COMPETENCIES IN DIGITAL MEDIA FOR JORDANIAN GRAPHIC DESIGNERS

BY

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DECLARATION

I hereby declare that the work has been done by myself and no portion of the work contained in this thesis has been submitted in support of any application for any other degree or qualification of this or any other university or institution of learning.

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Mahmoud Ahmad AbuShawali

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Last, but not least, I thank my wife and children for their support and patience during my time away from them.

DEDICATION

To my father's soul…

To my mother's soul, who left me before the completion of this journey...

To my wife and children.

ABSTRACT

Graphic design has relied on print since its emergence. Like most aspects of life, graphic design has been affected by technological developments and the usage of digital media for visual communication, which has had an impact on the role of graphic designers and their duties. At the same time, this development has created new opportunities for graphic designers to get involved in digital media design. However, graphic design schools in Jordan still rely on old curricula that mainly focus on print media as the sole form of visual communication, which has contributed significantly to a widening of the gap between graphic design education and marketplace needs. Also, many print graphic designers are looking at going into digital media design. However, they are unable to identify the required competencies for this transition.

This study aimed to explore the required competencies for print graphic designers to transition into digital media design in Jordan. Qualitative and quantitative methods were used in this study to achieve the research objectives. Interviews with academics and practitioners in the digital media design field were conducted and then a modified Delphi method was used to obtain consensus and validation from a panel of experts on the significant competencies for practising digital media design. Later, a self-assessment questionnaire was used to determine the needed competencies for print graphic designers to transition into digital media design.

The results of this study showed that there are 85 competencies that are considered to be significant for practising digital media design and that gained consensus and validation from the panel of experts of this study. These competencies were sorted into five groups. The results also revealed that there is a difference between the practitioners and academics in the panel of experts in terms of their perception of the identified digital media design competencies, where, in 19 out of 85 competencies, there is a significant difference between the two groups. This study also showed that print graphic designers lack 16 out of the 85 competencies that are needed for the transition into digital media design.

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CHAPTER 1

INTRODUCTION

1.1 Overview

The development of the digital world is one of the most affective changes in our lifestyle, which was based on the integration of communication and computer technologies. This development has broken the spatial and temporal constraints of traditional communication, and has converted the whole world into a global electronic village. All aspects of life, including visual communication, have been affected by this technological development in computers and communication technologies (J. Singh, 1999).

Moreover, the emergence of the World Wide Web and its rapid development during the nineties contributed significantly to changing the way in which people communicate with each other and how they get information. Communication methods have evolved from using mobile phones to send text messages, images, and videos to using the Internet for chatting, blogging, and conference video calling (Austin & Doust, 2007). Since the beginning of the twenty-first century, many people have become dependent on the Internet for many aspects of everyday life. The different ways in which users prefer to interact with information have created a variety of forms of interaction and many types of information; yet some of this information is useless and unnecessary. Also, new generations have become visually literate as a result of increasingly sophisticated branding and advertising (Keating, 2004).

Things are now different in graphic design as well; it has been transformed from a manual to a digital machine process, from paper to different shapes and forms of digital media. This transformation creates a new challenge for traditional graphic designers seeking to get involved in new digital media design, as digital media

design requires graphic designers to possess new knowledge (Keating, 2004; Steane, 2010a). The convergence of technology, media, and culture has changed the design process and the design audience. The global economy has realised the value of design and created new business opportunities (Steane, 2010a).

Portable technology has forced graphic designers to present information to their audience in a new nonlinear way and to be part of a team of information architects. This is quite similar to the Internet because users interact with information and manipulate it according to their interests (Meggs & Purvis, 2012). The changes in technologies have affected and continue to affect design education and the profession. Digital media (Internet and interactive media) has extended the body of knowledge beyond that of traditional design (Fleischmann, 2013).

The emergence of smartphones and tablets in the last decade has played a central role in the rapid spread of social media, which has become one of the most important channels for delivering communication, services, and media. Social media creates a new way for people to communicate and interact with each other that is reflected in the design profession and education. This brings with it a new set of rules and design language that need to be included in design curricula, and consequently the graphic design industry has been confronted with another new challenge (Fleischmann, 2013).

New opportunities for traditional graphic designers were offered by web design, but the slow progress in developing their skills to meet these new job needs gave the developers the chance to acquire 'design skills' to do web design themselves in the place of graphic designers (Wood, 2009). In addition to applying the principles and building blocks of print design, the designer needs to consider dynamic functionality and the user experience when designing for the Web (Winfield, 2011).

Graphic designers need to understand computers, networks, and software in the same way as they understood printing, binding, and other production techniques in order to cope with the changing role of the graphic designer (Dubberly, 2011). They need new ways of thinking and new design skills and knowledge to make the

transition into digital media design (Fleischmann, 2013). These skills and knowledge are called competencies, which are required for a person to be well qualified to perform a task (Clark, 2004).

This study aims to explore the required competencies for print graphic designers to transition into digital media design in Jordan. The fulfilment of this aim requires an understanding of the evolution of graphic design and its relation to digital media, the transition from printing to digital media, the practice of graphic design, and graphic design education. For this study, a panel of experts will validate and identify the significant competencies for digital media design.

1.2 Background of the Study

A networked workstation is needed to communicate with anyone across the globe. It also gives the user real-time access to digital documents. In the last few decades, multimedia and hypermedia have also been significant developments. However, networks have contributed significantly to international collaboration in teaching, learning, publishing, and resource sharing (J. Singh, 1999).

Digital media has transformed our life significantly and at unprecedented speed; it has changed how people communicate, work, shop, learn, and play (Fleischmann, 2012; Steane, 2010a). This technology has enabled companies to communicate with their audience individually by offering many control options for target audience selection (Meggs & Purvis, 2012).

Graphic design is closely related to developments in paper and printing, and it spread widely because of the evolution of printing techniques. In the early twentieth century, graphic design was largely inspired by technological advancements in printing and also in photography. In the last quarter of the same century, technology played a similar role, but this time through the computer (Meggs & Purvis, 2012). Many computer applications emerged quickly for computer graphics, which became alternatives to traditional production methods in television (TV), film, and print (Austin & Doust, 2007).

After the transformation of the graphic design process from a hand-made to a computer-based one, the computer started a new revolution by transforming visual communications at a deeper level from using computers and electronics as composition and production tools for graphic design to employing them to act as a communications delivery medium (McCoy, 1998). It is extremely difficult nowadays to implement a traditional design without using a computer. The computer offers a set of possibilities to implement designs for digital media that gives the designer several ways to manipulate, sample, add or delete the materials used in designs (Austin & Doust, 2007).

The design of the graphical user interface (GUI) has been the graphic designer's responsibility within an interdisciplinary design team since the early days of software development (Wood, 2009). This was the first challenge for graphic designers because designing for the screen involves a different process than designing for print (Winfield, 2011). Graphic designers have much to offer in the design of GUIs such as layout, typography, and aesthetics. In the digital media world, it is increasingly important to present an information design effectively (Keating, 2004).

Before the emergence of the Internet, a print-based design was used as the main parent of the small sub-discipline of interface design. Later, the invention of smartphones and personal digital assistants (PDAs) forced many graphic designers to get involved in interactive design (Wood, 2009).

Interactive design is a visual language that relies on the intuitiveness of graphic design that has been gained from decades of designing for print. Graphic designers' skills in layout enable them to control design elements, but this control over the design in interactive digital media relies on the use of code and browsers. Applying design methodologies to this new medium has been a challenge for traditional graphic designers (Wood, 2009).

In the nineties, graphic design expanded in the digital world and moved away from print (Wood, 2009). The new digital media has changed the structure of people's concerns, the tools they use to obtain knowledge and cooperate with each other, the nature of the social environment that enables them to innovate and develop ideas, and their mind-sets (Sperka & Stolar, 2005). At the same time, this new digital media has transformed graphic design from being linear and two-dimensional (2D) to being flexible and six-dimensional (6D); the traditional XY coordinates in addition to the dimensions of real time, motion, sound, and interactivity (Heller & Talarico, 2011; McCoy, 1998).

New digital media has significantly affected print production, which has led some authors and researchers to predict the end of the printing era as a result of the emergence of digital alternatives. Moreover, as many images, designs, and words are transmitted electronically, graphic design should not be limited solely to physical products (Wang, 2006). Traditional graphic designers are now required to design online campaigns, animated logos, and digital art works that suit new digital media (Bacon, 2010). Dubberly (2011) warned that printing is dying; he predicted that the mass-customisation inkjet and other digital printing techniques would replace mass production lithography, and that printed newspapers, magazines, and books may vanish.

Nowadays, graphic design intersects with many other disciplines; some of them are considered to be part of graphic design and others offer opportunities for graphic designers to collaborate with other broader design activities (Sperka & Stolar, 2005). The variety of options and trends in the graphic design industry expanded enormously under the influence of digital media, which opened up new opportunities for graphic designers (Austin & Doust, 2007). While traditional graphic designers were trained to design fixed content, new digital media designers must develop open-ended systems with dynamic and interactive content, which requires a totally different mind-set (Karaca, 2011; Timney, 2007). Technology, globalisation, and environmental concerns are reshaping economies and societies around the world. A critical moment has been reached in the design industry, where

designers are facing a radical change in their professional lives (Design Skills Advisory Panel, 2007).

1.3 Research Issues

The graphic design industry has been affected like many other aspects of life by technological developments. In the last decade, digital media (computers, smartphones, tablets, digital advertising screens and many others) have played a key role in changing how people communicate, work, entertain, and get information (Fleischmann, 2012). The marketing of products and services via the Internet has rapidly expanded, which has created a new virtual space for motion, time, and multimedia beyond the limitations of the static 2D printed paper (Raizman, 2003).

In the past 20 years, graphic designers' tasks have expanded to include digital media design, especially since the growth of the Internet and the range of applications used in smartphones (Souto, 2017). Also, A. Singh (2017) found that designers need to have the ability to design for both print and digital media. The change in the graphic designer's role has created new challenges for the traditional graphic designer who was trained for the print media world and used to design static and 2D designs (Wood, 2009). At the same time, it has created new opportunities for graphic designers to take up (Austin & Doust, 2007). Designers must be prepared for future tasks (Ciampa, 2010). Some clients would prefer to hire one designer to do all their design projects with the aim of saving money and time; the all-in-one designer is considered the best solution to give value for money (Gresly, 2009).

Designing for digital media is a new task for graphic designers and requires new competencies that include new graphic design skills and knowledge (Fleischmann, 2013; Keating, 2004). The designer has to deal with a virtual space that combines image and text with movement, sound, real time, and interactivity (Heller & Talarico, 2011). Thus, graphic designers who have the old and new skills are needed in the marketplace (Heller, 2015).

This new challenge has imposed on institutes the task of re-evaluating their graphic design curricula to match the profession's needs (Fleischmann, 2013). Generally, digital media design is being taught alongside print design within the graphic design discipline or as a different new discipline under the heading of 'digital media design' (Souto, 2017). Some institutes in developed countries have modified their graphic design curricula and others have developed new programmes of study. However, many graphic design programmes still rely on a set of out-of-dated programmes from the Bauhaus Foundation's model by offering design foundation classes, such as 2D and 3D design and basic drawing for students as prerequisites for graphic design programmes (Marks, 2015).

In Jordan, which is categorised as a developing country, the universities still depend on out-of-date graphic design curricula that focus on print production as the main traditional medium for visual communication (Alkholy, 2010). From a comparison of the curricula of Jordanian universities and the rules for graphic designers set by the Bureau of Labour in the United States of America (USA), it is obvious that the curricula for graphic design in Jordan need to be improved (Alkholy, 2010). Also, Al Qur'an (2012) asserts that while graphic design curricula in Jordanian universities have a few strengths, they also have some weaknesses. Some other countries in the Middle East and other developing countries could be facing a similar situation to that in Jordan. Like any country in the world, Jordan is witnessing the rapid growth of new digital media, which is considered to be an alternative competing medium to print.

Therefore, fresh graduate graphic designers in Jordan, like many other print graphic design practitioners, are not equipped with the needed competencies to practise digital media design (Alhalasa, 2017). Moreover, the wages and work opportunities in print design are decreasing, which makes this industry extremely competitive. Many or most of the opportunities for graphic designers nowadays come from the digital industries (Johnson, 2011). Graphic designers place significant importance on transitioning from print to screen design (Keating, 2004).

1.4 Research Aim and Objectives

The main purpose of this study is to identify the required competencies for print graphic designers to transition into digital media design in Jordan. This study therefore aims to achieve the following objectives:

- To obtain a consensus and validation from a panel of experts in identifying the significant competencies for digital media design in Jordan (RQ1);
- To understand and discuss the differences between practitioners' and academics' perceptions of the validated competencies (RQ2);
- To explore the needed competencies for print graphic designers to transition into digital media design (RQ3).

1.5 Research Questions

This study was guided by the following research questions:

1. What are the most important competencies that digital media design practices need in Jordan?

2. How do practitioners and academics perceive the digital media design competencies investigated in this study? Where are the differences in those perceptions?

3. How would print graphic designers in Jordan transition into digital media design?

1.6 Hypothesis

Two different populations are used in Study I of this research (see Figure 1.1). It is expected that the two populations will have different points of view about the needed competencies for digital media design. For Study I, the following hypothesis was formulated:

H1: There are significant differences between academics and practitioners in identifying the significant competencies for digital media design.

1.7 Significance of the Study

The rapid technological developments in the field of graphic design and digital media have led to a widening of the gap between graphic design education and the needs in the field. Despite technology spreading worldwide without constraint, graphic design schools in Jordan still depend on out-of-date curricula that mainly focus on old or traditional forms of media for visual communication (Alkholy, 2010).

Moreover, in Jordan, many traditional print graphic designers are stuck in print production and are unable to cope with the available job opportunities in the field of digital media design because of the lack of training and lack of investigation and research on the competencies that are required to practise in the field of digital media design.

1.8 Scope of the Research

1. This research falls within the graphic design and digital media areas. Therefore it does not include other visual communication areas such as illustration, fine art, and photography.

2. The panel of experts consists of graphic design educators and digital media industry representatives from Jordan.

3. This study is restricted to undergraduate universities and graphic design practitioners in Jordan.

1.9 Research Design

To help graphic designers to make an appropriate transition from print graphic design to digital media design, this research aims to identify the competencies that graphic designers in Jordan need to transition from print to digital

media design. The competence theory, which was introduced in 1973 by David McClelland, significantly contributes to improve and control employees' performance by assessing and developing their skills and knowledge through identifying the needed competencies for a particular profession (Boyatzis, 2008; Ntinyari, 2014). Designing academic programmes and training courses based on a competency model (including knowledge, skills, and attitude) ensures an alignment between these programmes and courses with the requirements of the job and the needs of the business from a long-term perspective (Sanghi, 2007).

The research consists of three stages (see Figure 1.1). In the first stage, a literature review is undertaken as well as a preliminary study using semi-structured interviews to explore perspectives on relevant digital media design and on the extent to which Jordanian universities equips graphic design graduates with the needed competencies to deal with digital media. A non-probability sampling is used in this study due to the special characteristics that the participants need to have to be considered as experts (Kumar, 2011). The aim of this stage of the research is to propose suggested competencies that are considered to be important for the digital media designer.

In the second stage, the proposed competencies identified from the literature review and interviews are presented to an expert panel by using a modified Delphi method (Study I) to obtain a consensus on and validation of the significant competencies for digital media design in Jordan. As mentioned above, the experts are chosen by using a non-probability sampling method because of the specific characteristics that the participants need to have that are not available in the total population (Delbecq, Van de Ven, & Gustafson, 1975). The Delphi method consists of three rounds of a questionnaire survey. After every round, the data is analysed and the questionnaire is then reformed to filter the competencies (Delbecq et al., 1975). After the third round, the competencies obtained are considered to represent the set of significant competencies for digital media design in Jordan.

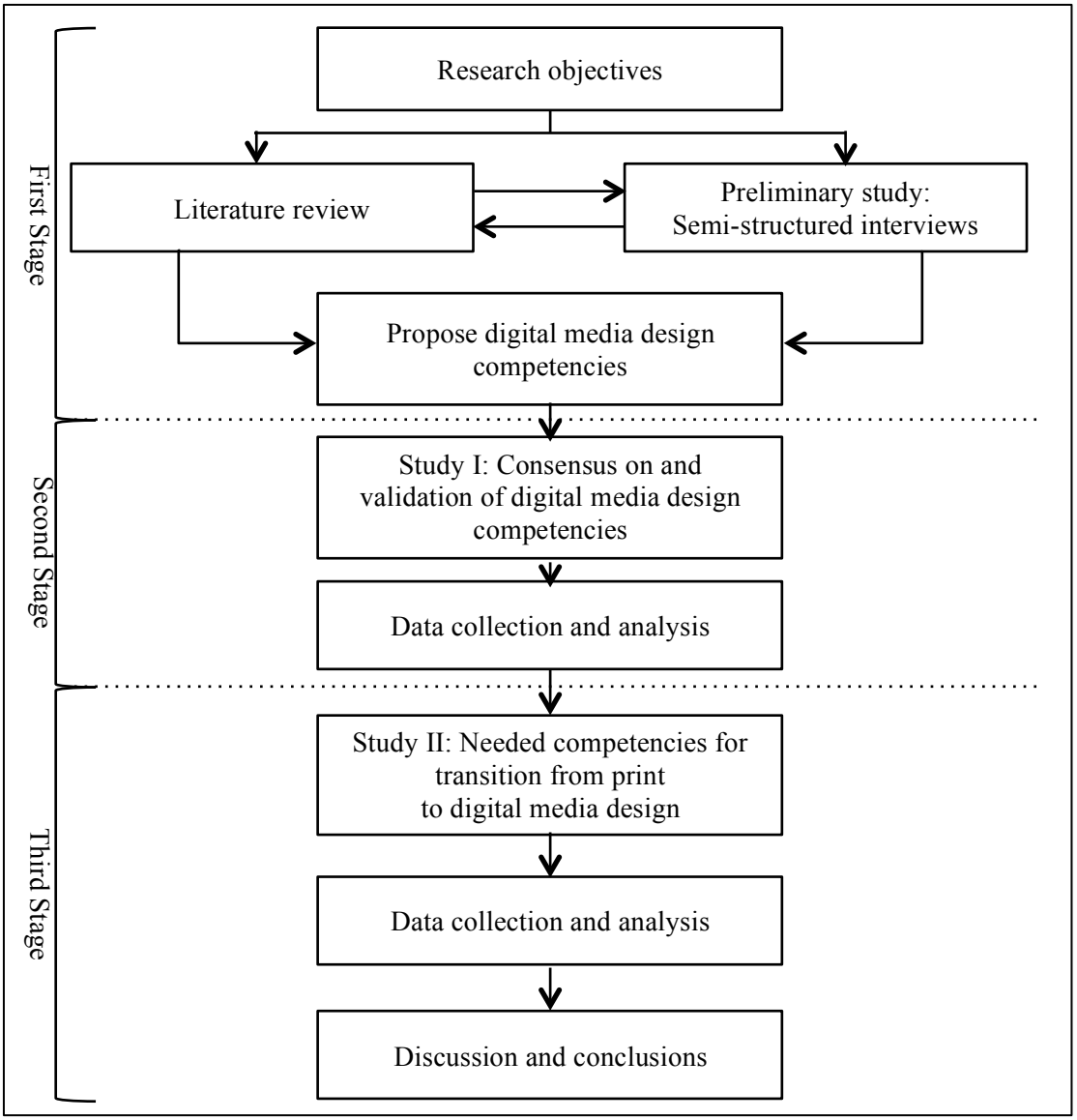

Figure 1.1: Research Workflow

In the third and last stage, which depends on the results of the second stage, a questionnaire is designed and distributed to determine which of the identified competencies traditional print graphic designers have (Study II). The population of this study is traditional graphic designers in Jordan. A non-probability sampling is used in this study due to the impossibility of identifying the population of this study in person or their physical locations individually (Kumar, 2011). The objective of this study is to explore the needed competencies for print graphic designers to transition into digital media design.

1.10 Definition of Terms

The following definitions of terms (Table 1.1) are applied in this study, which are important in understanding this research:

Table 1.1: Definitions of Terms

Terminology	Definition
Graphic Design	"A form of visual communication used to convey a message or information to an audience; it is a visual representation of an idea relying on the creation, selection, and organisation of visual elements. Powerful graphic design imbues a message with greater meaning" (Landa, 2011, p. 2).
Old Media	The media "that were developed before computers and the Internet came into widespread use, namely print, film, and television, with the allied skills of illustration, photography, and graphic design" (Austin & Doust, 2007, p. 10).
New Media or Digital Media	All media since the advent of the computer era are called new media. In the design field, new media represents the Internet, computer games, CD-ROMs and DVDs, interactive environments, smartphones, PDAs, and tablets, in fact anything digital and moving. Therefore, the term 'digital media' is used interchangeably with 'new media' (Austin & Doust, 2007; Sperka & Stolar, 2005).
Competencies	A group of knowledge, skills, and attitudes that when combined helps people improve the efficacy of their work (Hellriegel, Jackson, & Slocum, 2001).
Delphi Method	A group process technique developed by Norman Dalkey and his associates at the RAND Corporation. This technique is employed to utilise written responses thus obviating the need to bring individuals together. The purpose of employing this technique is to collect opinions from a panel of experts to improve the quality of decision-making (Delbecq et al., 1975).

1.11 Organisation of Chapters

This thesis is organised into five chapters. Chapter 1 contains the introduction to the thesis. It provides an overview of the research topic, a background of the study, the problem statement, aim and objectives, research questions, significance of the study, scope of the research, research design, and a definition of terms.

Chapter 2 presents the literature review. It covers the relationship between graphic design and printing in the past, and between graphic design and digital media in the present and the future, the medium and the message, the changes in the graphic designer's role, the transition into graphic design, the changes in the profession's name, graphic design education, graphic design in Jordan, and finally it defines some competencies.

Chapter 3 explains the research methodology. It discusses the methodologies that are used in the three studies for this research, including the data collection procedures, study instruments, and data analysis strategies.

Chapter 4 contains the data analysis and findings. It presents the data collected by all three studies and discusses the results of analysing this data.

Chapter 5 presents the discussion and conclusion and some recommendations for further studies. It includes a summary of the research outcome and discusses possible ways to extend the research.

1.12 Summary

This chapter presented the background to this research and the problem statement. The research questions and the aim and objectives were also defined in this chapter. The significance of the study, scope of the research, research design, and definition of terms were also presented in this chapter. The links between the

questions, objectives, and methods employed in this research are provided in Table 1.2.

Table 1.2: Research Questions, Objectives, and Methods

Research Question	Objective	Research Method
➢ RQ1: What are the most important competencies that digital media design practices need in Jordan?	1. To obtain a consensus and validation from a panel of experts in identifying the significant competencies for digital media design in Jordan	Study I
➢ RQ2: How do practitioners and academics perceive the digital media design competencies investigated in this study? Where are the differences in those perceptions?	2. To understand and discuss the differences between practitioners' and academics' perceptions of the validated competencies	Study I
➢ RQ3: How would print graphic designers in Jordan transition into digital media design?	3. To explore the needed competencies for print graphic designers to transition into digital media design	Study II

The next chapter will review the related literature to understand the evolution of graphic design and its relation to digital media, the transition from printing to digital media, the practice of graphic design, and graphic design education. In addition, the chapter will explore previous and related studies about graphic design and digital media competencies.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

A review of the literature was undertaken to understand the evolution of graphic design and its relation to digital media, the transition from printing to digital media, the practice of graphic design, and graphic design education. This chapter presents a review of the historical relationship between graphic design and print. It also presents a review of the emergence of digital media as a communication medium used by graphic designers.

This chapter also discusses the relationship between the medium and the message, the changing role of the graphic designer, the transitions in the field of graphic design over time, the changes in the profession's name, graphic design education, and graphic design in Jordan. The review in this study also covers competence theory and previous and related studies that identify graphic design and/or digital media competencies.

2.2 Graphic Design and Print

Printing is one of the most important forms of mass communication, which also includes radio, TV, and film (Meggs & Purvis, 2012). Printing is the basis of much of our education. Commercial transactions depend on printing in many ways, such as in the production of receipts, bank notes, and investment certificates. Advertising also partly depends on printing to promote goods and services.

Graphic design has been affected by the developments and changes in the printing industry (Allen, 2012; Keating, 2004; Panning, 2005), thus the history of

graphic design cannot be covered without mentioning printing and its development. Historians consider graphic design as part of printing history when explaining the origins of the graphic design profession (Stock-Allen, 2011). However, the rapid developments in printing have placed a burden on graphic designers and pushed them to update their knowledge to keep abreast of new technology (AbuAwad, 2007).

All books before movable type were handwritten by scribes. The invention of movable type by Johannes Gutenberg in the mid-fifteenth century gave more control over printing and is seen as the beginning of graphic design (Keating, 2004; Meggs & Purvis, 2012). About 400 years later the first significant change that affected the printing industry was the Industrial Revolution, when the mechanisation of the printing process encouraged the publishing and advertising industry to expand (Keating, 2004).

Steam power was used for operating printing presses and craftsmen were replaced by machines that could produce printed material more quickly and cheaply, thus the artistry and critical eye of the craftsman was sacrificed for the sake of speed (Stock-Allen, 2011). At the same time, the Industrial Revolution increased the need for graphic communications because the spread of manufacturing created greater competition between products (DiMarco, 2010).

Lithography was one of the significant developments in printing during the Industrial Revolution, which affected graphic design and pushed it to a new level of production (Fried, 2013; Keating, 2004). Graphic design has been connected to communication in terms of ideas and concepts since its birth. The lithographic process pushed graphic design into new forms and expanded designers' creativity by giving them new ways to communicate (Fried, 2013).

The developments in photographic technology and the half tone process gave printers the ability to integrate type and images in the printing process, which encouraged the circulation of periodicals and newspapers. The graphic design

profession grew due to these developments as there was a need for new skilled workers (Keating, 2004).

Modernism movements challenged designers to create meaningful communications based on predetermined standards and formats, including posters, brochures, book covers, magazine designs, and advertisements (DiMarco, 2010).

By the late sixties computer technology became involved in the printing process through the use of the electric typewriter to produce text pages in a negative form. Designers got more freedom by using phototypesetting and photographic manipulation of text and images (Keating, 2004). Desktop publishing and software applications created a new generation of designers who were able to create and manipulate images using computer software. This software enabled designers to create unlimited designs of one concept virtually (Ayiter, 2006).

2.3 Graphic Design and Digital Media

The terms 'new media' and 'digital media' are used interchangeably to refer to the Internet, computer games, CD-ROMs and DVDs, interactive environments, smartphones, PDAs, and tablets (Austin & Doust, 2007; Sperka & Stolar, 2005). The meaning of the term digital media has remained the same so far. However, devices are undergoing great development and change. In the design domain, the term digital media has been used to refer to screen-based interactive media (Fleischmann, 2012). In general, digital media includes any media that publishes or distributes information digitally, which distinguishes them from digital content that is delivered via traditional channels such as TV and radio (Yann, McColl, & Kitchen, 2010).

In his book, 'The Language of New Media', Manovich (2001) identifies the principles of new media as follows:

1. Numerical representation: all objects in the new media are composed from digital code.

2. Modularity: all elements in new media, whether images, sounds, shapes, or behaviours, are formed from collections of separated items like pixels, voxels, characters, polygons, and scripts.
3. Automation: creating, manipulating, and accessing media could be automated operations.
4. Variability: objects in new media are not fixed and could be in different versions.
5. Transcoding: all cultural categories and concepts can be translated or re-formed into another format on meaning and/or language level.

