href="#">AlRowais et al. (2013)</a> ;<br><a href="#">Cardello (2014)</a> ; <a href="#">Cyr and Trevor-Smith (2004)</a> ;<br><a href="#">Kralisch et al. (2005)</a> ;<br><a href="#">Marcus and Gould (2000)</a> ;<br><a href="#">Mushtaha (2012)</a> ;<br><a href="#">Salmerón et al. (2017)</a> ; <a href="#">Yu and Roh (2002)</a> and the interviewed experts. |
|               |  |                  |  | 28.1.2 Arabic language are used through the Arabic website including log in pages, error messages or CAPTCHA.   |                | ALL   |  |
|               |  |                  |  | 28.1.3 More than one way to skip unwanted content.  | Operable       | People who are blind or with vision impairment who depend on screen readers, screen magnifiers or keyboard in navigation.         |  |
|               |  |                  |  | 28.1.4 Information is provided for users about their location.  |                | People with short attention span or new and infrequent users  |  |
|               |  |                  |  | 28.1.5 Help are provided for users when they need it.   | Understandable | Users with writing, reading and intellectual disabilities. Older users, or new and infrequent users.                              |  |

| Sub Component | Element                 | Affected By | Resultant Guidelines                                     | Resultant SCs   | Principles | Target Users   | Resources  |
|---------------|-------------------------|-------------|--|---|------------|--|------------|
| Navigation    | 29. Keyboard accessible | None        | 29.1 Make all functionality available from the keyboard. | 29.1.1 All page functionality is available using the keyboard, unless the functionality cannot be accomplished in any known way using a keyboard (e.g., free hand drawing).   | Operable   | Users who are blind, with low vision, some users with hand tremors or some older users.  | WCAG 2.1.1 |
|               |                         |             |  | 29.1.2 Keyboard focus is never locked or trapped at one particular page element. The user can navigate to and from all navigable page elements using only a keyboard.   |            | Users who depend on a keyboard or keyboard interface to use the web such as blind users and users with physical disabilities.  | WCAG 2.1.2 |
|               | 30. Enough time         |             | 30.1 Provide users enough time to read and use content.  | 30.1.1 If a page or application has a time limit, the user is given options to turn off, adjust, or extend that time limit. This is not a requirement for real-time events (e.g., an auction), where the time limit is absolutely required, or if the time limit is longer than 20 hours. |            | Users with physical disabilities, with low vision, who are blind and using screen readers, who are deaf, or users with reading disabilities, cognitive limitations, and learning disabilities. Users with low literacy or not fluent in the language. New and infrequent users. Older users. | WCAG 2.2.1 |
|               |                         |             |  | 30.1.2 Automatically moving, blinking, or scrolling content that lasts longer than 5 seconds can be paused, stopped, or hidden by the user.   |            | Users with low literacy, reading and intellectual disabilities, or users with attention deficit disorders.   | WCAG 2.2.2 |



| Sub Component | Element            | Affected By | Resultant Guidelines  | Resultant SCs  | Principles     | Target Users  | Resources  |
|---------------|--------------------|-------------|---|--|----------------|---|------------|
| Navigation    |                    | None        |   | 30.1.3 Automatically updating content can be paused, stopped, or hidden by the user or the user can manually control the timing of the updates.  | Operable       | Users with low literacy, reading and intellectual disabilities, or users with attention deficit disorders.  | WCAG 2.2.2 |
|               | 31.<br>Navigable   |             | 31.1 Provide ways to help users navigate, find content, and determine where they are. | 31.1.1 The web page has descriptive and informative page title.  |                | ALL users and especially users with visual disabilities, with limited short-term memory and reading disabilities, users with severe mobility impairments whose mode of operation relies on audio when navigating between web pages. | WCAG 2.4.2 |
|               |                    |             |   | 31.1.2 The navigation order of links, form elements, etc. is logical and intuitive.  |                | Users with mobility impairments who rely on keyboard for operating a page, users with visual impairments, or people using a screen magnifier.   | WCAG 2.4.3 |
|               |                    |             |   | 31.1.3 The purpose of each link can be determined from the link text alone, or from the link text and its context.   | Understandable | Users with visual disabilities, cognitive limitations, or users with motion impairment.   | WCAG 2.4.4 |
|               | 32.<br>Predictable |             | 32.1. Make Web Pages appear and operate in predictable ways.                          | 32.1.1. When a page element receives focus, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user. |                | Users with visual disabilities, cognitive limitations, motor impairments or new and infrequent users.   | WCAG 3.2.1 |

| Sub Component | Element              | Affected By | Resultant Guidelines  | Resultant SCs   | Principles     | Target Users  | Resources   |
|---------------|----------------------|-------------|---|---|----------------|---|---|
| Navigation    |                      | None        |   | 32.1.2 When a user inputs information or interacts with a control, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user unless the user is informed of the change ahead of time. | Understandable | Users who are blind, with low vision, with reading and intellectual disabilities, or new and infrequent users.  | WCAG 3.2.2  |
|               | 33. Input assistance |             | 33.1 Help users avoid and correct mistakes.   | 33.1.1 The error in user input is clearly identified, user is allowed to easily fix the error and resubmit the form.<br><br>33.1.2 Labels, cues, and instructions for required user input are provided.   |                | Users who are blind or colour-blind, users with cognitive, language, and learning disabilities. New and infrequent users.   | WCAG 3.3.1  |
|               |                      |             |   |   |                | Users with motor, cognitive, language and learning disabilities. Keyboard only users. Users who rely on screen reader or screen magnifiers. New and infrequent users. | WCAG 3.3.2  |
| General       | 34. Compatible       | None        | 34.1. Maximize compatibility with current and future user agents, including assistive technologies. | 34.1.1. Web page code validation and parsing according to specification are implemented with no errors.<br>34.1.2 Web page code is created in a way that supports accessibility and assistive technology.   | Robust         | People who use assistive technology.  | WCAG 4.1.1  |
|               |                      |             |   |   |                |   | WCAG 4.1.2  |
|               | 35. Usability        |             | 35.1 Make the web content usable for all users.   | 35.1.1 The web content is usable for all users.   | ALL            | ALL   | Nielsen and Mack (1994); Petrie and Kheir (2007) and the interviewed experts. |

# Appendix I

## Online Questionnaire

السلام عليكم ورحمة الله وبركاته

وبعد

تقوم الباحثة بإجراء دراسة بعنوان: توطین معايير النجاح لسهولة الوصول لمحتوى الويب في مواقع الجامعات السعودية

### Localised Web Content Accessibility Success Criteria for University Websites in Saudi Arabia

وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه في علوم الحاسب من كلية علوم الحاسب والهندسة - جامعة ساوثهامبتون - بريطانيا. حيث تهدف الدراسة لاستخلاص معايير النجاح لسهولة الوصول لمحتوى الويب في مواقع الجامعات السعودية للمستخدمين العاديين وذوي الاحتياجات الخاصة كالمكفوفين والصم. هذه المعايير ستعتبر الأساس لتقويم سهولة الوصول لمحتوى الويب في المواقع العربية وخصوصاً مواقع الجامعات السعودية حيث سيتمكن مطورو ومصممو هذه المواقع من استخدامها كأداة لتقويم سهولة الوصول في مواقعهم وتمكينهم من معرفة مواضع الخلل.

تتدرج هذه المعايير تحت عدة مواضيع، وسيتم عرض المعايير الخاصة بكل موضوع في صفحة مستقلة وكذلك كل معيار نجاح سيوضح معه الفئات المستفيدة من تطبيقه في موقع الويب. مشاركتكم بخبرتكم القيمة في هذا البحث ستكون بإذن الله حجر الأساس لتطوير أداة لتقويم سهولة الوصول لمحتوى الويب في مواقع الجامعات السعودية مما يساهم في تمكين ذوي الاحتياجات الخاصة من تصفح المواقع ببسر وسهولة

مشاركتكم في تعبئة الاستبانة لهذا المشروع البحثي هي مشاركة تطوعية وسيتم التعامل مع جميع الاجابات بسرية تامة بحيث لا تشير إلى هوية المشارك واستخدامها سيكون لغرض البحث فقط.

إذا كان لديكم أي استفسار يرجى مراسلة الباحثة (أسماء العابد) على الايميل التالي: [asia1g14@soton.ac.uk](mailto:asia1g14@soton.ac.uk)

مشر فر البحث:

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| الأسئلة الشخصية<br>Demographic Questions   |   |
|--|---|
| What is your name? (Optional اختياري)<br>اسم المشارك   |   |
| Your e-mail (Optional اختياري):<br>البريد الإلكتروني   |   |
| What is your nature of expertise?<br>ماهي طبيعة خبرتك  | a) Saudi university web developer or designer. مطور أو مصمم مواقع جامعات سعودية<br>b) Researcher in the area of web accessibility. باحث في مجال سهولة الوصول للويب.<br>c) Work with or closed to people with special needs. تعمل مع أو قريب من أشخاص ذوي احتياجات خاصة.   |
| <b>If answered (a) إذا كانت الإجابة (a)</b>  |   |
| Choose the option that best reflects your years of experience:<br>كم عدد سنوات خبرتك؟  | a) Less than a year. أقل من سنة واحدة.<br>b) Between one year and less than 2 years. من سنة واحدة إلى أقل من سنتين<br>c) Between 2 years and less than 5 years. من سنتين إلى أقل من ٥ سنوات<br>d) Between 5 years and less than 10 years. من ٥ سنوات إلى أقل من ١٠ سنوات<br>e) 10 years and more. ١٠ سنوات فأكثر  |
| What is the university you work at?<br>ماهي الجامعة التي تعمل بها؟   | List of government universities<br>Other. Specify: .....  |
| <b>If answered (b) إذا كانت الإجابة (b)</b>  |   |
| How many papers have you published in the area of web accessibility?<br>كم عدد الأوراق المنشورة لكم في مجال سهولة الوصول لمواقع الويب؟   | a) Nothing. لا شيء<br>b) One paper. ورقة علمية واحدة<br>c) Two papers. ورقتان علميتان<br>d) Between 3 and 5 papers. بين ٣ و ٥ أوراق علمية<br>e) Between 6 and 8 papers. بين ٦ و ٨ أوراق علمية<br>f) More than 8 papers. أكثر من ٨ أوراق علمية   |
| Does your work involve web accessibility for Arabic users?<br>هل أعمالكم تتضمن سهولة الوصول للويب للمستخدمين العرب؟                      | Yes I am focusing on web accessibility for Arabic users. نعم، فتركيزي على سهولة الوصول للويب للمستخدمين العرب<br>No my work involves web accessibility in general. لا، فأنا مهتم بسهولة الوصول بشكل عام   |
| <b>If answered (c) إذا كانت الإجابة (c)</b>  |   |
| Choose the option that best reflects your years of experience:<br>كم عدد سنوات خبرتك؟  | a) Less than a year. أقل من سنة واحدة.<br>b) Between one year and less than 2 years. من سنة واحدة إلى أقل من سنتين<br>c) Between 2 years and less than 5 years. من سنتين إلى أقل من ٥ سنوات<br>d) Between 5 years and less than 10 years. من ٥ سنوات إلى أقل من ١٠ سنوات<br>e) 10 years and more. ١٠ سنوات فأكثر  |
| Would you please specify the type of disability you have been working with:<br>يرجى تحديد نوع إعاقة/إعاقات الشخص/الأشخاص الذين تعمل معهم | a) Visual disabilities including blindness colour blindness and low vision. إعاقات بصرية مثل: العمى، ضعف النظر وعمى الألوان<br>b) Auditory disabilities such as deafness or a hearing impairment. إعاقات سمعية مثل: الصمم وضعف السمع<br>c) Cognitive disabilities or learning disabilities. إعاقات إدراكية مثل: صعوبات التعلم أو القراءة أو محدودية الذاكرة أو صعوبات في الاستيعاب وغيره<br>d) Motor disabilities. إعاقات حركية تصعب تصفح الويب مثل عدم القدرة على التحكم بالفأرة أو مرض الرعاش<br>e) Progressive disabilities due to ageing including gradual decrease in some abilities such as vision or hearing. إعاقات تقدمية ناتجة عن التقدم بالعمر ويشمل ذلك انخفاض تدريجي في بعض القدرات مثل السمع أو الإبصار<br>f) Other. Please Specify أخرى يرجى التحديد |

Please rate the importance of the following accessibility success criteria for university websites in Saudi Arabia.

يرجى تحديد أهمية معايير النجاح لسهولة الوصول لمواقع الجامعات السعودية

Not Important (NI) غير مهم

Slightly Important (SI) مهم قليلاً

Moderately Important (MI) متوسط الأهمية

Important (I) مهم

Very Important (VI) مهم جداً

#### الجزء الأول: سهولة الوصول للغة العربية

#### Part 1: Accessibility of Arabic Language

|     |  |
|-----|--|
| 1.1 | <p>تحديد اللغة واتجاهها لصفحة الويب العربية في مواقع الجامعات السعودية يكون في الكود البرمجي لصفحة الويب.</p> <p>The language and its direction of any Arabic web page are specified in the web page code.</p> <p><b>الفئات المستفيدة:</b> الأشخاص الذين يستخدمون قارئات الشاشة أو تقنيات أخرى لتحويل النص إلى كلام مسموع، أو الأشخاص من ذوي صعوبات التعلم أو القراءة</p>  |
| 1.2 | <p>اللغة واتجاهها لأي نص غير عربي في صفحة الويب العربية يكونان محددان في الكود البرمجي لصفحة الويب.</p> <p>The language of any non-Arabic text in an Arabic web page and its direction are specified in the web page code.</p> <p><b>الفئات المستفيدة:</b> الأشخاص الذين يستخدمون قارئات الشاشة أو تقنيات أخرى لتحويل النص إلى كلام مسموع، أو الأشخاص من ذوي صعوبات التعلم أو القراءة</p>  |
| 1.3 | <p>هناك تناسق في الاتجاه بين البيانات المدخلة كتابياً وبين عرضها للقراءة.</p> <p>There is a consistency in the direction between data entry (writing) and data display (reading).</p> <p><b>الفئات المستفيدة:</b> الأشخاص الذين يستخدمون قارئات الشاشة أو تقنيات أخرى لتحويل النص إلى كلام مسموع، أو الأشخاص من ذوي صعوبات التعلم أو القراءة.</p> <p><b>مثال:</b></p>  <p>The screenshot shows a login form with the following elements: a search bar with a 'بحث' button; a login section with a title 'تسجيل الدخول' and a subtitle 'المدخل نص انجليزي فاتجاه الإدخال من اليسار لليمين' (input text is English, direction from left to right); input fields for 'اسم المستخدم' (username) and 'كلمة المرور' (password); a 'دخول' (login) button; a checkbox for 'تذكرني لاحقاً' (remember me); a registration link 'رقم التذكرة يكون كالتالي: 056 - 1234567890'; an 'E-Ticket No:' field with a right-to-left label; and a 'رقم التذكرة:' (ticket number) field with a right-to-left label. Red circles and arrows highlight the right-to-left text alignment in the input fields and labels.</p> |
| 1.4 | <p>وجود التشكيل الجزئي في صفحة الويب العربية يكون بشكل افتراضي.</p> <p>Partial diacritics are provided in any web page as a default.</p> <p><b>الفئات المستفيدة:</b> الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <p><b>مثال:</b></p>  <p>The screenshot shows a text block with the following text: 'جامعة أم القرى ومن يومها الأول وضعت نُصَبَ أعينها هذا الإرث الإسلامي الخالد وهذه الحضارة التي تسمو على كل حضارات الدنيا، فكانت الانطلاقة نحو التميز في إبراز هذه الحضارة لتكون واقعا ملموساً تشهدُه الدنيا في زمن العلم والتقدم العلمي.' The text is right-aligned and includes partial diacritics (vowels) to aid in reading.</p>  |
| 1.5 | <p>علاوة على التشكيل الجزئي للنص هناك خياران للمستخدم: إما أن تُعرض الصفحة بتشكيل كامل أو أن تُعرض بدون تشكيل على الإطلاق.</p>   |

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|      | <p>There are options for users for full diacritics and no diacritics in any web page.</p> <p>الفئات المستفيدة: الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |
| 1.6  | <p>Partial or full diacritics are provided to differentiate between homograph words.</p> <p>الفئات المستفيدة: الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <p>مثال:</p> <p>كُنْزَتْ أدوات التواصل الاجتماعي وأصبحت وسيلة تستخدمها الجامعات للتواصل مع الناس بشكل أفضل. من الأمثلة على ذلك حسابات الجامعات على موقع تويتر للتواصل الاجتماعي وكثرة المتابعين والمتابعين.</p>   |
| 1.7  | <p>General language is used where possible.</p> <p>الفئات المستفيدة: الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <p>مثال:</p> <p>يُشترطُ لقبول الطالب المستجد في الجامعة أن يكون حاصلاً على شهادة الثانوية العامة أو ما يعادلها من داخل المملكة أو من خارجها.</p>   |
| 1.8  | <p>When it is needed, partial or full diacritics are used to differentiate between genders.</p> <p>الفئات المستفيدة: الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <p>مثال:</p> <p>عزيزتي الطالبة:</p> <p>يُرجى استلام نسختك من مكتبة الجامعة وتسجيل رقمك الجامعي وبريدك الإلكتروني.</p> <p>أ. تشكيل جزئي</p> <p>عزيزتي الطالبة:</p> <p>يُرجى استلام نسختك من مكتبة الجامعة وتسجيل رقمك الجامعي وبريدك الإلكتروني.</p> <p>ب. تشكيل كامل</p> |
| 1.9  | <p>يكون حجم الخط للنص ١٦ نقطة على الأقل وللعناوين ٢٠ نقطة على الأقل.</p> <p>(16pt = 22px = 1.4em = 140%)<br/>(20pt = 26px = 1.6em = 160%)</p> <p>Font size is at least 16 point for the text and 20 point for the headings.</p> <p>الفئات المستفيدة: الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.</p> <p>مثال يوضح حجم الخط بشكل تقريبي:</p> <p>الجامعات السعودية: حجم الخط 20 نقطة</p> <p>ازداد عدد الجامعات السعودية في السنوات الأخيرة، وتنوعت بين جامعات أهلية وجامعات حكومية.....</p> <p>حجم الخط 16 نقطة</p>       |
| 1.10 | <p>يكون الخط المستخدم في مواقع الجامعات السعودية مقروء وواضح.</p> <p>Fonts are clear and readable</p> <p>الفئات المستفيدة: الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.</p> <p>If the response is not (Not Important (NI) : (غير مهم</p>   |

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| 1.10.a | <p>من وجهة نظرك ماهي أكثر الخطوط العربية الواضحة المقروءة من مجموعة الخطوط التالية:<br/> From your point of view, what are the most readable Arabic fonts from the list below:</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Tahoma سهولة الوصول لمحتوى الويب</p> <p>Arial سهولة الوصول لمحتوى الويب</p> <p>Times New Roman سهولة الوصول لمحتوى الويب</p> <p>Simplified Arabic سهولة الوصول لمحتوى الويب</p> <p>Traditional Arabic سهولة الوصول لمحتوى الويب</p> </div> <p> <input type="checkbox"/> Tahoma<br/> <input type="checkbox"/> Arial<br/> <input type="checkbox"/> Times New Roman<br/> <input type="checkbox"/> Simplified Arabic<br/> <input type="checkbox"/> Traditional Arabic<br/> <input type="checkbox"/> Other أخرى . Please Specify : يرجى التحديد: ----- </p>   |
| 1.11   | <p>وضوح المسافات بين الكلمات وسهولة التمييز بين حدود الكلمات في مواقع الجامعات السعودية.<br/> Spaces between words are clear.<br/> الفئات المستفيدة: الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.</p> <p><b>If the response is not (Not Important (NI) غير مهم :</b></p> <p>1.11.a من وجهة نظرك ما الذي يمثل المسافة المناسبة بين الكلمات في الأمثلة التالية (علماً أن السطر الأول يمثل المسافة الافتراضية بين الكلمات على الويب):<br/> From your point of view, what is the best spacing between the words:</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>إزداد عدد الجامعات ليشمل مناطق عدة في أنحاء المملكة. <b>افتراضي</b></p> <p>إزداد عدد الجامعات ليشمل مناطق عدة في أنحاء المملكة. <b>١</b></p> <p>إزداد عدد الجامعات ليشمل مناطق عدة في أنحاء المملكة. <b>٢</b></p> <p>إزداد عدد الجامعات ليشمل مناطق عدة في أنحاء المملكة. <b>٣</b></p> </div> <p> <input type="radio"/> الافتراضي<br/> <input type="radio"/> ١<br/> <input type="radio"/> ٢<br/> <input type="radio"/> ٣<br/> <input type="radio"/> يُفضل وجود مسافات أكبر بين الكلمات. </p> |
| 1.12   | <p>يستخدم الخط العريض Bold أو الخط العريض مع لون مختلف في إضافة أهمية للنص.<br/> Bold or a combination of bold and colour is applied to emphasise the text.<br/> الفئات المستفيدة: الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.</p> <p><b>مثال:</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>تدعوكم عمادة شؤون الطلاب ممثلة بالنادي الصحي للمشاركة في الحملة الإلكترونية للتوعية بسرطان الرئة وأضرار التدخين</p> <p>بعنوان <b>حقى أنتفس هواء.</b></p> </div>   |
| 1.13   | <p>محاذاة النص العربي تكون إما لليمين (وهو الأفضل) أو محاذاة كلية Fully justified.<br/> Arabic text is either right justified (better) or fully justified.<br/> الفئات المستفيدة: الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم.</p> <p><b>مثال:</b></p>   |

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|      | <p>حظي تعليم المرأة في المملكة العربية السعودية بقدر وافر من الرعاية والاهتمام أتاح لها أن تسير بخطى واثقة نحو تحقيق طموحاتها وإظهار تميزها في مجالات مختلفة، مما جعلها تبرز بشكل لافت ليس على المستوى المحلي فقط بل وحتى على المستوى العالمي. نجد نماذج للمرأة السعودية المثقفة والباحثة المتخصصة ممن يشار لهن بالبنان وتذكر أسماؤهن في المحافل الدولية وميادين العلم مثبتهن ذلك نجاحهن وجدارتهن التي لا تقل عن نظيراتهن في دول أخرى متقدمة.</p> <p>أ. محاذاة لليمين</p> <p>حظي تعليم المرأة في المملكة العربية السعودية بقدر وافر من الرعاية والاهتمام أتاح لها أن تسير بخطى واثقة نحو تحقيق طموحاتها وإظهار تميزها في مجالات مختلفة، مما جعلها تبرز بشكل لافت ليس على المستوى المحلي فقط بل وحتى على المستوى العالمي. نجد نماذج للمرأة السعودية المثقفة والباحثة المتخصصة ممن يشار لهن بالبنان وتذكر أسماؤهن في المحافل الدولية وميادين العلم مثبتهن ذلك نجاحهن وجدارتهن التي لا تقل عن نظيراتهن في دول أخرى متقدمة.</p> <p>ب. محاذاة ليلية</p> |  |
| 1.14 | <p>لا تزيد أي جملة عن ٢٠ كلمة ولا تزيد أي فقرة عن ٥ جمل.</p> <p>NO sentence exceeds 20 words and NO paragraph exceeds 5 sentences.</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو من عندهم ذاكرة محدودة أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <p>مثال:</p> <p>أصبحت صناعة الحاسب الآلي وتقنية المعلومات هي الأكبر والأسرع نمواً وازدهاراً في العالم. كما أنها تعد القوة المحركة للتطورات في جميع جوانب الأعمال التجارية والتعليمية. في الوقت نفسه أصبحت الحواسيب جزءاً لا يتجزأ من كثير من الشركات الكبرى التي تحتاج إلى أنظمة مراقبة متطورة. كما أن الحواسيب تلعب دوراً رئيسياً في كثير من التقنيات الحديثة، بما فيها المنتجات الاستهلاكية، وشبكات الحاسب عالية السرعة. ولذلك فإن تطوير هذه التطبيقات تتطلب مهارة الفنيين المؤهلين في تصميم كل من الأجهزة والبرمجيات.</p>   |  |
| 1.15 | <p>تستخدم اللغة العربية الفصحى والكلمات البسيطة والشائعة الاستخدام في مواقع الجامعات السعودية.</p> <p>Readable Modern Standard Arabic with common and simple words is used.</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |  |
| 1.16 | <p>عندما يكون المحتوى ذو لغة متقدمة أو غير مقروءة، تُقدّم بدائل له بحيث تكون هذه البدائل مفهومة ومقروءة.</p> <p>Other readable and understandable alternatives for advanced or not readable content are provided.</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |  |
| 1.17 | <p>الأرقام تكون موجودة في صفحة الويب بصيغة الأرقام الهندية وهي المتعارف عليها في اللغة العربية أنها أرقام عربية، أما الأرقام العربية فلا تُستخدم مع النصوص العربية وهي المتعارف عليها أنها أرقام انجليزية.</p> <p>Arabic-Indic numbers are used in Arabic context.</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <p>مثال:</p> <p>الأرقام الهندية: ١ ٢ ٣ ٤ ..... ✓<br/>الأرقام العربية: ١ ٢ ٣ ٤ .....</p>   |  |
| 1.18 | <p>علامة الموجب + أو السالب - تكون دائماً على يمين العدد، مثال: ٤٥-.</p> <p>Positive and negative signs are at the right of the number, for example, (٤٥-).</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |  |
| 1.19 | <p>علامة النسبة المئوية تكون على يسار العدد، مثال: ٩٧%.</p> <p>Percentage sign is at the left of the number, for example, (%٩٧).</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>   |  |
| 1.20 | <p>الفاصلة العشرية (,) هي المستخدمة مع الأرقام، مثال: ٦٧,٩.</p> <p>Decimal separator is (,). For example, (٦٧,٩).</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |  |
| 1.21 | <p>لا تُستخدم فاصلة الآلاف حيث لا تُستخدم عادةً في اللغة العربية، مثال: ٥٢٦٧٠٠٠.</p> <p>Thousand separators are not used in Arabic most of the time. Example: 5267000</p> <p>الفئات المستفيدة: الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |  |