During the last decade, digital media has become more complex mainly because of the huge developments in portable computing. At the same time, digital media devices such as tablets, smartphones, and e-readers have given the user more freedom compared to sitting in front of a traditional computer (Lisi, 2013). Digital screens are now all around us providing more data and information to create a digital culture (J. E. Davis, 2013). Interactivity is the core element that distinguishes digital media from other traditional media formats because the user interacts with digital content by using different tools such as a mouse, keyboard, pen, direct touch, sound, and motion detectors (Fleischmann, 2013).

Graphic design also plays a key role in media art design because graphic design elements are used in such projects. Lee and Kim (2015) investigated the graphic design elements that could be used in projection mapping, a particular type of media art project. They argue that the use of graphic design elements such as texture, colour, and scale in media art can increase the sense of immersion more than projecting images onto a flat screen, and that these elements can be used effectively for both commercial and artistic purposes.

2.3.1 Web Design

The Internet has greatly influenced and changed how we deal with everyday tasks, which can now mostly be accomplished via the Internet, such as shopping,

correspondence, learning, social networking, and many other tasks that people need to perform daily (Graphic Mania Editorial, 2010).

The rise of the Internet and the spread of PCs has contributed immensely to the liberalisation of information dissemination from physical limitations because the Internet is a medium that allows the use of multimedia in a full-colour environment, free of paper, and publishing and distribution costs (Lynch & Horton, 2008).

Graphic design was connected to web design when Tim Berners-Lee, who is considered the inventor of the Internet, designed his first website and published it in the early nineties. He was the first to use hypertext in his design, which allowed the use of different types of elements in website design, such as pictures, sounds, and graphics in addition to text. Later, browsers with a GUI emerged, such as the NCSA Mosaic browser (Engholm, 2002), which encouraged many graphic designers to engage in web design as it provided hypertext basics that allowed the use of graphical elements with text (Keating, 2004). The Internet has provided many possibilities for graphic designers that were not present in print design. However, it also introduced new obstacles that graphic designers had never faced when working with a printed medium (DiMarco, 2010).

The emergence of the Internet and its spreading to the general public has had a significant impact on graphic design. At the beginning, most web designs and contents largely followed the format of print designs (Lisi, 2013). Perhaps the only difference from print design was the links that were used to navigate between pages (Engholm, 2002). Keating (2004) considers the computer screen to still be a flat surface to which it is possible to apply the old standards of construction and composition such as setting the typeface, colours, and backgrounds, although there are differences between the nature of the computer screen and a paper page. Many print graphic designers have been stimulated to move over to web design. In print design, graphic designers have full control over the size and measurements of all the design elements, but they no longer have control over the screen design, including the window size and the style and size of the typeface (Ayiter, 2006).

2.3.1.1. Coding and Web Design

The basic programming language for web design was and remains hypertext markup language (HTML); it is the language used to control the layout and build webpages. This language enables the designer to adjust the text, graphics, colours, images, and links on a webpage (Engholm, 2002; Lynch & Horton, 2008; Wang, 2006). The dependence of web design on programming gave programmers the opportunity to do webpage design tasks themselves (Engholm, 2002). Furthermore, it limited graphic designers to using a vertical structural and they lost control over the typeface because of the users' ability to change it in their browser preferences (Lynch & Horton, 2008).

Due to the need for more control over a design and its elements, many improvements were made to HTML programming language including the introduction of the cascading style sheet (CSS). The CSS allows the designer to determine the typeface, which has a significant impact on the design (Lynch & Horton, 2008). Many other software and programming languages have appeared since then, such as Java applets, dynamic HTML, and Flash, all of which have contributed to giving the designer greater control over the design and how it is displayed on users' devices (Engholm, 2002). Flash software gave the designer the ability to control the design view and limit user control, and it also became possible to integrate animation, audio-visual materials, and interactive elements (Erlhoff & Marshall, 2008), while Java programming language has been used extensively to create interactive behaviours (Lynch & Horton, 2008).

There have been developments in the methods used by web designers, from HTML to XHTML, CSS, ASP, PHP, and Flash, and recently HTML 5, which has created a great variation in the criteria used for digital media design, and which has made it difficult to control them all because of their diversity. Thus digital media is unlike print media, which has had stability in its standards, specifications, and automation for a long time (Lisi, 2013).

2.3.1.2. New Opportunities and New Challenges

The job opportunities that the evolution of web design created in the early nineties attracted many graphic designers who had trained in print design. Those designers used print design basics on the Internet, which resulted in there being a great similarity between web design and print design (Aynsley, 2004; Keating, 2004). However, applying print design principles on screen was not sufficient due to the inherently different nature of the two mediums, in addition to a lack of awareness among many graphic designers about the possibilities offered by the new medium.

Other forces have played an important role in influencing the development of web design, such as cinema and human-computer interaction (HCI). After the dominance of printing over the design styles used for the Internet, cinematic elements took on this role and their influence gradually became stronger, and they were increasingly used in providing information with a time-sequence connected to audio-visual moving pictures while minimising the text, which was consistent with the general trends in modern societies (Keating, 2004). This interaction between different fields such as printing, film, and TV because of the computer encouraged those involved in these domains to explore and break down the barriers and borders between them (Aynsley, 2004).

When media and publishing entered the Internet world, many print magazines started publishing a soft copy online as a fixed and non-interactive PDF file, which, at that time, met users' needs. Recently, developments in the Internet world have encouraged those in digital media to further challenge traditional print media. Digital media has advantages that were not available in the previous medium such as dynamic interaction with users. Also, merely replicating printed materials online no longer meets users' desires (Lisi, 2013). Consequently, many web designers have sought to improve their designs to a higher degree to reflect the possibilities that the technology has to offer, and they have paid attention to abstract requirements such as user-friendliness and appropriate communication (Engholm, 2002).

The Internet has become a place of sanctuary for many artistic activities, which has contributed to expanding the boundaries of the digital medium. Web designers have taken advantage of the creative possibilities of the medium to move away from focusing on just functionality, relying on their experience in design knowledge acquired over the past century. Designers have also started playing an authorial role by using illustrations to give an additional motive to the content, which has led to distinctive graphical artworks especially for the digital medium (Engholm, 2002). The Web is considered as an extension of printing and publishing due to an accumulation of knowledge that has been learnt by users across the centuries as regards how to read and consume information (Lynch & Horton, 2008).

The term 'multimedia' has been used incorrectly as a synonym for digital media (Rourke, 2007). Multimedia is defined by Acab (1996) as using a computer to mix two or more of the following elements: text, graphics, video, animation, and sound. This capability is one of the strong features of computer technology. Due to Internet bandwidth limitations, it was difficult in the beginning to use multimedia on the Internet because of the large file sizes required. However, recently, due to the substantial improvement in Internet speed, multimedia has become an effective means by which to deliver content (Lynch & Horton, 2008).

2.3.1.3. Internet Development

Recently, the Internet has been used as an influential and effective means of communication by many establishments. However, they need to know how to convince their website visitors to come back and visit their website again. Companies have become aware of the importance of creating a website to communicate with their audience and that it was as important as publishing flyers, catalogues, advertisements, and annual reports. It is the responsibility of managers and communication specialists to start planning and producing a website as a platform for connecting customers (Van der Geest, 2001). The developments in Internet services have enhanced the ways in which business stakeholders are able to promote their products and services globally, which requires improvement to their brands to make them more suitable for the new medium and the global audience in

terms of offering more flexibility and vitality (Steane, 2010b). Moreover, the web interfaces of these companies need to morally and deeply reflect their brand to encourage customers to make frequent visits. These interfaces must reflect the company's brand, and not just look like it (Zeldman, 2001).

Nowadays, websites come in different forms and users deal with them in different ways. The first version of the Internet, which was called Web 1.0, did not give the user any role in page building. The user just received information from it, for example, via traditional websites and search engines. The second version was Web 2.0, which allowed users to create page content by themselves, for example on YouTube; the site producer provides the tools and the users create all the contents. Later, another version of the Internet emerged, called Web 2.5, through which users got the ability to create programmable social networks to communicate with others, such as Facebook and MySpace. With this version, the user is able to create pages rather than just amend content (Martínez, 2008).

Screens and Internet speed are the most important aspects that affect the presentation of designs online. There are many methods to connect to the Internet, such as via a modem, wireless, or mobile phone network. As for the screens, these come in a variety in sizes, from small ones such as portable devices or iPods, to medium ones such as tablets and computers screens as well as large TV screens that are Internet compatible. These variations impose limits on the designer's work in respect of the file size and the actual measurements for website design (Lynch & Horton, 2008).

2.3.1.4. Graphic Design and Web Design

Web design requires the cooperation of several fields, namely, information systems, information technology (IT), and graphic design. There are two basic sides to every website: the visual side which is called the front-end and the functional side or back-end. The front-end is concerned with the page organisation, user interface, text, graphics, and sound. The back-end is concerned with programming and software engineering. To regulate the performance of all the members of a website

design team requires the presence of a person with different skills to manage the project, who is called the web master (Ayiter, 2006). The key role of a graphic designer when creating websites is to create the visual side of the webpages to ensure that data and messages will be effectively received. Additionally, the designer is required to transfer the concept of the product branding to increase product usability and desirability to the highest level (Goodwin, 2009). The graphic design role is not restricted to giving life to webpages; rather, it needs be an integral part of the user experience. The graphic designer also plays an active role in designing the GUIs of interactive documents (Lynch & Horton, 2008).

As a result of the ease of use of the PC, graphic design has been linked to the design of the GUI since the eighties. Graphic designers worked in this field, which was classed as a sub-specialty of print design. The emergence of the Internet, smartphones, and PDAs allowed graphic designers to participate more widely into the field of interactive design (Wood, 2009). The need for the involvement of various disciplines including information architecture, technical design, user interface, and graphic design in creating websites has required a merging of the borders between them. Their integration produces a coherent and consistent website. When building a website with weak content and organisation, the visual and interactive design will not compensate for or be able to solve these problems (Lynch & Horton, 2008). Usually, it requires cooperation among multiple design disciplines such as interactive design, graphic design, information design, and industrial design to create complex products and services (Goodwin, 2009).

When the Web emerged, the range of devices that could use the Internet was limited, and this led to the creation of web properties based on the strict and fixed covenants found in print media. However, due to the recent spread of different devices that are compatible with the Internet, Internet flexibility has clearly increased. Graphic designers need to be aware of these changes to be able to reach customers wherever they are and through whatever way they choose to connect to the Internet. Moreover, the users' needs must be met by considering usability when building the Web (Frain, 2012).

2.3.2 Smartphones and Tablets

As a result of the acceleration in the development of many electronic devices, most of them come with an Internet connection and they are equipped with the needed hardware and software to receive data from the Internet and to display it visually, and users have to change their behaviour to suit the requirements of technological developments (A. Dawson, 2011). Nowadays, smartphone, tablets, and even TVs have the ability to connect to the Internet, thus building designs based on a mouse and a keyboard as the only input devices is no longer useful (Frain, 2012). Smartphones and tablets have created new ways of interaction for users who are not obliged to stay in same location. Some newly invented devices can be used to control or interact with computers, like virtual reality (VR), Wiimotes, and Kinect, which free the user from being physically in front of a computer, but smartphones and tablets give users more flexibility to move and take their devices with them, and this offers new possibilities for interaction design (Laurel, 2014).

As many digital devices are used for communication, the future could be different due to these changes that need a set of rules and a design language to be developed. This will create job opportunities for digital media designers. Yet, at the same time, a question emerges about the extent of change that could happen to the profession in order to keep pace with these developments. Despite the unpredictable future of the digital media design profession, it will not disappear anytime soon. Especially in the light of the massive and rapid growth of digital content worldwide, which is greater than in other sectors of the economy (Fleischmann, 2012). For example, the Information and Communications Technology Council (2014) in Canada reported that the digital media sector is in an accelerating growth phase and is contributing to the Canadian digital economy. It contributes to game design and development, interactive training and simulation, advertising and promotional content, software design and development, content management systems, and web design and development. There are more than 52,000 professionals working in the field of digital media design in Canada and the annual revenue of this domain is between 3.5 and 5.1 billion Canadian dollars.

The rapid growth in the broadband market has contributed to motivating many consumers to spend more time on the Internet away from the TV, as well as to slowing the growth in the PC market to a rate of less than 20%. Also, the use of smartphones is increasing dramatically, especially among young consumers (Yann et al., 2010), which is making many brand agencies consider the mobile phone as the next platform for dialogue with their audience. Mobile phones have been prepared for this task according to digital media strategies. Smartphones sales have surpassed those of other digital media. A mobile phone often remains to hand during the day. Moreover, the percentage of mobile phone users among the overall population exceeded 45% worldwide in 2010 (Steane, 2010b).

Developments in the magazine world for tablets, especially the iPad, have opened up amazing opportunities for graphic designers who work in layout and print design. Whatever the technological development, it will rely on the basic elements of design that designers already understand, and this will help them to get involved in the next level of development. Providing interactivity in designs will expand their potential and make them more effective and conducive for learning and education. Transferring magazines and books to an interactive electronic platform is in need for those who can contribute to organising and transferring information that the graphic designer has already mastered (Allen, 2012).

Advertisers are broadly heading towards relying on mobile Internet devices, such as the iPhone, but they need to maximise the creative and persuasive potential of alternative advertising. Apple launched the iAd in 2010, which was intended to deliver interactive rich media advertising through applications on the iPhone and iPad and to contribute to the growth of this medium. There are more than 23.8 million smartphones with a touch screen in the USA alone. This huge expansion of smartphones users is expected to lead to a new generation of wireless business and social networking models for Internet mobile use (Mallia & Windels, 2011).

Applications (apps) for smartphones and tablets are considered as alternatives to websites with interactive design. These apps could offer possibilities for designing

pages and using typography beautifully that would reflect the skills used in traditional print design, which might be better than the rectangles and bad typography on the Web (Grannell, 2011).

2.3.3 User-Centred Design

The way in which people access information has changed. Therefore, designers have become increasingly interested in users and are trying to satisfy their desires in ways that suit them. Users have also changed the way in which they handle information to suit the new digital media, which increasingly controls their daily lives. Users choose the information they want to search for and then determine when and how to search for it. The importance of the user's role is constantly increasing; he/she reacts, creates, and edits the information (Brusatto, 2010).

Previously, GUIs were designed to enable people to control their own computer easily. Later, the design of user interfaces and webpages became more sophisticated to match the users' expectations (Lynch & Horton, 2008) in order to make the information accessible and usable (Keating, 2004).

In communication theory, the user is able to greatly control their reading experience, which changes the designer's relationship with the user (Keating, 2004). Designers have started to give the performance of a design greater importance and to make it understandable to users. After conducting more studies and explorations of human experiences and user experiences, the social and behavioural sciences have been used to extract ideas that have helped them to understand the user experience. They have explored form and content in addition to form and function. The content is an important aspect of the digital experience (Buchanan, 2000).

The design priorities have changed, and the user has become the primary focus of the design process. Thus, user-centred design (UCD) has emerged, which is a broad philosophy and methodology that provides a collection of methods that places the users/people at the centre of the design process. In this methodology, users can play a variety of roles from being consulted to being partners with designers

during the design process. There are several techniques that could be used to get users involved in the design process; some of these techniques, such as interviews, questionnaires, focus groups, and on-site observation, could be employed early in the design cycle. At the mid-point of the design cycle, techniques like role-playing, walkthroughs, and simulations could be applied. Interviews and questionnaires, in addition to usability testing, could also be used in the final stage of the design cycle. (Abras, Maloney-Krichmar, & Preece, 2004)

A digital media designer has to organise and present information that can be accessed and understood by the intended user in a high-quality visual environment and there needs to be diversification in the context and the used interactive technology that can encourage the arising information society to accept and explore designs (Keating, 2004).

Usability is one of the design advantages that designers should aim to achieve. To meet users' needs, designers must offer a way for users to quickly get the services and products they are looking for, while staying away from creatively challenging the user with complex multimedia (Zeldman, 2001).

2.3.4 Screen Design

Designing for screens is not a new experience for graphic designers; it began with TV screens. The first graphic designer was hired by the British Broadcasting Corporation (BBC) TV channel in 1954, and that designer worked as a full-time designer and demonstrated his skills in typography, animated image sequences, and presentation (Keating, 2004). The organising of information and interactive elements on a screen is called screen design. It is closely related to interface design and interactive design. It is also related to animation and motion graphics, which rely on time-based dynamic characteristics. Multiple temporal and spatial materials can be displayed on screens (Erlhoff & Marshall, 2008).

All the ways and contexts in which the user can interact with tools and technology must be considered when building the elements and contents of the

screen. The human factor and HCI play an important role in determining the design criteria of screens. The user interacts with screens in different ways in terms of input, which is one of the basic issues that the designer must bear in mind when designing for screens; users can use a mouse and keyboard, touch screen, video game controller, and remote controller, or physical input such as moving a hand that is picked up by movement sensors. Many designers resort to using metaphorical symbols to refer to the physical world in their designs for a user interface. These include buttons, handles, shopping carts, and trash bins, which are all part of the GUI. Recently, new symbols have emerged that do not refer to physical things in reality, which indicates the maturity of interactive media (Erlhoff & Marshall, 2008).

A screen design depends on graphic design traditions in arranging the optical systems, and on HCI to understand the cognitive processes, as well as on animation and motion graphics to give more vitality to screen elements (Erlhoff & Marshall, 2008). What distinguishes a screen design from a print design is the possibility of applying design changes even after publication without incurring substantial costs, unlike in print design, because a screen design can be modified and reset and updated continuously (Winfield, 2011).

2.3.5 Interaction Design

User interaction in print design is usually simple and predictable. In contrast, it is more complex and unpredictable in digital media design (Souto, 2017). When new interactive media emerged in the mid-nineties, some authors were already predicting that interaction design would affect every kind of business strategy. The emergence of the Internet has allowed companies to interact with their customers and to create new communication styles for them (Yann et al., 2010). Interaction design is not limited to HCI; it encompasses any products that offer communication and interaction for people in their daily life. Thus it may be found in a product design, user interface design, UCD, web design, experience design, software design, and interactive system design (Rogers, Sharp, & Preece, 2011). The media that were used before the Internet, such as TV, radio, and print, were aiming for limited interaction between the user and the transmitted content. In contrast, digital media requires

significant interaction between the user and the content so that the user can perceive the information he/she needs. Hence, the user is the main factor that governs design in digital media (Keating, 2004).

Interaction design is based on defining the behaviours that products, services and interactive systems perform (Goodwin, 2009). The art of understanding people is at the core of interaction design. The role of the designer, who specifies the way in which people access the design content, is to offer an aesthetic artwork that attracts users to interact with the design content (Grannell, 2011). The Internet has allowed users to interact with each other or with a sender of information or to execute a request or purchase products (Van der Geest, 2001). Nowadays, interaction design is available everywhere around us, and it is not restricted to interaction between people and machines; it can be between people and also between machines (Danzico, 2015).

The availability of interaction design features in digital media has created great design opportunities, but there are also many challenges that designers need to overcome in this regard. The expansion of Internet capabilities has, interestingly, increased the opportunity to incorporate interactivity in design (Zeldman, 2001), as Gothelf (2011) mentions:

> "Interaction design is a multi-faceted discipline that links static communications together to form an experience. Understanding the basic principles of this discipline is core to designing websites that are not only aesthetically pleasing but that actually solve business problems and bring delight to their users" (para. 18).

The designer of an interaction design has to offer a working prototype of the design in order to test the design outcomes and to determine whether the proposed solution is usable or not. On the other hand, paper and three-dimensional (3D) prototypes are valid prototypes in the traditional design process that are relied upon when making a decision to accept a design or not (Kang, 2009).

Interaction design should not be confused with other nearby disciplines such as HCI, human factors, or usability, even though many interaction design practitioners have come from these fields. These disciplines are more concerned with evaluation techniques than creative problem-solving skills, which is what design is concerned about. At the same time, there are many commonalities between interaction design, graphic design, and industrial design. The relationship between interaction design and HCI, human factors, and usability is complementary but not interchangeable (Goodwin, 2009). As regards research on this type of design, Forlizzi, Zimmerman, and Evenson (2008) developed a model that could help interaction design researchers to contribute to HCI research. They also proposed a set of criteria that could be used to evaluate the contributions of interaction design research to HCI research, which covered the design process, invention, relevance, and extensibility.

Yann et al. (2010) posited that fixed advertisements are less effective at drawing consumers' attention than digital ones. They found that the use of interactivity in advertising on digital media has become essential in order to meet users' expectations while using their digital devices because advertisements should be interactive and beloved (entertaining or useful). The increasing shift towards using new digital media has given advertisers a new opportunity to invest in targeting their audience. The interactive nature of digital media is contributing to providing an improved commercial identity throughout interaction with consumers.

2.3.6 Differences Between Designing for Print and Digital Media

Since the advent of the Internet and its adoption as a global communication medium, many graphic designers with print design experience have sought to work in the field of web design, although they often do not have a clear idea about the requirements for such a job (Keating, 2004). There are many things that a graphic designer should be aware of when designing for digital media due to the differences between the two mediums, which are explained in the following subsections.

2.3.6.1. Display Area

A print design is usually limited by the dimensions of the paper on which the design is to be printed. In book and magazine design, the facing pages can be considered as one area on which to work. In contrast, in screen design, the design height could be any height. However, the upper area of the page that the users can see on their screen when opening the website is responsible for attracting users. Thus, a webpage should not be considered as a single unit whatever its length; rather, it must be divided into visual and functional spaces, and then the design elements should be arranged within these spaces (Lynch & Horton, 2008). The unit used to measure space on screens is the pixel, which is the smallest unit in the picture. In print design the millimetre, centimetre or inch is used as the measurement unit (Coyle, 2011).

2.3.6.2. Colours

As is well known, the colour environment that print designers work in is CMYK. However, when working on a design for digital media, which relies on screens lights to display the content, the RGB colour environment should be used. Although all the screens work in the same colour environment, there is a great variation between screens, which affects the appearance of the colours of the design on each screen (Coyle, 2011). The different components inside devices play an important role in determining the appearance of the colours. Even though most devices can support millions of colours, the difference is still there. When designing for many users, the designer cannot control the screen type they use, therefore it is better to rely on basic colours or web-safe colours (Kyrnin, 2013).

2.3.6.3. Typefaces and Sizes

The difference in the fonts available on users' devices makes typeface selection for a given design difficult, which is a problem that print design has never suffered from. It cannot be guaranteed that every website user has the same font set as that used by the designer. Some designers resort to determining proportional

lengths for the used fonts so that the users' devices can adhere to the length of whatever typeface is used, which can contribute to maintaining the overall layout of the designed webpages (Kyrnin, 2013). The facilities that the users have to change the typeface and size presents the designers with further challenges, and designers have tried to embrace these differences by trying out all the possibilities and not working against the tide (Frain, 2012). In connection with this issue, there is a difference between the screens of Apple Macintosh and other PCs. The letter length on Apple Macintosh screens represents the exact font size. Apple screens were designed based on the concept of having 72 pixels per square inch. On the other hand, PC devices do not comply with this rule and this has led to letter lengths that differ from the font size (Keating, 2004).

2.3.6.4. Layout

Many web designers believe that they can control the layout inside their pages using tables and CSSs. However, it is not possible to reach the level of perfection that layout artists look for. The differences in user operating systems and Internet browsers are some of the reasons that could affect the final visual view of a layout (Kyrnin, 2013).

2.3.6.5. Resolution and File Size

Graphic designers usually use high-quality images to create clear designs and images. The ideal setting for a print design is a resolution of 300 dpi for images. On the other hand, digital media design does not require such a high resolution because the medium used to display the final work is a screen, which normally requires a 72-dpi image resolution. However, developments in screen resolution, like retinal display, have opened the door to higher quality images (Marshall, 2012). The file size, which increases when using high-quality images, is another thing that the web designer must consider because users connect their devices to the Internet in different ways and there is a disparity between the download speeds of their various connections. Thus the designer should keep the file size as small as possible to ease the downloading process (Coyle, 2011).

2.3.6.6. Creativity

Souto (2017) compared the creativity found in digital media design with that of print-based graphic design by providing an explanation of the two disciplines' respective characteristics. Further, some design projects were discussed in terms of three different aspects: designers' knowledge of digital technology, UCD, and design guidelines.

The differences between print media and digital media that have been discussed above are summarised in Table 2.1.

Table 2.1: Comparison of Print Media and Digital Media Characteristics

Print Media	**Digital Media**
Linear way of presenting information	Nonlinear way of presenting information
Two-dimensional (XY)	Six-dimensional (XY, real time, motion, sound, and interactivity)
Static	Dynamic and interactive
Fix surface and content	Open-ended systems
Restricts the user	Gives the user more freedom
High production, publishing, and distribution costs	Lower production, publishing, and distribution costs
Designers have full control over the size and measurements of all the design elements	Designers do not have control over the screen design, including the window size and the style and size of the typeface
Designers can use vertical or horizontal structures	Designers are limited to using a vertical structure
Print media has stability in its standards, specifications, and automation	The great variation in the criteria used for digital media design makes it difficult to control them all because of their diversity

Print Media	Digital Media
Design changes after publishing are costly and take a relatively long time	Changes to a design after publication can be done without incurring substantial costs because the design can be modified and reset and updated continuously
Paper drafts and three-dimensional prototypes are valid prototypes in the traditional design process	A working prototype of the design is required in order to test the design outcomes and to determine whether the proposed solution is usable or not
A design is usually limited by the dimensions of the paper on which the design is to be printed	The design height can be any height
The millimetre, centimetre or inch is used as the measurement unit	The unit used for measurement is the pixel
The colour environment is CMYK	The colour environment is RGB
The ideal image resolution for a print design is 300 dpi	The screen does not need a resolution of more than 72 dpi
The file size is not an issue	The file size should be as small as possible to ease the downloading process
Print technology created the public	Electric technology created the mass

2.3.7 The Future of Print Design

The development and rapid spread of digital media has affected many advertisers and pushed them away from print media and towards digital media. It is expected that there the demand for printing will shrink or even disappear in certain areas as a result of the availability of digital alternatives. For instance, Quentin Newark, the director of the Atelier Works design agency says, "It will bring about the near complete disappearance of printed materials. As it is now, you can download newspapers to your iPhone, you can read all of Shakespeare; you can download every best seller and read it" (Design Council, 2014). Also, Neves (2013) has warned that some printed materials may be replaced or simply disappear due to

the features of digital production such as the relationship created with the users through digital interactive processes, the systematic exchange of information, and the continuous modification of objects.

Martínez (2008) believes that the future of e-books is promising, which requires a special way of thinking in order to integrate printed versions with the potentials inherent in digital media. Martínez expects also that there will be more challenges and problems in relation to the issue of copyright. Dubberly (2011) says that commercial offset printing may disappear within 10 years and remain in use only among a handful of luxury artisans because of the influence of digital media. Mass-customisation inkjet and other digital printing technologies could be used to replace lithographic production methods. Printed newspapers, magazines, and books will probably disappear and be replaced by tablet applications.

Digital devices, which are made to be under human control, have begun to create their own world, which has attracted many people to spend most of their daily life on them. Digital media has started to determine how the younger generation deal with the media and entertainment (Brusatto, 2010). The number of people who consume media on tablets, smartphones, and other interconnected devices is constantly increasing. Meanwhile print design is decreasing at an alarming rate. That is why many magazines and newspapers are seeking to keep pace with this change by finding business models for their publications that can be applied to mobile phones (A Digital Dreamer, 2014). In the USA alone, the growth of advertising expenditure on social networks has shown a marked increase (Mallia & Windels, 2011) in recent years.

With the maturation of the electronic experience, users are able to do multiple readings due to hypertext that allows the linking of pages with each other in a nonlinear style, as opposed to the linear style available in printed books. Interactivity has increased in the digital environment and has been influenced by technological developments in digital media and the awareness of designers and users of this feature. This has allowed an expansion in the use of digital creations. These

developments have affected print design and some print processes have disappeared because of their high cost. Others have been affected by the invention of new alternative solutions that have become more appropriate than the printed format, such as encyclopaedias. Achieving interaction in many modern digital phenomena has become a priority in design, rather than an extra feature, such as in forums, social networks, and e-commerce among others (Neves, 2013).