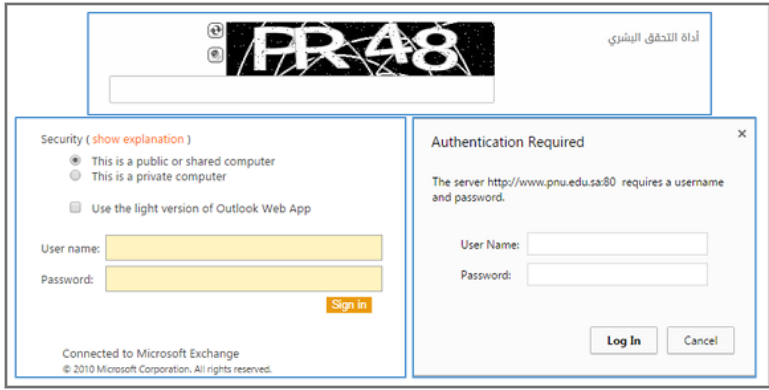


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| 1.22   | <p>لا يوجد أي استخدام للاختصارات خلال صفحة الويب في مواقع الجامعات السعودية وهذا الأفضل. مثال: بدلاً من كتابة الاختصار (واس) يتم كتابة فك الاختصار كاملاً: وكالة الأنباء السعودية.</p> <p>There is no use of abbreviations or acronyms throughout the web page.</p> <p><b>اللغات المستفيدة:</b> الأشخاص الذين لديهم صعوبات في تفكيك الكلمات، أو الذين يعتمدون على مكبرات الشاشة لتصفح الويب، أو الذين يعانون من محدودية ذاكرتهم، أو الذين يجدون صعوبة في استخدام السياق لمساعدتهم في الفهم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>  |
| 1.23   | <p>توجد اختصارات في صفحة الويب وتكون إما اختصارات عربية (أ) ويكون هناك مسافة بين الأحرف في الاختصار، مثلاً: و هـ م (اختصار: وهو المطلوب)، أو يكون هناك نقط بين الأحرف في الاختصار، مثلاً: و.هـ.م أو مسافات بين الأحرف ونقط و. هـ. م</p> <p>(ب) يتواجد فك للاختصار. مثال: واس (وكالة الأنباء السعودية) أو اختصارات مستعارة من لغات أخرى (أ) اختصارات غير مترجمة والتي تُستخدم كما هي في اللغات الأخرى، مثال: ليزر أو رادار. في هذه الحالة يمكن تقديم شرح لهذه الاختصارات ولكنه ليس ضرورياً.</p> <p>(ب) اختصارات مترجمة: يُقدم نطق للاختصار بالعربية (و/ أو) يُقدم فك للاختصار بالعربية كذلك، مثلاً MBC إم بي سي (مركز إذاعة الشرق الأوسط)، IMF أي إم إف (صندوق النقد الدولي).</p> <p>When abbreviations are used, they could be 1) Arabic abbreviations: 1.a) There are spaces between the letters in initialism, and/OR there are full stops between the letters in initialism. OR 1.b) The expansion form of the abbreviation is available. 2) Borrowed abbreviations from other languages: 2.a) Untranslated: Acronyms are written and pronounced in Arabic as they are in the other languages. Explanations of the untranslated abbreviations may be provided. OR 2.b) Translated: Arabic pronunciation of the abbreviation and/or its expansion are available.</p> <p><b>اللغات المستفيدة:</b> الأشخاص الذين لديهم صعوبات في تفكيك الكلمات، أو الذين يعتمدون على مكبرات الشاشة لتصفح الويب، أو الذين يعانون من محدودية ذاكرتهم، أو الذين يجدون صعوبة في استخدام السياق لمساعدتهم في الفهم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> |
| 1.24   | <p>في حال استخدمت الاختصارات، سواء كانت عربية أو مستعارة من لغات أخرى، يتواجد شرح أو فك للاختصار إما أ. عند أول ظهور للاختصار إذا كان يحمل معنى واحد خلال صفحة الويب.</p> <p>ب. في كل مرة يظهر فيها الاختصار إذا كان يحمل أكثر من معنى خلال صفحة الويب.</p> <p>If abbreviations or acronyms were used, Arabic and borrowed abbreviations Expansion or explanation are available: a. At the first occurrence if there is one meaning through the web page. b. Every time if there is more than one meaning.</p> <p><b>اللغات المستفيدة:</b> الأشخاص الذين لديهم صعوبات في تفكيك الكلمات، أو الذين يعتمدون على مكبرات الشاشة لتصفح الويب، أو الذين يعانون من محدودية ذاكرتهم، أو الذين يجدون صعوبة في استخدام السياق لمساعدتهم في الفهم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p>   |
| 1.25   | <p>يكون التباعد بين الأسطر بمقدار مسافتين في الفقرة الواحدة أما بين الفقرة والأخرى فتضاعف هذه المسافة بمقدار مرة ونصف.</p> <p>Line spacing is at least 2 spaces within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing.</p> <p><b>اللغات المستفيدة:</b> الأشخاص ضعيفو النظر أو من يعانون من صعوبات في القراءة (ديسلكسيا) أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.</p> <div> </div>  |
| 1.26   | <p>في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.</p> <p>If you have any comments or suggestions please use the text box below to do so</p>  |
| <p><b>الجزء الثاني: تنسيق البيانات</b></p> <p><b>Part 2: Data Format</b></p> |  |
| 2.1  | <p>في مواقع الجامعات السعودية، يُستخدم التاريخ الهجري فقط وفي حالة استخدام التاريخ الميلادي يُوضح التاريخ الهجري الموافق له.</p> <p>Hijri calendar or Hijri and Gregorian calendars are used in Saudi university websites.</p> <p><b>اللغات المستفيدة:</b> جميع المستخدمين.</p> <div> </div>   |
| 2.2  | <p>في مواقع الجامعات السعودية، يتم استخدام صيغة التاريخ الطويلة، مثال: الخميس، ٢٣ ربيع الأول، ١٤٣٨</p> <p>Usually, long date format is used in Saudi university websites ,e.g., ٢٣ ربيع الأول، ١٤٣٨</p> <p><b>اللغات المستفيدة:</b> جميع المستخدمين.</p>   |
| 2.3  | <p>في مواقع الجامعات السعودية، يمكن استخدام صيغة التاريخ المختصرة بشرط استخدام (/) كفاصل، مثال: ١٤٣٨/٠٣/٢٣</p> <p>When short date format is used, the separator is (/) in Saudi university websites ,e.g., ١٤٣٨/٠٣/٢٣</p> <p><b>اللغات المستفيدة:</b> جميع المستخدمين.</p>   |
| 2.4  | <p>في مواقع الجامعات السعودية، الوقت يكون بصيغة ١٢ ساعة مع (ص) للصباح و (م) للمساء، حيث أن صيغة ٢٤ ساعة نادراً ما تُستخدم في اللغة العربية. مثال: ٣:٤٩ م.</p>  |

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|  | In Saudi university websites, time is mostly in 12 hour format with (ص) for AM and (م) for PM. 24 hour format is rarely used. E.g., م ٣:٤٩<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 2.5  | في مواقع الجامعات السعودية، عند استخدام الوقت تُستخدَم (:) كفاصل، مثال: م ٣:٤٩<br>In Saudi university websites, if time is used, time separator is (:). E.g., م ٣:٤٩<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 2.6  | يُستخدَم الريال السعودي بصيغته الطويلة (ريال سعودي) أو المختصرة (ر.س.) عند استخدامه في مواقع الجامعات السعودية.<br>Saudi Riyal is used as a long or short format (ر.س.) when it is used in Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 2.7  | تُوضع العملة على يسار العدد عند استخدامها في مواقع الجامعات السعودية.<br>The currency is located at the left of the number when it is used in Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 2.8  | عند استخدام عملات أخرى في مواقع الجامعات السعودية، فالقيمة المقابلة بالريال السعودي تُعرض أيضاً<br>When other currencies are used in Saudi university websites, the equivalent value in Saudi Riyal is presented.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.<br>مثال يوضح عرض عملة أجنبية بدون توضيح المقابل بالريال السعودي<br>   |
| 2.9  | عند استخدام الرمز البريدي السعودي في مواقع الجامعات السعودية، فهو عبارة عن رقم من خمس خانات. مثال: لتوضيح عنوان المراسلة لجامعة س<br>الرمز البريدي: ١٢٣٤٥<br>When a Saudi postal code is used in university websites, it is a 5-digit number.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 2.10   | عند استخدام الأرقام الهاتفية السعودية في مواقع الجامعات السعودية، فإنها تكون على النمط التالي<br>XXX XXXX<br>خانتين لمفتاح المنطقة +966<br>والهاتف الجوال<br>+966 5XXX XXXXX<br>When Saudi phone numbers are used in Saudi university websites, phone number format is: +966 2-digit Area Code XXX XXXX and Mobile phone: +966 5XXX XXXXX.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 2.11   | عند استخدام الأسماء في مواقع الجامعات السعودية، على سبيل المثال: عند تعبئة نموذج التسجيل في الجامعة يُطلب من المستخدم إدخال اسمه. في هذه الحالة المقبول والمفهوم لدى المستخدم هو إدخال اسمه الأول، اسم الأب والجد والعائلة أي الاسم الرباعي.<br>When names are used in Saudi university websites, first name, father, grandfather and family names are the accepted and understood name format.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 2.12   | عند استخدام الأسماء في مواقع الجامعات السعودية، على سبيل المثال: عند تعبئة نموذج التسجيل في الجامعة يُطلب من المستخدم إدخال اسمه. في هذه الحالة الاسم الأوسط أو أول حرف منه أو اسم المرأة قبل الزواج (وهي الدارج استخدامها في الثقافات الأخرى) لا تُستخدم كونها غير مقبولة ثقافياً وغير مفهوم.<br>When names are used in Saudi university websites, middle initial, middle or maiden names are not used as they are not accepted culturally nor understood.<br><b>الفئات المستفيدة:</b> جميع المستخدمين. |
| 2.13   | يُستخدَم النظام المتري في مواقع الجامعات السعودية. مثالاً: عند توصيف عنوان، يبعد المبنى الأول عن المبنى الثاني مسافة ٢٠ متر ولا نقول ٦٦ قدم.<br>Metric system is used in Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 2.14   | في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.<br>If you have any comments or suggestions please use the text box below to do so   |
| <b>الجزء الثالث: الرموز والأيقونات</b><br><b>Part 3: Symbols and Icons</b> |  |
| 3.1  | الرموز والأيقونات المستخدمة في مواقع الجامعات السعودية تكون مفهومة عند المستخدمين المستهدفين.<br>Symbols and icons used in Saudi university websites are understood by target users.<br><b>الفئات المستفيدة:</b> جميع المستخدمين وخاصة المستخدمين الجدد وقليلو الاستخدام للويب.<br>مثال يوضح استخدام رموز غير مفهومة لجميع المستخدمين وبالدات حديثو أو قليلو الاستخدام للويب:  |

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| 3.2   | <p>الرموز والأيقونات المستخدمة في مواقع الجامعات السعودية تكون غير مهينة ومقبولة عند المستخدمين المستهدفين. مثال: الرموز والأيقونات من الثقافات الأخرى والتي يمكن أن تكون غير مقبولة مثل شجرة الكريسماس أو أي رموز أو أيقونات من ديانات أخرى أو مثلاً بعض الحيوانات مثل الخنزير.</p> <p>Symbols and icons used in Saudi university websites are inoffensive and acceptable to target users. E.g., symbols from other cultures that would be unacceptable such as Christmas tree, symbols of other religions, some animals like pigs.</p> <p>الفئات المستفيدة: جميع المستخدمين</p> |
| 3.3   | <p>الرموز والأيقونات المستخدمة في مواقع الجامعات السعودية تكون مناسبة للمحتوى.</p> <p>Symbols and icons used in Saudi university websites are appropriate to the content.</p> <p>الفئات المستفيدة: جميع المستخدمين.</p>   |
| 3.4   | <p>في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.</p> <p>If you have any comments or suggestions please use the text box below to do so</p>   |
| <p>الجزء الرابع: الوسائط المتعددة</p> <p>Part 4: Multimedia</p> |   |
| 4.1   | <p>عناصر الوسائط المتعددة الموجودة في مواقع الجامعات السعودية تكون ملائمة لثقافة المستخدمين.</p> <p>Multimedia elements on Saudi university websites are appropriate to the users' culture.</p> <p>الفئات المستفيدة: جميع المستخدمين.</p>   |
| 4.2   | <p>في مواقع الجامعات السعودية، جميع عناصر الوسائط المتعددة التي تضم موسيقى يتم توفير: إما تلميح لوجود موسيقى في الوسائط المتعددة و/ أو نسخة أخرى من الوسائط المتعددة ولكن بدون موسيقى.</p> <p>In Saudi university websites, all multimedia elements incorporating music provides: Hint that there is music in the multimedia and/or another version without music.</p> <p>الفئات المستفيدة: جميع المستخدمين ماعدا الصم.</p>   |
| 4.3   | <p>في مواقع الجامعات السعودية حجم صفحة الويب الواحدة بجميع عناصر الوسائط المتعددة ملائم لسرعة الانترنت في بلد المستخدمين المستهدفين وهي السعودية.</p> <p>In Saudi university websites, the total size of the web page including its multimedia elements is suitable to the internet speed in the country of its target users (Saudi Arabia).</p> <p>الفئات المستفيدة: جميع المستخدمين.</p>  |
| 4.4   | <p>في مواقع الجامعات السعودية، أي محتوى غير نصي مثلاً: صورة، فيديو، تسجيل صوتي، أيقونات أو رموز.... الخ يُعرض للمستخدم يحتوي على بديل نصي Text Alternative يصف غرض المحتوى غير النصي.</p> <p>In Saudi university websites, all non-text content that is presented to the user has a descriptive text alternative that serves the equivalent purpose.</p> <p>الفئات المستفيدة: المستخدمون المكفوفون أو ذوي الإعاقة البصرية، أو من يعانون من الصمم أو صعوبة في السمع، أو من لديهم صعوبات في فهم المحتوى غير النصي</p>   |
| 4.5   | <p>في مواقع الجامعات السعودية، أي تسجيل صوتي يرافقه نصي توصيفي Descriptive Text Transcript لكامل التسجيل الصوتي.</p> <p>In Saudi university websites, a descriptive text transcript is provided for recorded web-based audio.</p> <p>الفئات المستفيدة: المستخدمون المكفوفون أو ذوي الإعاقة البصرية، أو من يعانون من الصمم أو صعوبة في السمع، أو من لديهم صعوبات في فهم المحتوى غير النصي.</p>   |
| 4.6   | <p>في مواقع الجامعات السعودية، أي تسجيل فيديو فقط (بدون صوت) يرافقه نص أو تسجيل صوتي (Audio) توصيفي لكامل الفيديو.</p> <p>In Saudi university websites, text or audio description is provided for recorded web-based video-only.</p> <p>الفئات المستفيدة: المستخدمون المكفوفون أو ذوي الإعاقة البصرية، أو من يعانون من الصمم أو صعوبة في السمع، أو من لديهم صعوبات في فهم المحتوى غير النصي.</p>  |
| 4.7   | <p>في مواقع الجامعات السعودية، أي تسجيل فيديو يرافقه نصوص أو تعليقات متزامنة Synchronised Captions لأي أصوات في الفيديو.</p> <p>In Saudi university websites, synchronized captions are provided for recorded, web-based video</p> <p>الفئات المستفيدة: من يعانون من الصمم أو صعوبة في السمع.</p>   |
| 4.8   | <p>في مواقع الجامعات السعودية، أي تسجيل فيديو يرافقه نصي توصيفي Descriptive Text Transcript أو توصيف صوتي لكامل محتوى الفيديو.</p> <p>In Saudi university websites, a descriptive text transcript OR audio description is provided for recorded web-based video.</p> <p>الفئات المستفيدة: المستخدمون المكفوفون أو ذوي الإعاقة البصرية، أو من يعانون من صعوبات في فهم واستيعاب الفيديو هات.</p>  |
| 4.9   | <p>أي تسجيل صوتي يعمل لأكثر من ٣ ثواني في أي صفحة ويب في مواقع الجامعات السعودية، يوجد طريقة لإيقاف التسجيل الصوتي تماماً أو إيقافه مؤقتاً أو كتم صوته.</p>   |

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|  | In Saudi university websites, a mechanism is provided to stop, pause, mute, or adjust volume for audio that automatically plays on a page for more than 3 seconds.<br><b>الفئات المستفيدة:</b> الأشخاص الذين يعتمدون على قارئات الشاشة أو من لا يستطيعون التركيز على المحتوى في حال وجود صوت يعمل.  |
| 4.10   | في مواقع الجامعات السعودية، لا يوجد أي محتوى في صفحة الويب يومض Flash أكثر من ٣ مضع في الثانية الواحدة إلا إذا كان هذا المحتوى صغيراً بشكل كافٍ وكذلك الومضات ذات تباين منخفض ولا تحتوي على اللون الأحمر.<br>No page content flashes more than 3 times per second unless that flashing content is sufficiently small and the flashes are of low contrast and do not contain too much red.<br><b>الفئات المستفيدة:</b> الأشخاص الذين يعانون من نوبات صرع أو تشنجات بسبب الحساسية من الضوء.   |
| 4.11   | في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.<br>If you have any comments or suggestions please use the text box below to do so  |
| <b>الجزء الخامس: الألوان</b><br><b>Part 5: Colours</b>             |   |
| 5.1  | تستخدم الألوان الذكورية كالأخضر والرمادي في مواقع الجامعات السعودية بينما الألوان الأنثوية كالوردي يتم تجنبها.<br>In Saudi university websites, masculine colours such as blue, green and grey are used and feminine colours such as pink are avoided.<br><b>الفئات المستفيدة:</b> جميع المستخدمين ماعدا المكفوفين.   |
| 5.2  | الألوان المستخدمة في مواقع الجامعات السعودية مشتقة من شعار الجامعة، أو من البيئة المحيطة، على سبيل المثال: ألوان الصحراء أو العلم السعودي.<br>The colours of a Saudi university website stem from the university's logo, or the surrounding environment, for example, the colours of the desert, or the national flag.<br><b>الفئات المستفيدة:</b> جميع المستخدمين ماعدا المكفوفين.   |
| 5.3  | لا تُستخدم الألوان على أنها الوسيلة الوحيدة لتوصيل محتوى الويب أو للتمييز بين عناصره البصرية. مثال: نموذج يُعياً من قبل المستخدم ويحوي عدداً من الحقول الإلزامية وهذا يُوضح في النموذج بكتابة (حقل إلزامي) باللون الأحمر أمام الحقول المطلوبة. أيضاً يكون ذلك موضعاً في تعليقات تعبئة النموذج أن الحقول المطلوبة موضحة كتابةً ولوناً.<br>Colour is not used as the sole method of conveying content or distinguishing visual elements.<br><b>الفئات المستفيدة:</b> المستخدمون ذوو الرؤية الجزئية أو من يعانون من عمى الألوان أو بعض كبار السن أو من يعتمدون على اللمس مثل الأجهزة التي تعرض لغة برايل أو من يعتمدون على شاشات منخفضة التقنية والألوان فلا يستطيعون الاعتماد على أي معلومات تعتمد على الألوان فقط.   |
| 5.5  | في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.<br>If you have any comments or suggestions please use the text box below to do so  |
| <b>الجزء السادس: مخطط صفحة الويب</b><br><b>Part 6: Page Layout</b> |   |
| 6.1  | اتجاه صفحة الويب في مواقع الجامعات السعودية يكون من اليمين لليسار.<br>The orientation of any web page of Saudi university websites is right to left.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 6.2  | شعار الجامعة في مواقع الجامعات السعودية يوجد في الركن العلوي الأيمن من صفحة الويب.<br>University logo is at the top right corner of any web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 6.3  | الشريط الأفقي Banner في مواقع الجامعات السعودية يوجد في الجزء العلوي من صفحة الويب.<br>The banner is at the top of the web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 6.4  | القائمة menu في مواقع الجامعات السعودية تكون في الجزء العلوي من صفحة الويب و/ أو على يمينها.<br>The menu is at the top and/or right of the web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 6.5  | التاريخ في مواقع الجامعات السعودية يكون في الركن العلوي الأيسر من صفحة الويب.<br>The date is available at the top left of the web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 6.6  | خانة البحث في مواقع الجامعات السعودية تكون موجودة في الركن العلوي الأيسر من صفحة الويب.<br>Search box is available at the top left of the web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 6.7  | الرابط المؤدي للنسخة الانجليزية من صفحة الويب في مواقع الجامعات السعودية يكون موجود في الركن العلوي الأيسر من الصفحة.<br>A link to the English version is at the top left of the web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.  |
| 6.8  | معلومات الاتصال، روابط الحسابات في مواقع التواصل الاجتماعي وحقوق الملكية الفكرية تكون موجودة في الجزء السفلي من صفحة الويب في مواقع الجامعات السعودية.<br>Contact information, social media links and copyrights are at the bottom of the web page of Saudi university websites.<br><b>الفئات المستفيدة:</b> جميع المستخدمين.   |
| 6.9  | في مواقع الجامعات السعودية، معلومات محتوى صفحة الويب وبنيتها والعلاقات التي تحدد كيفية عرض هذه المحتويات تكون محددة برمجياً في كود صفحة الويب أو متوفرة في النص.<br>In Saudi university websites, content information, structure, and relationships conveyed through presentation can be determined through the web page code or are available in text.<br><b>الفئات المستفيدة:</b> المستخدمون من ذوي الاحتياجات الخاصة مثل المكفوفين الذين يستخدمون قارئات الشاشة أو من هم صم ومكفوفون في آن واحد يستخدمون لغة برايل.<br>مثال: معلومات محتويات صفحة الويب وبنيتها والعلاقات بينها تُحدد من خلال استخدام الكود البرمجي لصفحة الويب لتحديد على سبيل المثال: العناوين، القوائم، الفقرات، الجداول، تنسيق الصفحة أو المحتوى الرئيسي وغيره. المثال التالي يوضح إضافة landmarks to HTML4 or XHTML 1.0 document: |