On the other hand, while some authors acknowledge the influence of digital media on printing, in light of the fact that people receive most of their information through digital systems, they believe that print will still persist and will not completely disappear (Royal Academy of Art, 2014).

2.4 The Medium and the Message

The origins and history of graphic design can be seen through the evolution of techniques and technology. In the beginning, graphic design was connected to the art of printing. Then it developed and reinvented itself over time. Although paper will not disappear completely, information will mostly be received via electronic systems. The designer should not only be able to work with technology, but also has to understand its complete technological potential and how it transforms relations and practices (Royal Academy of Art, 2014). Just as designers previously had to understand the printing process to overcome the limitations and requirements of printing materials and techniques, they now have to understand the forms of digital media that they intend to use. Business owners also have to choose a graphic designer who has experience and expertise in the medium they want to use (Coyle, 2011). Even when designing for the Web or making apps, the designer has to understand the medium and how it works before designing for it. The main way to get experience about a medium is to immerse oneself in it (Grannell, 2011).

Designers who are forward-thinking and who are planning a lifelong career tend to work on design ideas for any or all media and embrace the differences. Understanding each medium and its advantages and disadvantages helps them to find

a clear and easy way to interpret designs for the target audience (Stone, 2013). The Web is a communication medium like print or TV, and it is available to anyone with an Internet connection. However, the use of this relatively new medium is not limited to delivering a message, it also allows the user to create or contribute to it, which makes it a two-way communication channel (Zeldman, 2001). The new medium is different from a book; for instance, it is backlit, user-controlled, and has moving pixel screens, which offers different ways of viewing and different methods of engagement (J. E. Davis, 2013). The proper delivery medium should always be chosen because a great design gets the right message to the right audience in the right way (Stone, 2013). The choice of the medium is not only important to the communication process, but also affects the nature of the design. A design should suit the mood, ambience, temporal properties, and message receiver profile. Using the wrong medium could lead to design failure even if the design is artistically successful. This is because the medium affects the recipients' interpretation of the message (Erlhoff & Marshall, 2008).

Thus the differences between forms of media are not just technical; the medium could affect the message and how it is perceived by the receiver. This is what the theorist of communication and media, Marshall McLuhan, discusses in his book, 'The Medium is The Message', in which he also argues that the way a message is delivered affects people's absorption and judgement of the message (McLuhan & Fiore, 2001). When publishing an advertisement in a newspaper, the receiver perceives it simply as factual as it has been delivered through mass media. Then he/she deciphers the message to determine whether it can be trusted or not, which is a part of media culture. The complete message consists of the content, design, and medium, and each affects the perception of the credibility and persuasiveness of the communication (DiMarco, 2010). When looking at a website, users tend to scan information rather than read a large amount of text (Keating, 2004). McLuhan and Fiore (2001) differentiate between print and electronic technology, stating that:

> "Print technology created the public. Electric technology created the mass. The public consists of separate individuals walking around with separate, fixed points of view. The new technology demands that we

abandon the luxury of this posture, this fragmentary outlook" (pp. 68–69).

McLuhan and Fiore (2001) also state that our understanding of the effects of the new medium is impeded by the inherent habit of regarding all phenomena from a fixed point of view. The environment of the medium used to deliver the created message has the same importance as the message itself. It is quite difficult to understand social and cultural changes without knowing the way in which media works as an environment. Also, the medium affects social life, such as a society's cultural characteristics, as well as the personality and cognitive processes of individuals in that culture. For example, a book can be an extension of the mind and memory by a person keeping in mind the core point of a book without remembering all its details. This helps readers to develop their creativity. Conversely, technology can take on this task instead of humans.

Also, Manovich (2014) argues that software is the main new medium in his book, 'Software is the Message'. He considers that software is now used to communicate with people and to store, create, access, and distribute cultural artefacts, which includes computer software and web applications or 'webware' as he calls them.

2.5 The Graphic Designer's Changing Role

The vast amount of information available and its speed of dissemination during the past two decades have had a significant impact on graphic designers. Designers have to take responsibility for finding solutions to communication problems in light of the huge amount of information there is to convey, which has become an extra task that needs to be performed to finish an actual design. Meantime, the reflection of this change in contemporary information society in the graphic designer's role cannot be avoided (Royal Academy of Art, 2014). Gresly (2009) believes that the graphic designer's role has to be reviewed in light of the massive digital evolution, where computers offer endless options for users from

changing font size to interacting with a design. However, designers still have to control the entire design process by mastering many skills that give them the ability to retain control. Keating (2004) warns that graphic designers have to be careful in how they fulfil their fundamental role in digital design due to the increasing dependence of society on digital screens.

Despite the fact that the print medium still exists and it will continue to do so for some time, it would be better for designers to start transforming their skills by expanding their toolset to include digital media (A Digital Dreamer, 2014). Margolin (2011) states that graphic designers must understand the types of media that people use and as they have to design for print, they should be capable of designing for the Internet too. Courses in layout and visual organisation have to take into account both media. The Design Council in the United Kingdom (UK) also believes that graphic designers should understand how to present visual and information elements on screens by applying the same methods used in the design of printed materials (Design Council, 2014). Digital design contains many non-visual elements such as programming, interactivity, and information architecture. However, the graphic designer's skills in grids, typography, and composition are clearly shown complex information on screen visually. Keating (2004) confirms that it is important for graphic designers to understand the medium they are working in because of the different priorities of interactive design and print design.

Miller (2013) believes that graphic designers should be able to deal with print and the Internet at the same time in order to be marketable because even when a job opportunity focuses on one of them, knowledge of both will be required. A. Singh (2017) conducted a study to identify the recent trends in the graphic industry and found that graphic designers have to design for print and digital media. Graphic designers should be able to design for communications, marketing, packaging, publishing, and digital media. A freelance designer should be able to offer a complete marketing campaign for his/her client including printed material in addition to a matching website, which will grow his/her work and build an admirable portfolio. Gresly (2009) supports this point of view, stating that companies prefer to

save as much outlay as possible, which means that many of them prefer to hire an 'all-in-one' graphic designer for the completion of all their design tasks from start to finish.

The digital world, which is rapidly expanding, has created new ways to promote products, which has contributed to expanding the designer's role in helping to educate visually the inhabitants of the digital world (Gresly, 2009). In the nineties, digital evolution dramatically contributed to expanding the graphic designer's opportunities to get involved in tasks away from print (Wood, 2009). At the same time, the evolution of the digital world has offered great opportunities for graphic designers to work on and created new markets and different ways of working. It also presents significant challenges that the designers have to address (Design Skills Advisory Panel, 2007).

Advances in computer technology have led to changes in the designer's tasks, which were previously carried out by several people. These expanding responsibilities in the workplace require more abilities that students in the field of design must gain (Smith, 1999). Many new skills are now required to deal with new technology, while some of the old skills have become obsolete. Technological advances have forced designers to reinvent their conceptions about graphic design. Designers are freed from the old limitations, but new ones have taken their place simultaneously (Keating, 2004).

The focus of the design process is no longer the production of a finished product; rather, design has become capable of growth and development even after the transfer phase. The focus of graphic design has shifted from product to process (Keating, 2004). The designer's role is no longer limited within the creative process of design; the technical side of the project must also be considered. The progress made in the development of IT components has contributed to involving the designer in these tasks (Fleischmann, 2012). A graphic designer's interest should not be limited to delivering the project in terms of form and utility; it must cover the whole relationship process with the user (Neves, 2013).

Frain (2012) prefers not to blame graphic designers for any weaknesses in a web design. Frain considers that the graphic designer's job is to create beautiful visual works. However, designers' skills have to be invested in and used properly. A. Dawson (2011) states that designers are forced to innovate, endure, and push through limitations to preserve the stability and flexibility of their websites.

One of challenges that graphic designers need to deal with is preparing adequately flexible designs and creating a clear message that suits a great variety of digital devices, such as the Internet, film, TV, and smartphones, while at the same time maintaining the cohesion of design (Heavey, 2008). The standards used by different companies in file preparation, such as for e-books, digital magazines, and others, vary, which increases the difficulty of implementing designs that retain the same look on different devices and thus it may require implementing multiple designs for the same content to suit all these devices and the viewers' needs. Therefore, many companies such as Adobe and Apple are looking for a way to unify these standards. With the release of the new Internet language HTML 5, it has become possible to do this. However, the problem will remain until the majority of digital devices support this language. Until this goal is achieved, designers should continue satisfying the majority of viewers by using PDF, old HTML standards, and Flash (A Digital Dreamer, 2014).

Buckler (2013) states that a designer can no longer rely on fixed-width designs as in the past. Designers who are unable to accommodate the changes in their field will face problems in producing usable mock-ups. Grannell (2011) believes that designers should embrace presenting responsive, adaptive, fluid, and flexible designs to suit the nature of interactive design and that they should stay away from fully controlled fixed designs that are similar to those found in print designs. Website and app designs have to adjust with the tablet device orientation or browser window size.

The change in the designer's role led Davis (Neves, 2013) to propose a re-examination of the paradigms used due to the significant difference between what is

required from the designer in the twenty-first century and what was required in the past. Challenges are not limited to the designer's duties, but also include what the designer should know. Grannell (2011) believes that designers have to change their mind-set to suit the medium to be successful app and website designers. Frain (2012) blames the current graphic design tools as these may lead to design failure. For instance, software such as Photoshop and Illustrator do not deal with a dynamic canvas. The flexible canvas that is available to the designer is the same as the browser window. However, the designer may not be able to test the design on the browsers of multiple devices because he/she is not the developer. Designing frequently in a browser, with developer help if needed, will have a significant impact on speeding up the design process. Wood (2009) states that "designers who have chosen to design for interactivity had learnt, post-dotcoms, that they couldn't innovate or experiment in new graphic languages for interfaces without developing, or accepting a new mind-set towards deepening their knowledge of human factors" (p. 1514).

The designer must get involved in message editing and also collaborate with other team members in their operations. Commercial competition requires more care to capture viewers' attention and keep their senses fully engaged with what they want to see or experience (Eekelen, 2012). The designer must think and work far beyond the visual realm on web design, interactive design, or movie title sequences (Cheung, 2008).

Gresly (2009) argues that many technical aspects should be addressed in the graphic designer's role for the profession to survive. Panning (2005) calls on print designers to adapt and learn interactive, multimedia techniques in order to survive as designers due to the growing usage of the Web. Increasing the awareness of the potential of digital media design requires changing the designer's role and his/her skillset to suit the current complex work environment (Fleischmann, 2012). The Design Skills Advisory Panel in the UK states that designers must develop their skills to keep pace with the rapidly changing global business scenario. The Panel's

report calls for the development of a mechanism for the continuity of the profession's development (Design Skills Advisory Panel, 2007).

Many new opportunities have emerged for graphic designers to get involved in due to the emergence of the Internet, such as website design, templates for content management systems, banners, Flash design, and much more (Graphic Mania Editorial, 2010). A few years ago, a U.S. Bureau of Labor Statistics (2008) report forecast that there would be an increasing demand for graphic designers due to the rapid expansion of the web-based information market as well as the video entertainment market. The report stressed that there would be more demand for graphic designers experienced in website design and animation due to the increasing number of interactive media design projects. The report also stated that the demand for graphic designers would grow in the advertising domain for printing and web marketing. Echeverri (2017) also asserts that designers with digital media competencies can offer comprehensive solutions, which will meet marketplace needs.

The design process and the needed skills are different for designing websites than for other media (Van der Geest, 2001). With the emergence of the Internet, a need for designers who are able to work with the new technologically complex medium has emerged. As a result, a digital media design profession has emerged (Fleischmann, 2012). Heller and Talarico (2011) state that a designer cannot become a digital designer without knowledge of the language of graphic design.

Some people believe that a graphic designer only needs to learn more software skills to make a transition into digital media design. In fact, a graphic designer needs to expand his/her traditional knowledge and skills because digital media design relies on traditional graphic design skills and methods (McCoy, 1998). The transition into digital media design needs new ways of thinking and new design skills and knowledge (Fleischmann, 2013). A designer should not just rely on applicable communication theories and methods, he/she must also study cognitive and perceptual psychology, sociology strategies, and cultural anthropology (McCoy,

1998). Keating (2004) supports this point of view and considers that the designer must acquire the new skills and knowledge that are required by the technological communication environment. Beltran (2000) points out that web design needs a deeper understanding of cognitive psychology, learning theory, and other areas of sociology. Also, Mallia and Windels (2011) state that digital media evolution calls for a deeper understanding of branding and consumer behaviour. Technical skills are no more important than the ability to creatively use technology across different platforms. Goodwin (2009) asserts that digital media design is not totally technical; rather it is very rational and rigorous. It also relies on cognitive psychology, sociology, and descriptive anthropology. Those involved in interactive design need to learn techniques and patterns that could help them in understanding humans as well as software.

Graphic designers have to be knowledgeable about the technological possibilities so that they are better able to work with technology. In addition, they must understand how technology transforms relations and practices. Technology allows interaction, and also encourages substantive input from the public (Royal Academy of Art, 2014).

2.6 The Transition of Graphic Design

Graphic design is influenced by many artistic, social, and political movements as well as by designers and innovative thinkers. However, none of the above has affected graphic design as much as technological advances (Fried, 2013). The most significant stages of technological evolution that have affected the graphic design profession are:

- The invention of printing
- Advances in printing and the invention of photography
- The invention of the PC and its use as a design tool
- The emergence of the digital screen as a communication medium (Keating, 2004).

Also, Manovich (2001) argues that the new media revolution is more profound than other technological evolutions such as the printing press and photography. Manovich states that the computer medium has affected all communication stages and all types of media. On the other hand, the printing press only affected the media distribution stage and photography affected one type of cultural communication, that is, still images. Technological development is usually accompanied by a need for new skills and a rejection of old skills. The graphic design profession has been dominated by this trend since the invention of printing. Technological developments in printing led to the dramatic linking of design to mass reproduction (Keating, 2004).

Before the emergence of the computer, metal typefaces were arranged by human hand for letterpress printing. Later, with offset lithographic printing, the artwork was prepared for camera-ready processing. The evolution of graphic design and the use of the computer as a design tool has led to typography being prepared digitally (Aynsley, 2004).

The use of computers by graphic designers caused many manual processes that used different physical artistic materials and that were an essential part of the graphic designer's work in the past to be discarded. Computers also expanded the work scope and accelerated production. Desktop publishing software enabled designers to work in small groups (Aynsley, 2004). This contributed to many graphic designers becoming visual producers in the late eighties and nineties after their adoption of tasks that were previously performed by others (Rawsthorn, 2011). The emergence of Macintosh computers in the early eighties changed the graphic design profession dramatically as traditional tools were dispensed with in favour of using digital ones (Fleischmann, 2012). The use of images and printed text by machines was not new; however, assembling these elements together on a computer screen using a mouse and keyboard on a virtual desktop was a new feature of the Macintosh computer (Raizman, 2003).

Desktop publishing software producers used the graphic designers' terms in their applications, such as 'cut and paste'. The graphical interfaces of applications significantly contributed to spreading this type of software. Applications gave designers the ability to use different font types and to add effects to them with just one mouse click. Computers also provided designers with a wide range of symbols and clip arts that were stored on small disks (Raizman, 2003).

The changes in the graphic design profession forced universities and institutes to replace the traditional tools of design with computers equipped with design software, scanners, and high-resolution printers to equip students with the skills needed in the field and the market. The rapid development in designer tools allowed the designer to produce neat printing projects by using colours in subtle tonal effects and manipulating images in complex layering (Raizman, 2003). However, design principles, theory, and composition remained applicable even when implementing designs on a computer rather than on a traditional drawing board and light table (Panning, 2005).

In the early nineties, using a computer in graphic design was optional but soon it became a necessity. Even designers who had insisted on using their manual skills to create designs were forced to convert them into a digital form in order to complete the design process. The technological improvements in the graphic design profession continued to include all the designer needed to implement his/her tasks digitally (Panning, 2005). Designers who started in the profession in the early eighties or earlier faced difficulties in adapting because they needed to have knowledge of the many aspects that had been affected by the technological developments in all phases of the design process (Faiola, 1999).

The emergence of the computer as a design tool blurred the boundary between graphic design and other close disciplines, such as animation, photography, and advertising (Raizman, 2003). Even the boundaries between different elements of the design process started to fade, such as the boundary between designer and user, product and process. Indeed, these boundaries continue to shift and settle. Moreover,

this phenomenon is not new to the graphic design profession because designers encountered similar challenges during the Renaissance and in the era of desktop publishing (Keating, 2004).

Zeldman (2001) refers to the importance of the emergence of the Internet for humanity, stating that: "If the invention of the printing press brought humanity out of the Dark Ages, the building of the Internet and the growth of the Web have ushered in a new information age" (p. 34). The digital revolution has affected many aspects of our life, which has created new opportunities for designers to address and new problems to solve (Steane, 2010b). The transition from print design to screen design has been the most significant development in the graphic designer's role, which occurred as a result of continuous research in the field of HCI and software design (Keating, 2004).

After graphic designers adopted the use of computers to implement designs and to shorten production time, the computer initiated a new phase of change in the graphic design profession through the use of the digital screen as a communication medium. This was totally different from the traditional print medium that graphic designers had relied on for several centuries (Keating, 2004). The new medium created new challenges for graphic designers who had trained in the print medium and they struggled to shift to the new medium especially in respect of transferring their knowledge in typography to the screen, which is considered difficult by the new generation of new digital medium designers because the origin of typography lies in another medium (Yee, 2006). The user's ability to change the typography parameters created a new challenge for designers who used to create static typography, and they also have to create complex, coloured, and moving branding systems for conveying emotions and telling stories (Lupton, 2014). Lupton (2014) discusses the use of typography in digital media in her book, 'Type on Screen', in which she explains the flexibility of typography in responding to technological developments over the years.

In less than 20 years, most aspects of the graphic design profession have changed, such as the context of a design project, how to create a design, and the

application of design outcomes (Vaughan, 2008). This has greatly affected the design process and graphic design products (Keating, 2004). In the digital age, the change is not limited to finding an alternative medium through which to communicate with an audience, it has also changed how people do their jobs and how they communicate with each other and enjoy themselves (Steane, 2010b).

With the advent of other types of technology such as mobile phones and the Internet, designers invented their own tools to work with new and different forms of production and distribution (Rawsthorn, 2011). The designer had to develop his/her way of thinking and acquire more skills to get involved in the new medium of design (Fleischmann, 2012). The new medium has created a new virtual space with new features such as movement, time, and multimedia in addition to the old items used in the print medium that limited the designer to working on a fixed and 2D surface (Raizman, 2003). The designer is now required to transform a corporate fixed visual identity into a sophisticated brand that can tell stories through the employment of new sensory elements including movement, voice, and gestures (Steane, 2010a).

Since the end of the nineties, many graphic designers have shown an interest in moving from print design to screen design (Keating, 2004). A survey of designers that aimed to collect data about their views on digital media that was conducted by Panning (2005) shows that 75% of the respondents have the intention to expand their skills to web, multimedia, and interactive design. Also, more than half of the respondents express a desire to explore freelance opportunities and accept project management responsibilities as a way to expand their careers. Another study, the Graphic Design USA 48th Annual Print Survey (Johnson, 2011), shows that 93% of respondents claim to have worked on print design projects in the past year. The same study indicates that 71% of respondents have worked on online projects and 24% of them have worked on motion-based projects. The study predicts that the demand for designers will grow 13% during the period from 2008 to 2018. Graphic designers who possess expertise in website design and animation have the best opportunities due to this increase in demand, while the demand for print designers will decrease.

Zeldman (2001) states that there are thousands of designers who want to employ their talents online, but they are not sure how to go about it. At the same time, web design agencies need more creative designers. Panning (2005) shows that the most popular methods used to develop designers' skills and knowledge are trade magazines, periodicals, and online articles, as well as education and training through self-funding.

Designers from a print design background who were interested in web design tried to control online designs in the same way that they controlled print design, based on their previous skills. However, HTML and CSS were too limited to enable them to have complete control over a design (Reeve, 2010).

Although the emergence of the Internet has offered great opportunities for graphic designers, the slow development in their potential gave those in other disciplines, such as developers, the opportunity to take up these opportunities. Many developers have sought to gain different design skills to enable them to implement designs for the Internet (Wood, 2009).

The transition from print design to digital media design is not just a question of learning more technical skills. Graphic designers need to understand computers, networks, and software, just as they previously had to understand printing, binding, and other production techniques (Dubberly, 2011).

A digital media designer is now required to use a visual medium to help in educating people, to facilitate information exchange within the digital world, to help in changing consumer behaviour, and to inspire and inform people (Gresly, 2009).

A print graphic designer is required to understand prepress and printing; however, a digital media designer should be able to comprehend other aspects of human activities such as art, science, and entertainment and must deal directly with digital media to communicate (Sperka & Stolar, 2005). Yet, the digital media designer should not let the machine control his/her thoughts, and many technical

aspects must be addressed to save the profession and keep the designer's role a professional one (Gresly, 2009)

The U.S. Bureau of Labor Statistics (2008) report shows that the demand for graphic design will increase because of the rapidly expanding market for web-based information and video entertainment including TV, movies, video, and made-for-Internet channels. Designers for interactive media will be needed who have experience in website design and animation. The growing number of products and services will increase the demand for graphic designers for print and web marketing and promotional materials.

2.7 The Change in the Profession's Name

The Industrial Revolution was the first turning point for the graphic design profession. It ended the idea of the designer as a craftsman and highlighted that graphic design was an independent career (Keating, 2004). The graphic design profession has witnessed many changes and has evolved since its emergence as an independent discipline at the beginning of the twentieth century (Chou, 2006). The term 'graphic design' appeared in the early twentieth century. Previously it was called 'commercial and applied art', then it was changed to 'visual communication' and later to graphic design (Fried, 2013; Kirschenbaum, 1999). Beltran (2000) considers that there is no fixed definition for graphic design. This name was created to define scope of the new profession, which included typography, book design, and advertising design. Later, the graphic designer participated in designing large exhibitions, banners, and corporate identities.

Britannica Encyclopaedia (2006) defines graphic design as "the art and profession of selecting and arranging visual elements – such as typography, images, symbols, and colours – to convey a message to an audience" (p. 791). On the other hand, it has been defined by the American Institute of Graphic Art (AIGA) as "the profession that plans and executes the design of visual communication according to the needs of audiences and in the context for which communication is intended"

(Yee, 2006). Erlhoff and Marshall (2008) define graphic design as "the conscious organization of text and/or images to communicate a specific message" (p. 198), while Poggenpohl (1993) defines graphic design as

> "… a creative process that combines art and technology to communicate ideas. The designer works with a variety of communication tools in order to convey a message from a client to a particular audience. The main tools are images and typography" (para. 3).

The Council for National Academic Awards (Harland, 2012) describes graphic design more fully as follows:

> "... the generic title 'graphic design' is understood to apply to the broad range of specialisms contributing to visual design for communication media, whether printed or electronic, static or time-based. The media include print (e.g. books, magazines and promotional material) and electronic media (e.g. computer graphics and video). The technical specialisms include illustration, typography and photography. Its applications may be informative, persuasive or recreational, and include information design, advertising design, corporate identity design, packaging design and publishing design" (p. 5).

The Association of Registered Graphic Designers of Ontario (AGDA, 2014) describes the graphic design profession as:

> "… an interdisciplinary, problem-solving activity which combines visual sensitivity with skill and knowledge in areas of communications, technology and business. Graphic design practitioners specialize in the structuring and organizing of visual information to aid communication and orientation" (para. 1).

The expansion of the graphic designer's tasks, which are no longer limited to print media and contain more elements than image and text, encouraged authors and researchers to call for a reconsideration of the name of the profession because it no

longer conveys what these designers actually do. For instance, Poynor (2011) is one of those who has called for a new name for the graphic design profession, which has expanded beyond the limits of its name, and states that graphic design relies on a combination of multiple disciplines that require a new name to better express the profession's content. Bracy (2013) supports Poynor and argues that the profession is in a significant stage of development and change that is moving it away from images and text. Heller and Talarico (2011) consider that the use of the graphic design name has become obsolete because of its relation with text and images in a 2D environment. Newark (2002) considers that what is known as graphic design has become unrecognisable because of its intersection with different disciplines, such as film, art, writing, digital, and exhibition design, and the connection between the terms graphic design and printing. (Beltran, 2000) calls for a new term to express what the designer does in light of the expansion of his/her tasks in the digital world and the use of new elements. Keating (2004) believes that a rearrangement of the graphic design profession must include an innovative agenda that may lead to a new name for the profession. Raizman (2003) believes that the use of computers in design has paved the way for designers to unite photography, film making, and more traditional graphic design and illustration together, which makes it relevant to use the name digital media, which places all these activities under one umbrella.

In light of the changes to the profession, some scholars have sought to redefine the profession as well. Panning (2005) considers that the surface definition of the graphic designer as 'an individual who designs graphics' does not explain what a graphic designer is or how a design is made. The author also notes that the U.S. Bureau of Labour Statistics website defines graphic designers as professionals who:

> "… plan, analyze, and create visual solutions to communications problems. They use a variety of print, electronic, and film media and technologies to execute a design that meets clients' needs. They consider cognitive, cultural, physical, and social factors in planning and executing designs appropriate for a given context" (p. 12).

Saldanha (2003) believes that the term 'graphic' no longer reflects the nature of the profession, and that it must be replaced by another term that is closer to what designers do. The author says that the name graphic design has become obsolete due to the changes in the profession. Also, the term graphic limits the achievements of the industry as it refers only to images and not to other elements that have become an essential part of the designer's job, such as strategies, concepts, words, sound, and animation. He also points out that some practitioners in the profession have started to call themselves designers without using the term graphic, which may confuse the general public with respect to other design disciplines such as interior design, industrial design, and fashion design among others. Saldanha (2003) also notes that a previous change in the profession's name was accompanied by a change in its nature; the term 'design' was used instead of 'art' to show that what the profession was doing was more technical. Saldanha suggests using the term 'communication' instead of 'graphic' because the term communication is broader than the graphic term and can be applied to the use of any medium to communicate.

Smith (1999) argues that the term graphic is related to ink on paper. Smith thinks that using 'information designer' or 'communication designer' as a job title may better express the tasks that the designer does. Erlhoff and Marshall (2008) state that the term graphic design fails to reflect the developments in the profession and they believe that the term communication design is more appropriate. Vaughan (2008) agrees and argues that the term communication includes sound, visual, smell, touch, and motion. Communication is also a two-way process. Aynsley (2004) points out that the idea behind using the name visual communication instead of the name graphic design was to avoid connecting the designer's job to print design, which could include design for films and TV. Panning (2005) asserts that the graphic designer name fails to express the role of these designers. The author also argues that the emergence of new job titles such as 'e-designer' has been due to the reliance of all designers on an electronic medium either to produce or publish designs, which are tasks that would initially have been used to describe the role of web designers. Later, the scope of the name expanded to include any creative designer engaged in interactivity between various design media forms.

McCoy (1998) wonders about an appropriate name for the profession in light of the changes in the graphic designer's role. The author discusses some of the suggested names and considers that the terms 'new media' or 'multimedia' are linked to the software being used by designers, while the terms 'computer graphics' and 'website design' are linked to the product more than to the conceptual process of designing. She also states that 'communications design' or 'digital communications design' could be more expressive about the profession. Yee (2006) points out that the emergence of new job titles such as 'new media designer', 'interaction designer', 'web designer', 'information architect', 'multimedia designer' and 'interface designer' reflect the diversification in the skills and roles of graphic designers.