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|   | <pre> &lt;div id="header" role="banner"&gt;A banner image and introductory title&lt;/div&gt;  &lt;div id="sitelookup" role="search"&gt;...&lt;/div&gt;  &lt;div id="nav" role="navigation"&gt;...a list of links here ... &lt;/div&gt;  &lt;div id="content" role="main"&gt; ... Main content here ...&lt;/div&gt;  &lt;div id="rightsideadvert" role="complementary"&gt;...an advertisement here...&lt;/div&gt;  &lt;div id="footer" role="contentinfo"&gt;(c) Copyright reserved .... &lt;/div&gt; </pre>   |
| 6.10  | <p>في أي صفحة ويب في مواقع الجامعات السعودية، عندما يكون للترتيب الذي تُعرض به المعلومات في المحتوى أهمية في فهم المحتوى، يكون هذا الترتيب محدداً برمجياً في كود صفحة الويب.</p> <p>In any web page of Saudi university websites, when the sequence in which content is presented affects its meaning, a correct reading sequence for the content can be determined in the web page's code.</p> <p><b>الفئات المستفيدة:</b> المستخدمون الذين يعتمدون على التقنيات المساعدة لقراءة محتوى الويب بصوت عالي حيث أنها تعتمد على ترتيب التصفح للمحتوى المحدد في الكود البرمجي.</p>  |
| 6.11  | <p>في أي صفحة ويب في مواقع الجامعات السعودية، التعليمات المعطاة لفهم المحتوى وتشغيله يجب ألا تعتمد على الخصائص الحسية للمكونات وحدها مثل الشكل أو الحجم أو الموضع البصري أو الاتجاه أو الصوت.</p> <p>In any web page of Saudi university websites, instructions given to understand and operate the content do not only rely upon sensory characteristics of components such as shape, size, visual location, orientation or sound.</p> <p><b>الفئات المستفيدة:</b> المستخدمون ضعيفو النظر أو المكفوفون.</p> <p>مثال: جدول يعرض فعاليات الجامعة تُستخدَم فيه الألوان والأشكال للتمييز بين الفعاليات. في هذا الجدول تُعرض قائمة من الأوقات في الصف العلوي وقائمة من الفعاليات في أول عمود. أحد هذه الفعاليات مثالاً: فعالية س عندما تُعرض في أي خلية في الجدول يكون لون خلفية الخلية أخضر وكذلك يعرض شكل المربع. بينما عندما تُعرض فعالية أخرى ولتكن فعالية ص يكون لون خلفية الخلية وردي وتُعرض دائرة وهكذا يتم التفريق بين الفعاليات من خلال خاصيتي اللون والشكل وليس أحدهما فقط.</p> |
| 6.12  | <p>في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.</p> <p>If you have any comments or suggestions please use the text box below to do so</p>   |
| <p><b>الجزء السابع: تصفح صفحات الويب</b></p> <p><b>Part 7: Navigation</b></p> |   |
| 7.1   | <p>تُعرض عناصر التنقل بين صفحات الويب بشكل ثابت في صفحات موقع الجامعة. مثلاً يتم عرض شعار الجامعة وخانة البحث وقائمة تنوّدي إلى صفحات الموقع الأخرى- في أعلى صفحة الويب وهذا يكون مكرراً بنفس الترتيب تقريباً في جميع صفحات موقع الويب.</p> <p>Navigation elements are displayed consistently through the website.</p> <p><b>الفئات المستفيدة:</b> الأشخاص ذوو الإعاقات الفكرية أو العقلية وضعيفو البصر والمكفوفون وكذلك الأشخاص الجدد أو قليلو الاستخدام للويب.</p>  |
| 7.2   | <p>تُستخدم اللغة العربية في جميع عناصر التصفح لموقع الجامعة بنسخته العربية، ويشمل هذا صفحات تسجيل الدخول والتحقق من الاستخدام البشري CAPTCHA لأي رسائل الأخطاء.</p> <p>Arabic language is used for all navigation elements in Arabic version of Saudi university website including log in pages, error messages or CAPTCHA.</p> <p><b>الفئات المستفيدة:</b> جميع المستخدمين.</p> <p>المثال التالي يوضح عدم الالتزام باللغة العربية في بعض مكونات مواقع الجامعات السعودية:</p>   |
| 7.3   | <p>في أي صفحة ويب في مواقع الجامعات السعودية، يوجد هناك أكثر من وسيلة لتجاوز المحتوى غير المرغوب به.</p> <p>In any web page of Saudi university websites, there is more than one way to skip unwanted content.</p> <p><b>الفئات المستفيدة:</b> المستخدمون المكفوفون أو ذوي الإعاقات البصرية الذين يعتمدون على قارئات الشاشة، أو مكبرات الشاشة أو لوحة المفاتيح لتصفح الويب.</p>   |
| 7.4   | <p>في أي صفحة ويب في مواقع الجامعات السعودية، تتواجد معلومات للمستخدمين بخصوص مكانهم في الموقع.</p> <p>In any web page of Saudi university websites, information is provided for users about their location.</p> <p><b>الفئات المستفيدة:</b> المستخدمون الذين يعانون من محدودية التركيز والمستخدمون الجدد وقليلو الاستخدام للويب.</p> <p><b>الرئيسية / الكليات / كلية الهندسة / الأقسام / قسم الهندسة الطبية الحيوية</b></p>  |
| 7.5   | <p>في أي صفحة ويب في مواقع الجامعات السعودية، تُقدّم المساعدة للمستخدمين عند احتياجهم لها.</p>  |

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|      | <p>In any web page of Saudi university websites, help is provided for users when they need it.</p> <p><b>الفئات المستفيدة:</b> مَنْ يعانون من صعوبات في الكتابة أو القراءة أو إعاقات أخرى عقلية أو كبار السن أو المستخدمين الجدد وقليلو الاستخدام للويب.</p> <p>مثال: نموذج مخصص لتقديم طلبات الالتحاق بالجامعة للطلاب. ونظراً لإمكانية وجود صعوبة عند بعض المستخدمين في فهم بعض الأسئلة أو ادخال البيانات المطلوبة. يكون هناك رابط مساعدة عند كل سؤال يوضح المطلوب.</p>  |
| 7.6  | <p>في أي صفحة ويب في مواقع الجامعات السعودية، جميع وظائف الصفحة (مثلاً: الانتقال من رابط لآخر) تكون متوفرة من خلال لوحة المفاتيح ما عدا لو كانت الوظيفة لا يمكن إنجازها باستخدام لوحة المفاتيح ومثال ذلك: الكتابة بخط اليد على شاشة لمسية.</p> <p>In any web page of Saudi university websites, all page functionality is available using the keyboard, unless the functionality cannot be accomplished in any known way using a keyboard (e.g., free hand drawing).</p> <p><b>الفئات المستفيدة:</b> المستخدمون المكفوفون أو من يعانون من إعاقات بصرية أو كبار السن أو من يعانون من رعاش في أيديهم.</p>   |
| 7.7  | <p>في أي صفحة ويب في مواقع الجامعات السعودية، تركيز لوحة المفاتيح على أي عنصر في الصفحة لا يكون مقيداً بحيث لا يمكن التحرر منه والانتقال لأي عناصر أخرى بل العكس فالمستخدم عنده إمكانية التنقل بحرية بين عناصر الصفحة باستخدام لوحة المفاتيح فقط.</p> <p>In any web page of Saudi university websites, keyboard focus is never locked or trapped at one particular page element. The user can navigate to and from all navigable page elements using only a keyboard.</p> <p><b>الفئات المستفيدة:</b> المستخدمون المكفوفون أو من يعانون من إعاقات بصرية أو كبار السن أو من يعانون من رعاش في أيديهم.</p>  |
| 7.8  | <p>في أي صفحة ويب في مواقع الجامعات السعودية، إذا كان هناك مهلة زمنية محددة للصفحة أو التطبيق فالمستخدم يُعطى الخيار لإلغاء المهلة الزمنية أو تعديلها أو تمديدتها، ولكن لا يكون ذلك في الفعاليات التي تتطلب تجاوب في وقت محدد كالمراد العلني مثلاً أو عندما تكون المهلة المعطاة للمستخدم أكثر من ٢٠ ساعة.</p> <p>In any web page of Saudi university websites, if a page or application has a time limit, the user is given options to turn off, adjust, or extend that time limit. This is not a requirement for real-time events (e.g., an auction), where the time limit is required, or if the time limit is longer than 20 hours.</p> <p><b>الفئات المستفيدة:</b> المستخدمون ذوي الإعاقات الحركية والمكفوفون الذين يعتمدون على قارئات الشاشة ومن يعانون من إعاقات بصرية والصمم ومن يعانون من صعوبات في القراءة أو التعلم وكبار السن والمستخدمون الجدد أو حديثو الاستخدام للويب أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض</p> <p>مثال: تطبيق البريد الإلكتروني يسجل خروج المستخدم بشكل أوتوماتيكي إذا لم يكن هناك أي نشاط لمدة ٣٠ دقيقة. لكن قبل تسجيل الخروج يتيح للمستخدم زيادة المهلة الزمنية في حال كان يحتاج وقت أطول.</p> |
| 7.9  | <p>في أي صفحة ويب في مواقع الجامعات السعودية، أي محتوى يتحرك أو يومض بشكل متتابع أو يُمرّر لمدة أكثر من ٥ ثواني بشكل أوتوماتيكي يستطيع المستخدم ان يوقفه بشكل مؤقت أو يوقفه بشكل كامل أو يخفيه.</p> <p>In any web page of Saudi university websites, automatically moving, blinking, or scrolling content that lasts longer than 5 seconds can be paused, stopped, or hidden by the user.</p> <p><b>الفئات المستفيدة:</b> من يعانون من صعوبات في القراءة أو التعلم ومن يعانون من فرط الحركة وصعوبة التركيز والأشخاص ذوي المستوى التعليمي المنخفض.</p> <p>مثال: يوجد رسوم متحركة animation في أعلى صفحة الويب تعمل أوتوماتيكياً لأكثر من ٥ ثواني وهناك زر (إيقاف الرسوم المتحركة) قريب من الجزء السفلي من الرسوم.</p>  |
| 7.10 | <p>في أي صفحة ويب في مواقع الجامعات السعودية، أي محتوى يتم تحديثه بشكل أوتوماتيكي يستطيع المستخدم ان يوقفه بشكل مؤقت أو يوقفه بشكل كامل أو يخفيه، أو بإمكان المستخدم التحكم في توقيت التحديث بشكل يدوي.</p> <p>In any web page of Saudi university websites, automatically updating content can be paused, stopped, or hidden by the user or the user can manually control the timing of the updates.</p> <p><b>الفئات المستفيدة:</b> من يعانون من صعوبات في القراءة أو التعلم ومن يعانون من فرط الحركة وصعوبة التركيز والأشخاص ذوي المستوى التعليمي المنخفض.</p> <p>مثال: آخر أخبار الجامعة يتم تحديثها أوتوماتيكياً بشكل دوري، ومع ذلك هناك زر للمستخدم لإيقاف هذا التحديث مؤقتاً أو كلياً أو لإخفاء المحتوى.</p>   |
| 7.11 | <p>يوجد عنوان لأي صفحة ويب في مواقع الجامعات السعودية وهذا العنوان يصف ويعطي معلومات عن الصفحة. مثال: عنوان صفحة نشأة الجامعة س في موقعها الإلكتروني هو: <b>نشأة الجامعة   جامعة س</b></p> <p>In any web page of Saudi university websites, the web page has descriptive and informative page title.</p> <p><b>الفئات المستفيدة:</b> جميع المستخدمين وبالأذات من لديهم ذاكرة محدودة المدى أو من يعانون من صعوبات في القراءة أو من يعتمدون بشكل كلي على قارئات الشاشة في تصفح الويب.</p>   |
| 7.12 | <p>في أي صفحة ويب في مواقع الجامعات السعودية، ترتيب تصفح الروابط أو مكونات النماذج المختلفة وغيره من عناصر التصفح يكون بشكل منطقي وبديهي حتى لو كان التصفح عن طريق لوحة المفاتيح فقط.</p> <p>In any web page of Saudi university websites, the navigation order of links, form elements, etc. is logical and intuitive even if they are navigated using the keyboard.</p> <p><b>الفئات المستفيدة:</b> جميع المستخدمين وبالأذات ذوي الإعاقات الحركية الذين يعتمدون على لوحة المفاتيح لتصفح الويب ومن يعانون من إعاقات بصرية ومن يستخدمون مكبرات الشاشة لتصفح الويب.</p>  |
| 7.13 | <p>في أي صفحة ويب في مواقع الجامعات السعودية، الغرض من كل رابط يمكن ان يُحدد من خلال نص الرابط فقط أو من خلال نص الرابط والسياق المتواجد فيه الرابط.</p> <p>In any web page of Saudi university websites, the purpose of each link can be determined from the link text alone, or from the link text and its context.</p> <p><b>الفئات المستفيدة:</b> المستخدمون ذوي الإعاقات الحركية أو ذوي الإعاقات البصرية أو الإعاقات الفكرية.</p>  |
| 7.14 | <p>في أي صفحة ويب في مواقع الجامعات السعودية، <b>عندما ينتقل التركيز لأي عنصر في الصفحة</b>، فإن ذلك لا يؤدي إلى تغيير جوهري في الصفحة مثلاً ظهور فجائي لنافذة منبثقة أو تغيير في تركيز لوحة المفاتيح بالانتقال إلى عنصر آخر من الصفحة فجائياً أو أي تغيير يمكن أن يتسبب في إرباك وتضليل المستخدم.</p> <p>In any web page of Saudi university websites, when a page element receives focus, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user.</p> <p><b>الفئات المستفيدة:</b> المستخدمون ذوي الإعاقات الحركية أو ذوي الإعاقات البصرية أو الإعاقات الفكرية أو المستخدمين الجدد أو قليلو الاستخدام للويب.</p>  |
| 7.15 | <p>في أي صفحة ويب في مواقع الجامعات السعودية، <b>عندما يقوم المستخدم بإدخال معلومات أو يتفاعل مع أي عناصر تحكم مثلاً ضغط زر</b>، فإن ذلك لا يؤدي إلى تغيير جوهري في الصفحة مثلاً ظهور فجائي لنافذة منبثقة أو تغيير في تركيز لوحة المفاتيح بالانتقال إلى عنصر آخر من الصفحة فجائياً أو أي تغيير يمكن أن يتسبب في إرباك وتضليل المستخدم إلا في حال تم إعلام المستخدم بهذا التغيير قبل أن يحصل فعلياً.</p>   |

|  |   |
|--|---|
|  | <p>In any web page of Saudi university websites, when a user inputs information or interacts with a control, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user unless the user is informed of the change ahead of time.</p> <p><b>الفئات المستفيدة:</b> المستخدمون ذوي الإعاقات الحركية أو ذوي الإعاقات البصرية أو الإعاقات الفكرية أو المستخدمون الجدد أو قليلو الاستخدام للويب.</p>       |
| 7.16   | <p>في أي صفحة ويب في مواقع الجامعات السعودية، أي خطأ في المدخلات من قِبَل المستخدم يتم تحديده بوضوح، وعندئذٍ يُسمح للمستخدم أن يصحح الخطأ ويعيد إرسال النموذج الإلكتروني مرة أخرى.</p> <p>In any web page of Saudi university websites, the error in user input is clearly identified, user is allowed to easily fix the error and resubmit the form.</p> <p><b>الفئات المستفيدة:</b> المستخدمون المكفوفون ومن يعانون من عمى الألوان والإعاقات الفكرية أو صعوبات في التعلم أو القراءة أو المستخدمون الجدد أو قليلو الاستخدام للويب.</p> |
| 7.17   | <p>في أي صفحة ويب في مواقع الجامعات السعودية، توجد تسميات توضيحية وتلميحات وتعليمات Labels, Cues and Instructions للمستخدم لأي مخلات إلزامية وليست اختيارية.</p> <p>In any web page of Saudi university websites, labels, cues, and instructions for required user input are provided.</p> <p><b>الفئات المستفيدة:</b> من يعانون من إعاقات حركية أو فكرية أو صعوبات في التعلم أو القراءة ومن يتصفحون باستخدام لوحة المفاتيح فقط أو من يعتمدون على قارئات أو مكبرات الشاشة والمستخدمون الجدد أو قليلو الاستخدام للويب.</p>               |
| 7.18   | <p>في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.</p> <p>If you have any comments or suggestions please use the text box below to do so</p>   |
| <p><b>الجزء الثامن: أخرى</b><br/><b>Part 8: Others</b></p> |   |
| 8.1  | <p>في مواقع الجامعات السعودية، عند تنفيذ التحقق من صحة الكود البرمجي لصفحة الويب وذلك وفقاً للمواصفات الخاصة به لا تنتج أي أخطاء من هذا التحقق.</p> <p>Web page code validation and parsing according to specification are implemented with no errors.</p> <p><b>الفئات المستفيدة:</b> الأشخاص الذين يستخدمون التقنيات المساعدة لتصفح الويب.</p>  |
| 8.2  | <p>يتم إنشاء الكود البرمجي لصفحة الويب بطريقة تدعم سهولة الوصول والتقنيات المساعدة. مثلاً: جافا أبلت يستخدم API التي تدعم التقنيات المساعدة وسهولة الوصول.</p> <p>Web page code is created in a way that supports accessibility and assistive technology.</p> <p><b>الفئات المستفيدة:</b> الأشخاص الذين يستخدمون التقنيات المساعدة لتصفح الويب.</p>   |
| 8.3  | <p>محتوى الويب سهل الاستخدام لجميع المستخدمين.</p> <p>The web content is usable for all users.</p> <p><b>الفئات المستفيدة:</b> جميع المستخدمين.</p>   |
| 8.4  | <p>في حال وجود أي اقتراحات أو تعليقات على هذا القسم يرجى إضافتها في المربع أدناه.</p> <p>If you have any comments or suggestions please use the text box below to do so</p>   |





## Appendix J

# SPSS Results for the Online Questionnaire

**One-Sample Statistics**

|       | N  | Mean | Std. Deviation | Std. Error Mean |
|-------|----|------|----------------|-----------------|
| Q1.1  | 60 | 3.38 | .691           | .089            |
| Q1.2  | 60 | 4.05 | .852           | .110            |
| Q1.3  | 60 | 4.30 | .743           | .096            |
| Q1.4  | 60 | 3.65 | .899           | .116            |
| Q1.5  | 60 | 3.43 | 1.125          | .145            |
| Q1.6  | 60 | 3.95 | .964           | .124            |
| Q1.7  | 60 | 3.53 | 1.157          | .149            |
| Q1.8  | 60 | 3.63 | 1.041          | .134            |
| Q1.9  | 60 | 3.93 | .918           | .119            |
| Q1.10 | 60 | 4.40 | .764           | .099            |
| Q1.11 | 60 | 4.27 | .634           | .082            |
| Q1.12 | 60 | 4.03 | .780           | .101            |
| Q1.13 | 60 | 3.92 | .907           | .117            |
| Q1.14 | 60 | 3.78 | .976           | .126            |
| Q1.15 | 60 | 4.07 | .710           | .092            |
| Q1.16 | 60 | 3.83 | .886           | .114            |
| Q1.17 | 60 | 3.68 | 1.081          | .140            |
| Q1.18 | 60 | 3.95 | .891           | .115            |
| Q1.19 | 60 | 3.92 | .962           | .124            |
| Q1.20 | 60 | 3.83 | .806           | .104            |
| Q1.21 | 60 | 3.42 | 1.169          | .151            |
| Q1.22 | 60 | 3.77 | .927           | .120            |
| Q1.23 | 60 | 3.72 | .993           | .128            |
| Q1.24 | 60 | 3.85 | .917           | .118            |
| Q1.25 | 60 | 3.85 | .860           | .111            |
| Q2.1  | 60 | 3.97 | .920           | .119            |
| Q2.2  | 60 | 3.57 | 1.064          | .137            |
| Q2.3  | 60 | 3.58 | .926           | .120            |
| Q2.4  | 60 | 3.80 | .971           | .125            |
| Q2.5  | 60 | 3.88 | .804           | .104            |

|       |    |      |       |      |
|-------|----|------|-------|------|
| Q2.6  | 60 | 3.58 | .979  | .126 |
| Q2.7  | 60 | 3.73 | .918  | .119 |
| Q2.8  | 60 | 3.83 | .942  | .122 |
| Q2.9  | 60 | 3.85 | .820  | .106 |
| Q2.10 | 60 | 3.97 | .863  | .111 |
| Q2.11 | 60 | 4.02 | .813  | .105 |
| Q2.12 | 60 | 3.62 | 1.106 | .143 |
| Q2.13 | 60 | 3.85 | .899  | .116 |
| Q3.1  | 60 | 4.28 | .783  | .101 |
| Q3.2  | 60 | 4.27 | .861  | .111 |
| Q3.3  | 60 | 4.30 | .850  | .110 |
| Q4.1  | 60 | 4.37 | .637  | .082 |
| Q4.2  | 60 | 3.80 | 1.176 | .152 |
| Q4.3  | 60 | 4.08 | .829  | .107 |
| Q4.4  | 60 | 4.13 | .892  | .115 |
| Q4.5  | 60 | 4.28 | .783  | .101 |
| Q4.6  | 60 | 4.27 | .756  | .098 |
| Q4.7  | 60 | 4.22 | .865  | .112 |
| Q4.8  | 60 | 4.20 | .879  | .113 |
| Q4.9  | 60 | 4.27 | .861  | .111 |
| Q4.10 | 60 | 4.07 | .918  | .119 |
| Q5.1  | 60 | 3.15 | 1.176 | .152 |
| Q5.2  | 60 | 3.55 | 1.080 | .139 |
| Q5.3  | 60 | 4.02 | .833  | .108 |
| Q6.1  | 60 | 3.40 | .643  | .083 |
| Q6.2  | 60 | 3.90 | 1.020 | .132 |
| Q6.3  | 60 | 3.75 | 1.052 | .136 |
| Q6.4  | 60 | 4.03 | .991  | .128 |
| Q6.5  | 60 | 3.38 | 1.195 | .154 |
| Q6.6  | 60 | 3.75 | 1.114 | .144 |
| Q6.7  | 60 | 3.83 | .994  | .128 |
| Q6.8  | 60 | 3.80 | .988  | .128 |
| Q6.9  | 60 | 4.07 | .899  | .116 |
| Q6.10 | 60 | 3.98 | .892  | .115 |

|       |    |      |       |      |
|-------|----|------|-------|------|
| Q6.11 | 60 | 3.83 | .867  | .112 |
| Q7.1  | 60 | 4.25 | .704  | .091 |
| Q7.2  | 60 | 4.02 | 1.000 | .129 |
| Q7.3  | 60 | 4.13 | .650  | .084 |
| Q7.4  | 60 | 4.20 | .798  | .103 |
| Q7.5  | 60 | 4.22 | .739  | .095 |
| Q7.6  | 60 | 4.15 | .777  | .100 |
| Q7.7  | 60 | 4.20 | .632  | .082 |
| Q7.8  | 60 | 4.27 | .634  | .082 |
| Q7.9  | 60 | 4.12 | .825  | .107 |
| Q7.10 | 60 | 4.07 | .800  | .103 |
| Q7.11 | 60 | 4.10 | .752  | .097 |
| Q7.12 | 60 | 4.08 | .696  | .090 |
| Q7.13 | 60 | 3.97 | .863  | .111 |
| Q7.14 | 60 | 4.02 | .930  | .120 |
| Q7.15 | 60 | 4.23 | .767  | .099 |
| Q7.16 | 60 | 4.37 | .637  | .082 |
| Q7.17 | 60 | 4.22 | .761  | .098 |
| Q8.1  | 60 | 4.23 | .789  | .102 |
| Q8.2  | 60 | 4.20 | .840  | .108 |
| Q8.3  | 60 | 3.38 | .691  | .089 |