The changing of the profession's name is not new, but it has become more urgent with the changing of the nature of the profession in the past few decades. After the emergence of the term graphic design in the early twentieth century, the term communication design was adopted in the early seventies with the proliferation of media and communication theories such as those of Marshall McLuhan and Quentin Fiore. Later, the term 'visual communication' spread across Europe and the USA in the eighties and nineties. However, these name changes have not spread that much outside universities or affected the term graphic design, which remains the most common name in the marketplace (Erlhoff & Marshall, 2008).

At the same time, many international graphic design organisations have sought to change their names to reflect the changes in the profession, such as the AIGA, which was created in 1914. The AIGA tried to find a new name that would preserve the achievements expressed by the old name in addition to conveying what designers are currently doing (Walker, 2005). So, in 2005, the organisation changed its name to the Professional Association for Design while retaining the same, well-known acronym AIGA (Bohn, 2011). Another global organisation, the International Council of Graphic Design Associations (ICOGRADA), also changed its name deciding to use 'communication design' instead of 'graphic design', but it also preferred to keep its earlier acronym, ICOGRADA (Bohn, 2011). The ICOGRADA

identified the tasks of the communication designer, which include print design, motion graphic design, and digital media design (e.g. web/game interface design and interaction design) (Fleischmann, 2012). The AIGA also considers that graphic designers produce printed and electronic communication, which includes in addition to traditional print products, CD covers, movie titling, on-air TV graphics, interactive websites, and multimedia programs. The AIGA considers that graphic designers might use sound and motion as a means of communicating messages (Cadle, 2011).

Neves (2013) believes that there is a difference between academics and designers with respect to defining the meaning of graphic design in terms of its content, presentation, and scope. The author mentions that the area that graphic design deals with is broad and it has variety of applications. Many educational institutions have been affected by the changes in the profession and have tried to change the names of their programmes of study. In his study on graphic design in the UK, Harland (2012) tried to collect data on the names of various design programmes run by universities that participated in the Exhibition of British Universities in 2012. The author found approximately 30 different programmes branching off graphic design, which was one discipline two decades earlier.

Fleischmann (2012) also tried to categorise the different terms used to define the design field. The author divides visual communication into digital media design and communications design. She also found that digital media design could have alternative names such as digital design, multimedia design or interactive design. Communications design also has alternative names such as graphic design, visual communication, graphic art or advertising design. She assumes that there are no clear borders between digital media design and communications design despite the perception that they seem to be two different disciplines.

Efe Varol (2012) points out that the teaching of graphic design has been influenced by changes in the profession. It is no longer restricted to 2D design or print design; it has come to include phone design, web design and even graphic design for computer games. The author mentions that universities started looking for

a new name for the discipline or founding alternative disciplines to match these changes. Harland (2012) agrees with Efe Varol (2012) about the changes in discipline names at universities and mentions that some universities replaced the term design with that of communication. Others have found that the name visual communication is more general and can include film and televisual media design (Gresly, 2009).

Many universities in the USA, Europe, and Australia tend to use the term communication design instead of graphic design because they believe that the former is more expressive of the profession and the design communities' needs (Steane, 2010b; Vaughan, 2008; Warburton, 2010). Qiao, Han, and Wang (2012) believe that the emergence of new disciplines such as digital media design was a result of the developments in the design field that were related to the rapid developments in using digital computer technology, which required an intersection and integration between different disciplines to meet the profession's needs.

Communication design was defined by ICOGRADA after it was adopted by the association instead of graphic design as: "… an intellectual, technical and creative activity concerned not simply with the production of images but with the analysis, organisation and methods of presentation of visual solutions to communication problems" (ICOGRADA, 2007).

2.8 Graphic Design Education

As a young discipline, graphic design education came to fulfil the needs of the industrial economy when there was an adequate understanding of the value of design thinking (Owen, 1990). In the past, the graphic design path was clear and design institutions focused on designing for print, which was the medium used for products such as newspapers, magazines, books, and other printed materials. The body of knowledge for practising graphic design was known, which gave designers and teachers security in their chosen field. Even after designers started to use computers in the early eighties, the nature of the profession did not change just the

design implementation tools. In 1990, Owen (1990) called for fundamental changes to be made to the nature of design education in order to utilise the technological advancements that had been made by computer technology. He also argued that there was a demand for talented design students with perfect minds to meet these technological developments. Marks (2015) asserts that graphic design education in 1992 was still reliant on courses similar to those that were taught in the 1970s, which basically included 2D and 3D design and basic drawing for foundation and first-year undergraduate courses.

Some educational institutions responded to the emergence of the Internet as a new medium through which to display designs by adding some courses to graphic design programmes, such as web design, interaction design, motion graphics, animation, multimedia and video (M. Davis, 2011; Fleischmann, 2013; Koch, 2008; Margolin, 2011). Many trans-media programmes have emerged because postgraduate programmes rely on there being a convergence between design disciplines and technology, business and strategy (Heller, 2015).

Graphic design has been able to withstand the expansion of its scope through diversification into new sub-disciplines or the emergence of new alternatives such as illustration, digital media, graphic communication, and visual communication among others (Harland, 2012). Digital media design is the latest discipline to appear, and it emerged in the mid to late nineties as a response to the emergence of the Internet and other interactive digital media. The digital media design discipline arose and grew out of the graphic design or communication design discipline (Fleischmann, 2012). However, in some authors' opinion, graduates in this discipline are still not well trained because design education is still stuck in the twentieth century (M. Davis, 2011; Dubberly, 2011; Norman, 2011; Poggenpohl, 2012).

The changes in the field of graphic design have begun to impose on graphic design education. Yet some believe that graphic design education is out of date. Despite accelerating changes in the profession, design education still largely reflects design's origins in craftwork (Dubberly, 2011). The transition from print to digital

platforms requires a re-evaluation of educational practices and procedures and a reassessment of the philosophical concepts (Heller & Talarico, 2011). To adapt existing curricula or develop new ones it is necessary to determine the identity of the twenty-first century designer and understand the context of modern graphic design (Cadle, 2011). As Grefe (Cadle, 2011) points out:

> "There is a tendency amongst educational institutions and design studios to think in terms of what additional skills or knowledge is required of a traditional designer, when they should be considering a completely new model of designer who will be the standard in the not-too-distant future" (p. 7).

Findeli (2001) argues that the theoretical model that the design education curriculum is based on includes three components: art, science, and technology. He suggests replacing science and technology in this model with perception and action, where perception refers to the concept of visual intelligence and action refers to the moral actions. Despite the diversity in graphic design curricula and the differences between universities that focus on the technical side, which normally results in the award of a Bachelor of Science (BSc), and others that focus on the artistic side, which usually results in the award of a Bachelor of Arts (BA) or Bachelor of Fine Arts (BFA), the existing graphic design curricula are no longer suitable for equipping the designer with the necessary competencies required in the market (Ciampa, 2010).

Many art and design schools have modified their curricula to fit digital technology because of the increasing influence of digital media (Amiri, 2011). Design schools need to focus on digital media in order to meet the career needs of future graphic designers (Bacon, 2010). In a way, this means that design education should expand its boundaries to contain technological aspects (Colucci, 2011). As in many other education fields, there can be differences between design education in university and real-life practice. Therefore, the curriculum need to be revised according to the needs of the job (Hsieh, Guan, & Wu, 2010). Marks (2015) suggests replacing the current introductory courses for new undergraduate students with

courses that provide a basic understanding of design principles and vocabulary, as well as more relevant core classes.

Due to the impact of rapid technological developments on the way in which society consumes content, design education needs to recognise this transition and change with it. It is clear that the rapid progress of technology presents a big challenge to design education, especially to those universities that have a hostile relationship with the speed of technological and social change (Fleischmann, 2013). Design schools have developed designer training in light of changes in the field of graphic design, which have mainly been led by technological advances. Designers are often trained in independent thinking about the transmitting medium (Stone, 2013). Somehow, graphic design education must embrace the changes in order to help meet the challenges that are facing corporations and businesses in the marketplace (Canniffe, 2011). Echeverri (2017) also asserts that design education has expanded to include new technological subjects that are related to the new media in the last 15 years.

The transition from the print to the digital platform has forced many educational institutions to re-evaluate their educational practices and procedures, and look again at the philosophical concepts that have long defined and framed design activity (Heller & Talarico, 2011). Erlhoff and Marshall (2008) state that graphic design education in institutions does not give adequate attention to interactive design and time-based design. Graphic design is no longer restricted to 2D design for advertising and printed materials only, it now can include smartphone interface design, web design, and even graphic design for computer games (Efe Varol, 2012).

The rapid and vital change in the nature of digital media has created a major challenge for educational institutions that requires a radical change in existing design curricula to comply with the urgent requirements for changes in the design profession (Faiola, 1999; Fleischmann, 2013). Educational institutions are required to train their students to design for the Web, DVDs, CD-ROMs, online presentations, information kiosks, branded emails, computer games, interactive TV and many more,

after they have taught their students about the composition and layout, typography, and conceptual work involved in advertising and posters (Keating, 2004). Hunter (2014) believes that educational institutions that seek to provide a successful design curricula should prepare their graduates to work in the digital world, which provides jobs opportunities for designers that are equal to what traditional design and advertising companies offer. Steane (2010b) believes that education must prepare student to explore, understand, and develop the language of the new medium, which is interactive.

In the late twentieth century, Western societies focused on learning to deal with computers and digital media. In recent years it has become more necessary to redo the design of curricula and teaching methods so that they equip design graduates with skills for an unknown future (Fleischmann, 2013). The development of and rapid spread of smartphones and social media has created a new challenge for design educators and universities and they need to accommodate the recent changes that have taken place in the profession (Fleischmann, 2013). Despite the dramatic change in design over the past two decades, design educators have failed to reflect these changes in their programmes (Kolko, 2010). Koch (2008) argues that a new design pedagogy is needed due to design now including art, science and technology, which requires changes to be made to design programmes and curricula. Kooi (2008) supports this point of view and calls for new curricula that can prepare students for new tasks and educate them to resolve complex problems that are cross-disciplinary.

The Design Skills Advisory Panel (2007) confirms that there is a gap between the skills that universities and colleges teach graphic design graduates and the skills required by the profession. The Panel explains that the solution to this problem lies in creating designers with a deeper experience in a specific field and a broad knowledge of and skills in other fields. Dubberly (2011) also stresses the importance of developing and adapting design education so that it can remain flexible and help the field in changing. Canniffe (2011) asserts that there is a need for a change in graphic design education to deal with changes in the profession and the marketplace expectations of graphic design graduates. The author also believes that design

schools in the USA are resisting or are not able to fulfil marketplace needs, which has widened the gap between educational instruction and professional practice. Marks (2015) supports this point of view by calling on graphic design education to keep pace with the changes in the profession.

2.9 Graphic Design in Jordan

Graphic design education appeared as an academic discipline in Jordan in the early eighties, and it was initially offered at only one public university, namely, Yarmouk University. Then, later in the nineties, two private universities started to run a graphic design programme. By 2012, there were 14 universities offering programmes on graphic design and related disciplines due to the growing desire among the population to study these disciplines (Al Qur'an, 2012). Most Jordanian universities use a credit hours system, where students need to pass 132 credit hours in practical and theoretical subjects to get a bachelor's degree in graphic design (Alkholy, 2010).

Al Qur'an (2012) conducted a study on teaching graphic design at Jordanian universities. The author indicates that graphic design graduates from Jordanian universities are not well-equipped to work in the graphic design marketplace, and they need more training to work in a sophisticated and rapidly evolving global market. Alhalasa (2017) investigated the relationship between the graphic design curriculum in Yarmouk University and marketplace requirements, and found that the university curriculum does not equip students with the required competencies.

Alkholy (2010), who compared the Jordanian curricula with those offered by institutions in the USA, asserts that graphic design curricula in Jordan need to be improved. Al Qur'an (2012) states that research on the field of graphic design and the teaching of the discipline in Jordan is still limited. The author contends that the shortage in published sources about graphic design education in Jordan is one of the reasons for the limited development and improvement in graphic design education in Jordan.

AbuAwad (2007) points to the importance of cooperation between design education institutions and experts from the marketplace to keep up with technological advances in graphic design to which design education institutions must adapt. A conference held in Amman, which was organised by the Danish–Jordanian University Cooperation Project (DJUCO), discussed the gap between Jordanian university education and the marketplace. The participants asserted that there is a need for cooperation between educational institutions and companies in the private sector, and that curricula need to be developed to bridge the gap and equip students so that they are more able to work in the marketplace (Malkawi, 2014).

While graphic design education is still unable to keep up with changes in the graphic design profession, practitioners are struggling to respond to market needs that are affected by different social, technological, and economic changes (Kooi, 2008). The most prominent among these changes is the growing demand for digital products, which graphic designers are now required to design. This change has led many companies to move from print design to screen design, which requires new skills and knowledge (Keating, 2004). Steane (2010a) points out that 57% of design agencies now offer designs for multimedia/digital media.

Fleischmann (2012) believes that the design industry has been passing through a phase of change and development since the emergence of computers at the beginning of the eighties and later the emergence of interactive digital media. The emergence of the Internet has created new themes that the graphic designer has to get involved with and to which he/she has to apply his/her skills. The graphic design profession has changed profoundly since the emergence of digital media, especially the Internet, and consequently new roles have emerged.

According to the Design Skills Advisory Panel (2007) in the UK, there is a demand for designers who are able to deliver innovation, establish brands, and improve systems to give companies the ability to compete in global markets. The Panel also calls for finding a way to help designers in the marketplace to develop

their skills and knowledge so that they can keep pace with the changes in the design profession. The Panel believes that an improvement in the skills level of design students as well as senior practitioners will contribute to leading the change towards achieving the structural and cultural shifts that the design profession needs.

In Jordan, printing started in the late forties. However, since then printing in Jordan has evolved alongside the developments in other countries. Design practices began in Jordan in the early eighties. At that time, plastic artists and architects played the designer role. By the end of the eighties, the Linotype computer was used for desktop publishing while advertisements were still processed manually. At the same time, some publishing houses were concerned with creating a graphic design section to cover their design needs. Later, Linotype technology was used in various types of commercial printing. Then the computer was used in design and printing to improve productivity, which forced many designers to develop their skills in using computers to implement their designs (AbuAwad, 2007).

AbuAwad (2007) believes that the graphic design sector needs designers who are equipped with sufficient skills to overcome the challenges created by technological developments. This is because graphic design has become dependent on technology to produce designs that require the graphic designer to have a conscious perception about design theories and the required tools to complete his/her tasks.

Jordan is a developing country in the Middle East that suffers from a high rate of unemployment among young people, where the ratio is up to twice that of the global average by 24.1% based on figures provided by the Jordanian Department of Statistics (Malkawi, 2014). On the other hand, many countries in the region depend on educated Jordanians, including graphic designers. Jordan is located next to the Arabian Gulf countries that attract skilled and educated people from other countries to foster domestic development (AbuAwad, 2007). According to AbuAwad (2007), there are more than 500 foundations working in the graphic design field in Jordan. The author mentions that by the end of the nineties, big changes took place in the

graphic design sector with some design companies merging or declining and others expanding.

2.10 Digital Media Design Competencies

The literature review shows that there are clear changes in the role of the graphic designer and his/her tasks, which are heading towards digital media design. Both print and digital media design may require similar knowledge and the principles and theories of the two disciplines are closely related. However, there are still some differences between them, such as in the technologies used and the user experience (Souto, 2017). These differences have forced designers to acquire more of the types of skills and knowledge that are required to meet marketplace needs. The skills and knowledge that are required from a person to be well qualified to perform a task are called competencies (Clark, 2004). Due to technological evolution and the changes in the nature of the profession, it has become necessary to develop job competencies to match marketplace needs and to provide appropriate methods to manage training and development in organisations (Sandberg, 2000).

2.10.1. Competence Theory

The first appearance of the term 'competence' was in 1959 in article authored by R.W. White where it was applied as a concept for performance motivation. Later, in 1973, David McClelland wrote a paper entitled, 'Testing for Competence Rather than for Intelligence', which contributed to spreading the term and its relationship to performance improvement. McClelland initiated the Occupational Competency Movement in the sixties that described competency in terms of knowledge, skills, and attitudes (Ntinyari, 2014). McClelland (1973) considers that the assessment of social competencies as well as occupational ones is desirable and more generally useful in clusters of life outcomes.

Competency is the ability of an individual to do a job properly (Boyatzis, 2008; CIPD, 2014; Ntinyari, 2014). LaRocca (2008) defines competencies as "behaviours that encompass the knowledge, skills, and attributes required for

successful performance" (para. 1). Spencer and Spencer (1993) define competency as "an underlying characteristic of an individual that is casually related to criterion-referenced effecting and/or superior performance in a job situation" (p. 9). Clark (2004) states that most of the definitions of competency contain two basic components:

1. The competencies are observable or measurable skills, knowledge, and abilities.
2. The knowledge, skills, and attitude (KSA) must distinguish between superior and other performers.

A person's mastering of these competencies reflects on the extent of his/her work proficiency (Clark, 2004). The competency concept is associated with performance theory, where the highest level of performance will be achieved when a person's skills or abilities address the needs of the job and the organisational environment (Boyatzis, 2008). Dreyfus and Dreyfus (Ntinyari, 2014) give names to five levels of competency development: "

1. Novice: Rule-based behaviour, strongly limited and inflexible
2. Experienced Beginner: Incorporates aspects of the situation
3. Practitioner: Acting consciously from long-term goals and plans
4. Knowledgeable practitioner: Sees the situation as a whole and acts from personal conviction
5. Expert: Has an intuitive understanding of the situation and zooms in on the central aspects" (p. 19).

Competencies include cognitive skills (technical knowledge, expertise, and abilities), and personal or behavioural characteristics (principles, attitudes, values, and motives) (Ntinyari, 2014). Boyatzis (2008) groups competencies into three clusters, namely:

1. Cognitive competencies
2. Emotional intelligence competencies
3. Social intelligence competencies.

The possession of these competencies will lead to effective or superior performance.

On the other hand, Taylor (2007) sorts competencies into three types:

1. Universals, which could be needed for any job
2. Occupationals, which are related to a specific job or family of jobs
3. Relationals, which are required in a particular job.

Boyatzis (2008) considers that when defining a person's competencies, it should be understood that the person's unconscious motives and traits or dispositions are in the centre, and that these are surrounded by the person's values and self-image. The skill level comes next, and finally observed, specific behaviours.

Organisations that are seeking to achieve better results must be aware of the competencies that each job needs, and knowing this will increase the performance level of their employees, which is an important factor in improving organisational performance (LaRocca, 2008; Ntinyari, 2014). There is a positive correlation between the level of employee performance and job satisfaction and competency-based staffing used by companies (Spencer Jr, 1997).

Competency modelling can be applied to various human resource (HR) activities to identify the competencies required to deliver superior performance in a given job (LaRocca, 2008; Noonan, 2012). Many organisations have become dependent on the concept of competency as a key factor in the recruitment, selection, hiring, and performance evaluation of employees, and it is a popular concept among management as well as HR practitioners (Ntinyari, 2014). Indeed, competency-based HR has become a common practice in most companies that employ more than 300 staff (Boyatzis, 2008). According to Rankin (Taylor, 2007), 76% of organisations use or would like to use a competence framework.

Competencies are normally gained through education, training, experience, and natural abilities (Clark, 2004). Competency-based education has been used for curriculum development, accreditation standards, practice statutes, and certification (American Academy of Physician Assistants, 2010). A study conducted by Spencer

and Morrow (Spencer Jr, 1997) shows that competency-based training raises the performance level significantly more than traditional theory and knowledge training; competency-based training improves performance twice as much as traditional training.

Azemikhah (2006) believes that teaching competency is achieved through several repetitions so that problems can be graded from the simple to the complex until the learner has mastered a particular competency. The wider the circle of competencies gained by the learner, the higher the level of competency and professionalism achieved by the learner. The learner continues in this process until reaching the point of transposition, where he/she becomes able to solve new problems and cases independently.

At the beginning of the twenty-first century, 100 universities in Europe got involved in a project called the Tuning Project, which focused on the development of the educational structures and contents of higher education studies. This project has led the higher education sector globally towards tuning curricula in terms of structures, programmes, and the actual teaching of competencies (Azemikhah, 2006).

Lankard (1990) believes that employers are now looking for employees who have wider competencies than before, which may include some administrative and organisational skills. The author believes that domestic and international competition has a significant impact on the marketplace, which encourages businesses to look for new strategies to improve productivity, services, and product quality. Ntinyari (2014) defines three objectives that are targeted by all countries that have successfully linked skills with productivity in their skills development policy. These objectives are:

1. To meet the demand for skills in terms of relevance and quality
2. To mitigate adjustment costs
3. To sustain a dynamic development process.

Azemikhah (2006) argues that there is a need for new theories such as competency theory in the twenty-first century because the emphasis is no longer limited to the contents, but also includes the constituents of competence. The Chartered Institute of Personnel and Development (CIPD, 2014) defines a competency framework as a structure that sets out and defines each individual competency needed by individuals working in an organisation. Normally, there is an overlap between different competencies in any competence framework (Taylor, 2007). The competence framework for a particular job could be different in different countries and across different cultures. Therefore, there is a growing interest among both academics and practitioners in these differences across different cultures (Taylor, 2007).

Designing a training and development system based on a competency model will:

1. Ensure that there is a focus on the right competencies required from a long-term perspective;
2. Enable a focus on relevant behaviours and skills;
3. Ensure alignment of training and development;
4. Make the most effective use of training and development; and
5. Provide a framework for bosses/coaches (Sanghi, 2007).

2.10.2. Digital Media Design Competencies in the Literature

Due to the change in the graphic designer's role, Panning (2005) calls for a better understanding of industry needs by defining what knowledge and competencies are required to succeed. Wands (2001) suggests three areas that the e-designer student should be encouraged to develop: creativity, traditional art skills, and computer art skills. The Information and Communications Technology Council (2014) in Canada asserts that digital media design occupations require a complex set of skills including technical, creative, communication, and business skills. AIGA (2008) also argues that graphic designers in the future will need more skills than is typical today, but the AIGA questions whether a single designer could possess all the skills required. Heller (2015) asserts that there is an increasing demand for user

experience (UX) and data visualisation designers in the marketplace and wonders about the required knowledge and skills that students should be equipped with for these disciplines.

Ciampa (2010) suggests some solutions to improve graphic design education based on her own thoughts and observations. For instance, she considers the liberal arts to be an important aspect for students to study and suggests increasing the usage of problem-based and group-based learning methods. She also highlights the possibility of students graduating as a specialist in one design discipline or increasing the study period to five years. Furthermore, she calls for activating entrance exams for design schools. Bacon (2010) predicts that in the future graphic design disciplines could include branding and identity, screen and interactive design, motion graphics, environmental design, and data visualisation and information design. Moreover, Freeman (2011) states that the services that a graphic designer should support are interactive media, marketing and advertising, and computer skills.

van der Waarde (2009) identifies 27 activities that are undertaken by graphic design practitioners (see Table 2.2). These activities show the interdisciplinary nature of graphic design practice and to what extent it could expand.

Table 2.2: The Activities of Graphic Designers

No.	Activity	No.	Activity	No.	Activity
1.	Illustration	10.	Infographics	19.	Marketing
2.	Photography	11.	Font design	20.	Communication strategy
3.	Typography	12.	Desktop publishing	21.	Usability
4.	Copywriting	13.	Film production	22.	End user research
5.	Image processing	14.	Website design	23.	Visual research
6.	Animation	15.	Graphic art	24.	Visual strategy
7.	Audio-video	16.	Spatial design	25.	Concept development

No.	Activity	No.	Activity	No.	Activity
8.	Programming	17.	Advertising	26.	House style management
9.	Author	18.	House style design	27.	Project organisation

Source: van der Waarde (2009)

Malvik (2012) analysed more than 28,000 graphic design jobs posted in the USA over three months and determined the top 15 graphic design skills that employers are looking for in their prospective candidates. The skills are listed below in descending order of preference:

1. Photoshop (image editing software)
2. InDesign (page layout software)
3. Website design
4. Illustrator (vector drawing software)
5. Typesetting
6. Concept development
7. Dreamweaver (web development software)
8. Visual design
9. JavaScript (coding software)
10. Packaging
11. Marketing materials
12. Art direction
13. User interface design
14. Print production
15. Multimedia.

Many authors have suggested new competencies that they think designers should have to get involved in digital media design. Yee (2006) asserts that designers must have the ability to deal with a wide range of disparate elements including graphics, music and sound, typography, text, and animation and filmic imagery in an interactive context. Heller and Talarico (2011) consider space, time, sound, and motion as the components of communication design that designers have to deal with.

Therefore, designers should master technologies and learn to use various communication platforms in order to engage with existing and future media and platforms.

The user experience is an interdisciplinary field that could serve many disciplines of information design and other related fields including graphic design (Heavey, 2008). Keating (2004) argues that graphic designers are becoming more involved in digital media design and that they should design the user experience so that it moves away from that encountered in the physical printed material environment. The author asserts that it is important to use the Internet's unique features such as scrolling, interactivity, hypertext, and multimedia. However, the basics that a graphic designer masters, such as layout, colour, typography, and illustration, are still needed in digital media design. Miller (2013) agrees with Keating (2004) about the need for knowledge of design elements and layout for digital media design. Miller (2013) also focuses on the importance of considering the audience experience when designing for digital media. The author states that keeping the audience on a specific website is a new challenge for print designers, which requires clear navigation methods, animation, sound, and interactivity to keep the audience attracted. Danzico (2015) points out that interaction design uses the user experience in a dual way by returning the interaction design back to the users again.

The problems encountered in digital media are more complex than those in print media, therefore to solve them they require multidisciplinary teamwork rather than a solo graphic designer as is the case for print media (Keating, 2004). Fleischmann (2011) agrees with Keating and asserts that teamwork and communication skills are in need of improvement for digital media design. Non-designer participants in digital media design have an essential role to play in the design process, where designers become co-creators (Echeverri, 2017).

The necessity of designers having coding skills is one of the issues about which authors have different opinions. However, most of them agree that designers at least need to have a basic knowledge of coding. Keating (2004) believes that the

graphic designer should at least be fluent in the language of programming and the rhetoric of the programmer, and that the designer also needs to understand the limitations and possibilities offered by programming technology. Buckler (2013) agrees with Keating (2004) and believes that designers should understand the coding basics to avoid mistakes. Zeldman (2001) states that designers must learn some coding languages such as HTML, JavaScript, and CSS. Moreover, the author believes that learning only HTML will limit designers' creative thinking as well as their employability. Fleischmann (2012) believes that the rapid advances in IT components has increased the challenges facing many designers in terms of the need to serve both the creative and technical sides of projects. Miller (2013) states that web designers should at least know what a programmer can or cannot do. Buckler (2013) considers coding skills as beneficial, even if they are not vital for the designer to produce interactive browser-based prototypes, because it is no longer acceptable to provide a single Photoshop mock-up. Reed and Davies (2006) assert that understanding and applying programming principles is a must for graphic designers who would like to develop a digital media design because this will give designers control over the dynamic behaviour of the media.

Gestalt principles still have an influence on digital media. Lynch and Horton (2008) believe that using Gestalt principles in webpage layout will make web content scanning easier. Keating (2004) asserts that Gestalt psychology has been widely used in graphic design and screen design. Using a grid in a digital media design is a critical element that helps designers to achieve a Gestalt composition (DiMarco, 2010). Lynch and Horton (2008) assert that design grids are just as necessary in designing for digital publishing as for paper-based publications.

The main common quality in all forms of digital media is interactivity (Keating, 2004). Gothelf (2011) considers that a basic understanding of interaction design principles is required in anyone designing for the Web. The author also believes that knowing the fundamentals of HCI, user experience design, and human factors will give a design a better chance to succeed.