### One-Sample Test

Test Value = 3

|       | t      | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |       |
|-------|--------|----|-----------------|-----------------|---|-------|
|       |        |    |                 |                 | Lower                                     | Upper |
| Q1.1  | 4.296  | 59 | .000            | .383            | .20                                       | .56   |
| Q1.2  | 9.544  | 59 | .000            | 1.050           | .83                                       | 1.27  |
| Q1.3  | 13.547 | 59 | .000            | 1.300           | 1.11                                      | 1.49  |
| Q1.4  | 5.603  | 59 | .000            | .650            | .42                                       | .88   |
| Q1.5  | 2.982  | 59 | .004            | .433            | .14                                       | .72   |
| Q1.6  | 7.632  | 59 | .000            | .950            | .70                                       | 1.20  |
| Q1.7  | 3.572  | 59 | .000            | .533            | .23                                       | .83   |
| Q1.8  | 4.713  | 59 | .000            | .633            | .36                                       | .90   |
| Q1.9  | 7.874  | 59 | .000            | .933            | .70                                       | 1.17  |
| Q1.10 | 14.202 | 59 | .000            | 1.400           | 1.20                                      | 1.60  |
| Q1.11 | 15.470 | 59 | .000            | 1.267           | 1.10                                      | 1.43  |
| Q1.12 | 10.256 | 59 | .000            | 1.033           | .83                                       | 1.23  |
| Q1.13 | 7.825  | 59 | .000            | .917            | .68                                       | 1.15  |
| Q1.14 | 6.218  | 59 | .000            | .783            | .53                                       | 1.04  |
| Q1.15 | 11.639 | 59 | .000            | 1.067           | .88                                       | 1.25  |
| Q1.16 | 7.284  | 59 | .000            | .833            | .60                                       | 1.06  |
| Q1.17 | 4.895  | 59 | .000            | .683            | .40                                       | .96   |
| Q1.18 | 8.258  | 59 | .000            | .950            | .72                                       | 1.18  |
| Q1.19 | 7.382  | 59 | .000            | .917            | .67                                       | 1.17  |
| Q1.20 | 8.008  | 59 | .000            | .833            | .63                                       | 1.04  |
| Q1.21 | 2.762  | 59 | .000            | .417            | .11                                       | .72   |
| Q1.22 | 6.404  | 59 | .000            | .767            | .53                                       | 1.01  |
| Q1.23 | 5.590  | 59 | .000            | .717            | .46                                       | .97   |
| Q1.24 | 7.177  | 59 | .000            | .850            | .61                                       | 1.09  |
| Q1.25 | 7.655  | 59 | .000            | .850            | .63                                       | 1.07  |
| Q2.1  | 8.139  | 59 | .000            | .967            | .73                                       | 1.20  |
| Q2.2  | 4.127  | 59 | .000            | .567            | .29                                       | .84   |
| Q2.3  | 4.880  | 59 | .000            | .583            | .34                                       | .82   |
| Q2.4  | 6.383  | 59 | .000            | .800            | .55                                       | 1.05  |
| Q2.5  | 8.505  | 59 | .000            | .883            | .68                                       | 1.09  |
| Q2.6  | 4.614  | 59 | .000            | .583            | .33                                       | .84   |
| Q2.7  | 6.187  | 59 | .000            | .733            | .50                                       | .97   |
| Q2.8  | 6.854  | 59 | .000            | .833            | .59                                       | 1.08  |
| Q2.9  | 8.032  | 59 | .000            | .850            | .64                                       | 1.06  |
| Q2.10 | 8.677  | 59 | .000            | .967            | .74                                       | 1.19  |
| Q2.11 | 9.688  | 59 | .000            | 1.017           | .81                                       | 1.23  |
| Q2.12 | 4.319  | 59 | .000            | .617            | .33                                       | .90   |
| Q2.13 | 7.326  | 59 | .000            | .850            | .62                                       | 1.08  |

| Test Value = 3 |        |    |                 |                 |   |       |
|----------------|--------|----|-----------------|-----------------|---|-------|
|                | t      | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference |       |
|                |        |    |                 |                 | Lower                                     | Upper |
| Q3.1           | 12.694 | 59 | .000            | 1.283           | 1.08                                      | 1.49  |
| Q3.2           | 11.396 | 59 | .000            | 1.267           | 1.04                                      | 1.49  |
| Q3.3           | 11.851 | 59 | .000            | 1.300           | 1.08                                      | 1.52  |
| Q4.1           | 16.621 | 59 | .000            | 1.367           | 1.20                                      | 1.53  |
| Q4.2           | 5.269  | 59 | .000            | .800            | .50                                       | 1.10  |
| Q4.3           | 10.118 | 59 | .000            | 1.083           | .87                                       | 1.30  |
| Q4.4           | 9.843  | 59 | .000            | 1.133           | .90                                       | 1.36  |
| Q4.5           | 12.694 | 59 | .000            | 1.283           | 1.08                                      | 1.49  |
| Q4.6           | 12.976 | 59 | .000            | 1.267           | 1.07                                      | 1.46  |
| Q4.7           | 10.890 | 59 | .000            | 1.217           | .99                                       | 1.44  |
| Q4.8           | 10.573 | 59 | .000            | 1.200           | .97                                       | 1.43  |
| Q4.9           | 11.396 | 59 | .000            | 1.267           | 1.04                                      | 1.49  |
| Q4.10          | 8.999  | 59 | .000            | 1.067           | .83                                       | 1.30  |
| Q5.1           | .988   | 59 | .327            | .150            | -.15                                      | .45   |
| Q5.2           | 3.944  | 59 | .000            | .550            | .27                                       | .83   |
| Q5.3           | 9.449  | 59 | .000            | 1.017           | .80                                       | 1.23  |
| Q6.1           | 4.818  | 59 | .000            | .400            | .23                                       | .57   |
| Q6.2           | 6.834  | 59 | .000            | .900            | .64                                       | 1.16  |
| Q6.3           | 5.524  | 59 | .000            | .750            | .48                                       | 1.02  |
| Q6.4           | 8.078  | 59 | .000            | 1.033           | .78                                       | 1.29  |
| Q6.5           | 2.486  | 59 | .000            | .383            | .07                                       | .69   |
| Q6.6           | 5.214  | 59 | .000            | .750            | .46                                       | 1.04  |
| Q6.7           | 6.492  | 59 | .000            | .833            | .58                                       | 1.09  |
| Q6.8           | 6.272  | 59 | .000            | .800            | .54                                       | 1.06  |
| Q6.9           | 9.186  | 59 | .000            | 1.067           | .83                                       | 1.30  |
| Q6.10          | 8.536  | 59 | .000            | .983            | .75                                       | 1.21  |
| Q6.11          | 7.447  | 59 | .000            | .833            | .61                                       | 1.06  |
| Q7.1           | 13.751 | 59 | .000            | 1.250           | 1.07                                      | 1.43  |
| Q7.2           | 7.876  | 59 | .000            | 1.017           | .76                                       | 1.27  |
| Q7.3           | 13.504 | 59 | .000            | 1.133           | .97                                       | 1.30  |
| Q7.4           | 11.644 | 59 | .000            | 1.200           | .99                                       | 1.41  |
| Q7.5           | 12.760 | 59 | .000            | 1.217           | 1.03                                      | 1.41  |
| Q7.6           | 11.460 | 59 | .000            | 1.150           | .95                                       | 1.35  |
| Q7.7           | 14.697 | 59 | .000            | 1.200           | 1.04                                      | 1.36  |
| Q7.8           | 15.470 | 59 | .000            | 1.267           | 1.10                                      | 1.43  |
| Q7.9           | 10.481 | 59 | .000            | 1.117           | .90                                       | 1.33  |
| Q7.10          | 10.332 | 59 | .000            | 1.067           | .86                                       | 1.27  |
| Q7.11          | 11.325 | 59 | .000            | 1.100           | .91                                       | 1.29  |

|       |        |    |      |       |      |      |
|-------|--------|----|------|-------|------|------|
| Q7.12 | 12.056 | 59 | .000 | 1.083 | .90  | 1.26 |
| Q7.13 | 8.677  | 59 | .000 | .967  | .74  | 1.19 |
| Q7.14 | 8.472  | 59 | .000 | 1.017 | .78  | 1.26 |
| Q7.15 | 12.451 | 59 | .000 | 1.233 | 1.04 | 1.43 |
| Q7.16 | 16.621 | 59 | .000 | 1.367 | 1.20 | 1.53 |
| Q7.17 | 12.381 | 59 | .000 | 1.217 | 1.02 | 1.41 |
| Q8.1  | 12.107 | 59 | .000 | 1.233 | 1.03 | 1.44 |
| Q8.2  | 11.070 | 59 | .000 | 1.200 | .98  | 1.42 |
| Q8.3  | 4.296  | 59 | .000 | .383  | .20  | .56  |



## Appendix K

# A CheckList for Evaluating Web Content Accessibility in Arabic University Websites in the KSA

### K.1 English Version

#### First: Evaluation by web developer

a. Before you start, specify the following:

|                     |                   |                          |  |
|---------------------|-------------------|--------------------------|--|
| <b>Device Type:</b> | Desktop or Laptop | <b>Operating System:</b> |  |
|---------------------|-------------------|--------------------------|--|

|                      |   |                 |  |
|----------------------|---|-----------------|--|
| <b>Web Browsers:</b> | <input type="checkbox"/> Google Chrome.               | <b>Version:</b> |  |
|                      | <input type="checkbox"/> Microsoft Edge.              |                 |  |
|                      | <input type="checkbox"/> Microsoft Internet Explorer. |                 |  |
|                      | <input type="checkbox"/> Safari.                      |                 |  |
|                      | <input type="checkbox"/> Mozilla FireFox.             |                 |  |
|                      | <input type="checkbox"/> Opera.                       |                 |  |
|                      | <input type="checkbox"/> Other: .....                 |                 |  |

|                              |  |                 |  |                 |  |
|------------------------------|--|-----------------|--|-----------------|--|
| <b>Assistive Technology:</b> |  | <b>Purpose:</b> |  | <b>Version:</b> |  |
|                              |  |                 |  |                 |  |
|                              |  |                 |  |                 |  |
|                              |  |                 |  |                 |  |



b. Success Criteria Evaluation:

| Section  | No.                        | Success Criteria   | Yes | In Some Places | No | Not Applicable | Comments |
|----------|----------------------------|--|-----|----------------|----|----------------|----------|
| Language | 1-1                        | The language and its direction are specified in the web page code.   |     |                |    |                |          |
|          | 1-2                        | The language of any non-Arabic text in an Arabic web page and its direction are specified in the web page code.                |     |                |    |                |          |
|          | 1-3                        | There is a consistency in the direction between data entry (writing) and data display (reading).                               |     |                |    |                |          |
|          | 1-4                        | Partial diacritics are provided in any web page as a default.  |     |                |    |                |          |
|          | 1-5                        | There are options for users for full diacritics and no diacritics in any web page.   |     |                |    |                |          |
|          | 1-6                        | Partial or full diacritics are provided to differentiate between homograph words.  |     |                |    |                |          |
|          | 1-7                        | General language is used where possible.   |     |                |    |                |          |
|          | 1-8                        | When it is needed, partial or full diacritics are used to differentiate between genders.                                       |     |                |    |                |          |
|          | 1-9                        | Font size is at least 16 point for the text and 20 point for the headings.   |     |                |    |                |          |
|          | 1-10                       | Fonts are clear and readable. Recommended fonts are: Times New Roman then, Arial then Tahoma.                                  |     |                |    |                |          |
|          | 1-11                       | Spaces between words are 0.40em.   |     |                |    |                |          |
|          | 1-12                       | Bold or a combination of bold and colour is applied to emphasise the text.   |     |                |    |                |          |
|          | 1-13                       | Arabic text is either right justified (better) or fully justified.   |     |                |    |                |          |
|          | 1-14                       | NO sentence exceeds 20 words and NO paragraph exceeds 5 sentences.   |     |                |    |                |          |
|          | 1-15                       | Readable Modern Standard Arabic with common and simple words is used.  |     |                |    |                |          |
|          | 1-16                       | Other readable and understandable alternatives for advanced or not readable content are provided.                              |     |                |    |                |          |
|          | 1-17                       | Line spacing is at least 2 spaces within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing. |     |                |    |                |          |
|          | Numbers                    |  |     |                |    |                |          |
|          | 1-18                       | Arabic-Indic numbers are used in Arabic context.   |     |                |    |                |          |
|          | 1-19                       | Positive + and negative - signs are at the right of the number.  |     |                |    |                |          |
|          | 1-20                       | Percentage sign is at the left of the number.  |     |                |    |                |          |
|          | 1-21                       | Decimal separator is (.)   |     |                |    |                |          |
|          | 1-22                       | Thousand separators are not used in Arabic most of the time.   |     |                |    |                |          |
|          | Abbreviations and Acronyms |  |     |                |    |                |          |
|          | 1-23                       | There is no use of abbreviations or acronyms.  |     |                |    |                |          |
|          | 1-24                       | When abbreviations are used, they could be:  |     |                |    |                |          |
|          | Arabic abbreviations:      | a) There are spaces between the letters in initialism, and/OR there are full stops between the letters in initialism, and      |     |                |    |                |          |
|          |                            | b) The expansion form is available.  |     |                |    |                |          |
|          |                            |  |     |                |    |                |          |

|             |      | Borrowed abbreviations from other languages:   | a) <b>Untranslated:</b> Acronyms are written and pronounced in Arabic as they are in the other languages. Explanations of the untranslated abbreviations may be provided.<br>b) <b>Translated:</b> Arabic pronunciation of the abbreviation and/or its expansion are available. |  |  |  |  |  |  |
|-------------|------|--|---|--|--|--|--|--|--|
|             |      |  |   |  |  |  |  |  |  |
| Data Format | 1-25 | When abbreviations are used, expansion or explanation are available:<br>a) At the first occurrence if there is one meaning through the web page, or<br>b) Every time if there is more than one meaning through the web page. |   |  |  |  |  |  |  |
|             | 2-1  | Hijri calendar is used but in case that Gregorian is used, Hijri calendar is provided as well.   |   |  |  |  |  |  |  |
|             | 2-2  | Long date format is used.  |   |  |  |  |  |  |  |
|             | 2-3  | When short date format is used, the separator is (/).  |   |  |  |  |  |  |  |
|             | 2-4  | Time is in 12 hour format with AM and PM.  |   |  |  |  |  |  |  |
|             | 2-5  | Time separator is (:).   |   |  |  |  |  |  |  |
|             | 2-6  | For currency, Saudi Riyal is used as a long or short format.   |   |  |  |  |  |  |  |
|             | 2-7  | The currency is located at the left of the number.   |   |  |  |  |  |  |  |
|             | 2-8  | When other currencies are used, the equivalent value in Saudi Riyal is presented.  |   |  |  |  |  |  |  |
|             | 2-9  | When postal code is used, it is a 5-digit number.  |   |  |  |  |  |  |  |
|             | 2-10 | When phone numbers are used, the format is<br>+966 2-digit Area Code XXX XXXX for land line and<br>+966 5XXX XXXXX for mobile phone.   |   |  |  |  |  |  |  |
|             | 2-11 | When names are used, first name, father, grandfather and family names are the accepted and understood name format.   |   |  |  |  |  |  |  |
|             | 2-12 | Middle initial, middle or maiden names are not used.   |   |  |  |  |  |  |  |
|             | 2-13 | For measurement format, metric system is used.   |   |  |  |  |  |  |  |
|             | 3-1* | Symbols and icons are understood by target users.  |   |  |  |  |  |  |  |
|             | 3-2* | Symbols and icons are inoffensive and acceptable to target users.  |   |  |  |  |  |  |  |
| Multimedia  | 3-3  | Symbols and icons are appropriate to the content.  |   |  |  |  |  |  |  |
|             | 4-1* | Multimedia elements are appropriate to the culture.  |   |  |  |  |  |  |  |
|             | 4-2  | All multimedia incorporating music that is presented to the user provide:<br>a) hint that there is music in the multimedia, and/or<br>b) another version without music.  |   |  |  |  |  |  |  |
|             | 4-3  | All non-text content (including symbols and icons) that is presented to the user has a descriptive text alternative that serves the equivalent purpose.  |   |  |  |  |  |  |  |
|             | 4-4  | A descriptive text transcript is provided for recorded web-based audio.  |   |  |  |  |  |  |  |
|             | 4-5  | Text or audio description is provided for recorded web-based video-only (No sound).  |   |  |  |  |  |  |  |
|             | 4-6  | Synchronized captions are provided for recorded, web-based video.  |   |  |  |  |  |  |  |
|             | 4-7  | A descriptive text transcript OR audio description is provided for recorded web-based video.   |   |  |  |  |  |  |  |
|             | 4-8  | A mechanism is provided to stop, pause, mute, or adjust volume for audio that automatically plays on a page for more than 3 seconds.   |   |  |  |  |  |  |  |

|            |      |  |  |  |  |  |  |  |  |
|------------|------|--|--|--|--|--|--|--|--|
|            | 4-9  | No page content flashes more than 3 times per second unless that flashing content is sufficiently small and the flashes are of low contrast and do not contain too much red.   |  |  |  |  |  |  |  |
| Colours    | 5-1  | Masculine colours such as blue, green and grey are used and feminine colours such as pink are avoided.   |  |  |  |  |  |  |  |
|            | 5-2  | The colours of the website stem from the university's logo, or the surrounding environment.  |  |  |  |  |  |  |  |
|            | 5-3  | Colour is not used as the sole method of conveying content or distinguishing visual elements.  |  |  |  |  |  |  |  |
|            | 6-1  | The orientation of any web page is right to left.  |  |  |  |  |  |  |  |
| Layout     | 6-2  | University logo is at the top right corner.  |  |  |  |  |  |  |  |
|            | 6-3  | The banner is at the top of the web page.  |  |  |  |  |  |  |  |
|            | 6-4  | The menu is at the top and/or right of the web page.   |  |  |  |  |  |  |  |
|            | 6-5  | The date is available at the top left of the web page.   |  |  |  |  |  |  |  |
|            | 6-6  | Search box is available at the top left of the web page.   |  |  |  |  |  |  |  |
|            | 6-7  | A link to the English version is at the top left of the web page.  |  |  |  |  |  |  |  |
|            | 6-8  | Contact information, social media links and copyrights are at the bottom of the web page.  |  |  |  |  |  |  |  |
|            | 6-9  | Content information, structure, and relationships conveyed through presentation can be determined through the web page code or are available in text.  |  |  |  |  |  |  |  |
| Navigation | 6-10 | When the sequence in which content is presented affects its meaning, a correct reading sequence for the content can be determined in the web page's code.  |  |  |  |  |  |  |  |
|            | 6-11 | Instructions given to understand and operate the content do not only rely upon sensory characteristics of components such as shape, size, visual location, orientation or sound.   |  |  |  |  |  |  |  |
|            | 7-1  | Navigation elements are displayed consistently throughout the website.   |  |  |  |  |  |  |  |
|            | 7-2  | Arabic language are used through the Arabic website including log in pages, error messages or CAPTCHA.   |  |  |  |  |  |  |  |
|            | 7-3  | More than one way to skip unwanted content.  |  |  |  |  |  |  |  |
|            | 7-4  | Information is provided for users about their location.  |  |  |  |  |  |  |  |
|            | 7-5  | Help is provided for users when they need it.  |  |  |  |  |  |  |  |
|            | 7-6  | All page functionality is available using the keyboard, unless the functionality cannot be accomplished in any known way using a keyboard (e.g., free hand drawing).   |  |  |  |  |  |  |  |
|            | 7-7  | Keyboard focus is never locked or trapped at one particular page element. The user can navigate to and from all navigable page elements using only a keyboard.   |  |  |  |  |  |  |  |
|            | 7-8  | If a page or application has a time limit, the user is given options to turn off, adjust, or extend that time limit. (This is not a requirement for real-time events (e.g., an auction), where the time limit is absolutely required, or if the time limit is longer than 20 hours). |  |  |  |  |  |  |  |

|         |      |  |  |  |  |  |  |  |  |
|---------|------|--|--|--|--|--|--|--|--|
| General | 7-9  | Automatically moving, blinking, or scrolling content that lasts longer than 5 seconds can be paused, stopped, or hidden by the user.   |  |  |  |  |  |  |  |
|         | 7-10 | Automatically updating content can be paused, stopped, or hidden by the user or the user can manually control the timing of the updates.   |  |  |  |  |  |  |  |
|         | 7-11 | The web page has descriptive and informative page title.   |  |  |  |  |  |  |  |
|         | 7-12 | The navigation order of links, form elements, etc. is logical and intuitive even if they are navigated using the keyboard.   |  |  |  |  |  |  |  |
|         | 7-13 | The purpose of each link can be determined from the link text alone, or from the link text and its context.  |  |  |  |  |  |  |  |
|         | 7-14 | When a page element receives focus, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user.   |  |  |  |  |  |  |  |
|         | 7-15 | When a user inputs information or interacts with a control, it does not result in a substantial change to the page, the spawning of a pop-up window, an additional change of keyboard focus, or any other change that could confuse or disorient the user unless the user is informed of the change ahead of time. |  |  |  |  |  |  |  |
|         | 7-16 | The error in user input is clearly identified, user is allowed to easily fix the error and resubmit the form.  |  |  |  |  |  |  |  |
|         | 7-17 | Labels, cues, and instructions for required user input are provided.   |  |  |  |  |  |  |  |
|         | 8-1  | Web page code validation and parsing according to specification are implemented with no errors.  |  |  |  |  |  |  |  |
|         | 8-2  | Web page code is created in a way that supports accessibility and assistive technology.  |  |  |  |  |  |  |  |
|         | 8-3* | The web content is usable for target users.  |  |  |  |  |  |  |  |
|         | 8-4  | The total size of the web page and its download time are suitable to the internet speed in the country of its target users (Saudi Arabia).   |  |  |  |  |  |  |  |

\*User's evaluation is required.

## Second: User's Evaluation

a. Before you start, specify the following:

|                        |  |
|------------------------|--|
| <b>Evaluation NO.:</b> |  |
| <b>User ID:</b>        |  |
| <b>User Category:</b>  |  |

|                     |                   |                          |  |
|---------------------|-------------------|--------------------------|--|
| <b>Device Type:</b> | Desktop or Laptop | <b>Operating System:</b> |  |
|---------------------|-------------------|--------------------------|--|

|                      |   |                 |  |
|----------------------|---|-----------------|--|
| <b>Web Browsers:</b> | <input type="checkbox"/> Google Chrome.               | <b>Version:</b> |  |
|                      | <input type="checkbox"/> Microsoft Edge.              |                 |  |
|                      | <input type="checkbox"/> Microsoft Internet Explorer. |                 |  |
|                      | <input type="checkbox"/> Safari.                      |                 |  |
|                      | <input type="checkbox"/> Mozilla FireFox.             |                 |  |
|                      | <input type="checkbox"/> Opera.                       |                 |  |
|                      | <input type="checkbox"/> Other: .....                 |                 |  |

|                              |  |                 |  |                 |  |
|------------------------------|--|-----------------|--|-----------------|--|
| <b>Assistive Technology:</b> |  | <b>Purpose:</b> |  | <b>Version:</b> |  |
|                              |  |                 |  |                 |  |
|                              |  |                 |  |                 |  |
|                              |  |                 |  |                 |  |

b. Evaluation of Success Criteria (3-1, 3-2 and 4-1):

|     | Success Criteria                                    | Yes | In Some Places | No | Not Applicable | Comments |
|-----|---|-----|----------------|----|----------------|----------|
| 3-1 | Symbols and icons are understood.                   |     |                |    |                |          |
| 3-2 | Symbols and icons are inoffensive and acceptable.   |     |                |    |                |          |
| 4-1 | Multimedia elements are appropriate to the culture. |     |                |    |                |          |

c. Evaluation of Success Criterion (8-3):

User is asked to browse the website and then answer the following usability survey:

| No  | Statement   | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|-----|---|-------------------|----------|---------|-------|----------------|
| 1.  | I think that I would like to use this website frequently.                                   |                   |          |         |       |                |
| 2.  | I found the website unnecessarily complex.  |                   |          |         |       |                |
| 3.  | I thought the website was easy to use.  |                   |          |         |       |                |
| 4.  | I think that I would need the support of a technical person to be able to use this website. |                   |          |         |       |                |
| 5.  | I found the various functions in this website were well integrated.                         |                   |          |         |       |                |
| 6.  | I thought there was too much inconsistency in this website.                                 |                   |          |         |       |                |
| 7.  | I would imagine that most people would learn to use this website very quickly.              |                   |          |         |       |                |
| 8.  | I found the website very cumbersome to use.   |                   |          |         |       |                |
| 9.  | I felt very confident using the website.  |                   |          |         |       |                |
| 10. | I needed to learn a lot of things before I could get going with this website.               |                   |          |         |       |                |

## User's Evaluation Results:

### a. Users' Categories:

| Users Categories   | Number | Comments |
|--|--------|----------|
| Visual disabilities including blindness colour blindness and low vision.                                       |        |          |
| Auditory disabilities such as deafness or a hearing impairment.  |        |          |
| Cognitive disabilities or learning disabilities.   |        |          |
| Motor disabilities.  |        |          |
| Progressive disabilities due to ageing including gradual decrease in some abilities such as vision or hearing. |        |          |
| Other.<br>.....  |        |          |

### b. Results of Success Criteria (3-1, 3-2 and 4-1):

| Success Criteria  | Yes % | In Some Places % | No % | Not Applicable % | Comments |
|---|-------|------------------|------|------------------|----------|
| 3-1 Symbols and icons are understood.                   |       |                  |      |                  |          |
| 3-2 Symbols and icons are inoffensive and acceptable.   |       |                  |      |                  |          |
| 4-1 Multimedia elements are appropriate to the culture. |       |                  |      |                  |          |

### c. Results of Success Criterion (8-3):

Users will have ranked each of the 10 survey statements from 1 (Strongly Disagree) to 5 (Strongly Agree).

- For odd statements: subtract 1 from the user response.
- For even-numbered statements: subtract the user responses from 5.
- This scales all values from 0 to 4 (with four being the most positive response).
- Add up the converted responses for each user and multiply that total by 2.5. This converts the range of possible values from 0 to 100 instead of from 0 to 40.

| No     | Statement   | Response (Number between 1 and 5) | Calculation  | Result |
|--------|---|-----------------------------------|--------------|--------|
| 1.     | I think that I would like to use this website frequently.                                   |                                   | (Response)-1 |        |
| 2.     | I found the website unnecessarily complex.  |                                   | 5-(Response) |        |
| 3.     | I thought the website was easy to use.  |                                   | (Response)-1 |        |
| 4.     | I think that I would need the support of a technical person to be able to use this website. |                                   | 5-(Response) |        |
| 5.     | I found the various functions in this website were well integrated.                         |                                   | (Response)-1 |        |
| 6.     | I thought there was too much inconsistency in this website.                                 |                                   | 5-(Response) |        |
| 7.     | I would imagine that most people would learn to use this website very quickly.              |                                   | (Response)-1 |        |
| 8.     | I found the website very cumbersome to use.   |                                   | 5-(Response) |        |
| 9.     | I felt very confident using the website.  |                                   | (Response)-1 |        |
| 10.    | I needed to learn a lot of things before I could get going with this website.               |                                   | 5-(Response) |        |
| TOTAL: |   |                                   |              |        |

Total Raw Score = TOTAL \* 2.5 = .....

Score for Participated Users = Average of Total Raw Score

Here's how scores should measure:

| Score for Participated Users | Description  |
|------------------------------|--|
| 80.3 or higher               | A, people love your site and will recommend it to their friends. |
| 68 or thereabouts            | C, you're doing OK but could improve.                            |
| 51 or under                  | F, make usability your priority now and fix this fast.           |

## K.2 Arabic Version

استمارة تقويم سهولة الوصول لمحتوى الويب لمواقع الجامعات السعودية بنسختها العربية  
(وصول)

**أولاً: تقويم صفحة الويب من قبل مطوري الصفحة**

أ. قبل البدء يتم تحديد المواصفات التالية:

| نوع الجهاز: | جهاز مكتبي أو محمول. | نظام التشغيل: |
|-------------|----------------------|---------------|
|-------------|----------------------|---------------|

|                |         |   |
|----------------|---------|---|
| متصفحات الويب: | النسخة: | <input type="checkbox"/> جوجل كروم. Google Chrome                         |
|                |         | <input type="checkbox"/> مايكروسوفت إيدج. MS Edge                         |
|                |         | <input type="checkbox"/> مايكروسوفت انترنت اكسبلورر. MS Internet Explorer |
|                |         | <input type="checkbox"/> سفاري. Safari                                    |
|                |         | <input type="checkbox"/> موزيلا فايرفوكس Mozilla FireFox                  |
|                |         | <input type="checkbox"/> أوبرا. Opera                                     |
|                |         | <input type="checkbox"/> أخرى: .....                                      |

|                    |        |         |  |
|--------------------|--------|---------|--|
| التقنيات المساعدة: | الغرض: | النسخة: |  |
|                    |        |         |  |
|                    |        |         |  |

ب. تقويم معايير النجاح:

| ملاحظات    | لا ينطبق | لا | في مواضيع محددة | نعم | معيير النجاح  | الرقم التسلسلي | القسم |
|------------|----------|----|-----------------|-----|---|----------------|-------|
|            |          |    |                 |     | تم تحديد اللغة واتجاهها في الكود البرمجي لصفحة الويب العربية.   | ١-١            |       |
|            |          |    |                 |     | تم تحديد اللغة واتجاهها لأي نص غير عربي في الكود البرمجي لصفحة الويب العربية.   | ٢-١            |       |
|            |          |    |                 |     | هناك تناغم في الاتجاه بين البيانات المدخلة كتابياً وبين عرضها للقراء.   | ٣-١            |       |
|            |          |    |                 |     | يتواجد التشكيل الجزئي في صفحة الويب العربية بشكل اقتراضي.   | ٤-١            |       |
|            |          |    |                 |     | تم توفير خيارين للمستخدم: إما أن تُعرض الصفحة بتشكيل كامل أو أن تُعرض بدون تشكيل على الإطلاق.                                     | ٥-١            |       |
|            |          |    |                 |     | تم توفير التشكيل الكامل أو الجزئي للكلمات التي تحتل أكثر من معنى إذا اختلف السياق أو التي تُكتب بنفس الطريقة ولكن تختلف في النطق. | ٦-١            |       |
|            |          |    |                 |     | تم استخدام اللغة العامة بدون تحديد الجنس سواء ذكر أو أنثى متى ما كان ذلك ممكناً.  | ٧-١            |       |
|            |          |    |                 |     | تم استخدام التشكيل الكامل أو الجزئي للتفريق بين الجنسين متى ما دعت الحاجة لذلك.   | ٨-١            |       |
|            |          |    |                 |     | حجم الخط للنص ١٦ نقطة على الأقل وللعاوين ٢٠ نقطة على الأقل.   | ٩-١            |       |
|            |          |    |                 |     | نوع الخط المستخدم مقروء وواضح. الخطوط الموصى بها هي: Times New Roman ثم Arial ثم Tahoma.  | ١٠-١           |       |
|            |          |    |                 |     | المسافات بين الكلمات مقدارها (0.40em).  | ١١-١           |       |
|            |          |    |                 |     | تم استخدام الخط العريض Bold أو الخط العريض مع لون مختلف في اضافة أهمية للنص.  | ١٢-١           |       |
|            |          |    |                 |     | محاذاة النص العربي إمّا لليمين (وهو الأفضل) أو محاذاة كلية.   | ١٣-١           |       |
|            |          |    |                 |     | لا تزيد أي جملة عن ٢٠ كلمة ولا تزيد أي فقرة عن ٥ جمل.   | ١٤-١           |       |
|            |          |    |                 |     | تم استخدام اللغة العربية الفصحى والكلمات البسيطة والشائعة الاستخدام.  | ١٥-١           |       |
|            |          |    |                 |     | عندما يكون المحتوى ذو لغة متقدمة أو غير مقروءة، تم تقديم بدائل له بحيث تكون هذه البدائل مفهومة ومقروءة.                           | ١٦-١           |       |
|            |          |    |                 |     | التباعد بين الأسطر بمقدار مسافتين في الفقرة الواحدة أما بين الفقرة والأخرى فهي ضعف هذه المسافة بمقدار مرة ونصف.                   | ١٧-١           |       |
| الأرقام    |          |    |                 |     |   |                |       |
|            |          |    |                 |     | الأرقام تكون موجودة في صفحة الويب بصيغة الأرقام الهندية (١ ٢ ٣ ٤ ٥ ...).  | ١٨-١           |       |
|            |          |    |                 |     | علامة الموجب + أو السالب - تكون دائماً على يمين العدد.  | ١٩-١           |       |
|            |          |    |                 |     | علامة النسبة المئوية تكون على يسار العدد.   | ٢٠-١           |       |
|            |          |    |                 |     | الفاصلة العشرية (.) هي المستخدمة مع الأرقام.  | ٢١-١           |       |
|            |          |    |                 |     | لم تُستخدم فاصلة الألاف حيث أنها لا تُستخدم عادة في اللغة العربية.  | ٢٢-١           |       |
| الاختصارات |          |    |                 |     |   |                |       |
|            |          |    |                 |     | لا يوجد أي استخدام للاختصارات في صفحة الويب.  | ٢٣-١           |       |
|            |          |    |                 |     | عند استخدام الاختصارات تكون إمّا  | ٢٤-١           |       |
|            |          |    |                 |     | (أ) ويكون هناك مسافة بين الأحرف في الاختصار، أو يكون هناك نقط بين الأحرف في الاختصار أو مسافات بين الأحرف ونقط، و                 |                |       |
|            |          |    |                 |     | (ب) يتواجد فك للاختصار.   |                |       |
|            |          |    |                 |     | (أ) اختصارات غير مترجمة والتي تُستخدم كما هي في اللغات الأخرى، في هذه الحالة يمكن تقديم شرح لهذه الاختصارات ولكنه ليس ضرورياً     |                |       |



| تسليط البيانات |  | الوسائط المتعددة |  | الرموز والإيقونات |  |
|----------------|--|------------------|--|-------------------|--|
| ٢٥-١           | (ب) اختصارات مترجمة: يُقَدَّم نطق للاختصار بالعربية أو يُقَدَّم فك للاختصار بالعربية كذلك.   |                  |  |                   |  |
|                | في حال استخدام الاختصارات، تم توفير شرح أو فك للاختصار بطريقة من الآتي:<br>أ. عند أول ظهور للاختصار إذا كان يحمل معنى واحد خلال صفحة الويب. أو<br>ب. في كل مرة يظهر فيها الاختصار إذا كان يحمل أكثر من معنى خلال صفحة الويب. |                  |  |                   |  |
| ١-٢            | تم استخدام التاريخ الهجري فقط وفي حالة استخدام التاريخ الميلادي يُوضح التاريخ الهجري الموافق له.   |                  |  |                   |  |
| ٢-٢            | تم استخدام صيغة التاريخ الطولية.   |                  |  |                   |  |
| ٣-٢            | عند استخدام صيغة التاريخ المختصرة تم استخدام (I) كفاصل.  |                  |  |                   |  |
| ٤-٢            | تم توفير الوقت بصيغة ١٢ ساعة مع (ص) للصباح و (م) للمساء.   |                  |  |                   |  |
| ٥-٢            | عند استخدام الوقت استُخدمت (:) كفاصل.  |                  |  |                   |  |
| ٦-٢            | تم استخدام الزمان السعودي بصيغته الطولية (ريال سعودي) أو المختصرة (ر.س.).  |                  |  |                   |  |
| ٧-٢            | تُوضع العملة على يسار العدد عند استخدامها.   |                  |  |                   |  |
| ٨-٢            | عند استخدام عملات أخرى، فالقيمة المقابلة بالريال السعودي تم عرضها أيضاً.   |                  |  |                   |  |
| ٩-٢            | عند استخدام الرمز البريدي السعودي، فهو عبارة عن رقم من خمس خانات.  |                  |  |                   |  |
| ١٠-٢           | عند استخدام الأرقام الهاتفية السعودية، فإنها تكون على النمط التالي:<br>XXXX XXXX<br>خانتين لمفتاح المنطقة +966<br>والهاتف الجوال: +966 5XXX XXXX   |                  |  |                   |  |
| ١١-٢           | عند استخدام الأسماء، الاسم الأول، اسم الأب والجد والعائلة أي الاسم الرباعي هي المستخدمة.   |                  |  |                   |  |
| ١٢-٢           | عند استخدام الأسماء، لم يتم استخدام الاسم الأوسط Middle name أو أول حرف منه Middle Initial أو اسم المرأة قبل الزواج Mother's Maiden name (وهي الدارج استخدامها في الثقافات الأخرى).  |                  |  |                   |  |
| ١٣-٢           | تم استخدام النظام المتري عند الحاجة لوحدة قياس.  |                  |  |                   |  |
| ١-٣*           | الرموز والإيقونات مفهومة عند المستخدمين المستهدفين   |                  |  |                   |  |
| ٢-٣*           | الرموز والإيقونات غير مبهمة ومقبولة عند المستخدمين المستهدفين.   |                  |  |                   |  |
| ٣-٣*           | الرموز والإيقونات مناسبة للمحتوى.  |                  |  |                   |  |
| ١-٤*           | عناصر الوسائط المتعددة ملائمة لثقافة المستخدمين.   |                  |  |                   |  |
| ٢-٤            | لجميع عناصر الوسائط المتعددة التي تُضم موسيقى، تم توفير:   |                  |  |                   |  |
|                | (أ) تلميح لوجود موسيقى في الوسائط المتعددة. أو<br>(ب) نسخة أخرى من الوسائط المتعددة ولكن بدون موسيقى.  |                  |  |                   |  |
| ٣-٤            | حجم صفحة الويب الواحدة بجميع عناصر الوسائط المتعددة ملائم لسرعة الانترنت في بلد المستخدمين المستهدفين وهي السعودية.  |                  |  |                   |  |
| ٤-٤            | لاي محتوى غير نصي مثلاً: صورة، فيديو، تسجيل صوتي رموز أو أيقونات ، تم توفير بديل نصي Text Alternative يصف عرض المحتوى غير النصي.   |                  |  |                   |  |
| ٥-٤            | أي تسجيل صوتي يرافقه تفرغ نصي توصيفي Text Transcription كامل التسجيل الصوتي.   |                  |  |                   |  |
| ٦-٤            | لاي تسجيل فيديو فقط (بدون صوت)، تم توفير نص مرافق له أو تسجيل صوتي توصيفي كامل الفيديو.  |                  |  |                   |  |
| ٧-٤            | لاي تسجيل فيديو ، تم توفير نصوص أو تعليقات مترجمة Synchronised Captions لأي أصوات في الفيديو.  |                  |  |                   |  |
| ٨-٤            | لاي تسجيل فيديو، تم توفير تفرغ توصيفي نصي Descriptive Text أو توصيف صوتي Audio Description كامل محتوى الفيديو.   |                  |  |                   |  |
| ٩-٤            | أي تسجيل صوتي يعمل لأكثر من ٣ ثواني، تم توفير طريقة لإيقاف التسجيل الصوتي تماماً أو إيقافه مؤقتاً أو كتم صوته.   |                  |  |                   |  |

|      |  |  |  |  |  |
|------|--|--|--|--|--|
| ١٠-٤ | لا يوجد أي محتوى يومض Flash أكثر من ٣ ومضات في الثانية الواحدة إلا إذا كان هذا المحتوى صغيراً بشكل كافٍ وكذلك المضات ذات تبليين منخفض ولا تحتوي على اللون الأحمر.  |  |  |  |  |
| ١-٥  | تستخدم الألوان الزكورية كالأخضر والرمادي بينما الألوان الأتوية كالوردي يتم تجنبها.   |  |  |  |  |
| ٢-٥  | الألوان المستخدمة في مواقع الجامعات السعودية مشتقة من شعار الجامعة، أو من البنية المحيطة.  |  |  |  |  |
| ٣-٥  | لا تستخدم الألوان على أنها الوسيلة الوحيدة لتوصيل محتوى الويب أو التمييز بين عناصره البصرية.   |  |  |  |  |
| ١-٦  | اتجاه صفحة الويب يكون من اليمين لليسار.  |  |  |  |  |
| ٢-٦  | شعار الجامعة يوجد في الركن العلوي الأيمن من صفحة الويب.  |  |  |  |  |
| ٣-٦  | الشريط الأقي يوجد في الجزء العلوي من صفحة الويب.   |  |  |  |  |
| ٤-٦  | القائمة menu تكون في الجزء العلوي من صفحة الويب أو على يمينها.   |  |  |  |  |
| ٥-٦  | التاريخ يكون في الركن العلوي الأيسر من صفحة الويب.   |  |  |  |  |
| ٦-٦  | خانة البحث تكون موجودة في الركن العلوي الأيسر من صفحة الويب.   |  |  |  |  |
| ٧-٦  | الرابط المؤدي للنسخة الانجليزية من صفحة الويب يكون موجود في الركن العلوي الأيسر من الصفحة.   |  |  |  |  |
| ٨-٦  | معلومات الاتصال، روابط الحسابات في مواقع التواصل الاجتماعي وحقوق الملكية الفكرية تتواجد في الجزء السفلي من صفحة الويب.   |  |  |  |  |
| ٩-٦  | تم تحديد معلومات محتوى صفحة الويب وبنيتها والعلاقات التي تحدد كيفية عرض هذه المحتويات برمجياً في كود صفحة الويب أو تم توفيرها في النص.   |  |  |  |  |
| ١٠-٦ | تم تحديد الترتيب الذي تعرض به المعلومات في صفحة الويب برمجياً في كود الصفحة.   |  |  |  |  |
| ١١-٦ | التعليمات المعطاة لفهم المحتوى وتشغيله لا تعتمد على الخصائص الحسية للمكونات وحدها مثل الشكل أو الحجم أو الموضع البصري أو الاتجاه أو الصوت.   |  |  |  |  |
| ١-٧  | تم عرض عناصر التنقل بين صفحات الويب بشكل موحد في جميع صفحات موقع الجامعة.  |  |  |  |  |
| ٢-٧  | تم استخدام اللغة العربية في جميع عناصر التنصع لموقع الجامعة بنسخته العربية، ويشمل هذا صفحات تسجيل الدخول والتحقق من الاستخدام البشري CAPTCHA ورسائل الأخطاء.   |  |  |  |  |
| ٣-٧  | تم توفير أكثر من وسيلة لتجاوز المحتوى غير المرغوب به.  |  |  |  |  |
| ٤-٧  | تم توفير معلومات للمستخدمين بخصوص مكانهم في الموقع.  |  |  |  |  |
| ٥-٧  | تم توفير المساعدة للمستخدمين عند احتياجهم لها.   |  |  |  |  |
| ٦-٧  | تم توفير جميع وظائف الصفحة (مثلاً: الانتقال من رابط لآخر) من خلال لوحة المفاتيح ما عدا لو كانت الوظيفة لا يمكن إنجازها باستخدام لوحة المفاتيح (مثل الكتابة بخط اليد على شاشة لمسية).   |  |  |  |  |
| ٧-٧  | تم توفير إمكانية التنقل بحرية بين عناصر الصفحة باستخدام لوحة المفاتيح فقط بحيث أن تركيز لوحة المفاتيح على أي عنصر في الصفحة لا يكون مقيداً أو لا يمكن التحرر منه والانتقال لأي عناصر أخرى.   |  |  |  |  |
| ٨-٧  | في حال وجود مهلة زمنية غير الزامية للصفحة أو التطبيق، تم توفير خيار للمستخدم لإلغاء المهلة الزمنية أو تعديلها أو تمديدها، ولكن لا يكون ذلك في الفعاليات التي تتطلب تجارب في وقت محدد كالمراد العلني مثلاً أو عندما تكون المهلة المعطاة للمستخدم أكثر من ٢٠ ساعة. |  |  |  |  |
| ٩-٧  | لاي محتوى يتحرك أو يومض بشكل متتابع أو يُبرز لمدة أكثر من ٥ ثواني بشكل أوتوماتيكي، تم توفير خيارات للمستخدم بحيث يستطيع أن يوقفه بشكل مؤقت أو يوقفه بشكل كامل أو يحفيه.  |  |  |  |  |
| ١٠-٧ | لاي محتوى يتم تحديثه بشكل أوتوماتيكي، تم توفير خيارات للمستخدم بحيث يمكنه ان يوقفه بشكل مؤقت أو يوقفه بشكل كامل أو يحفيه، أو بإمكان المستخدم التحكم في توقيت التحديث بشكل يدوي.  |  |  |  |  |
| ١١-٧ | يوجد عنوان لصفحة الويب وهذا العنوان يصف ويعطي معلومات عن الصفحة.   |  |  |  |  |
| ١٢-٧ | عند استخدام لوحة المفاتيح للتنصع فإن المؤشر ينتقل بشكل موثق لترتيب العناصر في الصفحة.  |  |  |  |  |
| ١٣-٧ | تم تحديد الغرض من كل رابط من خلال نص الرابط فقط أو من خلال نص الرابط والسياق المتواجد فيه الرابط.  |  |  |  |  |

## تصفح صفحات الويب

## مخطط صفحة الويب

## الألوان

|      |  |  |  |  |  |  |  |
|------|--|--|--|--|--|--|--|
| ١٤-٧ | عندما ينتقل التركيز لأي عنصر في الصفحة، فإن ذلك لا يؤدي إلى تغيير جوهري في الصفحة مثلاً ظهور فجائي لنافذة منبثقة أو تغيير في تركيز لوحة المفاتيح بالانتقال إلى عنصر آخر من الصفحة فجائياً أو أي تغيير يمكن أن يتسبب في إرباك وتضليل المستخدم.  |  |  |  |  |  |  |
| ١٥-٧ | عندما يقوم المستخدم بإدخال معلومات أو يتفاعل مع أي عناصر تحكم مثلاً ضغط زر، فإن ذلك لا يؤدي إلى تغيير جوهري في الصفحة مثلاً ظهور فجائي لنافذة منبثقة أو تغيير في تركيز لوحة المفاتيح بالانتقال إلى عنصر آخر من الصفحة فجائياً أو أي تغيير يمكن أن يتسبب في إرباك وتضليل المستخدم إلا في حال تم إعلام المستخدم بهذا التغيير قبل أن يحصل فعلياً. |  |  |  |  |  |  |
| ١٦-٧ | عندما يوجد خطأ في المدخلات من قِبل المستخدم يتم تحديده بوضوح، وعندئذ يُسمح للمستخدم أن يصحح الخطأ ويعيد إرسال النموذج الإلكتروني مرة أخرى.   |  |  |  |  |  |  |
| ١٧-٧ | تم توفير تسميات توضيحية وتلميحات وتعليمات Labels, Cues and Instructions للمستخدم لأي مدخلات إلزامية وليست اختيارية.  |  |  |  |  |  |  |
| ١-٨  | تم تنفيذ التحقق من صحة الكود البرمجي لصفحة الويب وذلك وفقاً للمواصفات الخاصة به ولم تنتج أي أخطاء من هذا التحقق.   |  |  |  |  |  |  |
| ٢-٨  | تم إنشاء الكود البرمجي لصفحة الويب بطريقة تدعم سهولة الوصول والتقنيات المساعدة.  |  |  |  |  |  |  |
| ٣-٨* | محتوى الويب سهل الاستخدام لجميع فئات المستخدمين.   |  |  |  |  |  |  |
| عام  |  |  |  |  |  |  |  |

\*التقييمها يتطلب اختبار المستخدمين كما هو موضح أدناه.