Social media has become one of the main visual communication channels that designers have to understand and for which they need to create content to keep audiences attracted to their products (Steane, 2010a). Knowing and understanding the design audience is a critical factor that helps a designer to provide them with what they looking for in the way they would like to interact with it and to orient users in a proper way that gives them a sense of place and a non-static experience (Gothelf, 2011). Digital media designers are also required to understand the technology they use besides understanding the audience and being able to communicate with them in an enticing way (Souto, 2017).

Designing for different interface sizes is one of the competencies that a digital media designer has to master when clients want to promote their products and services on the Internet (Steane, 2010a). Storyboarding, which is a concept and technique that can be used to visualise sequences, is important in this regard. It is not only used for cinematic productions, but is also required for other forms of media production like CD-ROMs, websites, motion graphics, movies, and animation (DiMarco, 2010; Erlhoff & Marshall, 2008). Manovich (2016) states that CD-ROMs designers have to adapt cinematography and film editing to an interactive format and also understand the limitations of the hardware, which has merged the moving image technique into a new hybrid language.

In addition to designing the screen's appearance and function, often screen designers design non-visual things, either through the information structure or navigation systems, programming code-based interaction or design sounds and manipulating them as well as designing other forms of feedback information (Erlhoff & Marshall, 2008). Since digital technology is an instant and interactive form of communication, the images and sound in motion graphics have expanded the possibilities of advertising design, social media, and communications beyond the scope of the visual world. The user experience has been enriched greatly through the use of sounds, and visual solutions have become dynamic and multi-dimensional (Cheung, 2011).

Fleischmann (2012) indicates that employers are looking for digital media designers who have an additional core set of interactive and personal attributes such as problem-solving skills, strong communication skills, teamwork skills, an understanding and appreciation for other disciplines, the ability to communicate across disciplines, and an understanding of business. Steane (2010a) says that design agencies highly value any business management and enterprise skills that designers may have.

Three-dimensional design has its applications in traditional graphic design such as in packaging design. However, digital media design has a greater intersection with 3D design due to the 3D space that the designer has to deal with when designing for digital media. Efe Varol (2012) considers that a graphic designer should possess the required knowledge in 3D design, which will give him/her the ability to undertake design projects by himself/herself or cooperate with a 3D designer in more complex projects.

The National Association of Schools of Art and Design (2013), which is based in the USA, has defined nine essential competencies that need to be acquired to gain a BFA in Digital Media as follows: “

1. Knowledge of the concepts related to the visual, spatial, sound, motion, interactive, and temporal elements/features of digital technology and principles for their use in the creation and application of digital media-based work
2. Understanding of narrative and other information/language structures for organizing content in time-based or interactive media; the ability to organize and represent content structures in ways that are responsive to technological, social, and cultural systems
3. Understanding of the characteristics and capabilities of various technologies (hardware and software); their appropriateness for particular expressive, functional, and strategic applications; their positions within larger contexts and systems; and their influences on individuals and society

4. Knowledge of the processes for the development and coordination of digitally-based art and design strategies (for example, storyboarding, concept mapping, and the use of scenarios and personas)
5. Ability to analyse and synthesize relevant aspects of human interaction in various contexts (physical, cognitive, cultural, social, political, and economic) and with respect to technologically-mediated communication, objects, and environments
6. Understanding of what is useful, usable, effective, and desirable with respect to user/audience-centered digitally-based communication, objects, and environments
7. Knowledge of history, theory, and criticism with respect to such areas as film, video, technology, and digital art and design
8. Ability to work in teams and to organize collaborations among people from different disciplines
9. Ability to use the above competencies in the creation and development of professional quality digital media productions" (pp. 2–3).

2.10.3. Previous and Related Studies

The AIGA conducted a study in collaboration with Adobe to determine the significant future factors for graphic design and visual communications by 2015. From this AIGA research, six major trends emerged that help to broadly define the graphic designer's role as follows:

1. Wide and deep: meta-disciplinary study and practice
2. Expanded scope: scale and complexity of design problems
3. Targeted messages: a narrow definition of audiences
4. Break through: an attention economy
5. Sharing experiences: a co-creation model
6. Responsible outcomes: focusing on sustainability (Grefe, 2010).

According to the AIGA and Adobe study, the most important competencies for graphic design are: "

1. Ability to create and develop visual response to communication problems, including understanding of hierarchy, typography, aesthetics, composition and construction of meaningful images
2. Ability to solve communication problems including identifying the problem, researching, analysis, solution generating, prototyping, user testing and outcome evaluation
3. Broad understanding of issues related to the cognitive, social, cultural, technological and economic contexts for design
4. Ability to respond to audience contexts recognizing physical, cognitive, cultural and social human factors that shape design decisions
5. Understanding of and ability to utilize tools and technology
6. Ability to be flexible, nimble and dynamic in practice
7. Management and communication skills necessary to function productively in large interdisciplinary teams and 'flat' organizational structures
8. Understanding of how systems behave and aspects that contribute to sustainable products, strategies and practices
9. Ability to construct verbal arguments for solutions that address diverse users/audiences; lifespan issues; and business/organizational operations.
10. Ability to work in a global environment with understanding of cultural preservation
11. Ability to collaborate productively in large interdisciplinary teams
12. Understanding of ethics in practice
13. Understanding of nested items including cause and effect; ability to develop project evaluation criteria that account for audience and context" (AIGA, 2008).

Cadle (2011) extracts from his research and observations 10 key points that could serve as guidelines for developing a best practice curriculum for the twenty-first century: "

1. Breadth of knowledge
2. Collaboration
3. Critical thinking

4. Design principles
5. Design systems
6. Human-centredness
7. Interdisciplinary
8. Sustainability
9. Technical skills
10. Technological integration" (pp. 8–9).

Dharavath (2003) conducted a study to determine the technical competencies required in the graphic communications technology curriculum. The study was undertaken in the US market and focused on print production. There were two populations for this study: one of practitioners and the other of educators. The study determined that there are 57 technical competencies that the graphic communications technology curriculum requires to prepare students for the prepress and press and printing domain (see Appendix A).

Hsieh et al. (2010) conducted a study to define the competency gap between graphic design graduates and the field of graphic design in Taiwan. The authors identified 42 graphic design abilities (see Table 2.2) that are considered as important by the field of graphic design. The study examined whether the graduating students had these abilities or not. These abilities can be classified into five categories: 1) marketing planning, 2) innovative aesthetic, 3) cost management, 4) print application, and 5) process management. The authors found that students have skills in the marketing planning and innovative aesthetic categories, but have fewer abilities in cost management, print application, and process management. Moreover, the innovative aesthetic category of skills is considered as the most important ability by graphic design graduates.

Table 2.3: Graphic Design: Important Competencies

No.	Item	No.	Item	No.	Item
1	Communication Ability	15	Design Proposals	29	Aesthetic Performance
2	Strategy-making	16	Story Telling	30	Innovative Concept

No.	Item	No.	Item	No.	Item
3	Time Controlling	17	Marketing Investigation	31	Colour Scheme
4	Resource Controlling	18	Cost Planning	32	Photography Ability
5	Cost Controlling	19	Leading Ability	33	Print Design
6	Public Relations	20	Activity Enforcement	34	Information Management
7	Marketing Analysis	21	Planning Ability	35	Colour Management
8	Advertisements	22	Marketing Planning	36	Paper Material Application
9	Finance Management	23	Modelling Design	37	Print Process
10	Accounting Management	24	Design Ethic	38	Print Appraisal
11	Cost Analysis	25	Aesthetic Criterion	39	Editorial Design
12	Design Appraisal	26	Image Design	40	Software Application
13	Negotiation Skills	27	Intellectual Property Rights	41	Sketching
14	Design Methods	28	Material Application	42	Computer Graphic

Source: (Hsieh et al., 2010)

Wang (2006) identifies the essential competencies in graphic design by obtaining a consensus and validation from a panel of experts. The panel consisted of practitioners and educators. First, the author identified 63 competencies that are considered as desirable (see Appendix B). The panel then chose the 20 most important competencies for employment as follows:

1. Apply the principles of graphic design
2. Apply the basics of graphic design for print production
3. Apply the techniques of page layout and publishing software
4. Be able to learn and comprehend
5. Apply the basics of graphic design for webpage development
6. Apply the concepts of problem-solving
7. Apply the concepts of typography
8. Perform graphic design creatively
9. Perform conceptual thinking and ability

10. Determine the costs associated with graphic design and other creative services
11. Perform clear and concise verbal and written communications
12. Apply design concepts
13. Comprehend the terms used in graphic communications
14. Apply the techniques of image editing software
15. Desire to improve and clarify
16. Be able to teach or convey an idea, feeling and belief
17. Apply the basics of graphic design for multimedia
18. Apply the basics of photography for graphic design purposes
19. Prepare digital documents
20. Apply the techniques of colour management.

2.10.4. Proposing Competencies for Digital Media Design

From the above review of the previous literature, it is clear that some digital media design competencies have been identified by scholars as significant for digital media design. These competencies range across the domains of knowledge, skills, and attitude. However, none of the previous literature aimed specifically to identify the needed competencies for digital media design. Therefore this gap in knowledge will be addressed by this research. Thirty-seven competencies have been drawn from the literature review and are listed in Table 2.4 below:

Table 2.4: Drawn Competencies from the Literature Review

No.	Competency
1-	Apply basic knowledge of Gestalt psychology to digital graphic design
2-	Apply design principles on digital platforms
3-	Use graphic design terminology
4-	Applied understanding of typography and its judicial application
5-	Applied understanding of graphic design communication trends
6-	Applied understanding of editorial design for digital media
7-	Understanding aesthetics and aesthetic criterion

No.	Competency
8-	Ability to perform creative thinking
9-	Applied understanding of history of art
10-	Applied understanding of history of graphic design
11-	Apply the concepts of cross-media publishing and document repurposing
12-	Understand web processes and protocols
13-	Understanding of how systems behave and aspects that contribute to sustainable products, strategies and practices
14-	Applied understanding of presentation skills
15-	Applied understanding of and ability to utilise tools and technology
16-	Apply the techniques of page layout and publishing software
17-	Understand different types of computing platforms
18-	Apply the basics of photography for graphic design purposes
19-	Applied understanding of technical communication skills
20-	Applied understanding of recognising physical, cognitive, cultural and social factors that shape design decision
21-	Ability to solve communication problems visually
22-	Ability to collaborate productively in large interdisciplinary teams
23-	Applied understanding of colour theory
24-	Applied understanding of design theories and methodologies
25-	Applied understanding of digital advertising
26-	Apply the basics of graphic design for digital media
27-	Applied understanding of interactive design
28-	Understanding visual design psychology and visual literacy
29-	Applied understanding of user experience on digital media
30-	Describe different types and sizes of screens
31-	Applied understanding of basic marketing
32-	Applied understanding of storyboarding
33-	Apply the techniques of drawing software
34-	Apply the techniques of image editing software
35-	Applied understanding of basic programming skills

No.	Competency
36-	Apply the techniques of webpage development software
37-	Applied understanding of animation and motion graphics

As mentioned above, some scholars have conducted research studies that sought to identify graphic design competencies. Dharavath (2003) identifies 57 technical competencies for the graphic communications technology curriculum, which mostly focus on the technical aspects that the designer needs for preparing the design in the prepress stage, and also the technical aspects that the designer should know in the printing and post-printing stages. The competencies are sorted into four groups: print management, prepress, press and printing, and binding and finishing.

Later, Wang (2006) conducted another research study that sought to identify the needed competencies for graphic design. Wang identifies 63 competencies that are considered as needed competencies for the graphic designer. Wang's competencies are different to those of Dharavath, which included the basics and supplementary knowledge needed for the graphic design discipline, practical and technical skills, as well as the behaviour and attitude that designer should possess. Wang's study also included some digital design competencies that the graphic designer should have at that time such as being able to apply the basics of graphic design for multimedia and webpage development.

Hsieh et al. (2010) conducted a study that sought to identify the competency gap between what the marketplace needs and what graphic design graduates possess, and identified 42 competencies that are considered as significant to graphic design. The results of the Hsieh study are generally close to those of the Wang study. However, the Hsieh study focused more on the management, economic, and financial aspects, which accounted for 18 out of the 42 identified competencies. The AIGA (2008) study just identified 13 major competencies, where each one of them represents a set of graphic design competencies.

Dharavath (2003) and Wang (2006) relied on Delphi method to identify their competencies, where a panel of experts was formed from academics and practitioners. However, Hsieh et al. (2010) first used an education map for curricula development and then the proposed competencies were presented to three experts in designing curricula to discuss, which resulted in revealing the 42 competencies that are considered as needed for the graphic design marketplace in Taiwan. The AIGA (2008) study was conducted in cooperation with Adobe and it relied on interviews, focus groups, workshops, and surveys to identify the required competencies for the graphic designer. Educators, observers of the field, and AIGA members participated in the AIGA study.

The results of the above mentioned studies were not close to each other mainly because the aim and geographical context of each study differed. There was only one competency that all these studies agreed on, which is 'communication skills'. Dharavath (2003), Wang (2006), and Hsieh et al. (2010) agree on three competencies: photography, printing process, and paper properties. Wang (2006), Hsieh et al. (2010), and AIGA (2008) agree on the need for ethics and management skills competencies. Wang (2006) and Hsieh et al. (2010) are the studies that have greatest number of common competencies as they agree on 14 competencies.

From the previous and related studies, 34 competencies have been adopted to be proposed for digital media design competencies in addition to the competencies that listed in Table 2.4. The new competencies are listed in Table 2.5 below:

Table 2.5: Adopted Competencies from Previous and Related Studies

No.	Competency
1-	Understanding construction of meaningful images
2-	Apply the concepts of economics in graphic communications
3-	Identify characteristics of digital communications
4-	Applied understanding of research skills and methods
5-	Apply the techniques of information and Internet searching
6-	Ability to control cost, time and resources

No.	Competency
7-	Determine the costs associated with graphic design and other creative services
8-	Demonstrate the ability of design analysis
9-	Applied understanding of strategy-making
10-	Applied understanding of outcome evaluation
11-	Applied understanding of drawing sketches
12-	Applied understanding of prototyping
13-	Explain document and workflow management
14-	Apply the techniques of preparing portfolios
15-	Demonstrate digital document delivery
16-	Be able to convey an idea, feeling and belief
17-	Identify and provide customer needs
18-	Be able to learn and comprehend
19-	Ability to plan and lead design projects
20-	Ability to be flexible, nimble and dynamic in practice
21-	Comprehend ethical behaviours, Intellectual Property Rights (IPR) and copyright issues in design professions
22-	Applied understanding of using local cultural symbolism and colours
23-	Desire to improve and clarify
24-	Ability to work in a global environment with understanding of cultural preservation
25-	Understanding of nested items including cause and effect
26-	Ability to develop project evaluation criteria that account for audience and context
27-	Comprehend the basics of art appreciation
28-	Applied understanding of design appraisal
29-	Apply design and innovative concepts
30-	Understanding composition and its construction mechanism
31-	Apply the techniques of multimedia creation software

No.	Competency
32-	Applied understanding of how to communicate and sell ideas and designs to clients
33-	Applied understanding of decision-making and project management

2.11 Summary

Graphic design has relied on paper and print since its emergence. Developments in printing and technological advancements helped in widely spreading and improving graphic design. The usage of the computer as an implementation tool for graphic design contributed greatly to saving time and cost in the production of a design, which forced graphic designers to move from creating hand-made designs to using computer applications.

The role of the graphic designer started expanding with the need to improve the visual appearance of the computer screen interface, which is called the GUI. The Internet also played an important role in changing the graphic designer's role as it expanded the scope of graphic design beyond that of just printed material. In the last decade, digital media has pushed out the graphic design boundaries and transformed it from being linear and 2D to being flexible and 6D with real time, motion, sound, and interactivity dimensions. The rapid spread in the usage of digital media among the general population globally has created a real threat to the future of the print medium.

Digital media has affected many aspects of the graphic design profession, such as the graphic designer's role, the message content, and even the profession's name. The new tasks require new competencies including knowledge, skills and attitudes that the graphic designer needs to have in order to design for digital media.

From reviewing the literature, it is apparent that some previous studies aimed to identify graphic design or digital media competencies. For instance, in the context of the USA, Dharavath (2003) identifies the technical competencies for graphic

communications technology, while Wang (2006) identifies the essential competencies in graphic design. Also in the USA, AIGA (2008) identifies the most important competencies for graphic design. Hsieh et al. (2010) define the competency gap between graphic design graduates and the graphic design field in Taiwan, while AbuAwad (2012) identifies the significant design competencies in Jordan. Following this line, this study will identify the significant competencies for digital media design in Jordan and then attempt to explore the needed competencies for print graphic designers to transition into digital media design.

A set of competencies have been deduced from the literature review and these are summarised in Table 2.6 as follows:

Table 2.6: Proposed Competencies from the Literature Review

No.	Competency
1-	Apply basic knowledge of Gestalt psychology to digital graphic design
2-	Apply design principles on digital platforms
3-	Use graphic design terminology
4-	Applied understanding of typography and its judicial application
5-	Applied understanding of graphic design communication trends
6-	Applied understanding of editorial design for digital media
7-	Understanding construction of meaningful images
8-	Understanding aesthetics and aesthetic criterion
9-	Ability to perform creative thinking
10-	Apply the concepts of economics in graphic communications
11-	Identify characteristics of digital communications
12-	Applied understanding of history of art
13-	Applied understanding of history of graphic design
14-	Apply the concepts of cross-media publishing and document repurposing
15-	Applied understanding of research skills and methods
16-	Apply the techniques of information and Internet searching
17-	Understand web processes and protocols
18-	Understanding of how systems behave and aspects that contribute to

No.	Competency
	sustainable products, strategies and practices
19-	Ability to control cost, time and resources
20-	Determine the costs associated with graphic design and other creative services
21-	Demonstrate the ability of design analysis
22-	Applied understanding of strategy-making
23-	Applied understanding of outcome evaluation
24-	Applied understanding of drawing sketches
25-	Applied understanding of prototyping
26-	Applied understanding of presentation skills
27-	Applied understanding of and ability to utilise tools and technology
28-	Apply the techniques of page layout and publishing software
29-	Understand different types of computing platforms
30-	Explain document and workflow management
31-	Apply the basics of photography for graphic design purposes
32-	Apply the techniques of preparing portfolios
33-	Demonstrate digital document delivery
34-	Applied understanding of technical communication skills
35-	Be able to convey an idea, feeling and belief
36-	Identify and provide customer needs
37-	Be able to learn and comprehend
38-	Ability to plan and lead design projects
39-	Ability to be flexible, nimble and dynamic in practice
40-	Comprehend ethical behaviours, intellectual property rights (IPR) and copyright issues in design professions
41-	Applied understanding of using local cultural symbolism and colours
42-	Applied understanding of recognising physical, cognitive, cultural and social factors that shape design decisions
43-	Desire to improve and clarify
44-	Ability to solve communication problems visually

No.	Competency
45-	Ability to work in a global environment with understanding of cultural preservation
46-	Understanding of nested items including cause and effect
47-	Ability to develop project evaluation criteria that account for audience and context
48-	Comprehend the basics of art appreciation
49-	Applied understanding of design appraisal
50-	Apply design and innovative concepts
51-	Understanding composition and its construction mechanism
52-	Apply the techniques of multimedia creation software
53-	Applied understanding of how to communicate and sell ideas and designs to clients
54-	Applied understanding of decision-making and project management
55-	Ability to collaborate productively in large interdisciplinary teams
56-	Applied understanding of colour theory
57-	Applied understanding of design theories and methodologies
58-	Applied understanding of digital advertising
59-	Apply the basics of graphic design for digital media
60-	Applied understanding of interactive design
61-	Understanding visual design psychology and visual literacy
62-	Applied understanding of user experience on digital media
63-	Describe different types and sizes of screens
64-	Applied understanding of basic marketing
65-	Applied understanding of storyboarding
66-	Apply the techniques of drawing software
67-	Apply the techniques of image editing software
68-	Applied understanding of basic programming skills
69-	Apply the techniques of webpage development software
70-	Applied understanding of animation and motion graphics

The next chapter will discuss the methodologies that have been used in this research to achieve the research aim and objectives, which include semi-structured interviews, a modified Delphi method, and a self-assessment questionnaire. It will also present the study populations, sampling method, instruments, data collection procedures, data analysis, and ethical considerations.

CHAPTER 3

METHODOLOGY

3.1 Overview

This research is a descriptive research study. Both qualitative and quantitative methods were used to address the research objectives. In this research one preliminary study and two main studies were undertaken. In addition, as a secondary source of data, a literature review was conducted to gather information to understand the evolution of graphic design and digital media and highlight the important issues related to digital media in order to inform the research questions and identify gaps in knowledge.

The preliminary study involved conducting semi-structured interviews with practitioners and educators in digital media design. The aim of the preliminary study was twofold: to explore some digital media design experts' viewpoints about the preparedness of Jordanian university graduates for practising digital media design and to propose competencies that are considered as significant for digital media designers.

The aim of the first of the two main studies, Study I, was to obtain a consensus on and validation of the significant competencies for digital media design in Jordan by using a modified Delphi method for which a panel of experts was formed that consisted of digital media design practitioners and academics.

Based on the results of the first study, a questionnaire was designed for the second main study, Study II. The population consisted of graphic design practitioners in the Jordanian market. This study aimed to explore the needed competencies for

print graphic designers to transition into digital media design. Figure 3.1 shows the research design and methods for this study.

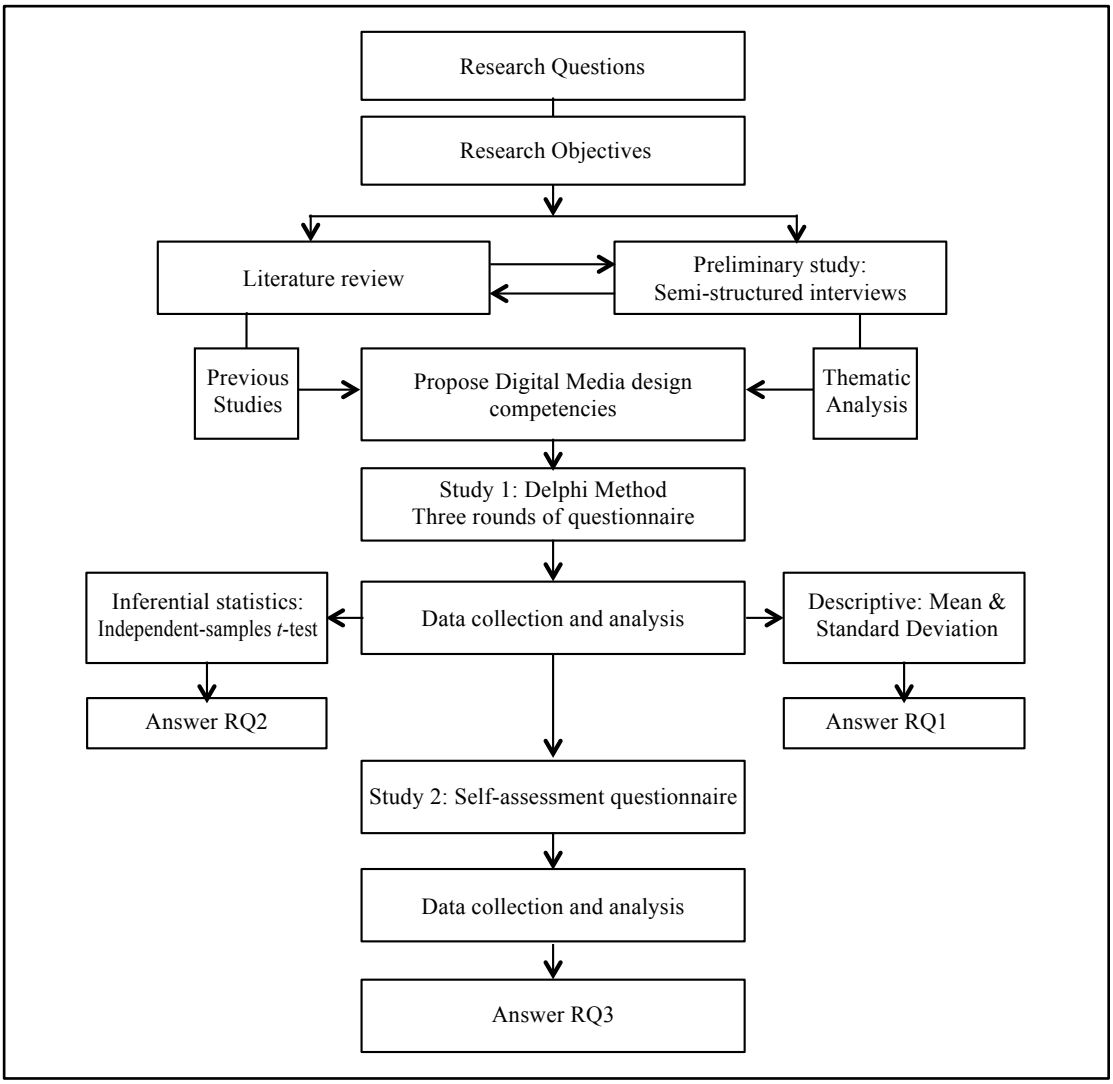

Figure 3.1: Research Design and Methods

3.2 Preliminary Study: Semi-Structured Interviews

The literature review revealed that there is a lack of sources that discuss the research problem generally and the situation in Jordan specifically. Alhalasa (2017) states that there is a shortage of research on graphic design education in Jordan. The consequent lack of evidence is the main motivation for this research study.

One of the main aims of the preliminary study was to explore some digital media design experts' viewpoints about the state of digital media design practice and education in Jordan. The other main aim was to identify a list of competencies that are considered significant for the digital media designer.

For this exploratory study, the researcher used a qualitative approach to get as much information as possible about the research problem. Individual interviews with academics and practitioners in the field of digital media design were conducted for this study.

3.2.1 Semi-Structured Interview

The semi-structured interview was chosen as the data collection method for this study as it gives the researcher the ability to explore the phenomena in depth by gathering more accurate and detailed information. This method is considered as one of the most effective methods to understand user behaviours (Lynch & Horton, 2008). Laforest (2009) states that interviews are useful for studying a specific situation and effective for gaining insight into problems that cause concern in certain segments of the population. McNamara (2006) asserts that interviews are useful for getting the story behind a participant's experiences, which can give in-depth information around a topic.

Woods (2011) considers the face-to-face interview mode as the best mode for semi-structured interviews. The semi-structured interview still has to be partially pre-planned, but the researcher has the opportunity to ask more questions to encourage participants to express themselves. Also, Phellas, Bloch, and Seale (2012) state that some of the advantages of face-to-face interviews include the ability to explain complex questions, if necessary, to the interviewee, the ability to control the context and the environment in which the interview takes place, and the ability to use visual aids.

Leading questions were avoided to minimise interviewer bias. Moreover, the researcher avoided using body language or verbal cues that could reveal his own opinions. Each respondent was given time to answer all the questions freely.

3.2.2 Study Population and Sampling

This study involved two different populations in the field of digital media design: graphic design academics in Jordanian universities and digital media design practitioners in the Jordanian design industry. The sampling method used in this study was non-probability sampling because, as Laforest (2009) explains, sampling for semi-structured interviews relies on knowing the participants' position, activities or responsibilities in order to identify those who are experts in a particular field and consider them as privileged witnesses who have a good understanding of the problem to be explored.

Academic participants who teach design for digital media and related subjects in Jordanian universities were chosen for this preliminary study because academics have a good understanding of the state of digital media design in Jordan. Moreover, they have the capability to determine some of the additional competencies that print graphic designers might need to transition into the digital media design profession.

The Jordanian universities that offer a major in graphic design and other related disciplines were identified from the website of the Jordanian Higher Education Accreditation Commission (HEAC, 2012). The deans of the faculties or the heads of graphic design departments in each of these universities were contacted to nominate a suitable participant for the interview.

Practitioners in the digital media design profession were chosen by defining the most famous and largest companies in the field of digital media design in Jordan based on the size and reputation of these companies in the Jordanian marketplace. At each company a representative was selected who was a creative manager or an art director. Normally, this type of representative is the person responsible for

determining the competencies required for the designer working within the company's team.

In total, 27 academic and professional nominated interviewees were prepared to take part. The number of interviews conducted was based on the concept of data saturation, where the researcher stops conducting interviews if the interviews do not provide any new or additional insights (Laforest, 2009). Each of the nominated interviewees was contacted separately to agree an appropriate time and venue to conduct the interview.

3.2.3 Study Instrument

Semi-structured interviews need rigorous preparation, which includes defining the interview objectives, formulating an interview plan, and drawing up a consent form (Laforest, 2009). An interview plan was formulated by taking into consideration the difference between the two study populations. An interview plan guides the interviews and gives the interviewer the flexibility to change the order of questions or choose another wording (Phellas et al., 2012). The interviews for each population were based on the following sets of questions:

Questions for academics:

1. Do you think that there is a difference between designing for print and digital media? What is the difference?
2. Are there any specific courses that teach digital media design in Jordanian universities? What are they?
3. Do you think that Jordanian universities are properly qualifying their students to work in the field of digital media design?
4. In your opinion, which way will your university graduates trend after graduation? To print or digital media design?
5. In your opinion, what competencies does a graphic designer need to be equipped with for digital media design?

Questions for practitioners:

1. Do you think that there is a difference between design for print and digital media? What is the difference?
2. How did you get into digital media design? And what obstacles have you faced?
3. What competencies have you gained from field experience that university did not equip you with?
4. Do you think that Jordanian university graduates are currently eligible to practise digital media design? What competencies do they need?
5. What courses do you suggest should be added to the current curriculum to enhance your career as a digital media designer?

The above questions guided every interview to ensure consistency. Also, the flexibility of the semi-structured interview gave the interviewees the opportunity to bring up other issues that they thought were important to the study (C. Dawson, 2009).

Due to the variation in the participants' background, culture, and education level, the interviews were conducted in the Arabic language, which is the mother tongue of all the study participants, because it was judged that this would give the participants the ability to express themselves better.

3.2.4 Data Collection

Semi-structured interviews allow interviewees to raise new important issues that the researcher might not have considered (C. Dawson, 2009). The first couple of interviews were conducted and analysed before completing the other interviews (Hoyos & Barnes, 2012). The analysis of these interviews helped the researcher to address loopholes in or make additions to the interview plan, which improved the conduct and outcome of the subsequent interviews. The researcher was also prepared

to deal with any misunderstanding of the questions or deviation from the interview limitations.

This study lasted for two consecutive months. A total of 17 interviews were conducted to get to the data saturation point. The interview participants consisted of eight academics and nine practitioners in digital media design. Some of them were interviewed in their own office and others were interviewed in a hotel lobby in Amman. Most of the interviews lasted between 15–20 minutes. All the interviews were documented through audio recording and photographs (see Figure 3.2) and consent forms were signed by all interviewees (see Appendix C).

Figure 3.2: Example of an Interview in Progress

3.2.5 Data Analysis

The interviews were analysed using thematic analysis, which is a way of seeing and a process for coding qualitative information (Woods, 2011). Interviews in

general are a way to describe and explore central themes in the real-life world of the subjects (Kvale, 1996). The collected data was identified, coded, and categorised into themes (Woods, 2011). This technique is recommended when a rich and broad thematic description is needed, especially if there is a lack of literature on the research issues (Boyatzis, 1998).

NVivo software version 8.0 was used for the interview analysis, which facilitated the data analysis process. All the interview data, as well as the demographic data on the study sample, was entered into the software. The program helped the researcher to classify the interview themes. From among these themes, key words were extracted to indicate the participant's viewpoint. The program also helped in identifying issues about which the participants agreed or disagreed.

3.3 Study I: Digital Media Design Competencies

This study was conducted to achieve the first and second objectives of this research, which are:

- To obtain a consensus and validation from a panel of experts in identifying the significant competencies for digital media design in Jordan.
- To understand and discuss the differences between practitioners' and academics' perceptions of the validated competencies.

This study will answer the first and second research questions, which are:

- RQ1: What are the most important competencies that digital media design practices need in Jordan?
- RQ2: How do practitioners and academics perceive the digital media design competencies investigated in this study? Where are the differences in those perceptions?

The researcher proposed a list of competencies that are required in the digital media designer. These competencies were drawn out of the literature review and the preliminary study conducted for this research. To obtain a consensus and validation

from a panel of experts on the proposed competencies, a modified Delphi method was used. A panel of experts was formed that consisted of academics from Jordanian universities and practitioners from the digital media design profession as representatives of the design marketplace.

3.3.1 Delphi Method (Technique)

Dalkey (1969) defines the Delphi method or technique as a set of procedures for formulating a group judgement on subject matter where precise information is lacking. It is also defined by Delbecq et al. (1975) as a group process tool used by organisations or researchers to utilise written responses as opposed to bringing individuals together. Linstone and Turoff (1975) state that the main objective of the original Delphi method was to obtain the most reliable consensus from a group of expert opinions, where they defined consensus as opinion stability or the collective agreement among the group members.

Olaf Helmer and Norman Dalkey developed the Delphi method in the 1950s in order to address military issues in the RAND Corporation (Delbecq et al., 1975). Delbecq et al. (1975) present a 10-step procedure that guides researchers in utilising the Delphi method of study: “

1. Develop the Delphi Technique question, and identify what information is desired and how the information will be used;
2. Select and contact respondents;
3. Select panel members;
4. Develop first-round questionnaire and test;
5. Analyse first-round questionnaire;
6. Develop second-round questionnaire based on the results of first-round questionnaire and test;
7. Analyse second-round questionnaire;
8. Develop third-round questionnaire based on the results of second-round questionnaire and test;
9. Analyse third-round questionnaire;

10. Prepare a final report" (p. 87).

The Delphi method has been used as a forecasting methodology (Sekaran & Bougie, 2010). It has also been used as a tool for group decision-making, structuring group communications, group problem-solving, and structural models (Landeta, 2006; Linstone & Turoff, 1975). The Delphi method is particularly useful in achieving consensus in an area where there is uncertainty or a lack of empirical evidence (Powell, 2003). Delbecq et al. (1975) state that the objectives associated with utilising Delphi method are: "

1. To determine or develop a range of possible program alternatives.
2. To explore or expose underlying assumptions or information leading to different judgments.
3. To seek out information which may generate a consensus on the part of the respondent group.
4. To correlate informed judgments on a topic spanning a wide range of disciplines.
5. To educate the respondent group as to the diverse and interrelated aspects of the topic" (pp. 10–11).

The Delphi method was quickly accepted and rapidly spread due to its ability to reveal valuable solutions for problems based on traditional group opinion methods (Landeta, 2006). The Delphi method is one of the best-known methods that has good prediction accuracy in the short-, medium-, and long-term time range (Gupta & Clarke, 1996). However, Skulmoski, Hartman, and Krahn (2007) caution that many design considerations need to be taken into account in order to use the Delphi method successfully.

3.3.2 Delphi Method Advantages and Disadvantages

The Delphi method has many unique strengths as a planning, forecasting, and decision-making tool (Gupta & Clarke, 1996). However, as with any other method, it has its advantages and disadvantages. One of the prominent features of the Delphi

method is the high level of accuracy of the results it generates (Dalkey, 1969). This is because it relies on a structured approach for group learning and forecasting by eliciting responses in a quick and efficiency way (Gupta & Clarke, 1996).

The Delphi method gives experts who face travel and schedule constraints the ability to choose their preferred time and place of participation. It also minimises conflicts among the panellists as they do not need to meet face to face. A face-to-face discussion is traditionally conducted to reach a consensus, but some people with greater authority or a louder voice tend to dominate such discussions. An advantage of the Delphi method is that it enables each participant to have an equal voice to express his/her opinion and make his/her own decisions (Gupta & Clarke, 1996; Wang, 2006). The Delphi method reduces the influence of undesirable psychological effects among the participants (Landeta, 2006) and encourages independent thought and a gradual formation of group solutions (Gupta & Clarke, 1996). However, one of the disadvantages of the Delphi method is the time required to conduct a Delphi method-based study. It is estimated by Delbecq et al. (1975) that a Delphi method-based study takes about 44 days, which may decrease the participants' motivation to complete the process.

3.3.3 Uses of the Delphi Method

Despite the drawbacks mentioned above, the Delphi method is a popular forecasting technique that has been extensively applied to a wide variety of problems in different domains (Gupta & Clarke, 1996; Iqbal & Pipon-Young, 2009). The purpose of using the Delphi method is to improve the quality of decision-making by collecting opinions from a panel of experts (Delbecq et al., 1975). The Delphi method has been used in different fields and for a variety of objectives. It has been utilised for forecasting and evaluating planning in industry, education, health, and urban development (Dalkey, 1969). Many articles in the social sciences and health sciences have used the Delphi method as a study instrument (Landeta, 2006).

One of the reasons for the rapid uptake of the Delphi method was its utility in identifying competencies in different fields. For example, Wang (2006) utilises a modified Delphi method to identify the significant competencies in graphic design, while Dharavath (2003) uses a modified Delphi method to identify the competencies in printing management and related areas. AbuAwad (2012) chose a modified Delphi method to identify the competencies for sign designers in Jordan and Staykova (2012) used a modified Delphi method to identify the competencies that nurse educators must demonstrate when designing nursing curricula.

It has been suggested that the Delphi technique can be used when: "

1. The problem does not lend itself to precise analytical techniques but can benefit from subjective judgment on a collective basis;
2. The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication and may represent diverse backgrounds with respect to experience and expertise;
3. More individuals are needed than can effectively interact in a face-to-face exchange;
4. Time and cost make frequent group meetings infeasible;
5. The efficiency of face-to-face meetings can be increased by a supplemental group communication process;
6. Disagreements among individuals are so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured; and
7. The heterogeneity of the participants must be preserved to assure validity of the results" (Linstone & Turoff, 1975, p. 4).

Many authors have discussed the Delphi method and its validity and uses. Landeta (2006) argues in favour of the validity of the Delphi method and states that it is a valid instrument for forecasting and supporting decision-making. Gupta and Clarke (1996) analysed 463 papers that used the Delphi method in their methodology over a period of two decades (1975–1994) and they found that the Delphi method was widely used in different domains for a wide range of complex problems during that period.

3.3.4 Modified Delphi Method

In the classical Delphi method, the panel of experts is asked to respond to open-ended questions in the first-round questionnaire, where the panel can put forward their suggestions that are then used to formulate the second-round questionnaire. Every subsequent questionnaire relies on the collected responses of the preceding questionnaire. The process concludes when consensus is reached (Delbecq et al., 1975; Sekaran & Bougie, 2010). The Delphi method process can consist of two or more rounds of questionnaires, and the rounds continue until the researcher stops the process (Sekaran & Bougie, 2010).

Since the emergence of the Delphi method, many researchers have added some modifications to the traditional Delphi method to increase the efficiency of conducting their studies and/or the accuracy of the results (Gupta & Clarke, 1996; Wang, 2006). One of the major modifications that has been adopted involves the proposal of a set of carefully selected items at the beginning of the process, which can be drawn from different sources such as a literature review or interviews with selected experts (Custer, Scarcella, & Stewart, 1999). For studies that aim at identifying competencies, Wang (2006) modified the Delphi method by proposing a list of competencies in the first-round questionnaire based on a literature review instead of asking the panel to develop the first-round statements. This modification accelerates the process without affecting the integrity of data collection (Wang, 2006). This modification also improves the response rate in the first round and because it relies on previous work it provides a solid grounding for the questionnaire (Custer et al., 1999).

Dharavath (2003), Wang (2006), and AbuAwad (2012) have used a modified Delphi method to identify competencies for different disciplines in the art and design domain. A modified Delphi method was also used in this study in which three rounds of questionnaire were utilised to obtain a consensus among higher education educators in graphic design and professional practitioners in the field of digital media design.

3.3.5 Study Population and Sampling

Expert sampling, which is one of the non-probability sampling designs, was used in this study because the participants have to have specific characteristics that are not available in the general population (Kumar, 2011). Delbecq et al. (1975) state that participants in the Delphi technique should: “

1. Feel personally involved in the problem of concern to the decision maker.
2. Possess pertinent information to share.
3. [Be] motivated to include the Delphi task in their schedule of completing tasks.
4. Feel that the aggregation of judgment of a respondent panel will include information which they too value and to which they would not otherwise have access” (pp. 87–88).

The knowledge, experience, and habitus that experts should have is very beneficial in qualitative research studies that employ the Delphi method (Creswell, 2007; Skulmoski et al., 2007). In this study, the above-mentioned characteristics were taken into account when the panel of experts was appointed. The participants signed a consent form (see Appendix D) that explained their right to withdraw at any time, but at the same time, it helped to reduce the possibility of participant withdrawal.

As mentioned earlier, the panel of experts for this study was formed from two different populations: academics from higher educational institutions in graphic design and other related majors, and practitioners from the digital media design profession.

To take part in the panel for this study, the academic experts had to:

1. Be engaged in teaching digital media design subjects
2. Have at least 5 years of experience
3. Have the ability to express their opinions clearly
4. Be willing to commit to all study stages,

To be included in the panel, the practitioner experts in this study had to:

1. Be engaged in digital media design practice
2. Have at least 5 years' experience
3. Occupy a management position
4. Have the ability to express their opinions clearly
5. Be willing to commit to all study stages.

The academic participants in the panel were from Jordanian universities and were nominated by their head of department. All the academic participants were currently teaching design for digital media courses such as web design and animation, which are part of the curriculum for degrees in graphic design or other related disciplines at Jordanian universities, such as degrees in design and visual communication and animation. Some of these academics hold a postgraduate qualification in the field of design and digital media. The reason for choosing academics from graphic design or other related disciplines is that there is no separate discipline for digital media design or web design in Jordan (HEAC, 2012). On the other hand, the practitioner participants in the panel of experts were senior officials from the leading digital media design companies in Jordan. Some of them have experienced the transition from print graphic design to digital media design.

The preferred panel size according to Delbecq et al. (1975) is about 30 participants. Skulmoski et al. (2007) assert that there are no hard and fast rules to define the required number of participants for the Delphi method. They reviewed many studies that utilised Delphi method and found that the number varies between eight and 61 participants. Iqbal and Pipon-Young (2009) state that the panel of experts in Delphi method-based studies can range between seven and 1,000 participants.

In this study, 48 candidates were contacted to be part of the panel of experts; 25 of them were academics and 23 were practitioners. The final makeup of the panel of experts contained 16 academics and 14 practitioners who agreed to participate in the study. Usually, the participants' identities are not revealed to prevent some

experts dominating others, and this allows experts to express their opinions unreservedly (Sekaran & Bougie, 2010).

3.3.6 Study Instruments

The Delphi technique relies on a series of questionnaires that are sent to a panel of experts who then evaluate the questionnaire items. The panel members have the ability to propose any amendments or additions to the questionnaire items that they think necessary. In this study, the first-round questionnaire was designed based on the outcomes of the literature review and the preliminary study conducted for this research, which is the main difference between the classical Delphi technique and the modified Delphi technique (Wang, 2006). Iqbal and Pipon-Young (2009) state that to generate consensus in studies using the Delphi method, it is preferable to conduct three or more rounds of questionnaire. Brooks (Custer et al., 1999) suggests that three rounds of questionnaire are usually sufficient to arrive at a consensus. The repeated inclusion of the items that are rated as significant in every round gives the panel of experts a new chance to reassess the items and change their opinion in light of the results of the previous round. At the same time, they have the opportunity to suggest new competencies that they omitted in the preceding round or make amendments to existing ones (Hsu & Sandford, 2007; Iqbal & Pipon-Young, 2009).

In this study, the first-round questionnaire, which was developed based on the literature review and the preliminary study, was reviewed by three academics before it was sent to the panel of experts. The participants were given the opportunity to contribute their ideas or make comments on the proposed competencies when responding to the first- and second-round questionnaires. Iqbal and Pipon-Young (2009) recommend giving the panel of experts the power to modify or produce the items, which may improve the reliability and validity of the study.

In the first of the three rounds of questionnaire for Study I, a cover letter (see Appendix E), participant information sheet (see Appendix F), and consent form (see Appendix D) were enclosed with the first-round questionnaire. The cover letter included the title of the study, the timescale in which to return the questionnaire, and

the instructions to complete the questionnaire (see Appendix E). The information sheet included the title and the purpose of the study, the reason for selecting the participant, the participant's right to withdraw, the nature of the access to the provided information, and the researcher's contact information (see Appendix F). The signing of the consent form constituted agreement by the participant to participate in the study (see Appendix D).

The first-round questionnaire consisted of three parts: the first part was designed to collect demographic information about the participant; the second part contained close-ended questions; and the third part contained an open question to allow the participant to suggest new competencies or modify the included ones (see Appendix G).

After analysis of the first-round questionnaire, the results were presented in the second-round questionnaire. Thus, the second round questionnaire was created on the basis of the first-round results. In the second round, the panel members still had the authority to propose any amendment or addition to the listed competencies that they considered as important. A cover letter was enclosed with the second-round questionnaire and included the timescale in which to return the questionnaire and a summary of the round-one questionnaire analysis (see Appendix H).

The second-round questionnaire was designed in two parts: the first part consisted of close-ended questions and the second part contained an open question to give the participants the opportunity to add new competencies or suggest changes to the available ones (see Appendix I). The results of the analysis of the second round were presented in the third and last round.

The third questionnaire consisted of close-ended questions that asked the panel of experts to score the significance of each competency identified in the second-round questionnaire (see Appendix K). A cover letter was also enclosed with the third-round questionnaire and included the timescale in which to return the questionnaire and a summary of the second-round results (see Appendix J).

Habibi, Sarafrazi, and Izadyar (2014) state that a Likert-type scale can be used to gather experts' opinions when the aim is to determine the importance of or screen the items in qualitative research. Therefore the researcher adopted a 7-point Likert-type scale to give the panel more flexibility when evaluating the significance of each competency. Additionally, a 7-point scale results in stronger correlations with t-test results (Habibi et al., 2014). The scale ranged from Strongly Agree, which was given the value of 7, to Agree, which was given the value of 6, Slightly Agree, which was given the value of 5, Neutral, which was given the value of 4, Slightly Disagree, which was given the value of 3, Disagree, which was given the value of 2, and Strongly Disagree, which was given the value of 1.

3.3.7 Data Collection

The Delphi method consists of a series of questionnaires that can be sent via mail, fax, or email to a selected panel of experts. In this study, the questionnaires were emailed as this was deemed to be the most appropriate tool for contacting the members of the panel of experts. Moreover, it was the fastest method for communicating with the panel. The email method reduces the time wasted by using regular mail (Wang, 2006). As this study had a limited number of participants, a follow-up phone call was made to notify the panel members that the questionnaires had been sent in order to avoid spam email issues.

The participants were given three days to respond for each round. After receiving the responses, two days were needed to analyse the data and prepare the next-round questionnaire, which was sent to the panel of experts with a summary of the results of the previous round.

In the first round, the questionnaire was sent electronically by email. However, it was collected by hand due to the need to collect the signed consent form that had been enclosed with the first-round questionnaire. In the first round, 29 out of the 30 panel members who agreed to be part of the study panel responded.

The second- and third-round questionnaires were sent and received back electronically. A reminder email was sent to the participants a day before the predetermined response date (see Appendix L) because Phellas et al. (2012) suggest that sending out reminder letters and emails and a follow-up posting of the questionnaire can increase the response rate. This approach contributed to encouraging the participants to send back their responses on time. In the second round, 25 out of the 30 panel members responded. However, all 30 members of the panel sent in their responses for the third round.

Study I took 24 days to complete, including preparing, sending, and collecting questionnaires. This study was completed in a shorter time than others in the literature as a result of using email instead of regular mail. The process used in this study is shown in Figure 3.3.

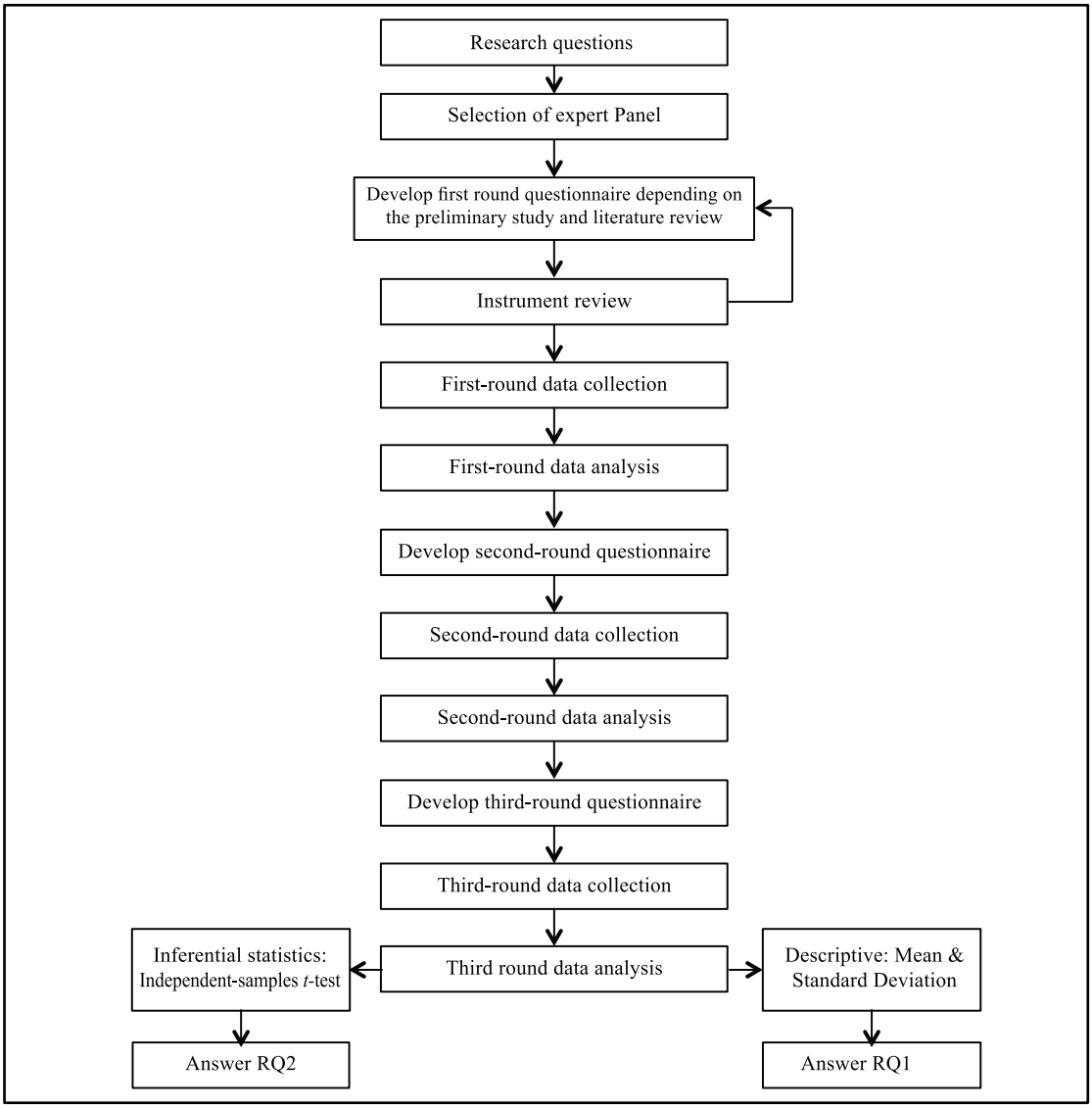

Figure 3.3: Study I: Diagram for Identification of Digital Media Design Competencies and Answering RQ1 and RQ2.

3.3.8 Data Analysis

This study has three rounds of questionnaires. After each round, the data was analysed using SPSS software version 20.0. All the participants' biographical data and their participation data was entered into SPSS. The collected data was analysed using descriptive statistics, where the mean and standard deviation (SD) was calculated for each competency in the questionnaire. The mean was used to measure the central tendency, which was used to represent group opinion. The SD, which is a measure of spread, was used to describe the agreement within the panel. A low value

for the SD was understood as denoting agreement within the panel, whereas a high value for the SD was understood to indicate disagreement within the panel (Glass & Hopkins, 1996; Greatorex & Dexter, 2000). The criterion used to evaluate the items in this study was the mean value, where all the items that had a mean value of less than 5 were excluded from the study (Habibi et al., 2014).

After each of the first and second rounds, the researcher reviewed all the participants' suggestions to determine whether any of the competencies suggested by the participants were duplicated or could be included in an existing competency in the previous questionnaire. Otherwise, the competencies suggested by the participants were listed in the next-round questionnaire.

In the third and final round, the panel of experts were not asked to suggest any modifications to the questionnaire. Instead, they were asked to rate the listed competencies and if they considered these competencies as significant for the digital media designer. The third-round results indicated the significant competencies for digital media design and thus a consensus and validation of the competencies was obtained from the panel of experts.

A non-parametric statistics approach was adopted to analyse the study data, which is a statistical method that is utilised for data that is not required to fit a normal distribution. The data in non-parametric statistics is often ordinal (AbuAwad, 2012; Corder & Foreman, 2009). In addition, inferential statistics were used to analyse the third-round questionnaire in order to understand and discuss the difference between the practitioners' and academics' perceptions of the significant competencies for digital media design. It was expected that there would be a significant difference between the two groups, so the following hypothesis was formulated:

H1: There are significant differences between academics and practitioners in identifying the significant competencies for digital media design.

An independent-samples t-test was applied to test the hypothesis, which is a test that is commonly used to find differences between two groups (Aron, Aron, & Coups, 2005).

3.4 Study II: Needed Competencies for Transition from Traditional to Digital Media Design

The last objective to achieve in this research study was to determine the competencies for print graphic designers to transition into digital media design. Therefore Study II attempts to answer RQ3: How would print graphic designers in Jordan transition into digital media design?

The significant digital media design competencies that were deduced from the results of Study I were used as a competence framework in order to uncover the competence gap in graphic designers' practise of digital media design. By identifying the available digital media design competencies in graphic designers, the weak or missing competencies were considered as the needed competencies for a traditional graphic designer to transition into digital media design.

This study population consisted of graphic designers currently practising graphic design in the Jordanian market. A questionnaire was designed using closed questions formed from the identified digital media competencies in order to measure the availability of these competencies in graphic designers.

3.4.1 Questionnaire and Competencies Identification

Whiddett and Hollyforde (2003) describe three techniques that can be used to assess an individual's job performance: questionnaires, records of achievement, and assignments. Sanghi (2007) classifies the various methods that can be used to assess competencies in employees as follows:

- Bottoms-in-seats Assessment, which is a curriculum-based assessment wherein training curricula are developed by position.

- Self-assessment, which is the self-rating of competencies through the administering of assessment instruments.
- 360-degree Assessment, which is a round-the-circle complete feedback method where performance is appraised by superiors, subordinates, peers, and customers.

In this study, print graphic designers filled in a self-assessment questionnaire which was designed to collect information on which of the significant competencies for practising digital media design they possessed. Maribu (2000) states that self-assessment is one of the methods that can be used to determine the competence gap, which helps to build an in-depth understanding of the assessed area. Using self-completion questionnaires also reduces the bias that could be imposed by the researcher and provides anonymity for the respondents, which can increase the reliability of responses (Phellas et al., 2012).

It is also argued that the ideal questionnaire to collect performance information about real job-holders is one that is developed from the competencies needed for effective performance in that job (Whiddett & Hollyforde, 2003).