## ثانياً: اختبار المستخدم:

أ. قبل البدء يتم تحديد المواصفات التالية لكل مستخدم:

اختبار رقم: -----

رقم المستخدم: -----

الفئة التي يندرج تحتها المستخدم: -----

| نوع الجهاز: | جهاز مكتبي أو محمول. | نظام التشغيل: |
|-------------|----------------------|---------------|
|-------------|----------------------|---------------|

| متصفح الويب: | النسخة: | <input type="checkbox"/> جوجل كروم. Google Chrome                         |
|--------------|---------|---|
|              |         | <input type="checkbox"/> مايكروسوفت ايدج. MS Edge                         |
|              |         | <input type="checkbox"/> مايكروسوفت انترنت اكسبلورر. MS Internet Explorer |
|              |         | <input type="checkbox"/> سفاري. Safari                                    |
|              |         | <input type="checkbox"/> موزيلا فاير فوكس Mozilla FireFox                 |
|              |         | <input type="checkbox"/> أوبرا. Opera                                     |
|              |         | <input type="checkbox"/> أخرى: .....                                      |

| التقنيات المساعدة: | الغرض: | النسخة: |  |
|--------------------|--------|---------|--|
|                    |        |         |  |
|                    |        |         |  |
|                    |        |         |  |

ب. اختبار معايير النجاح ١-٣، ٢-٣، ١-٤

| ملاحظات | لا ينطبق | لا | في بعض المواضع | نعم | م | معايير النجاح                                       |
|---------|----------|----|----------------|-----|---|---|
|         |          |    |                |     |   | ١-٣ الرموز والأيقونات مفهومة بالنسبة لي.            |
|         |          |    |                |     |   | ٢-٣ الرموز والأيقونات غير مهيئة ومقبولة بالنسبة لي. |
|         |          |    |                |     |   | ١-٤ عناصر الوسائط المتعددة ملائمة ثقافتي.           |

ج. اختبار المعيار ٣-٨ (سهولة استخدام محتوى الويب)

يُطلب من المستخدم تنفيذ عدد من المهام ومن ثم الإجابة على استبانة سهولة الاستخدام.

| الرقم | البند   | لا أوافق بتاتاً (١) | لا أوافق (٢) | محايد (٣) | أوافق (٤) | أوافق بشدة (٥) |
|-------|---|---------------------|--------------|-----------|-----------|----------------|
| ١     | أعتقد أنني سوف أستخدم هذا الموقع كثيراً.                                    |                     |              |           |           |                |
| ٢     | أعتقد أن موقع الويب معقد بدون داع.  |                     |              |           |           |                |
| ٣     | أعتقد أن موقع الويب كان سهل الاستخدام.                                      |                     |              |           |           |                |
| ٤     | أعتقد أنني كنت بحاجة إلى دعم شخص تقني لكي أكون قادر على استخدام هذا الموقع. |                     |              |           |           |                |
| ٥     | وجدت أن الوظائف المختلفة في هذا الموقع مترابطة بشكل جيد.                    |                     |              |           |           |                |
| ٦     | أعتقد أنه كان هناك الكثير من عدم ثبات في هذا الموقع.                        |                     |              |           |           |                |
| ٧     | أتوقع أن معظم الناس سوف تتعلم وتتقن استخدام هذا الموقع بسرعة كبيرة.         |                     |              |           |           |                |
| ٨     | وجدت أن الموقع مرهق جداً في الاستخدام.                                      |                     |              |           |           |                |
| ٩     | شعرت بأنني واثق جداً عند استخدام هذا الموقع.                                |                     |              |           |           |                |
| ١٠    | كنت بحاجة لمعرفة الكثير من الأمور قبل أن أقوم باستخدام هذا الموقع.          |                     |              |           |           |                |

## نتائج اختبار المستخدم:

بعد إجراء الاختبارات مع المستخدمين يتم تلخيص النتائج:

### أ. فئات المستخدمين:

| فئات المستخدمين  | العدد | ملاحظات |
|--|-------|---------|
| مستخدمون ذوو إعاقات بصرية مثل: العمى، ضعف النظر وعمى الألوان.  |       |         |
| مستخدمون ذوو إعاقات سمعية مثل: الصمم وضعف السمع.   |       |         |
| مستخدمون ذوو إعاقات إدراكية مثل: صعوبات التعلم أو القراءة أو محدودية الذاكرة أو صعوبات في الاستيعاب وغيره.     |       |         |
| مستخدمون ذوو إعاقات حركية تصعب تصفح الويب مثل عدم القدرة على التحكم بالفأرة أو مرض الرعاش.                     |       |         |
| مستخدمون ذوو إعاقات تقدمية ناتجة عن التقدم بالعمر ويشمل ذلك انخفاض تدريجي في بعض القدرات مثل السمع أو الإبصار. |       |         |
| أخرى.....  |       |         |

### ب. نتيجة اختبار معايير النجاح ١-٣، ٢-٣، ١-٤

خانة (في بعض المواضع) و (لا) يجب أن تكون صفر، في حال زادت النسبة يجب العودة والتعديل.

| مقياس النجاح  | نعم % | في بعض المواضع % | لا % | لا ينطبق % | النتيجة |
|---|-------|------------------|------|------------|---------|
| ١-٣ الرموز والأيقونات مفهومة بالنسبة لي.            |       |                  |      |            |         |
| ٢-٣ الرموز والأيقونات غير مبهنة ومقبولة بالنسبة لي. |       |                  |      |            |         |
| ١-٤ عناصر الوسائط المتعددة ملائمة لثقافتي.          |       |                  |      |            |         |

### ج. نتيجة اختبار معيار النجاح ٣-٨

مع أنه من الممكن معرفة الانطباع المبني من خلال مشاهدة نتائج كل سؤال على حده ولكن هناك طريقة عملية ومدرسة لمعرفة نتيجة سهولة الاستخدام كالتالي. طريقة الحساب:

كل مستخدم يقوم بوضع نتيجة من ١ إلى ٥ باعتبار الرقم ٥ بأن المستخدم موافق بشدة على هذا السؤال. وبعدها نقوم بالتالي:

- نقوم بطرح ١ من كل نتيجة من الأسئلة ذات الرقم الفردي.
- نقوم بطرح نتيجة الأسئلة ذات الرقم الزوجي من ٥.
- نقوم بجمع جميع الأرقام الناتجة ومن ثم نقوم بضربها في ٢,٥.

| الرقم          | البند   | الإجابة (رقم بين ١ و ٥) | العملية الحسابية | نتيجة العملية الحسابية |
|----------------|---|-------------------------|------------------|------------------------|
| ١              | أعتقد أنني سوف أستخدم هذا الموقع كثيراً.                                    |                         | (الإجابة)-١      |                        |
| ٢              | أعتقد أن موقع الويب معقد بدون داع.  |                         | (الإجابة)-٥      |                        |
| ٣              | أعتقد أن موقع الويب كان سهل الاستخدام.                                      |                         | (الإجابة)-١      |                        |
| ٤              | أعتقد أنني كنت بحاجة إلى دعم شخص تقني لكي أكون قادر على استخدام هذا الموقع. |                         | (الإجابة)-٥      |                        |
| ٥              | وجدت أن الوظائف المختلفة في هذا الموقع مترابطة بشكل جيد.                    |                         | (الإجابة)-١      |                        |
| ٦              | أعتقد أنه كان هناك الكثير من عدم ثبات في هذا الموقع.                        |                         | (الإجابة)-٥      |                        |
| ٧              | أتوقع أن معظم الناس سوف تتعلم وتتقن استخدام هذا الموقع بسرعة كبيرة.         |                         | (الإجابة)-١      |                        |
| ٨              | وجدت أن الموقع مرهق جداً في الاستخدام.                                      |                         | (الإجابة)-٥      |                        |
| ٩              | شعرت بأنني واثق جداً عند استخدام هذا الموقع.                                |                         | (الإجابة)-١      |                        |
| ١٠             | كنت بحاجة لمعرفة الكثير من الأمور قبل أن أقوم باستخدام هذا الموقع.          |                         | (الإجابة)-٥      |                        |
| مجموع النتائج: |   |                         |                  |                        |

سهولة الاستخدام لمستخدم واحد = مجموع النتائج: \* ٢,٥ =

سهولة الاستخدام لمجموعة مستخدمين = متوسط سهولة الاستخدام لكل المجموعة

يكون تقويم سهولة الاستخدام حسب الجدول التالي:

| متوسط سهولة الاستخدام لكل المجموعة | توصيف سهولة الاستخدام المقابلة |
|------------------------------------|--------------------------------|
| ٨٠,٣ فأكثر                         | ممتاز.                         |
| ٦٨ أو حولها                        | جيد ولكن يمكن تحسينه.          |
| ٥١ أو أقل                          | سئ                             |

## فهم معايير النجاح

### اللغة:

١-١ تم تحديد اللغة واتجاهها في الكود البرمجي لصفحة الويب العربية.

أ. الفئة المستهدفة:

الأشخاص الذين يستخدمون قارئات الشاشة أو تقنيات أخرى لتحويل النص إلى كلام مسموع، أو الأشخاص من ذوي صعوبات التعلم أو القراءة.

ب. مثال على تقنية كافية لتحقيق المعيار:

```
<!DOCTYPE html>
<html dir="rtl" lang="ar">
<head>
```

ج. مثال على فشل تحقيق المعيار:

```
<!DOCTYPE html>
<html lang="ar">
<head>
```

د. اختبار المعيار:

١. يتم التحقق من الكود البرمجي لصفحة الويب أنه يحدد اللغة وهي العربية.
٢. يتم التحقق من الكود البرمجي لصفحة الويب أنه يحدد الاتجاه وهو من اليمين لليسار.
٣. إذا تحقق ١ و ٢ فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٢-١ اللغة واتجاهها لأي نص غير عربي في صفحة الويب العربية يكونان محددان في الكود البرمجي لصفحة الويب.

أ. الفئة المستهدفة:

الأشخاص الذين يستخدمون قارئات الشاشة أو تقنيات أخرى لتحويل النص إلى كلام مسموع، أو الأشخاص من ذوي صعوبات التعلم أو القراءة.

ب. مثال على تقنية كافية لتحقيق المعيار:

```
<p dir="ltr" lang="en"> English text from left to right </p>
```

ج. مثال على فشل تحقيق المعيار:

```
<p> English text from right to left </p>
```

د. اختبار المعيار:

١. يتم التحقق من الكود البرمجي لأي نص بلغة مغايرة للعربية أن لغة هذا النص محددة.
٢. يتم التحقق من الكود البرمجي لأي نص أن اتجاهه محدد.
٢. إذا تحقق ١ و ٢ فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٣-١ هناك تناغم في الاتجاه بين البيانات المدخلة كتابياً وبين عرضها للقراءة.

أ. الفئة المستهدفة:

الأشخاص الذين يستخدمون قارئات الشاشة أو تقنيات أخرى لتحويل النص إلى كلام مسموع، أو الأشخاص من ذوي صعوبات التعلم أو القراءة.

ب. مثال على تقنية كافية لتحقيق المعيار:

المدخل نص عربي فاتجاه الإدخال من اليمين لليمن

تسجيل الدخول المدخل نص انجليزي فاتجاه الإدخال من اليسار لليمن

اسم المستخدم

كلمة المرور

تذكرني لاحقاً

دخول

المدخل رقم فاتجاه الإدخال من اليسار لليمن

رقم التنبؤ أو رقم التوبة

ج. مثال على فشل تحقق المعيار:

رقم التذكرة يكون كالتالي: 056 - 1234567890

E-Ticket No: \*

رقم التذكرة: \*

لذلك يُعتبر وضعه بهذا الشكل في النسخة العربية من الموقع خاطئاً ويسبب لبس للمستخدم والمفترض أن تُدخل الأرقام كما هي في النسخة الإنجليزية (من اليسار لليمن).

د. اختبار المعيار:

- لجميع العناصر التي تتطلب إدخال من المستخدم، يتم التحقق أن اتجاه الإدخال مناسب لنوعية المدخل.
- إذا تحقق ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٤-١ يتواجد التشكيل الجزئي في صفحة الويب العربية بشكل افتراضي.

أ. الفئة المستهدفة:

الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تقنية كافية لتحقيق المعيار:

جامعة أم القرى ومن يومها الأول وضعت نُصَبَ أعينها هذا الإزث الإسلامي الخالد وهذه الحضارة التي تسمو على كل حضارات الدنيا، فكانت الانطلاقة نحو التميز في إبراز هذه الحضارة؛ لتكون واقعا ملموساً تشهدُ الدنيا في زمن العلم والتقدم العلمي.

ج. مثال على فشل تحقق المعيار:

- عدم وجود تشكيل نهائياً.
- عدم وجود تشكيل آخر الكلمات.
- عدم وجود تشكيل على الكلمات التي تحتل أكثر من معنى.

د. اختبار المعيار:

- يتم التحقق من صفحة الويب أن التشكيل الجزئي متواجد في الصفحة بشكل افتراضي.
- إذا تحقق ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٥-١ تم توفير خيارين للمستخدم: إما أن تُعرض الصفحة بتشكيل كامل أو أن تُعرض بدون تشكيل على الإطلاق.

أ. الفئة المستهدفة:

الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تقنية كافية لتحقيق المعيار: يظهر محتوى الصفحة بتشكيل جزئي ومن ثم يقوم زوار الصفحة باختيار المناسب لهم (بدون تشكيل، تشكيل كامل أو يظل التشكيل جزئياً) ويخزن الخيار في cookie خاص بهذه الجلسة. وبعد ذلك جميع صفحات الويب في الموقع تظهر حسب الخيار الذي اختاره المستخدم اعتماداً على cookie. طبعاً يكون المحتوى مخزن على الخادم بتشكيل جزئي ويمكن من خلال function أن يتم تشكيله كلياً أو يتم إزالة التشكيل عنه حسب ما يفضل المستخدم.

ج. مثال على فشل تحقق المعيار:

عدم توفر خيارين للمستخدم وهي عرض الصفحة بتشكيل كامل أو بدون تشكيل. أو توفرها ولكن لا تعمل بالشكل الصحيح.

د. اختبار المعيار:

١. يتم التحقق من صفحة الويب أن التشكيل الجزئي متواجد في الصفحة بشكل افتراضي.
٢. يتم التحقق من وجود آلية لعرض المحتوى بدون تشكيل على الإطلاق.
٣. يتم التحقق أن استخدام آلية عرض المحتوى بدون تشكيل تعرض المحتوى بدون تشكيل على الإطلاق.
٤. يتم التحقق من وجود آلية لعرض المحتوى بتشكيل كامل.
٥. يتم التحقق أن استخدام آلية عرض المحتوى بتشكيل كامل تعرض المحتوى كامل التشكيل.
٦. إذا كانت الخطوات من ١ إلى ٥ متحققة فمعنى ذلك أن المعيار متحقق، وماعدا ذلك فالمعيار غير متحقق.

٦-١ يتوفر التشكيل الكامل أو الجزئي للكلمات التي تحتل أكثر من معنى إذا اختلف السياق أو التي تُكتب بنفس الطريقة ولكن تختلف في النطق.

أ. الفئة المستهدفة:

الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تقنية كافية لتحقيق المعيار:

كثرت أدوات التواصل الاجتماعي وأصبحت وسيلة تستخدمها الجامعات للتواصل مع الناس بشكل أفضل. من الأمثلة على ذلك حسابات الجامعات على موقع تويتر للتواصل الاجتماعي وكثرة المتابعين والمتابعين.

ج. مثال على فشل تحقق المعيار:

عندما لا يتوفر التشكيل الكامل أو الجزئي للكلمات التي تحتل أكثر من معنى إذا اختلف السياق أو التي تُكتب بنفس الطريقة ولكن تختلف في النطق.

د. اختبار المعيار:

١. يتم التحقق من توفر التشكيل الكامل أو الجزئي للكلمات التي تحتل أكثر من معنى إذا اختلف السياق أو التي تُكتب بنفس الطريقة ولكن تختلف في النطق.
٢. إذا تحقق ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٧-١ يتم استخدام اللغة العامة بدون تحديد الجنس سواء ذكر أو أنثى متى ما كان ذلك ممكناً.

أ. الفئة المستهدفة:

الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تقنية كافية لتحقيق المعيار:

يُشترط لقبول الطالب المستجد في الجامعة أن يكون حاصلاً على شهادة الثانوية العامة أو ما يعادلها من داخل المملكة أو من خارجها.

ج. مثال على فشل تحقق المعيار:

عندما يتم استخدام الخطاب للمؤنث في حين أن المقصودين من الجنسين.

د. اختبار المعيار:

١. يتم التحقق من استخدام اللغة العامة بدون تحديد الجنس سواء ذكر أو أنثى متى ما كان ذلك ممكناً.
٢. إذا تحقق ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٨-١ يتم استخدام التشكيل الكامل أو الجزئي للتفريق بين الجنسين متى ما دعت الحاجة لذلك.

أ. الفئة المستهدفة:

الأشخاص من ذوي صعوبات القراءة، أو من يعانون من صعوبات في استخدام السياق لمساعدتهم في فهم المحتوى أو من يستخدمون التقنيات المساعدة لتحويل النص لكلام مسموع، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تقنية كافية لتحقيق المعيار:

عزيزتي الطالبة:  
يرجى استلام نسخة من مكتبة الجامعة وتسجيل رقمك الجامعي وبريدك الإلكتروني.

أ. تشكيل جزئي

عزيزتي الطالبة:  
يرجى استلام نسخة من مكتبة الجامعة وتسجيل رقمك الجامعي وبريدك الإلكتروني.

ب. تشكيل كامل

ج. مثال على فشل تحقق المعيار: -



#### د. اختبار المعيار:

١. يتم التحقق من استخدام التشكيل الكامل أو الجزئي للتفريق بين الجنسين متى ما دعت الحاجة لذلك.
٢. إذا تحقق ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٩-١ حجم الخط للنص ١٦ نقطة على الأقل وللعناوين ٢٠ نقطة على الأقل.

#### أ. الفئة المستهدفة:

الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.

#### ب. مثال على تقنية كافية لتحقيق المعيار:

```
<!DOCTYPE html>
<html lang="ar" dir="rtl">
<head>
<style>
h2 { font-size: 1.6em; }
p { font-size: 16pt; }
</style>
</head>
<body>
```

```
</h2>عنوان بحجم كبير
<p>نص بحجم أصغر</p>
```

```
</body>
</html>
```



عنوان بحجم كبير  
نص بحجم أصغر

#### ج. مثال على فشل تحقيق المعيار: استخدام خطوط بحجم صغير يصعب القراءة.

#### د. اختبار المعيار:

١. يتم التحقق من حجم الخط من خلال الكود البرمجي لصفحة الويب.
٢. حجم النص يجب أن يكون ١٦ نقطة على الأقل ( 16pt = 22px = 1.4em = 140% ).
٣. حجم العناوين يجب أن يكون ٢٠ نقطة على الأقل ( 20pt = 26px = 1.6em = 160% ).
٤. إذا تحققت الخطوات ٢ و ٣ فالمعيار متحقق، عدا ذلك فالمعيار غير متحقق.

١٠-١ نوع الخط المستخدم مقروء وواضح. الخطوط الموصى بها هي: Times New Roman ثم Arial ثم Tahoma.

#### أ. الفئة المستهدفة:

الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.

#### ب. مثال على تقنية كافية لتحقيق المعيار:

```
<DOCTYPE html!>
<"html lang="ar" dir="rtl">
<head>
<style>
p.readable{ font-family: "Times New Roman", Arial, Tahoma;}
<style/>
<head/>
<body>
<p class="readable"> هنا تم استخدام خط مقروء من قِبَل المستخدمين. </p>
<body/>
<html/>
```

#### ج. مثال على فشل تحقيق المعيار: اختيار أنواع خطوط لمظهرها الجمالي وعدم التحقق من مدى مقروئيتها من قِبَل المستخدمين المستهدفين.

#### د. اختبار المعيار:

١. يتم التحقق من نوع الخط من خلال الكود البرمجي لصفحة الويب.
٢. نوع الخط يجب أن يكون من ضمن الخطوط الموصى بها هي: Times New Roman ثم Arial ثم Tahoma.
٣. إذا تحققت الخطوة ٢ فالمعيار متحقق، عدا ذلك فالمعيار غير متحقق.

١١-١ المسافات بين الكلمات تكون مساوية لـ (0.40em).

أ. الفئة المستهدفة:

الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.

ب. مثال على تقنية كافية لتحقيق المعيار:

```
<!DOCTYPE html>
<html lang="ar" dir="rtl">
<head>
<style>
p{ word-spacing: 0.40em; }
</style>
</head>
<body>
<p>إِذَا زَادَ عددُ الجامعاتِ ليشملَ مناطقَ عدّةٍ في أنحاءِ المملكةِ</p>
</body>
</html>
```

ج. مثال على فشل تحقيق المعيار: عدم تغيير المسافات الافتراضية للمسافة المحددة في المعيار، أو تغييرها ولكن لا تساوي نفس المسافة المحددة في المعيار.

د. اختبار المعيار:

١. يتم التحقق أن المسافات بين الكلمات مساوية لـ (0.40em) .

٢. إذا تحقق ١ فذلك يعني أن المعيار متحقق، عدا ذلك فالمعيار غير متحقق.

١٢-١ تم استخدام الخط العريض Bold أو الخط العريض مع لون مختلف في اضافة أهمية للنص.

أ. الفئة المستهدفة:

الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا)، أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض، أو كبار السن.

ب. مثال على تقنية تحقق المعيار:

```
<p> نص عادي <b> نص عريض </b></p>
```

ج. مثال على فشل تحقيق المعيار: -

د. اختبار المعيار:

١. يتم التحقق من استخدام الخط العريض Bold أو الخط العريض مع لون مختلف للنصوص أو الكلمات المهمة من خلال كود صفحة الويب.

٢. إذا وُجدَ محتوى مهم وتم تحديده سواءً بالخط العريض أو بالخط العريض مع لون فمعنى ذلك أن المعيار متحقق، عدا ذلك فالمعيار غير متحقق.

١٣-١ محاذاة النص العربي تكون إما لليمين (وهو الأفضل) أو محاذاة كلية.

أ. الفئة المستهدفة:

الأشخاص ضعيفو النظر، أو من يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم.

ب. مثال على تقنية كافية لتحقيق المعيار:

يتم تحديد المحاذاة إما لليمين وهي الأفضل أو محاذاة كلية من خلال كود صفحة الويب أو style المخصص لموقع الويب.

```
<head>
<style>
p { text-align: right; }
</style>
</head>
<body>
<p> محاذاة لليمين </p>
</body>
```

ج. مثال على فشل تحقيق المعيار: -

د.

```
<head>
<style>
p { text-align: left; }
</style>
</head>
<body>
<p> محاذاة لليسار </p>
```

ه. اختبار المعيار:

١. يتم التحقق من محاذاة النص لليمين أو محاذاة الكلية من خلال كود صفحة الويب.
٢. إذا كانت المحاذاة لليمين أو كلية فالمعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

١٤-١ لا تزيد أي جملة عن ٢٠ كلمة ولا تزيد أي فقرة عن ٥ جمل.

أ. الفئة المستهدفة:

الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو من عندهم ذاكرة محدودة أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تحقق المعيار:

أصبحت صناعة الحاسب الآلي وتقنية المعلومات هي الأكبر والأسرع نمواً وازدهارا في العالم. كما أنها تعد القوة المحركة للتطورات في جميع جوانب الأعمال التجارية والتعليمية. في الوقت نفسه أصبحت الحواسيب جزءاً لا يتجزأ من كثير من الشركات الكبرى التي تحتاج إلى أنظمة مراقبة متطورة. كما أن الحواسيب تلعب دوراً رئيسياً في كثير من التقنيات الحديثة، بما فيها المنتجات الاستهلاكية، وشبكات الحاسب عالية السرعة. ولذلك فإن تطوير هذه التطبيقات تتطلب مهارة الفنيين المؤهلين في تصميم كل من الأجهزة والبرمجيات.

ج. مثال على فشل تحقق المعيار: وجود جمل وفقرات طويلة، مثلاً جملة عدد كلماتها ٣٠ كلمة أو فقرة عدد جملها ٧ فقرات.

د. اختبار المعيار:

١. يتم التحقق من عدد الكلمات في أي جملة لا يزيد عن ٢٠ وعدد الجمل في كل فقرة لا يزيد عن ٥ جمل في صفحة الويب.
٢. إذا كان عدد الكلمات في أي جملة ليزيد عن ٢٠ وعدد الجمل في أي فقرة لا يزيد عن ٥ جمل فمعنى ذلك أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

١٥-١ تم استخدام اللغة العربية الفصحى والكلمات البسيطة والشائعة الاستخدام.

أ. الفئة المستهدفة:

الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تحقق المعيار: -ج. مثال على فشل تحقق المعيار: -د. اختبار المعيار:

١. يتم التحقق من استخدام اللغة العربية الفصحى والكلمات البسيطة والشائعة الاستخدام في صفحة الويب.
٢. إذا كانت اللغة المستخدمة في صفحة الويب فصحى وتحتوي كلمات بسيطة وشائعة فهذا يعني أن المعيار متحقق، أما إذا كانت اللغة المستخدمة عامية أو تحوي كلمات غير دارجة فهذا يعني عدم تحقق المعيار.

١٦-١ عندما يكون المحتوى ذو لغة متقدمة أو غير مقروءة، تم تقديم بدائل له بحيث تكون هذه البدائل مفهومة ومقروءة.

أ. الفئة المستهدفة:

الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تحقق المعيار: -ج. مثال على فشل تحقق المعيار: -د. اختبار المعيار:

١. يتم التحقق من أن أنه يوجد لأي محتوى ذو لغة متقدمة أو صعبة الفهم بدائل سهلة الفهم ومقروءة في صفحة الويب.
٢. إذا كان هناك بدائل مفهومة لأي لغة متقدمة وصعبة الفهم فهذا يعني أن المعيار متحقق، أما إذا لم يوجد فهذا يعني عدم تحقق المعيار.

١٧-١ التباعد بين الأسطر بمقدار مسافتين في الفقرة الواحدة أما بين الفقرات والأخرى فهي ضعف هذه المسافة بمقدار مرة ونصف.

أ. الفئة المستهدفة:

الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تقنية تحقق المعيار:

```
<html lang="ar"; dir="rtl";>
<head>
<style>
p.big {line-height: 2; margin-bottom: 3em;}
</style>
</head>
<body>
<p class="big">
```

جامعة طيبة جامعة متميزة قادرة على المنافسة مع نظيراتها السعودية والعربية. تعكس الهوية الإسلامية، تستند إلى الماضي وتعايش الحاضر وتستشرف المستقبل استجابة للثوابت والمتغيرات، مؤكدة على أهمية المساواة في فرص التعليم لجميع المواطنين دون تمييز.

</p>  
<p class="big">

وتؤكد الجامعة على أهمية التطوير باستمرار لارتقاء بجودة بيئة مجتمع التعليم لدعم عملية التدريس، والبحث العلمي، وخدمة المجتمع، بالتكامل بين مختلف العلوم والآداب، من خلال برامج دراسية وبحثية متطورة لإعداد مواطن منتج قادر على المنافسة والإبداع. وتسعى الجامعة لاستثمار مواردها البشرية واكتشاف الموهوبين من منسوبيها ورعايتهم لدعم الاقتصاد الوطني.

</p>  
</body>  
</html>

ج. مثال على فشل تحقق المعيار:

د. اختبار المعيار:

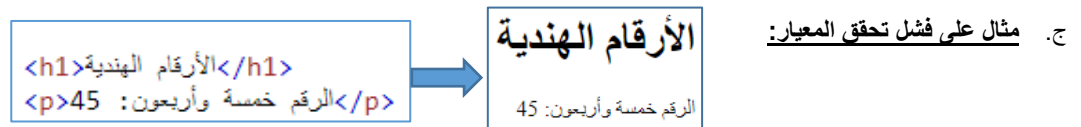
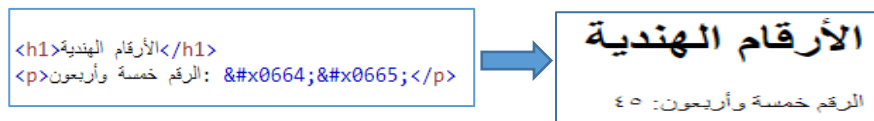
- يتم التحقق من خلال كود صفحة الويب أن التباعد بين الأسطر بمقدار مسافتين في الفقرة الواحدة أما بين الفقرة والأخرى فالتباعد يتضاعف.
- إذا كان التباعد بين الأسطر بمقدار مسافتين في الفقرة الواحدة ومضاعف بين الفقرات فهذا يعني أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

١٨-١ الأرقام تكون موجودة في صفحة الويب بصيغة الأرقام الهندية. ٤٥

أ. الفئة المستهدفة:

الأشخاص الذين يعانون من صعوبات في القراءة (ديسلكسيا) أو صعوبات تعلم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تحقق المعيار:



د. اختبار المعيار:

- يتم التحقق من خلال كود صفحة الويب أن Numeric Character Reference NCR وهي الصيغة المرجعية للأرقام موجودة وليس العدد نفسه وذلك لضمان ظهور الأرقام بصيغة الأرقام الهندية. وهذه الصيغة تبدأ من ٠ وهي &#x0660; إلى ٩ وهي &#x0669;.
- إذا كان الأرقام موجودة بصيغتها الهندية فهذا يعني أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

١٩-١ علامة الموجب + أو السالب - تكون دائماً على يمين العدد.

أ. الفئة المستهدفة: الكل.

ب. مثال على تحقق المعيار: -٤٥

مثال على فشل تحقق المعيار: -٤٥ أو -45

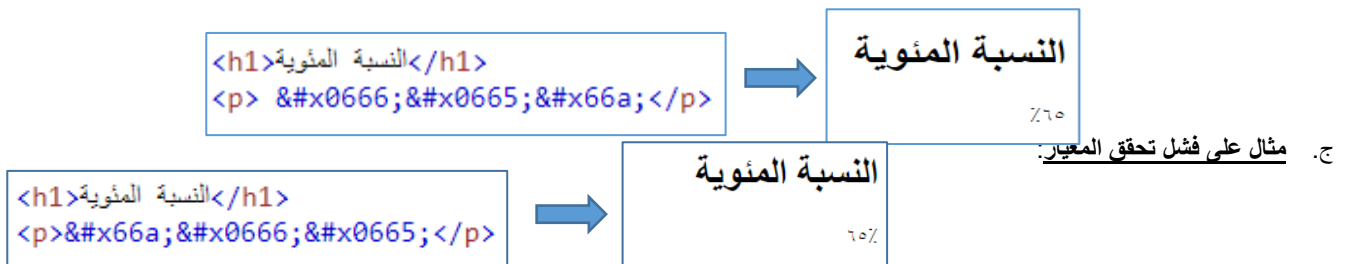
ج. اختبار المعيار:

- إذا كان هناك اعداد بإشارة، يتم التحقق من خلال صفحة الويب أن إشارة العدد السالبة أو الموجبة تكون على يمين العدد.
- إذا كانت الإشارات السالبة أو الموجبة على يمين العدد فهذا يعني أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

٢٠-١ علامة النسبة المئوية تكون على يسار العدد.

أ. الفئة المستهدفة: الكل.

ب. مثال على تقنية تحقق المعيار: استخدام الصيغة المرجعية للنسبة المئوية في اللغة العربية وهي &#x66a;



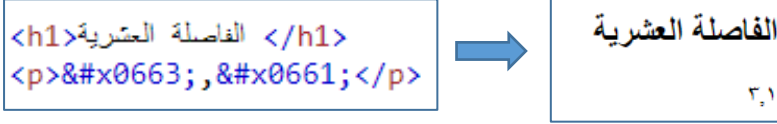
#### د. اختبار المعيار:

١. إذا كان هناك نسب مئوية، يتم التحقق من خلال صفحة الويب أن علامة النسبة المئوية مكتوبة كما هو ظاهر في الأمثلة وأنها على يسار العدد.
٢. إذا كانت علامات النسبة المئوية ظاهرة كالأمثلة أعلاه وعلى يسار العدد فهذا يعني أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

٢١-١ الفاصلة العشرية (,) هي المستخدمة مع الأرقام.

#### أ. الفئة المستهدفة: الكل.

ب. مثال على تحقق المعيار: ٦٧,٨



#### ج. مثال على فشل تحقق المعيار: ٦٧.٨

#### د. اختبار المعيار:

١. إذا كان هناك أعداد بفاصلة عشرية، يتم التحقق من خلال صفحة الويب أن الفاصلة العشرية (,) هي المستخدمة.
٢. إذا كانت الفاصلة العشرية (,) هي المستخدمة فهذا يعني أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

٢٢-١ لا تُستخدم فاصلة الآلاف حيث أنها لا تُستخدم عادةً في اللغة العربية.

#### أ. الفئة المستهدفة: الكل.

ب. مثال على تحقق المعيار: ٥٢٦٧٠٠٠

ج. مثال على فشل تحقق المعيار: ٥,٢٦٧,٠٠٠ خاطيء فهذه فاصلة عشرية. ٥.٢٦٧.٠٠٠ أيضاً خاطيء.

#### د. اختبار المعيار:

١. إذا كان هناك أعداد كبيرة، يتم التحقق من خلال صفحة الويب أنها لا تحتوي على فاصلة الآلاف.
٢. إذا كانت الأعداد لا تحتوي فاصلة الآلاف فهذا يعني أن المعيار متحقق، عدا ذلك يعني عدم تحقق المعيار.

٢٣-١ لا يوجد أي استخدام للاختصارات خلال صفحة الويب في مواقع الجامعات السعودية.

#### أ. الفئة المستهدفة: الأشخاص الذين لديهم صعوبات في تفكيك الكلمات، أو الذين يعتمدون على مكبرات الشاشة لتصفح الويب، أو الذين يعانون من محدودية ذاكرتهم، أو الذين يجدون صعوبة في استخدام السياق لمساعدتهم في الفهم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تحقق المعيار: بدلاً من كتابة الاختصار (واس) يتم كتابة فك الاختصار كاملاً: وكالة الأنباء السعودية.

ج. مثال على فشل تحقق المعيار: عند وجود اختصارات.

#### د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أنه لا توجد اختصارات.
٢. في حال وجود اختصارات يتم الانتقال إلى المعايير ٢٤-١، ٢٥-١ و ٢٦-١.

٢٤-١ هناك استخدام لاختصارات عربية أو اختصارات مستعارة من لغات أخرى في صفحة الويب.

#### أ. الفئة المستهدفة: الأشخاص الذين لديهم صعوبات في تفكيك الكلمات، أو الذين يعتمدون على مكبرات الشاشة لتصفح الويب، أو الذين يعانون من محدودية ذاكرتهم، أو الذين يجدون صعوبة في استخدام السياق لمساعدتهم في الفهم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.

ب. مثال على تحقق المعيار:

الاختصارات العربية: (أ) ويكون هناك مسافة بين الأحرف في الاختصار، مثلاً: و هـ م (اختصار: وهو المطلوب)، أو يكون هناك نقط بين الأحرف في الاختصار، مثلاً: و. هـ م أو مسافات بين الأحرف ونقط و. هـ م (ب) يتواجد فك للاختصار. مثلاً: واس (وكالة الأنباء السعودية) أو اختصارات مستعارة من لغات أخرى: (أ) اختصارات غير مترجمة والتي تُستخدم كما هي في اللغات الأخرى، مثال: ليزر أو رادار. في هذه الحالة يمكن تقديم شرح لهذه الاختصارات ولكنه ليس ضرورياً. (ب) اختصارات مترجمة يُقدّم نطق للاختصار بالعربية (و/ أو) يُقدّم فك للاختصار بالعربية كذلك، مثلاً MBC إم بي سي (مركز إذاعة الشرق الأوسط)، IMF أي إم إف (صندوق النقد الدولي).

ج. مثال على فشل تحقق المعيار: عند وجود اختصارات وعدم وجود فك لها.

#### د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أنه يوجد اختصارات.
٢. في حال وجود اختصارات يتم تصنيفها إلى اختصارات عربية أو اختصارات مستعارة من لغات أخرى.
٣. في حالة الاختصارات العربية يتم التأكد أنه يوجد مسافة بين الأحرف في الاختصار، أو يكون هناك نقط بين الأحرف في الاختصار أو مسافات بين الأحرف ونقط، وأيضاً أنه يوجد فك للاختصار.
٤. في حالة الاختصارات المستعارة من لغات أخرى وتكون اختصارات غير مترجمة وتُستخدم كما هي في اللغات الأخرى، في هذه الحالة يمكن تقديم شرح لهذه الاختصارات ولكنه ليس ضرورياً.
٥. في حالة الاختصارات المترجمة المستعارة من لغات أخرى يُقدّم نطق للاختصار بالعربية (تشكيل) أو يُقدّم فك للاختصار بالعربية كذلك.
٦. إذا لم يتحقق ما سبق للاختصارات العربية أو المستعارة فمعنى ذلك أن المعيار غير متحقق.

٢٥-١ . في حال أستخدمت الاختصارات، تم توفير شرح أو فك للاختصار بطريقة من الآتي: أ. عند أول ظهور للاختصار إذا كان يحمل معنى واحد خلال صفحة الويب. أو ب. في كل مرة يظهر فيها الاختصار إذا كان يحمل أكثر من معنى خلال صفحة الويب.

- أ. الفئة المستهدفة: الأشخاص الذين لديهم صعوبات في تفكيك الكلمات، أو الذين يعتمدون على مكبرات الشاشة لتصفح الويب، أو الذين يعانون من محدودية ذاكرتهم، أو الذين يجدون صعوبة في استخدام السياق لمساعدتهم في الفهم أو الأشخاص غير المجيدين للغة أو مستوى تعليمهم منخفض.
- ب. مثال على تحقق المعيار: .
- مثال على فشل تحقق المعيار: .

#### اختبار المعيار:

١. لكل اختصار موجود في صفحة الويب يتم التحقق أن هناك شرح للاختصار اذا لم يتواجد له فك أو كان بلغة أجنبية غير العربية.
٢. ما عدا ذلك يتم توفير فك للاختصار بجانب الشرح.
٣. يكون ذلك في أول مرة يظهر فيها الاختصار إذا كان يحمل نفس المعنى خلال الصفحة.
٤. إذا كان الاختصار يحمل معاني مختلفة فيتم التحقق أنه تم توفير شرح وفك للاختصار في كل مرة.
٥. إذا تم استيفاء ما سبق فمعنى ذلك أن المعيار متحقق أما ما عدا ذلك فيعني أن المعيار غير متحقق.

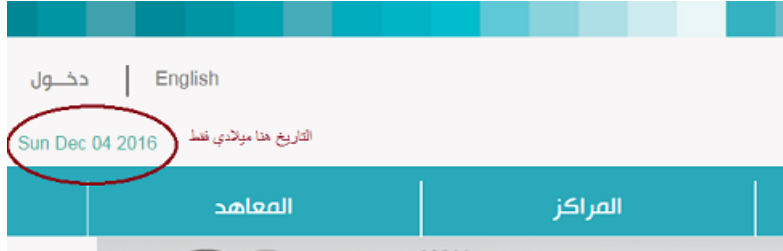
## تنسيق البيانات:

١-٢ تم استخدام التاريخ الهجري فقط وفي حالة استخدام التاريخ الميلادي يُوضح التاريخ الهجري الموافق له.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: -

ج. مثال على فشل تحقق المعيار:



د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أن التاريخ متواجد بصيغته الهجرية أو صيغته الهجرية والميلادية معاً.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٢-٢ تم استخدام صيغة التاريخ الطويلة.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: ٢٣ ربيع الأول، ١٤٣٨

ج. مثال على فشل تحقق المعيار: ٢٥ - ٠٥ - ١٤٣٩

د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أن التاريخ متواجد بصيغته الطويلة ( اليوم رقماً الشهر كتابةً السنة رقماً).

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٣-٢ عند استخدام صيغة التاريخ المختصرة تم استخدام ( / ) كفاصل.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: ١٤٣٨ / ٠٣ / ٢٣

ج. مثال على فشل تحقق المعيار: ١٤٣٨ - ٠٣ - ٢٣

د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أنه عند استخدام صيغة التاريخ المختصرة تم استخدام ( / ) كفاصل.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٤-٢ تم توفير الوقت بصيغة ١٢ ساعة مع (ص) للصباح و (م) للمساء.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: ٣:٤٩ م

ج. مثال على فشل تحقق المعيار: ١٥:٤٩

د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أنه عند توفير الوقت فإنه يكون بصيغة ١٢ ساعة مع (ص) للصباح و (م) للمساء.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٥-٢ عند استخدام الوقت استُخدمت (:) كفاصل.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: ٠٢:١٥ م

ج. مثال على فشل تحقق المعيار: ٢٠:١٥ م

د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أنه عند استخدام الوقت استُخدمت (:) كفاصل.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٢ تم استخدام الريال السعودي بصيغته الطويلة (ريال سعودي) أو المختصرة (ر.س.).

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: تبلغ قيمتها ٣٠٠ ريال سعودي

ج. مثال على فشل تحقق المعيار: تبلغ قيمتها ٣٠٠ ريال

- د. **اختبار المعيار:**
١. يتم التحقق من خلال صفحة الويب أنه تم استخدام الريال السعودي بصيغته الطويلة (ريال سعودي) أو المختصرة (ر.س.).
  ٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٧-٢ توضع العملة على يسار العدد عند استخدامها .

- أ. **الفئة المستهدفة:** جميع المستخدمين.
- ب. **مثال على تحقق المعيار:** تبلغ قيمتها ٣٠٠ ر.س.
- ج. **مثال على فشل تحقق المعيار:** تبلغ قيمتها ر.س ٣٠٠ .
- د. **اختبار المعيار:**

١. يتم التحقق من خلال صفحة الويب أنه عند استخدام العملة تم وضعها على يسار العدد.
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٨-٢ عند استخدام عملات أخرى، فالقيمة المقابلة بالريال السعودي تُعرض أيضاً.

- أ. **الفئة المستهدفة:** جميع المستخدمين.
- ب. **مثال على تحقق المعيار:** تبلغ قيمتها ١٠٠ دولار أمريكي وهو ما يعادل تقريباً ٣٧٥ ريال سعودي.
- ج. **مثال على فشل تحقق المعيار:** مثال يوضح عرض عملة أجنبية بدون توضيح المقابل بالريال السعودي



- د. **اختبار المعيار:**
١. يتم التحقق من محتوى صفحة الويب أنه عند استخدام عملات أخرى، فالقيمة المقابلة بالريال السعودي تُعرض أيضاً.
  ٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٩-٢ عند استخدام الرمز البريدي السعودي، فهو عبارة عن رقم من خمس خانات.

- أ. **الفئة المستهدفة:** جميع المستخدمين.
- ب. **مثال على تحقق المعيار:** لمراسلة الجامعة: الرمز البريدي: ١٢٣٤٥
- ج. **مثال على فشل تحقق المعيار:**
- د. **اختبار المعيار:**

١. يتم التحقق من خلال صفحة الويب أنه عند استخدام الرمز البريدي السعودي، فهو عبارة عن رقم من خمس خانات.
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

١٠-٢ عند استخدام الأرقام الهاتفية السعودية، فإنها تكون على النمط التالي

XXXX XXXX خانتين لمفتاح المنطقة +966

وللهاتف الجوال

+966 5XXX XXXXX

- أ. **الفئة المستهدفة:** جميع المستخدمين.
- ب. **مثال على تحقق المعيار:**
- ج. **مثال على فشل تحقق المعيار:**
- د. **اختبار المعيار:**

١. يتم التحقق من خلال محتوى صفحة الويب أنه عند استخدام الأرقام الهاتفية السعودية، فهي تتبع النمط المحدد.
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

١١-٢ عند استخدام الأسماء، الاسم الأول، اسم الأب والجد والعائلة أي الاسم الرباعي هي المستخدمة.

أ. **الفئة المستهدفة:** جميع المستخدمين.

- ب. **مثال على تحقق المعيار:** عند تعبئة نموذج طلب الالتحاق بالجامعة فإنه يتم طلب ادخال الاسم فانه من المقبول طلب الاسم الأول والعائلة أو الاسم الثلاثي أو الرباعي.
- ج. **مثال على فشل تحقق المعيار:** عند تعبئة نموذج يتم طلب الكنية فهذا خاطئ.
- د. **اختبار المعيار:**

١. يتم التحقق من خلال صفحة الويب أنه عند تعبئة نموذج يطلب ادخال الاسم فانه من المقبول طلب الاسم الأول والعائلة أو الاسم الثلاثي أو الرباعي.
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.



١٢-٢ عند استخدام الأسماء، لم يتم استخدام الاسم الأوسط Middle name أو أول حرف منه Middle Initial أو اسم المرأة قبل الزواج Mother's Maiden name (وهي الدارج استخدامها في الثقافات الأخرى).

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: عند تعبئة نموذج يطلب ادخال الاسم فانه لم يتم طلب الاسم الأوسط Middle name أو أول حرف منه Middle Initial أو اسم المرأة قبل الزواج Mother's Maiden name.

ج. مثال على فشل تحقق المعيار: عند تعبئة نموذج يطلب ادخال الاسم تم طلب الاسم الأوسط Middle name أو أول حرف منه Middle Initial أو اسم المرأة قبل الزواج Mother's Maiden name.

د. اختبار المعيار:

١. يتم التحقق من خلال صفحة الويب أنه عند استخدام الأسماء، لم يتم استخدام الاسم الأوسط Middle name أو أول حرف منه Middle Initial أو اسم المرأة قبل الزواج Mother's Maiden name.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

١٣-٢ تم استخدام النظام المتري عند الحاجة لوحدات قياس.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: عند توصيف عنوان، يبعد المبنى الأول عن المبنى الثاني مسافة ٢٠ متر.

ج. مثال على فشل تحقق المعيار: عند توصيف عنوان، يبعد المبنى الأول عن المبنى الثاني مسافة ٦٦ قدم

اختبار المعيار:

١. يتم التحقق من خلال محتوى صفحة الويب أنه تم استخدام النظام المتري عند الحاجة لوحدات قياس.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

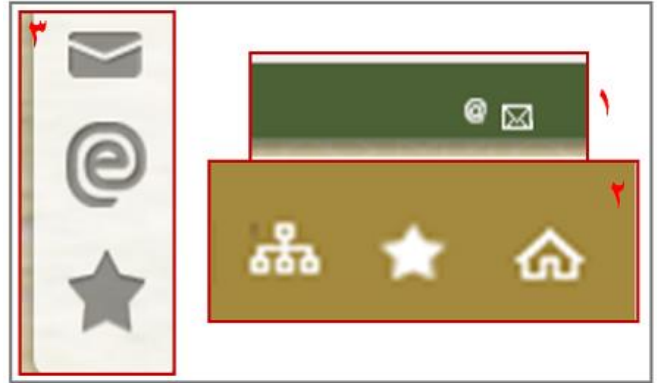
## الرموز والأيقونات:

١-٣ الرموز والأيقونات مفهومة عند المستخدمين المستهدفين.

- أ. الفئة المستهدفة: جميع المستخدمين وخاصةً المستخدمين الجدد وقليلو الاستخدام للويب.  
ب. مثال على تحقق المعيار:



- ج. مثال على فشل تحقق المعيار:



- د. اختبار المعيار:

١. يتم التحقق أن الرموز والأيقونات مفهومة عند المستخدمين المستهدفين من خلال اختبار المستخدمين.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٢-٣ الرموز والأيقونات غير مهيئة ومقبولة عند المستخدمين المستهدفين.

- أ. الفئة المستهدفة: جميع المستخدمين.

- ب. مثال على تحقق المعيار: عند توصيف عنوان، يبعد المبنى الأول عن المبنى الثاني مسافة ٢٠ متر.  
ج. مثال على فشل تحقق المعيار: الرموز والأيقونات من الثقافات الأخرى والتي يمكن أن تكون غير مقبولة مثل شجرة الكريسماس أو أي رموز أو أيقونات من ديانات أخرى أو مثلاً بعض الحيوانات مثل الخنزير.

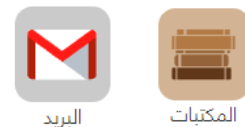
- د. اختبار المعيار:

١. يتم التحقق الرموز والأيقونات غير مهيئة ومقبولة عند المستخدمين المستهدفين.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٣-٣ الرموز والأيقونات مناسبة للمحتوى.

- أ. الفئة المستهدفة: جميع المستخدمين.

- ب. مثال على تحقق المعيار:





اختبار المعيار:

- ج. ١. يتم التحقق من خلال محتوى صفحة الويب أن الرموز والأيقونات مناسبة للمحتوى.  
٢. يتم التحقق أن الرموز والأيقونات مفهومة عند المستخدمين المستهدفين (١-٣).  
٢. إذا تم ١ و ٢ فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

## الوسائط المتعددة:

١-٤ عناصر الوسائط المتعددة تكون ملائمة لثقافة المستخدمين.