3.4.2 Study Population and Sampling

This study used non-probability sampling because it was not possible to identify the participants and their physical locations individually (Kumar, 2011). The participants in this study were contacted via the Internet via email, a website, and social media because of the breadth of the geographical area over which the participants were distributed, which extends over the whole country. The graphic designers currently employed in the Jordanian market who were selected as the population for this study came from different backgrounds and included:

1. Graduates with a bachelor's in graphic design
2. Graduates in other art and design disciplines
3. Graduates in computer science and other IT disciplines
4. Individuals with a diploma in graphic design

5. Individuals who had completed short training courses in graphic design
6. Amateurs in graphic design (AbuAwad, 2007).

To determine the number of graphic designers working in the Jordanian market, the researcher emailed the Department of Statistics, which is part of the Ministry of Planning and International Cooperation in Jordan. The Department was asked about statistics regarding the number of graphic design practitioners in the Jordanian market. The researcher received a reply from the Department indicating that the number of graphic designers working in the Jordanian market currently stood at 2110 designers, according to a field survey that took place in 2011 (see Appendix M).

To calculate the sample size of this study, the formula of Krejcie and Morgan (1970) was adopted:

$$Sample\ size = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

where:

- X^2 = 3.841 (the chi-square value for 1 degree of freedom at the 95% confidence level)
- N = the population size (2110)
- P = the population proportion (this is assumed to be .50)
- D = the margin of error (0.05).

By applying the above formula to this study's values, the needed sample size for this study was determined to be 325.

The study questionnaire was posted on the Jordanian Graphic Designers Association website and their social media page. Moreover, the questionnaire was sent by email to the most important graphic design companies in Jordan. The academics and digital media design practitioners who participated in Study I were not included in this study population.

3.4.3 Study Instrument

A self-assessment questionnaire with closed questions was designed based on the results of Study I (see Appendix N), which identified the required competencies for digital media design. The questionnaire contained all the competencies of digital media design that had obtained a consensus and validation from the panel of experts. The questionnaire was distributed digitally via the Internet. As mentioned above, the use of an online self-assessment questionnaire in this study was due to the widespread distribution of graphic designers across the country (Phellas et al., 2012), who would have been impossible to contact and include in the study by any other method. It was also considered as a suitable method for addressing personal issues as participants are often more willing to give more honest answers using this method (Phellas et al., 2012).

The participants in this study were asked to rate the availability of the required competencies for digital media design in themselves. The rating of competencies was done using a 5-point Likert-type scale. A Likert scale is designed to examine how strongly subjects agree or disagree with statements (Sekaran & Bougie, 2010). The 5-point scale ranged from Strongly Agree, which was given the value of 5 to Agree, which was given the value of 4, Neutral, which was given the value of 3, Disagree, which was given the value of 2, and Strongly Disagree, which was given the value of 1.

The questionnaire was translated into the Arabic language. A specialist translator was hired to translate the questionnaire back into English to avoid any mistakes in the translation. The questionnaire was presented in dual languages (Arabic, English) to help the participants who could not understand the English language.

A pre-test instrument (pilot test) was conducted to ensure that the questionnaire had the capability to obtain the necessary data for this study (Bell, 2010; C. Dawson, 2009; Phellas et al., 2012; Sekaran & Bougie, 2010). For the pilot

test, the questionnaire was sent to 30 participants. However, the responses were not included in the analysis of the main study responses. The pre-test was very important as it enabled the researcher to identify any ambiguities in or misunderstandings about the questionnaire items in addition to ascertaining the time required to complete the questionnaire.

3.4.4 Data Collection

The Internet was the best choice for collecting the data in this study because of the distribution of the study sample across the entire country and the difficulty of identifying their individual physical locations. The Jordanian Graphic Designers Association, which is the only official association that represents graphic designers in Jordan, was contacted to share this study questionnaire with Jordanian graphic designers. The questionnaire was posted on the Association's website and their page on social media. Furthermore, the questionnaire was sent by email to the most important graphic design companies in Jordan. The Internet survey approach was used as the target population consisted almost entirely of Internet users (Phellas et al., 2012).

Since all the participants were contacted by email, the questionnaire was designed in a digital format using Adobe Acrobat Pro software. The digital form gave participants the opportunity to fill out the form by using the same software or a free version of Adobe Reader, thereby obviating the need to make a hard copy. The participants saved their responses and sent the form back to the researcher as an email attachment. It should be noted that this software does not allow more than one response from the same sender, which helps to avoid duplicated responses (Phellas et al., 2012).

It took about 40 days to collect the data for this study. The deadline was extended twice to make room for participants to send back their responses. A total of 298 responses were received, whereas the study required 325 responses. A total of 16 of these responses were excluded due to errors in filling in the questionnaire; the

remaining 282 responses were accepted for further analysis. Therefore the response rate was 87% of the required sample size.

3.4.5 Data Analysis

The collected data was transferred to SPSS software version 20.0 immediately upon receiving all the responses. The descriptive statistics were then extracted. The researcher used the mean and SD values to evaluate the variables in the questionnaire. The mean was used to identify the competency availability in traditional graphic designers working in the Jordanian market. The results were divided into three equal categories, namely:

1. Available competencies – those with a mean value from 3.67 up to 5
2. Poor competencies – those with a mean value from 2.34 up to 3.66
3. Missing competencies – those with a mean value from 1 up to 2.33.

A competency with a mean value $\leq$ 3.66 was considered as a needed competency for the transition from print to digital media design. The distribution in the participants' opinions was represented by the SD value, where any competency that got a SD value of more than 1 was considered as significant. In the case of a high SD, an observation for the skewness direction was conducted to identify the impact of the dispersion on the study results.

3.5 Study Ethics

The researcher followed strict ethical procedures while conducting the studies for this research. In the preliminary study, the interview participants were asked for permission to record their interviews and to include some excerpts from the interviews in the thesis and/or publications coming out of this research. The participants were informed that they had the right to withdraw their consent at any time whenever they wanted. The study objectives were explained to the participants before the interview was conducted.

The expert panel members in Study I were given the choice to be part of the study. In the first round, the following documents were included with the questionnaire:

1. A cover letter, which gave the deadline for sending back responses, described the steps of this study, and explained how to complete the questionnaire;
2. A participant information sheet, which described the purpose of the study, the reason for choosing the participant, their freedom to withdraw from the study, and the confidentiality of the provided information, and also gave the researcher's contact information;
3. A consent form, which the participants signed after they had agreed to participate as a member of the panel of experts in this study.

A cover letter was also enclosed with the questionnaire in the second and third rounds, which explained the modifications made to the questionnaire of the previous round and the deadline for sending back responses. The cover letter in the second round emphasised that this round was the last chance to propose new competencies or suggest any modifications.

In Study II, a cover letter was attached to the questionnaire to explain the purpose of the study and to emphasise the confidentiality and explain the usage of the provided information. The letter also explained to the participants the purpose of the study and the deadline for sending back responses. The researcher's contact information was also included in the cover letter in case the participant needed more details or clarifications.

3.6 Summary

In this research, three studies were conducted: a preliminary study, Study I, and Study II. The preliminary study was conducted using the semi-structured interview method to explore some digital media design experts' viewpoints about the preparedness of Jordanian university graduates for practising digital media design. Study I was conducted using a modified Delphi method to obtain a consensus on and

validation of the significant competencies for digital media design in Jordan. Study II was conducted using a self-assessment questionnaire to explore the needed competencies for print graphic designers to transition into digital media design. The data analysis and findings of the collected data will be presented in the next chapter.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

4.1 Overview

This chapter presents an analysis of the data collected from primary sources in a preliminary study and two main studies. The data is presented according to the research design sequence; the preliminary study: semi-structured interviews with practitioners and educators in digital media design, then Study I: gaining consensus and validation on digital media design competencies, and lastly, Study II: needed competencies for transition from traditional to digital media design.

The qualitative data from the preliminary study was analysed using NVivo software version 8.0. The interviews were analysed using thematic analysis, which is a way of seeing and a process for coding qualitative information (Woods, 2011). The collected data was identified, coded, and categorised into themes.

The first study consists of qualitative and quantitative data. The quantitative data was analysed using SPSS software version 20.0. Non-parametric descriptive statistics were used in this study, where the mean and SD were calculated for each competency in the questionnaire. The mean was used to measure central tendency, which represented group opinion, and the SD was used to measure the data distribution (Glass & Hopkins, 1996; Greatorex & Dexter, 2000).

The qualitative data was analysed manually, where all participants' suggestions were reviewed to determine whether the proposed competency had been duplicated or could be included in an existing competency from the previous questionnaire. Otherwise, the competencies proposed by the participants were listed in the next-round questionnaire. Inferential statistics were used to understand and

discuss the differences between academics' and practitioners' perceptions of digital media design competencies. An independent-samples t-test was applied, which is a test commonly used to find differences between two groups (Aron et al., 2005).

SPSS software was used to analyse the Study II data. The descriptive statistics were extracted, where the mean was used to identify the competency availability in traditional graphic designers working in the Jordanian market. A competency with a mean value ≤ 3.66 was considered as a needed competency for transitioning from print to digital media design. The distribution in the participants' opinions was represented by the SD value.

Table 4.1 shows the guides that the researcher used to analyse the data and to measure the variables for every research question. Each research question was matched to a scale of measurement and statistical technique in order to answer the questions and to get the appropriate output.

Table 4.1: Data Analysis of Research Questions

Research Question	Scale of Measurement	Statistical Technique
1. What are the most important competencies that digital media design practices need in Jordan? (Study 1)	7-point Likert-type scale	Descriptive: mean & standard deviation
2. How do practitioners and academics perceive the digital media design competencies investigated in this study? Where are the differences in those perceptions? (Study 1)	7-point Likert-type scale	Inferential: independent-samples t-test
3. How would print graphic designers in Jordan transition into digital media design? (Study 2)	5-point Likert-type scale	Descriptive: mean & standard deviation

4.2 Preliminary Study: Interview Analysis

One of the main aims of this study was to explore some digital media design experts' viewpoints about the state of digital media design practice and education in Jordan. The other main aim was to identify suggested competencies which are considered as significant for digital media designers.

A non-probability sampling was used in this study (see Chapter 3 for more details), where the populations for this study consisted of academics from Jordanian universities and digital media design practitioners from the Jordanian marketplace. There were 17 participants in this study, who were from different universities and companies, as shown in Table 4.2 below:

Table 4.2: Preliminary Study Participants' Workplace and Position

N.	Institute / Company	Position
1	Philadelphia University	Assistant Professor
2	Applied Science University	Assistant Professor
3	Applied Science University	Dean of Faculty of Art and Design
4	Zarqa University	Lecturer
5	Amman Private University	Lecturer
6	Petra University	Assistant Professor
7	Petra University	Lecturer
8	German Jordanian University	Lecturer
9	Information Technology Planet (ITP)	Art Director
10	SOP Company	Software Development Manager
11	Phenomena Communications	Partner and Head of Creative Department
12	Rubicon Group Holding (RGH)	Head of Character Texturing Department
13	iHorizons	Head of Web Design Section
14	Zee Design Studio	General Manager
15	Untitled Creative Studios	General Manager
16	Eskadenia Software	Manager of Web Art Solutions
17	Sims Creation	General Manager

The interviews were analysed using thematic analysis (Braun & Clarke, 2006). Thematic analysis serves to identify important issues within a topic, such as identifying users' needs from focus group discussions, and is therefore recommended as a means of influencing policy development (Braun & Clarke, 2006).

Six themes emerged from the analysis:

1. The differences between print media and digital media;
2. Design education and students' preparedness for the digital media design profession in Jordan;
3. The career trends of university graduates in graphic design;
4. Experience of the transition from print to digital media design;
5. Demand for digital media designers in the labour market;
6. The missing competencies that graphic designers need in order to practise digital media design.

4.2.1 Theme 1: The Differences Between Print Media and Digital Media

Most of the participants in this study emphasised the differences between print design and digital media design that require new knowledge and a new toolset. Despite having the basics in common, the implementation tools and design outcomes are different.

An academic participant from Applied Science Private University says that "…their principles might be similar, but the implementation of tools and design results are different and obvious." Another academic participant from the same university points out that the design outcomes are different; digital media design outcomes are visible only while print design outcomes are visible and tangible.

An academic participant from Petra University states that the difference lies in the possibility of using not just text and images but new elements in digital media design, such as motion and sound. Another academic from the same university

believes that the most important characteristics of digital media are interactivity and motion, which require a different way of thinking.

The marketing aspect is another main difference, where not only the technical aspects, but also the target audience for both mediums is different. This is what an academic participant from Zarqa University believes. Another academic from the German Jordanian University states that the design idea in the two mediums is different.

An academic participant from Petra University states that the difference lies in the possibility of using not just text and images but new elements in digital media design, such as motion and sound. Another academic from the same university believes that the most important characteristics of digital media are interactivity and motion, which require a different way of thinking.

A general manager of a print and digital media design company says, "There are basic rules in dealing with a design in terms of processing. When working on a print design, the designer must take into consideration the colours, which must be print colours, the file size, and the font size if it's used in prints and screens. A digital design has its own colours and the design is different, even the design process."

4.2.2 Theme 2: Design Education and Students' Preparedness for the Digital Media Design Profession in Jordan

Most of the participants in this study believe that Jordanian universities still focus on the print medium, which deprives graduate graphic designers of the chance of getting involved in digital media. An academic participant from Applied Science Private University says, "… I don't think that graphic design graduates will be fully qualified to practise digital media design, multimedia, e-learning or animation." A general manager of a web design company also states that graphic design graduates are not adequately equipped to practise web design because they do not know some

basics of the digital medium's nature and needs, which are required from any designer who wants to get involved with digital media even if he/she has creativity.

An academic participant from Philadelphia University says, "…after 1995 we noticed that there was a general advance in the tools used by graphic designer, which affected the next generations who desired to study graphic design. Graphic design is not restricted to print materials any more, but graphic design schools in Jordan are still stuck in teaching print design." Another academic from Applied Science Private University states that graduates lack knowledge about digital media and its needs, despite the fact that they use digital tools to implement their designs.

Some participants gave reasons for this situation. Most of the academic participants state that their universities only have a few courses that can support students studying digital media design and some of them still have just one course of three credit hours, which is considered inadequate to qualify students to design for digital media. An academic from Petra University states that this lack in the graphic design curriculum is linked to the Jordanian Ministry of Higher Education's requirements that force universities to follow study plans connected to what has been taught at Yarmouk University since 1980, which was the first public university that started teaching graphic design in Jordan. Additionally, there is a lack of digital media specialists among Jordanian university staff as the majority of them are specialists in print design and the arts in general.

The participants called for changes to be made in Jordanian universities to help graduates facing challenges, for instance by developing study plans and including more digital media courses, or by starting new disciplines for digital media design in Jordanian universities.

4.2.3 Theme 3: The Career Trends of University Graduates in Graphic Design

Most of the participants in this study said that the majority of graduate students tend to go on to work in print media due to their weak skills in digital media

design. However, some students improve their skills by participating in different courses to expand their abilities to work in digital media design.

An academic participant from Zarqa University says, "The majority of graduate students head to print design, others develop their knowledge and technical abilities in the digital media field such as in web design, animation especially 3D technology for modelling, or other related fields." Another academic participant, this time from Applied Science Private University, considers that graduate students who lean toward working in digital media design normally have specific distinct skills that companies can detect and evolve. The manager of web art design solutions in a digital media design company says, "…What attracts me is to what extent does the student work hard himself/herself to learn software and look for experience."

An academic participant from Petra University explains that most of the graduate students tend look for a career in print design based on the competencies and skills with which they are equipped. However, the high competency that they have in print design pushes many designers to develop their digital media design abilities to help them to engage in this domain.

4.2.4 Theme 4: Experience of the Transition from Print to Digital Media Design

Some of the participants in this study have experienced the transition from print to digital media design. All of them have made a strong personal effort to do so and sometimes have attended some courses to make the transition.

An academic from Zarqa University talked about his own experience, saying, "In the beginning, I had a simple idea about digital media design such as web design. However, when I started working, I faced some problems, not on the visual communication side, but on the functionality of digital media design." A general manager of a digital media company explains that there were no courses about web design when he was a student, which requires the designer to have knowledge of the

user experience. He added that his design thinking when he graduated was limited to print design and its settings.

A manager and partner of a design company also talked about her experience of transition from print to digital media design. She tried to find a specialist institute to learn digital media design and web design as she believed that her university studies qualified her to generate design ideas but not to apply or implement them.

4.2.5 Theme 5: Demand for Digital Media Designers in the Labour Market

Most of the participants in this study emphasised the growing need for digital media designers in the Jordanian labour market. For instance, an academic participant from Applied Science Private University considers that technological developments have created a significant need for digital media design for different aspects of life. He says, "Most of the Jordanian university graduates get involved in print design, but after a while they feel the necessity to learn digital media design to meet the market's needs and get involved in digital media design."

Another academic, this time from Petra University, believes that the future lies in digital media design, which means that graduate students need to develop their abilities and gain digital media design skills through training courses. A manager of a web design company believes that the demand in the labour market is no longer focused on traditional graphic designers who have only mastered print design as the customer now expects that he/she can satisfy all his/her print and digital needs in one place.

An art director at an IT company believes that there is a growing demand for digital media design as the field has expanded to include smartphones, tablets and other new technologies that require designers to be able to design for them and to distinguish between their design requirements.

4.2.6 Theme 6: The Missing Competencies That Graphic Designers Need in Order to Practise Digital Media Design

The participants in this study suggested 28 competencies that graphic designers need to have to practise digital media design, as follows:

1. Applied understanding of anatomy
2. Apply the techniques of drawing software
3. Applied understanding of digital advertising
4. Applied understanding of user experience in digital media
5. Applied understanding of symbols and icons
6. Apply the techniques of multimedia creation software
7. Applied understanding of interactive design
8. Describe different types and sizes of screens
9. Apply the techniques of webpage development software
10. Apply design and innovative concepts
11. Understanding visual design psychology and visual literacy
12. Understanding composition and its construction mechanism
13. Applied understanding of lighting techniques
14. Applied understanding of 2D and 3D design
15. Applied understanding of basic marketing
16. Apply the techniques of filmmaking and video capturing
17. Applied understanding of design theories and methodologies
18. Applied understanding of colour theory
19. Apply the basics of graphic design for digital media
20. Applied understanding of decision-making and project management
21. Applied understanding of how to communicate and sell ideas and designs to clients
22. Ability to collaborate productively in large interdisciplinary teams
23. Apply the techniques of 3D software
24. Applied understanding of animation and motion graphics
25. Applied understanding of storyboarding
26. Applied understanding of basic programming skills

27. Apply the techniques of image editing software
28. Applied understanding of drawing and its techniques.

4.3 Study I Analysis: Digital Media Design Competencies

This study was conducted to obtain a consensus on and validation of the significant competencies for digital media design in Jordan from a panel of experts and to understand and discuss the differences in how practitioners and academics perceived the validated competencies. This study was designed using a modified Delphi method to answer RQ1 and RQ2 of this research (see Chapter 3 for more details).

Based on the results of the literature review and preliminary study, a questionnaire was designed that included 77 proposed competencies to be evaluated by the panel of experts. These competencies were sorted into the following five groups:

I. Design principles and elements: the elements and basics that designers from different disciplines need, which can be oriented to serve every discipline.
II. Accurate specialisations: the core discipline competencies that belong to a specific discipline.
III. Cognitive studies and skills: the cognitive and knowledge skills that designer need to recognise, understand, practise, and apply.
IV. Practical and technical skills: the practical and technical skills that support designers in designing and presenting their projects.
V. Behaviour and attitude: the required competencies to deal with others and building a personality.

I. Design principles and elements:

1. Applied understanding of colour theory
2. Apply basic knowledge of Gestalt psychology to digital media design
3. Apply design principles to digital platforms

4. Apply design and innovative concepts
5. Understanding composition and its construction mechanisms
6. Applied understanding of design theories and methodologies
7. Applied understanding of anatomy.

II. Accurate specialisations:

1. Applied understanding of digital advertising
2. Use graphic design terminology
3. Applied understanding of typography and its judicial application
4. Applied understanding of symbols and icons
5. Applied understanding of graphic design communication trends
6. Apply the basics of graphic design for digital media
7. Applied understanding of editorial design for digital media
8. Understanding construction of meaningful images
9. Applied understanding of interactive design.

III. Cognitive studies and skills:

1. Understanding aesthetics and aesthetic criteria
2. Understanding visual design psychology and visual literacy
3. Ability to perform creative thinking
4. Applied understanding of user experience in digital media
5. Describe different types and sizes of screen
6. Applied understanding of basic marketing
7. Apply the concepts of economics in graphic communications
8. Identify characteristics of digital communications
9. Applied understanding of history of art
10. Applied understanding of history of graphic design
11. Apply the concepts of cross-media publishing and document repurposing
12. Applied understanding of research skills and methods
13. Apply the techniques of information and Internet searching
14. Understanding of web processes and protocols

15. Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices
16. Ability to control cost, time, and resources
17. Determine the costs associated with graphic design and other creative services
18. Demonstrate the ability of design analysis
19. Applied understanding of strategy-making
20. Applied understanding of outcome evaluation.

IV. Practical and technical skills:

1. Applied understanding of drawing and its techniques
2. Applied understanding of 2D and 3D design
3. Applied understanding of drawing sketches
4. Applied understanding of storyboarding
5. Applied understanding of prototyping
6. Applied understanding of presentation skills
7. Applied understanding of and ability to utilise tools and technology
8. Apply the techniques of drawing software
9. Apply the techniques of page layout and publishing software
10. Apply the techniques of image editing software
11. Understanding of different types of computing platform
12. Explain document and workflow management
13. Applied understanding of basic programming skills
14. Apply the basics of photography for graphic design purposes
15. Apply the techniques of webpage development software
16. Apply the techniques of 3D software
17. Apply the techniques of preparing portfolios
18. Demonstrate digital document delivery
19. Apply the techniques of multimedia creation software
20. Apply the techniques of filmmaking and video capturing
21. Applied understanding of lighting techniques
22. Applied understanding of animation and motion graphics.

V. Behaviour and attitude:

1. Ability to collaborate productively in large interdisciplinary teams
2. Applied understanding of technical communication skills
3. Be able to convey an idea, feeling, and belief
4. Applied understanding of how to communicate and sell ideas and designs to clients
5. Identify and fulfil customer needs
6. Be able to learn and comprehend
7. Ability to plan and lead design projects
8. Ability to be flexible, nimble, and dynamic in practice
9. Applied understanding of decision-making and project management
10. Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions
11. Applied understanding of using local cultural symbolism and colours
12. Applied understanding of physical, cognitive, cultural, and social factors that shape design decisions
13. Desire to improve and clarify
14. Ability to solve communication problems visually
15. Ability to work in a global environment with an understanding of cultural preservation
16. Understanding of nested items including cause and effect
17. Ability to develop project evaluation criteria that account for audience and context
18. Comprehend the basics of art appreciation
19. Applied understanding of the design appraisal process.

4.3.1 Study I Statistical Analysis

This study had two different populations (see Chapter 3 for more details): academics from higher education institutions working in the field of graphic design and other related majors, and practitioners from the digital media design profession.

The final number of participants in this study who served on the panel of expert members was 30, who were distributed as shown in the following tables:

Table 4.3: Distribution of Participants in Study I by Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Academic	16	53.3	53.3	53.3
	Practitioner	14	46.7	46.7	100.0
	Total	30	100.0	100.0	

Table 4.3 shows that there were two more academics than practitioners. Thus there were 16 academics, accounting for 53.3% of participants, and 14 practitioners, accounting for 46.7% of the panel. The two groups are almost equal in terms of the number of participants, which contributed towards creating a balance between the two groups' viewpoints.

Table 4.4: Distribution of Participants in Study I by Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	21	70.0	70.0	70.0
	Female	9	30.0	30.0	100.0
	Total	30	100.0	100.0	

Table 4.4 shows that most of the participants were men. Specifically, 21 (70%) participants were men and nine (30%) were women. This percentage could reflect the proportion of working women in Jordanian marketplace, which is about 26% of the total workers in Jordanian marketplace (Department of Statistics, 2012).

Table 4.5: Distribution of Participants in Study I by Gender and Occupation

		Gender		
		Male	**Female**	**Total**
Occupation	Academic	11	5	16
	Practitioner	10	4	14
Total		21	9	30

Table 4.5 shows that there was almost the same percentage of female participants in the two groups, Academic and Practitioner, that make up this study sample. Women accounted for five of the 16 in experts in the academic group, while four out of the 14 experts were women in the practitioner group.

Table 4.6: Distribution of Participants in Study I by Age (Years)

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	20–29	9	30.0	30.0	30.0
	30–39	14	46.7	46.7	76.7
	40–49	5	16.7	16.7	93.3
	50+	2	6.7	6.7	100.0
	Total	30	100.0	100.0	

Table 4.6 shows that almost half of the participants were 30–39 years old (46.7%), nine of them were 20–29 years old (30%), and the rest were over 40 years old (23.3%). The majority of participants were from the younger generation, who have witnessed the emergence of digital media and its development. This experience should give them the ability to get involved in digital media design and understand its needs.

Table 4.7: Distribution of Participants in Study I by Age (Years) and Occupation

		Age				
		20-29	**30-39**	**40-49**	**50+**	**Total**
Occupation	Academic	4	7	3	2	16
	Practitioner	5	7	2	0	14
Total		9	14	5	2	30

Both groups of participants, Academic and Practitioner, have the same number of participants aged between 30 and 39 years old (see Table 4.7). The people in this age group have grown up with technology, and they have lived through the most recent developments in graphic design. On the other hand, the participants aged 20–29 years old (four academics and five practitioners) can reflect the future as it is their generation that is are going to lead the profession to the next level of development. The older participants were mainly in the academic group (three of them were 40–49 years old and two of them were over 50 years old), whereas there were only two participants in the practitioner group who were aged 40–49 years old. People in this age group should have the wisdom and experience to make a balanced judgement regarding the proposed competencies for digital media design.

Table 4.8: Distribution of Participants in Study I by Education

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Diploma	1	3.3	3.3	3.3
	Bachelor's degree	12	40.0	40.0	43.3
	Postgraduate degree	17	56.7	56.7	100.0
	Total	30	100.0	100.0	

Table 4.8 shows that more than half of the participants had a postgraduate degree (56.7%), 12 participants had a bachelor's degree (40%), and one participant had a diploma (3.3%).

Table 4.9: Distribution of Participants in Study I by Education and Occupation

		Education			
		Diploma	Bachelor degree	Postgraduate degree	Total
Working field	Academic	0	1	15	16
	Practitioner	1	11	2	14
Total		1	12	17	30

As expected, all academics had postgraduate degrees, except one participant who had a bachelor's degree, as shown in Table 4.9. Practitioner participants were all educated and most of them (11 out of 14) held a bachelor's degree, while two of them had a postgraduate degree, and just one of the practitioners had a diploma.

Table 4.10: Distribution of Participants in Study I by Experience (Years)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5–9	16	53.3	53.3	53.3
	10–14	8	26.7	26.7	80.0
	15–20	5	16.7	16.7	96.7
	20+	1	3.3	3.3	100.0
	Total	30	100.0	100.0	

Table 4.10 shows that almost half of the participants had 5–9 years of experience, that is, 16 participants or 53.3%. As for the remainder, eight (26.7%) participants had 10–14 years' experience, five (16.7%) had 15–20 years' experience, and one (3.3%) participant had more than 20 years' experience. The high number of the participants with 5 to 9 years of experience is likely due to the developments in digital media design and the growth in the need for designers with the ability to design for the new medium, which opened the doors to digital media design becoming an independent discipline.