- الفئة المستهدفة: جميع المستخدمين.
- مثال على تحقق المعيار: - وجود صور للنساء بحجاب و لباس محتشم.  
- بشكل عام يفضل عرض صور الطبيعة أو المباني على صور الناس.
- مثال على فشل تحقق المعيار: - وجود صور لنساء بغير حجاب أو ليس محتشم.
- وجود صور تنافي التعاليم الإسلامية .
- اختبار المعيار:
  - يتم التحقق أن عناصر الوسائط المتعددة الموجودة في مواقع الجامعات السعودية ملائمة لثقافة المستخدمين وذلك من خلال اختبار المستخدمين.
  - إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٢-٤ جميع عناصر الوسائط المتعددة التي تضم موسيقى يتم توفير: إما تلميح لوجود موسيقى في الوسائط المتعددة و/ أو نسخة أخرى من الوسائط المتعددة ولكن بدون موسيقى.

- الفئة المستهدفة: جميع المستخدمين.
- مثال على تحقق المعيار: وجود نسختين على الخادم لفديو عن الخدمات الالكترونية في موقع جامعة يحتوي على موسيقى. النسخة الأولى بموسيقى والثانية بدون ويتم عرض الفيديو المحتوي على موسيقى بشكل افتراضي مع تلميح بوجود موسيقى ويمكن أيضاً إضافة خيار لعرض الفيديو بدون موسيقى
- مثال على فشل تحقق المعيار: عندما يتم عرض فيديو أو ملف صوتي يحتوي على موسيقى بدون التلميح بذلك للمستخدم.
- اختبار المعيار:

لجميع عناصر الوسائط المتعددة في صفحة الويب:

  - يتم التحقق من وجود موسيقى أو عدمه.
  - إذا كان هناك موسيقى في أي عنصر فيتم التحقق من وجود تلميح بوجود الموسيقى.
  - يتم أيضاً التحقق من وجود نسخة أخرى بدون موسيقى وأنها تعمل.
  - إذا نُفذت الخطوات من ١ إلى ٣ فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٣-٤ حجم صفحة الويب الواحدة بجميع عناصر الوسائط المتعددة ملائم لسرعة الانترنت في بلد المستخدمين المستهدفين وهي السعودية.

- الفئة المستهدفة: جميع المستخدمين.
- مثال على تحقق المعيار: عند قياس حجم الصفحة باستخدام أدوات التقويم الأوتوماتيكية (مثال عليها موقع: <http://www.websiteoptimization.com/services/analyze>) ، فإنه الصفحة تنجح في اجتياز اختبار الحجم.
- مثال على فشل تحقق المعيار: الاعتماد على عناصر مثلاً صور ويكون حجمها كبير.
- اختبار المعيار:
  - يتم اختبار صفحة الويب وعناصرها من خلال أدوات التقويم الأوتوماتيكية.
  - إذا اجتازت صفحة الويب اختبارات حجم الصفحة بما فيها عناصر الوسائط المتعددة والصور فالمعيار متحقق، وإذا لم تجتز فالمعيار غير متحقق وينبغي الأخذ بالاعتبار التوصيات ونتائج الاختبار.

٤-٤ يتم الرجوع لـ WCAG 1.1.1

٥-٤ يتم الرجوع لـ WCAG 1.2.1

٦-٤ يتم الرجوع لـ WCAG 1.2.1

٧-٤ يتم الرجوع لـ WCAG 1.2.2

## الألوان:

١-٥ تُستخدم الألوان الذكورية كالأخضر والرمادي في مواقع الجامعات السعودية بينما الألوان الأنثوية كالوردي يتم تجنبها.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: -

ج. مثال على فشل تحقق المعيار: -

د. اختبار المعيار:

١. يتم التحقق من صفحة الويب أنه تم استخدام الألوان الذكورية كالأخضر والرمادي في مواقع الجامعات السعودية بينما الألوان الأنثوية كالوردي تم تجنبها.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٢-٥ الألوان المستخدمة في مواقع الجامعات السعودية مشتقة من شعار الجامعة، أو من البيئة المحيطة.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: -

ج. مثال على فشل تحقق المعيار: -

د. اختبار المعيار:

١. يتم التحقق أن الألوان المستخدمة في مواقع الجامعات السعودية مشتقة من شعار الجامعة، أو من البيئة المحيطة.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٣-٥ لا تُستخدم الألوان على أنها الوسيلة الوحيدة لتوصيل محتوى الويب أو للتمييز بين عناصره البصرية.

أ. الفئة المستهدفة: المستخدمون ذوو الرؤية الجزئية أو من يعانون من عمى الألوان أو بعض كبار السن أو من يعتمدون على اللمس مثل الأجهزة التي

تعرض لغة برايل أو من يعتمدون على شاشات منخفضة التقنية والألوان فلا يستطيعون الاعتماد على أي معلومات تعتمد على الألوان فقط.

ب. مثال على تحقق المعيار: نموذج يُعبأ من قِبَل المستخدم ويحوي عدداً من الحقول الإلزامية وهذا يُوضَّح في النموذج بكتابة (حقل إلزامي) باللون الأحمر أمام الحقول المطلوبة. أيضاً يكون ذلك موضعاً في تعليمات تعبئة النموذج أن الحقول المطلوبة موضحة كتابةً ولوناً.

ج. مثال على فشل تحقق المعيار: نص محدد بلون مختلف لتوضيح أهميته، خطأ استخدام الألوان فقط ويجب استخدام وسيلة أخرى تبين الأهمية مثل إظهاره بالبنط العريض بالإضافة للون.

د. اختبار المعيار:

١. يتم التحقق من خلال محتوى صفحة الويب أنه لم يتم استخدام الألوان على أنها الوسيلة الوحيدة لتوصيل محتوى الويب أو للتمييز بين عناصره البصرية.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

## مخطط صفحة الويب:

٦-١ اتجاه صفحة الويب يكون من اليمين لليساار.

- أ. الفئة المستهدفة: جميع المستخدمين.  
ب. مثال على تحقق المعيار: اتجاه التصفح وجميع عناصر صفحة الويب يكون من اليمين لليساار وليس اتجاه النصوص فقط. في المثال التالي للبحث في احدى مكتبات الجامعات تظهر الخانات بدءاً من اليمين وزر البحث على اليسار عند الانتهاء من التعبئة وهذا يوضح تسلسل الادخال والتفاعل مع الصفحة.

|  |                            |                            |                             |
|--|----------------------------|----------------------------|-----------------------------|
| <input checked="" type="radio"/> الكلمات المفتاحية | <input type="radio"/> تصفح | <input type="radio"/> محدد | <input type="radio"/> مصطلح |
| العنوان  | الكل                       | ▼                          | ▼                           |
| بحث  |                            |                            |                             |

- ج. مثال على فشل تحقق المعيار: إذا كان هناك عناصر في الصفحة من اليسار لليمين مثلاً التقييم الدراسي وكانت الأيام على اليسار والأحداث في اليمين، والمفترض تكون الأيام على اليمين والأحداث في اليسار.  
د. اختبار المعيار:  
١. يتم التحقق أن ١-١ متحقق وأن اتجاه العناصر في صفحة الويب يكون من اليمين لليساار وذلك حسب أهميتها وتسلسل التفاعل معها فالمهم يبدأ من اليمين.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٢ شعار الجامعة يوجد في الركن العلوي الأيمن من صفحة الويب.

- أ. الفئة المستهدفة: جميع المستخدمين.  
ب. مثال على تحقق المعيار: تواجد الشعار في الركن العلوي الأيمن.  
ج. مثال على فشل تحقق المعيار: تواجد الشعار مثلاً في الركن العلوي الأيسر من صفحة الويب.  
د. اختبار المعيار:  
١. يتم التحقق من أن شعار الجامعة يوجد في الركن العلوي الأيمن من صفحة الويب.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٣ الشريط الأفقي Banner يوجد في الجزء العلوي من صفحة الويب.

- أ. الفئة المستهدفة: جميع المستخدمين.  
ب. مثال على تحقق المعيار:  
ج. مثال على فشل تحقق المعيار: وجود الشريط الأفقي بأسفل الصفحة مثلاً.  
د. اختبار المعيار:  
١. يتم التحقق.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٤ القائمة menu في تكون في الجزء العلوي من صفحة الويب و/ أو على يمينها.

- أ. الفئة المستهدفة: جميع المستخدمين.  
ب. مثال على تحقق المعيار: .  
ج. مثال على فشل تحقق المعيار: تواجد القائمة الرئيسية في الجزء الأيسر أو الأسفل من صفحة الويب.  
د. اختبار المعيار:  
١. يتم التحقق أن الشريط الأفقي Banner يوجد في الجزء العلوي من صفحة الويب.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٥ التاريخ يكون في الركن العلوي الأيسر من صفحة الويب.

- أ. الفئة المستهدفة: جميع المستخدمين.  
ب. مثال على تحقق المعيار: -  
ج. مثال على فشل تحقق المعيار: إذا تواجد التاريخ في أي مكان غير الركن العلوي الأيسر من صفحة الويب.  
د. اختبار المعيار:  
١. يتم التحقق أن التاريخ موجود في الركن العلوي الأيسر من صفحة الويب.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٦ خانة البحث تكون موجودة في الركن العلوي الأيسر من صفحة الويب.

- أ. الفئة المستهدفة: جميع المستخدمين.  
ب. مثال على تحقق المعيار: -  
ج. مثال على فشل تحقق المعيار: إذا تواجدت خانة البحث في أي مكان غير الركن العلوي الأيسر من صفحة الويب.  
د. اختبار المعيار:  
١. يتم التحقق أن خانة البحث تكون موجودة في الركن العلوي الأيسر من صفحة الويب.  
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٧ الرابط المؤدي للنسخة الانجليزية من صفحة الويب يكون موجود في الركن العلوي الأيسر من الصفحة.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار:

ج. مثال على فشل تحقق المعيار: الرابط المؤدي للنسخة الانجليزية من صفحة الويب لا يكون موجود في الركن العلوي الأيسر من الصفحة.

د. اختبار المعيار:

١. يتم التحقق الرابط المؤدي للنسخة الانجليزية من صفحة الويب في مواقع الجامعات السعودية يكون موجود في الركن العلوي الأيسر من الصفحة.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٨ معلومات الاتصال، روابط الحسابات في مواقع التواصل الاجتماعي وحقوق الملكية الفكرية تكون موجودة في الجزء السفلي من صفحة الويب.

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار:

ج. مثال على فشل تحقق المعيار: تواجد معلومات الاتصال، روابط الحسابات في مواقع التواصل الاجتماعي وحقوق الملكية الفكرية في أي مكان غير الجزء

السفلي من صفحة الويب.

د. اختبار المعيار:

١. يتم التحقق معلومات الاتصال، روابط الحسابات في مواقع التواصل الاجتماعي وحقوق الملكية الفكرية تكون موجودة في الجزء السفلي من صفحة الويب.

٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٦-٩ يتم الرجوع لـ WCAG 1.3.1

٦-١٠ يتم الرجوع لـ WCAG 1.3.2

٦-١١ يتم الرجوع لـ WCAG 1.3.3

## تصفح صفحات الويب:

- ١-٧ يتم الرجوع لـ WCAG 3.2.3
- ٢-٧ تم استخدام اللغة العربية في جميع عناصر التصفح لموقع الجامعة بنسخته العربية، ويشمل هذا صفحات تسجيل الدخول والتحقق من الاستخدام البشري CAPTCHA ورسائل الأخطاء.
- أ. الفئة المستهدفة: جميع المستخدمين.
- ب. مثال على تحقق المعيار:
- هنا المثال يوضح أن صفحة اسم المستخدم وكلمة المرور تظهر بالعربية ولا يتواجد فيها أي لغة أخرى إطلاقاً.

المثال التالي يوضح صفحة لتقديم طلب الكتروني وجميع المطلوب يظهر بالعربية وفيها اظهار لرمز التحقق بصيغة الأرقام الهندية.

ج. مثال على فشل تحقق المعيار: المثال التالي يوضح عدم الالتزام باللغة العربية في بعض مكونات مواقع الجامعات السعودية:

د. اختيار المعيار:

١. يتم التحقق من استخدام اللغة العربية في جميع عناصر التصفح لموقع الجامعة بنسخته العربية، ويشمل هذا صفحات تسجيل الدخول والتحقق من الاستخدام البشري ورسائل الأخطاء.
٢. إذا تم ذلك فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.

٣-٧ يتم الرجوع لـ WCAG 2.4.1

٤-٧ يتم الرجوع لـ WCAG 2.4.8

٥-٧ يتم الرجوع لـ WCAG 3.3.5

٦-٧ يتم الرجوع لـ WCAG 2.1.1

٧-٧ يتم الرجوع لـ WCAG 2.1.2

٨-٧ يتم الرجوع لـ WCAG 2.2.1



٧-٩ يتم الرجوع لـ WCAG 2.2.2

٧-١٠ يتم الرجوع لـ WCAG 2.2.2

٧-١١ يتم الرجوع لـ WCAG 2.4.2

٧-١٢ يتم الرجوع لـ WCAG 2.4.3

٧-١٣ يتم الرجوع لـ WCAG 2.4.4

٧-١٤ يتم الرجوع لـ WCAG 3.2.1

٧-١٥ يتم الرجوع لـ WCAG 3.2.2

٧-١٦ يتم الرجوع لـ WCAG 3.3.1

٧-١٧ يتم الرجوع لـ WCAG 3.3.2

### **عام:**

٨-١ يتم الرجوع لـ WCAG 4.1.1

٨-٢ يتم الرجوع لـ WCAG 4.1.2

٨-٣ محتوى الويب سهل الاستخدام لجميع فئات المستخدمين

أ. الفئة المستهدفة: جميع المستخدمين.

ب. مثال على تحقق المعيار: -

ج. مثال على فشل تحقق المعيار: -

د. اختبار المعيار:

١. يتم التحقق من سهولة استخدام الويب لجميع فئات المستخدمين وذلك من خلال اختبار المستخدم.

٢. إذا تم اجتياز اختبار المستخدمين فالمعيار متحقق وما عدا ذلك فالمعيار غير متحقق.



## Appendix L

# Second Interview Questions - Arabic Version

أسئلة المقابلة الثانية النسخة العربية

| الأسئلة الشخصية:  |   |           |  |
|-------------------|---|-----------|--|
| ١.                | ما هي الجامعة التي تعمل بها؟                                  |           |  |
| ٢.                | ما عدد سنوات خبرتك كمطور ويب؟                                 |           |  |
| الأسئلة المفتوحة: |   |           |  |
| ٣.                | ما الذي تقوم بالعادة بتقييمه في موقع جامعتكم قبل نشرها؟ وكيف؟ |           |  |
| ٤.                | ما رأيك في استمارة التقييم المقترحة (وصول)؟                   |           |  |
| ٥.                | هل تقترح أي تعديلات على استمارة التقييم؟                      |           |  |
| الأسئلة المغلقة:  |   |           |  |
| نعم               | لا  | بعض الشيء |  |
|                   |   |           | ٦. هل تعتقد أن بنود استمارة التقييم (وصول) سهلة الفهم؟                                 |
|                   |   |           | ٧. هل تعتقد أن بنود استمارة التقييم (وصول) سهلة الاستخدام؟                             |
|                   |   |           | ٨. هل تعتقد أن بنود استمارة التقييم (وصول) تختصر عليك الوقت؟                           |
|                   |   |           | ٩. هل تعتقد أن بنود استمارة التقييم (وصول) يمكن أن تعزز سهولة الوصول لمحتوى الويب؟     |
|                   |   |           | ١٠. هل تعتقد أن بنود استمارة التقييم (وصول) يمكن أن تعزز سهولة الاستخدام لمحتوى الويب؟ |

# Appendix M

## Participants Information Sheet for the Second Interview

### M.1 English Version

**Study Title:** A CheckList for Evaluating Web Content Accessibility in Arabic University Websites in the KSA

**Researcher:** Asmaa Alayed

**Supervisors:** Prof. Mike Wald and Mrs. E. A. Draffan.

**Ethics reference:** ERGO/FPSE/26389

Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to sign a consent form.

#### **What is the research about?**

This research is required as part of the researchers PhD degree in Computer Science. The main aim of this study is to investigate the usefulness and usability of the proposed checklist for web developers. Moreover, improvements or suggestions regarding the checklist will be investigated as well. This research is under the supervision of the School of Electronics and Computer Science, University of Southampton, UK, and is fully funded by Saudi Arabian Cultural Bureau.

#### **Why have I been chosen?**

You are invited to participate in this study because of your expertise as an expert in Web development or design of Arabic university websites.

#### **What will happen to me if I take part?**

I will first ask you to sign a consent form, and then I am going to review the checklist and its items with you, and after that I will start to collect data from you by an interview with closed and open-ended questions about the checklist. I will record your voice during the interview only.

**Are there any benefits in my taking part?**

This research is not designed to help you personally, but your feedback as an expert will help me to validate the proposed checklist and probably gather more useful information around it.

**Are there any risks involved? No.****Will my participation be confidential?**

Yes. Your information will be stored and used on secure systems and will be used for the purpose of this study only, your responses are voluntary, and will not be linked to your name or to your organisations name. All responses will be compiled and analysed together.

**What happens if I change my mind?**

You have the right to terminate your participation in the research, at any stage, you do not need to give any reasons, and without your legal rights being affected. Any data collected from you will be immediately destroyed.

**What happens if something goes wrong?** In the unlikely case of concern or complaint, please contact Research Governance Manager (02380 595058, [rgoinfo@soton.ac.uk](mailto:rgoinfo@soton.ac.uk)).

**Where can I get more information?**

For further details, please contact either myself Asmaa Alayed ([asia1g14@soton.ac.uk](mailto:asia1g14@soton.ac.uk)) or my research supervisors, Professor Mike Wald ([mw@ecs.soton.ac.uk](mailto:mw@ecs.soton.ac.uk)) and Mrs. E. A. Draffan ([ead@ecs.soto.ac.uk](mailto:ead@ecs.soto.ac.uk)).

## M.2 Arabic Version

### دليل المعلومات للمشاركين في الدراسة

**عنوان الدراسة:** استمارة تقييم سهولة الوصول لمحتوى الويب في مواقع الجامعات السعودية بنسختها العربية (وصول)  
**اسم الباحث:** أسماء العايد  
**الرقم المرجعي للجنة أخلاقيات البحث:** ERGO/FPSE/26389

يرجى قراءة هذه المعلومات بعناية قبل اتخاذ القرار بالمشاركة في هذا البحث. إذا كنت سعيداً بالمشاركة سيطلب منك وضع علامة صح للموافقة في بداية الاستبيان.

#### ما هو هدف البحث؟

تهدف الدراسة لبحث فائدة وسهولة استخدام استمارة التقييم المقترحة عند استخدامها من قبل مطوري الويب العرب. بالإضافة لذلك سيتم بحث أي تحسينات أو مقترحات لتطويرها. هذا البحث يعتبر استكمالاً لمتطلبات الحصول على درجة الدكتوراه في علوم الحاسب من كلية علوم الحاسب والهندسة - جامعة ساوثهامبتون - المملكة المتحدة.

#### لماذا تم اختياري؟

لتحقيق أهداف الدراسة تأمل الباحثة في التواصل معكم كونكم من أهل الخبرة والاختصاص في تطوير مواقع الويب وبالذات مواقع الجامعات السعودية ولما لوجهة نظركم من أهمية بالغة في نجاح هذا البحث.

#### ما الذي سيحدث إذا شاركت؟

سأطلب منك التوقيع على استمارة الموافقة على المشاركة، ومن ثم سأقوم بشرح استمارة تقييم سهولة الوصول المقترحة ومن ثم سيتم استطلاع آرائكم من خلال أسئلة عن استمارة التقييم. سيتم تسجيل المقابلة صوتياً.

#### هل هناك أي فائدة لي من المشاركة؟

لم يتم تصميم هذا البحث لإفادتك شخصياً ولكن خبرتك ستعود على البحث بالنفع الكبير وتسهم في التأكد من صحة استمارة التقييم المقترحة وتطويرها.

#### هل هناك أي مخاطر التي تنطوي على مشاركتي؟

لا.

#### هل ستكون مشاركتي سرية؟

نعم بالطبع. وسيتم تخزين المعلومات الخاصة بك واستخدامها على أنظمة آمنة وسوف تستخدم لأغراض هذه الدراسة فقط، مشاركتك تطوعية وليست إجبارية، وسيتم تجميع جميع الردود وتحليلها معاً كمجموعة.

#### ماذا سيحدث إن قمت بتغيير رأيي؟

لديك الحق في إنهاء مشاركتك في البحث في أي مرحلة، ولن تحتاج إلى إعطاء أي مبرر، وحقوقك القانونية لن تتأثر. سيتم حذف البيانات الخاصة بك مباشرة إذا قررت الانسحاب في أي وقت.

#### ماذا إن حدث خطأ ما؟

من غير المرجح أن يحدث أي خطأ، وبإمكانك الاتصال بمدير إدارة البحوث (rgoinfo@soton.ac.uk, 02380 595058).

#### أين يمكنني الحصول على مزيد من المعلومات؟

للمزيد من التفاصيل، يرجى الاتصال إما بالباحثة أو بالمشرفين:

أسماء العايد ([asia1g14@soton.ac.uk](mailto:asia1g14@soton.ac.uk)).

برفيسور مايك والد ([mw@ecs.soton.ac.uk](mailto:mw@ecs.soton.ac.uk)) Prof. Mike Wald

الأستاذة إي إيه درايفان ([ead@ecs.soto.ac.uk](mailto:ead@ecs.soto.ac.uk)) Mrs. E. A. Draffan

## Appendix N

# Consent Form for the Second Interview

### N.1 English Version

**Study title:** A CheckList for Evaluating Web Content Accessibility in Arabic University Websites in the KSA (Wosool).

**Researcher name:** Asmaa Alayed

**Supervisors:** Prof. Mike Wald and Mrs. E. A. Draffan.

**Ethics reference:** ERGO/FPSE/26389

**Please sign below if you agree with the statements:**

- I have read and understood the information sheet (Version 1 dated 05-04-2017) and have had the opportunity to ask questions about the study.
- I agree to take part in this research.
- I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.
- I agree to record my voice during my participation in this study.

#### Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

**Name of participant (print name):**

**Signature of participant:**

**Date:**

## N.2 Arabic Version

### استمارة الموافقة على المشاركة

عنوان الدراسة : استمارة تقويم سهولة الوصول لمحتوى الويب في مواقع الجامعات السعودية بنسختها العربية (وصول)  
اسم الباحث : أسماء العابد  
الرقم المرجعي للجنة أخلاقيات البحث: ERGO/FPSE/ 26389

**Study title:** A CheckList for Evaluating Web Content Accessibility in Arabic University  
Websites in the KSA

**Ethics reference:** ERGO/FPSE/ 26389

الرجاء وضع علامة ( √ ) في المربعات أمام الجمل الآتية إذا تمت الموافقة على محتوى هذه الجمل:

- ☐ لقد قرأت وفهمت استمارة معلومات المشارك ومُنحت الفرصة لطرح أسئلة عن الدراسة.
- ☐ أنا موافق على المشاركة في هذه الدراسة وأوافق على استخدام بياناتي من أجل هذه الدراسة.
- ☐ أن على علم أن مشاركتي هي تطوعية وأنتي أستطيع الانسحاب في أي وقت دون أي عواقب وأن بياناتي سوف يتم مسحها إذا انسحبت في أي وقت بعد الانسحاب.
- ☐ أوافق على التسجيل الصوتي خلال مشاركتي في هذه الدراسة.

### حماية البيانات

أنا أعلم أن المعلومات التي جمعت عني أثناء مشاركتي بهذه الدراسة سوف تُخزن في كمبيوتر محمي بكلمة سر وأن هذه المعلومات سوف تستخدم فقط من أجل هذه الدراسة. جميع الملفات التي بها بيانات شخصية سوف تكون غير معلنة.

اسم المشارك.....

توقيع المشارك.....

التاريخ.....



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