Table 4.11: Distribution of Participants in Study I
by Experience (Years) and Occupation

		Experience				
		5-9	**10-14**	**15-20**	**20+**	**Total**
Working field	Academic	10	2	3	1	16
	Practitioner	6	6	2	0	14
Total		16	8	5	1	30

Table 4.11 shows that most of the academic participants had 5–9 years of experience at the time of the study, which reflects the situation in Jordanian universities. Most of the Jordanian universities established their graphic design programmes within the last 20 years (Al Qur'an, 2012). However, the marketplace started to pay attention to digital media design early in the twenty-first century.

4.3.2 Study I Outcomes

Following the Delphi method, a series of questionnaires was designed and presented to the panel of experts who were asked to evaluate the significance of the proposed competencies in three rounds. In the first two rounds, participants had the opportunity to suggest new competencies or modify the proposed ones (see Chapter 3 for more details).

The collected data was analysed using descriptive statistics on SPSS software. The mean was used to reflect the competency score or rate achieved by the panel evaluation. The SD showed the dispersion of participants' opinions.

The following levels of importance were adopted for the questionnaire statements in order to categorise the competencies into three equal groups:

- A mean of 1 to less than 3.5 = low importance
- A mean of 3.5 to less than 5.00 = medium importance
- A mean of 5 to 7 = high importance.

All the competencies that fell into the high importance category were included in the next round. Any competency with a mean value of less than 5 was excluded from the next-round questionnaire. In the last round, any competency with a SD value of more than 1.5 was considered as a non-consensus competency, that is, the panel of experts were not in enough agreement about its importance, and was excluded from the final list of significant competencies. The final results from the third round constituted the significant competencies for digital media design in Jordan and thus answered the first research question (RQ1).

In the final round in this study, the mean values for the competencies were calculated separately for the academic and practitioner groups. This allowed the use of the independent-samples t-test to compare the perceptions of academics and those of practitioners regarding significant competencies. The results of this test answer the second research question (RQ2). The results for every round are shown separately below.

4.3.3 First-Round Results

The first-round questionnaire was sent to the 30 expert panel members and they were given three days to respond. The panel responded by indicating the level of significance of each proposed competency on a 7-point Likert scale. Twenty-nine of the 30 members returned the first-round questionnaire. This represented a response rate of 97%.

The collected data was analysed using descriptive statistics on SPSS software. The mean and SD of the experts' opinions were calculated for every competency. Table 4.12 shows the results:

Table 4.12: First-Round Results

No.	Competency	Responses (%)	Mean	SD
1.	Applied understanding of colour theory	96.67	6.62	0.82

Table 4.12: First-Round Results

No.	Competency	Responses (%)	Mean	SD
2.	Apply basic knowledge of Gestalt psychology to digital media design	93.33	6.11	1.21
3.	Apply design principles to digital platforms	96.67	6.45	0.69
4.	Apply design and innovative concepts	96.67	6.69	0.54
5.	Understanding composition and its construction mechanisms	96.67	6.62	0.56
6.	Applied understanding of design theories and methodologies	96.67	6.38	0.68
7.	Applied understanding of anatomy	96.67	5.48	1.15
8.	Applied understanding of digital advertising	93.33	6.39	0.72
9.	Use graphic design terminology	96.67	5.83	0.89
10.	Applied understanding of typography and its judicial application	96.67	6.38	1.01
11.	Applied understanding of symbols and icons	96.67	6.34	1.01
12.	Applied understanding of graphic design communication trends	96.67	6.38	0.86
13.	Apply the basics of graphic design for digital media	96.67	6.45	1.06
14.	Applied understanding of editorial design for digital media	90.00	5.81	1.28
15.	Understanding construction of meaningful images	96.67	6.38	0.82
16.	Applied understanding of interactive design	96.67	6.45	0.83
17.	Understand aesthetics and aesthetic criteria	96.67	5.97	1.24
18.	Understanding visual design psychology and visual literacy	96.67	6.14	1.36
19.	Ability to perform creative thinking	93.33	6.68	0.66

Table 4.12: First-Round Results

No.	Competency	Responses (%)	Mean	SD
20.	Applied understanding of user experience in digital media	96.67	6.38	0.98
21.	Describe different types and sizes of screen	96.67	6.07	1.00
22.	Applied understanding of basic marketing	96.67	5.76	1.18
23.	Apply the concepts of economics in graphic communications	96.67	5.52	1.21
24.	Identify characteristics of digital communications	90.00	6.26	0.87
25.	Applied understanding of history of art	96.67	5.31	1.44
26.	Applied understanding of history of graphic design	96.67	5.86	1.38
27.	Apply the concepts of cross-media publishing and document repurposing	90.00	5.59	0.94
28.	Applied understanding of research skills and methods	96.67	6.00	1.16
29.	Apply the techniques of information and Internet searching	96.67	6.10	1.14
30.	Understanding of web processes and protocols	93.33	5.93	1.44
31.	Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices	96.67	5.66	1.17
32.	Ability to control cost, time, and resources	96.67	5.62	1.47
33.	Determine the costs associated with graphic design and other creative services	93.33	5.61	1.32
34.	Demonstrate the ability of design analysis	96.67	6.21	0.77
35.	Applied understanding of strategy-making	96.67	6.00	1.00
36.	Applied understanding of outcome evaluation	93.33	5.86	0.87

Table 4.12: First-Round Results

No.	Competency	Responses (%)	Mean	SD
37.	Applied understanding of drawing and its techniques	96.67	6.31	0.71
38.	Applied understanding of 2D and 3D design	96.67	6.59	0.57
39.	Applied understanding of drawing sketches	96.67	6.45	0.69
40.	Applied understanding of storyboarding	96.67	6.28	1.10
41.	Applied understanding of prototyping	96.67	6.17	1.07
42.	Applied understanding of presentation skills	96.67	6.48	0.74
43.	Applied understanding of and ability to utilise tools and technology	96.67	6.41	0.68
44.	Apply the techniques of drawing software	93.33	6.32	0.93
45.	Apply the techniques of page layout and publishing software	96.67	6.14	0.83
46.	Apply the techniques of image editing software	96.67	6.66	0.55
47.	Understand different types of computing platform	96.67	6.17	1.04
48.	Explain document and workflow management	93.33	5.54	1.30
49.	Applied understanding of basic programming skills	96.67	5.45	1.59
50.	Apply the basics of photography for graphic design purposes	96.67	6.48	0.63
51.	Apply the techniques of webpage development software	96.67	5.59	1.82
52.	Apply the techniques of 3D software	96.67	5.66	1.34
53.	Apply the techniques of preparing portfolios	96.67	6.24	0.69
54.	Demonstrate digital document delivery	96.67	6.03	0.94
55.	Apply the techniques of multimedia creation software	96.67	5.97	1.09

Table 4.12: First-Round Results

No.	Competency	Responses (%)	Mean	SD
56.	Apply the techniques of filmmaking and video capturing	96.67	5.93	0.96
57.	Applied understanding of lighting techniques	93.33	6.04	1.02
58.	Applied understanding of animation and motion graphics	96.67	6.14	0.88
59.	Ability to collaborate productively in large interdisciplinary teams	96.67	6.24	0.83
60.	Applied understanding of technical communication skills	96.67	6.31	0.85
61.	Be able to convey an idea, feeling, and belief	96.67	6.59	0.63
62.	Applied understanding of how to communicate and sell ideas and designs to clients	96.67	6.38	1.05
63.	Identify and fulfil customer needs	96.67	6.62	0.62
64.	Be able to learn and comprehend	93.33	6.54	0.57
65.	Ability to plan and lead design projects	96.67	6.10	0.86
66.	Ability to be flexible, nimble, and dynamic in practice	96.67	6.28	0.96
67.	Applied understanding of decision-making and project management	96.67	5.72	1.07
68.	Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions	96.67	6.24	1.06
69.	Applied understanding of using local cultural symbolism and colours	96.67	6.34	1.01
70.	Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions	96.67	6.17	0.76

Table 4.12: First-Round Results

No.	Competency	Responses (%)	Mean	SD
71.	Desire to improve and clarify	96.67	6.55	0.74
72.	Ability to solve communication problems visually	96.67	6.52	0.74
73.	Ability to work in a global environment with an understanding of cultural preservation	96.67	6.45	0.91
74.	Understanding of nested items including cause and effect	96.67	6.00	0.93
75.	Ability to develop project evaluation criteria that account for audience and context	96.67	6.03	0.87
76.	Comprehend the basics of art appreciation	96.67	6.38	0.82
77.	Applied understanding of design appraisal	96.67	6.45	0.69

Table 4.12 indicates the attitudes of the panel of experts towards the proposed digital media design competencies, where the means were between 5.31 and 6.69, which meant that all the proposed competencies were perceived as significant and valid for the next round. The highest ranked competency was 'Apply design and innovative concepts' followed by 'Ability to perform creative thinking', which reflects the importance that the panel gave to the innovation and creativity of the designer. However, there was clear disagreement between the panel members on two competencies: 'Apply the techniques of webpage development software' and 'Applied understanding of basic programming skills'. This disagreement was demonstrated by the high SD value of 1.82 and 1.59, respectively.

Meanwhile, the panel of experts suggested that 17 new competencies be added to the next round. Eight of them were similar to or duplicated the competencies listed in the first-round questionnaire. Two of them were merged into listed competencies that were close to them in meaning. The remaining seven suggestions were added to the next-round questionnaire, namely:

1. Ability to differentiate between the psychology of the digital media and print media audience
2. Ability to work under high pressure
3. Flexibility to reschedule the timeframe of project production
4. Applied understanding of advanced photography tips, tricks, and techniques
5. Understanding of media communication theory
6. Understanding of how to visualise information in the digital age
7. Ability to design and work with mobile applications.

Thus, a new questionnaire was designed based on the panel of experts' suggestions that contained 84 competencies to rate in the next round of the study.

4.3.4 Second-Round Results

The second-round questionnaire was sent to the same panel members and they were given three days to respond. The panel responded by indicating the level of significance of each of the 84 competencies on a 7-point Likert scale. Twenty-five of the 30 participants returned the second-round questionnaire. This represented a response rate of 83%.

The collected data was analysed using descriptive statistics on SPSS software. The mean and SD of the experts' opinions were calculated for every competency, Table 4.13 shows the results:

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
1.	Applied understanding of colour theory and psychology	83.33	6.60	0.87
2.	Apply basic knowledge of Gestalt psychology to digital media design	83.33	6.28	0.94
3.	Apply design principles to digital platforms	83.33	6.56	0.71

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
4.	Apply design and innovative concepts	83.33	6.68	0.56
5.	Understanding composition and its construction mechanisms	83.33	6.44	0.65
6.	Applied understanding of design theories and methodologies	83.33	6.52	0.51
7.	Applied understanding of anatomy	83.33	5.68	1.18
8.	Applied understanding of digital advertising	83.33	6.24	0.97
9.	Use graphic design terminology	83.33	6.12	0.73
10.	Applied understanding of typography and its judicial application	83.33	6.52	0.59
11.	Applied understanding of symbols and icons	83.33	6.44	0.82
12.	Applied understanding of graphic design communication trends	83.33	6.56	0.65
13.	Apply the basics of graphic design for digital media	83.33	6.52	0.71
14.	Applied understanding of editorial design for digital media	83.33	6.24	0.88
15.	Understanding construction of meaningful images	83.33	6.32	0.99
16.	Applied understanding of interactive design	83.33	6.56	0.77
17.	Understanding aesthetics and aesthetic criteria	83.33	6.28	0.84
18.	Understanding visual design psychology and visual literacy	83.33	6.60	0.58
19.	Ability to perform creative thinking	83.33	6.80	0.50
20.	Applied understanding of user experience in digital media	83.33	6.44	0.82
21.	Describe different types and sizes of screen	83.33	6.52	0.59

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
22.	Applied understanding of basic marketing	83.33	6.04	0.89
23.	Apply the concepts of economics in graphic communications	83.33	5.72	1.10
24.	Identify characteristics of digital communications	83.33	6.12	0.93
25.	Applied understanding of history of art	83.33	5.48	1.33
26.	Applied understanding of history of graphic design	83.33	5.72	1.46
27.	Apply the concepts of cross-media publishing and document repurposing	83.33	5.52	1.05
28.	Applied understanding of research skills and methods	83.33	6.20	1.08
29.	Apply the techniques of information and Internet searching	83.33	6.32	0.90
30.	Understanding of web processes and protocols	83.33	5.80	1.04
31.	Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices	83.33	5.60	1.12
32.	Ability to control cost, time, and resources with understanding the time, cost, and quality triangle	83.33	6.20	1.12
33.	Determine the costs associated with graphic design and other creative services	83.33	5.96	1.31
34.	Demonstrate the ability of design analysis	83.33	6.20	1.12
35.	Applied understanding of strategy-making	83.33	5.84	1.37
36.	Applied understanding of outcome evaluation	83.33	5.92	1.26

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
37.	Applied understanding of drawing and its techniques	83.33	6.16	1.11
38.	Applied understanding of 2D and 3D design	83.33	6.32	1.07
39.	Applied understanding of drawing sketches	83.33	6.40	1.00
40.	Applied understanding of storyboarding	83.33	6.28	1.02
41.	Applied understanding of prototyping	83.33	6.52	0.77
42.	Applied understanding of presentation skills	83.33	6.36	1.11
43.	Applied understanding of and ability to utilise tools and technology	83.33	6.44	0.92
44.	Apply the techniques of drawing software	83.33	6.32	0.99
45.	Apply the techniques of page layout and publishing software	83.33	6.40	0.91
46.	Apply the techniques of image editing software	83.33	6.72	0.61
47.	Understanding of different types of computing platforms	83.33	6.16	0.85
48.	Explain document and workflow management	83.33	5.60	1.15
49.	Applied understanding of basic programming skills	83.33	5.52	1.19
50.	Apply the basics of photography for graphic design purposes	83.33	6.44	0.92
51.	Applied understanding of advanced photography tips, tricks, and techniques	83.33	6.24	1.30
52.	Apply the techniques of webpage development software	83.33	6.08	0.86
53.	Apply the techniques of 3D software	83.33	5.80	1.26
54.	Apply the techniques of preparing portfolios	83.33	6.20	0.96

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
55.	Demonstrate digital document delivery	83.33	5.80	1.08
56.	Apply the techniques of multimedia creation software	83.33	6.24	0.97
57.	Apply the techniques of filmmaking and video capturing	83.33	5.92	1.44
58.	Applied understanding of lighting techniques	83.33	6.04	1.14
59.	Applied understanding of animation and motion graphics	83.33	6.40	1.15
60.	Ability to collaborate productively in large interdisciplinary teams	83.33	6.36	0.91
61.	Applied understanding of technical communication skills	83.33	6.16	0.80
62.	Be able to convey an idea, feeling, and belief	83.33	6.56	0.77
63.	Applied understanding of how to communicate and sell ideas and designs to clients	83.33	6.44	0.87
64.	Identify and fulfil customer needs	83.33	6.20	1.00
65.	Be able to learn and comprehend	83.33	6.48	0.87
66.	Ability to plan and lead design projects	83.33	6.40	1.15
67.	Ability to be flexible, nimble, and dynamic in practice	83.33	6.28	1.17
68.	Applied understanding of decision-making and project management	83.33	5.88	1.36
69.	Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions	83.33	6.08	1.29

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
70.	Applied understanding of using local cultural symbolism and colours	83.33	6.24	1.30
71.	Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions	83.33	6.20	1.22
72.	Desire to improve and clarify	83.33	6.40	0.82
73.	Ability to solve communication problems visually	83.33	6.44	0.77
74.	Ability to work in a global environment with an understanding of cultural preservation	83.33	5.96	1.40
75.	Understanding of nested items including cause and effect	83.33	6.00	1.22
76.	Ability to develop project evaluation criteria that account for audience and context	83.33	6.04	1.21
77.	Comprehend the basics of art appreciation	83.33	6.08	1.15
78.	Applied understanding of design appraisal	80.00	6.21	1.12
79.	Ability to differentiate between the psychology of the digital media and print media audience	83.33	6.44	0.71
80.	Ability to work under high pressure	83.33	6.28	1.28
81.	Flexibility to reschedule the timeframe of project production	83.33	5.96	1.06
82.	Understanding of media communication theory	83.33	6.28	0.84
83.	Understanding of how to visualise information in the digital age	83.33	6.24	0.83

Table 4.13: Second-Round Results

No.	Competency	Responses (%)	Mean	SD
84.	Ability to design and work with mobile applications	83.33	6.32	1.07

Table 4.13 indicates the attitudes of the panel of experts towards the second-round competencies, where the means were between 5.48 and 6.80, which meant that all the listed competencies were regarded as significant and valid for the next round. The highest ranked competency in this round was 'Ability to perform creative thinking' followed this time by 'Apply the techniques of image editing software'. In this round, there were no items with a SD value of over 1.5; all the items were between 0.50 and 1.46.

In this round, the panel of experts suggested that 11 competencies be added into the next-round questionnaire. Nine of them were similar to or were included in one of the listed competencies in the second-round questionnaire. One of them was not considered as a competency but as experience. Therefore, one new competency was added to the next-round questionnaire, namely, 'Ability to plan and organise the logo design process'.

Thus a new questionnaire was designed based on the panel of experts' suggestions that included 85 competencies for the next and final round of the study.

4.3.5 Third-Round Results

The third-round questionnaire was sent to the 30 panel members and again they were given three days to respond. The panel responded by indicating the level of significance of each of the 85 competencies on a 7-point Likert scale. All the members returned the third-round questionnaire. This represented a response rate of 100%.

The collected data was analysed using descriptive statistics on SPSS software. The means and SD of the experts' opinions were calculated for every competency, Table 4.14 shows the results:

Table 4.14: Third-Round Results

No.	Competency	Responses (%)	Mean	SD
1.	Applied understanding of colour theory and psychology	100.00	6.67	0.80
2.	Apply basic knowledge of Gestalt psychology to digital media design	100.00	6.33	0.96
3.	Apply design principles to digital platforms	100.00	6.50	0.86
4.	Apply design and innovative concepts	100.00	6.57	0.82
5.	Understanding composition and its construction mechanisms	100.00	6.53	0.57
6.	Applied understanding of design theories and methodologies	100.00	6.53	0.73
7.	Applied understanding of anatomy	100.00	5.53	1.31
8.	Applied understanding of digital advertising	100.00	6.50	0.82
9.	Use graphic design terminology	100.00	6.03	0.81
10.	Applied understanding of typography and its judicial application	100.00	6.43	0.68
11.	Applied understanding of symbols and icons	100.00	6.43	0.94
12.	Applied understanding of graphic design communication trends	100.00	6.50	0.68
13.	Apply the basics of graphic design for digital media	100.00	6.47	0.97
14.	Applied understanding of editorial design for digital media	100.00	6.47	0.73
15.	Understanding construction of meaningful images	100.00	6.27	1.14

Table 4.14: Third-Round Results

No.	Competency	Responses (%)	Mean	SD
16.	Applied understanding of interactive design	100.00	6.67	0.55
17.	Understanding aesthetics and aesthetic criteria	100.00	6.33	0.76
18.	Understanding visual design psychology and visual literacy	100.00	6.53	0.68
19.	Ability to perform creative thinking	100.00	6.77	0.77
20.	Applied understanding of user experience in digital media	100.00	6.67	0.55
21.	Describe different types and sizes of screen	100.00	6.20	0.85
22.	Applied understanding of basic marketing	100.00	5.63	1.22
23.	Apply the concepts of economics in graphic communications	100.00	5.73	1.20
24.	Identify characteristics of digital communications	100.00	6.03	1.22
25.	Applied understanding of history of art	100.00	5.23	1.28
26.	Applied understanding of history of graphic design	100.00	6.00	1.31
27.	Apply the concepts of cross-media publishing and document repurposing	100.00	5.73	1.01
28.	Applied understanding of research skills and methods	100.00	6.00	0.95
29.	Apply the techniques of information and Internet searching	100.00	6.20	0.89
30.	Understanding of web processes and protocols	100.00	5.80	1.27
31.	Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices	100.00	5.70	1.18

Table 4.14: Third-Round Results

No.	Competency	Responses (%)	Mean	SD
32.	Ability to control cost, time, and resources with understanding the time, cost, and quality triangle	100.00	6.00	1.36
33.	Determine the costs associated with graphic design and other creative services	100.00	5.93	1.28
34.	Demonstrate the ability of design analysis	100.00	6.20	0.89
35.	Applied understanding of strategy-making	100.00	5.77	1.22
36.	Applied understanding of outcome evaluation	100.00	5.93	1.20
37.	Applied understanding of drawing and its techniques	100.00	6.13	1.04
38.	Applied understanding of 2D and 3D design	100.00	6.30	1.12
39.	Applied understanding of drawing sketches	100.00	6.53	0.68
40.	Applied understanding of storyboarding	100.00	6.33	1.06
41.	Applied understanding of prototyping	100.00	6.30	1.18
42.	Applied understanding of presentation skills	100.00	6.50	1.01
43.	Applied understanding of and ability to utilise tools and technology	100.00	6.53	0.63
44.	Apply the techniques of drawing software	100.00	6.20	1.00
45.	Apply the techniques of page layout and publishing software	100.00	6.33	0.92
46.	Apply the techniques of image editing software	100.00	6.83	0.59
47.	Understand different types of computing platform	100.00	6.20	0.92
48.	Explain document and workflow management	100.00	5.73	1.01
49.	Applied understanding of basic programming skills	100.00	5.77	1.33

Table 4.14: Third-Round Results

No.	Competency	Responses (%)	Mean	SD
50.	Apply the basics of photography for graphic design purposes	100.00	6.43	1.14
51.	Applied understanding of advanced photography tips, tricks, and techniques	100.00	6.23	1.14
52.	Apply the techniques of webpage development software	100.00	5.90	1.18
53.	Apply the techniques of 3D software	100.00	5.80	1.13
54.	Apply the techniques of preparing portfolios	100.00	6.30	0.84
55.	Demonstrate digital document delivery	100.00	6.03	1.07
56.	Apply the techniques of multimedia creation software	100.00	6.27	0.83
57.	Apply the techniques of filmmaking and video capturing	100.00	5.93	1.01
58.	Applied understanding of lighting techniques	100.00	6.30	0.75
59.	Applied understanding of animation and motion graphics	100.00	6.50	0.68
60.	Ability to collaborate productively in large interdisciplinary teams	100.00	6.50	0.82
61.	Applied understanding of technical communication skills	100.00	6.43	0.73
62.	Be able to convey an idea, feeling, and belief	100.00	6.53	0.78
63.	Applied understanding of how to communicate and sell ideas and designs to clients	100.00	6.43	1.07
64.	Identify and fulfil customer needs	100.00	6.43	1.01
65.	Be able to learn and comprehend	100.00	6.50	0.68
66.	Ability to plan and lead design projects	100.00	6.43	0.63

Table 4.14: Third-Round Results

No.	Competency	Responses (%)	Mean	SD
67.	Ability to be flexible, nimble, and dynamic in practice	100.00	6.43	0.73
68.	Applied understanding of decision-making and project management	100.00	6.10	0.96
69.	Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions	100.00	6.33	0.92
70.	Applied understanding of using local cultural symbolism and colours	100.00	6.47	1.01
71.	Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions	100.00	6.37	0.85
72.	Desire to improve and clarify	100.00	6.47	1.04
73.	Ability to solve communication problems visually	100.00	6.53	0.90
74.	Ability to work in a global environment with an understanding of cultural preservation	100.00	6.33	1.06
75.	Understanding of nested items including cause and effect	100.00	6.27	1.08
76.	Ability to develop project evaluation criteria that account for audience and context	100.00	6.20	0.89
77.	Comprehend the basics of art appreciation	100.00	6.37	0.81
78.	Applied understanding of design appraisal	100.00	6.50	0.73
79.	Ability to differentiate between the psychology of the digital media and print audience	100.00	6.57	0.73
80.	Ability to work under high pressure	100.00	6.20	1.10

Table 4.14: Third-Round Results

No.	Competency	Responses (%)	Mean	SD
81.	Flexibility to reschedule the timeframe of project production	100.00	6.20	1.00
82.	Understanding of media communication theory	100.00	6.43	0.68
83.	Understanding of how to visualise information in the digital age	100.00	6.47	0.63
84.	Ability to design and work with mobile applications	100.00	6.33	0.88
85.	Ability to plan and organise the logo design process	100.00	6.50	0.86

Table 4.14 indicates the attitudes of the panel of experts towards the third-round competencies, where the means were between 5.23 and 6.83, which meant that all of the listed competencies were seen as significant and valid. The highest ranked competency in this round was 'Apply the techniques of image editing software' followed by 'Ability to perform creative thinking', which are the same two items that were ranked the highest in the second round but with the positions reversed.

The SD values in this round were between 0.55 and 1.36, which indicates that the panel of experts were in agreement on 85 of the digital media design competencies. The greatest consensus among panel members was on two competencies, which had a SD value of 0.55, namely, 'Applied understanding of user experience in digital media' and 'Applied understanding of interactive design'. In contrast, the most disagreement between them related to 'Ability to control cost, time, and resources' and 'Applied understanding of basic programming skills' with a SD value of 1.36 and 1.33, respectively.

By the end of the third round of the Delphi method, the panel of experts had reached a consensus on and validated 85 competencies that they considered as significant for practising digital media design. Table 4.15 shows these competencies in order of mean value from high to low:

Table 4.15: The Significant Competencies for Practising Digital Media Design Sorted by Mean Value

Rank	Competency
1.	Apply the techniques of image editing software
2.	Ability to perform creative thinking
3.	Applied understanding of colour theory and psychology
4.	Applied understanding of interactive design
5.	Applied understanding of user experience in digital media
6.	Apply design and innovative concepts
7.	Ability to differentiate between the psychology of the digital media and print audience
8.	Understanding composition and its construction mechanisms
9.	Applied understanding of design theories and methodologies
10.	Understanding visual design psychology and visual literacy
11.	Applied understanding of drawing sketches
12.	Applied understanding of and ability to utilise tools and technology
13.	Be able to convey an idea, feeling, and belief
14.	Ability to solve communication problems visually
15.	Apply design principles to digital platforms
16.	Applied understanding of digital advertising
17.	Applied understanding of graphic design communication trends
18.	Applied understanding of presentation skills
19.	Applied understanding of animation and motion graphics
20.	Ability to collaborate productively in large interdisciplinary teams
21.	Be able to learn and comprehend
22.	Applied understanding of design appraisal
23.	Ability to plan and organise the logo design process

Table 4.15: The Significant Competencies for Practising Digital Media Design Sorted by Mean Value

Rank	Competency
24.	Apply the basics of graphic design for digital media
25.	Applied understanding of editorial design for digital media
26.	Applied understanding of using local cultural symbolism and colours
27.	Desire to improve and clarify
28.	Understanding of how to visualise information in the digital age
29.	Applied understanding of typography and its judicial application
30.	Applied understanding of symbols and icons
31.	Apply the basics of photography for graphic design purposes
32.	Applied understanding of technical communication skills
33.	Applied understanding of how to communicate and sell ideas and designs to clients
34.	Identify and fulfil customer needs
35.	Ability to plan and lead design projects
36.	Ability to be flexible, nimble, and dynamic in practice
37.	Understanding of media communication theory
38.	Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions
39.	Comprehend the basics of art appreciation
40.	Apply basic knowledge of Gestalt psychology to digital media design
41.	Understanding of aesthetics and aesthetic criteria
42.	Applied understanding of storyboarding
43.	Apply the techniques of page layout and publishing software
44.	Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions
45.	Ability to work in a global environment with an understanding of cultural preservation
46.	Ability to design and work with mobile applications
47.	Applied understanding of 2D and 3D design
48.	Applied understanding of prototyping

Table 4.15: The Significant Competencies for Practising Digital Media Design Sorted by Mean Value

Rank	Competency
49.	Apply the techniques of preparing portfolios
50.	Applied understanding of lighting techniques
51.	Understanding of construction of meaningful images
52.	Apply the techniques of multimedia creation software
53.	Understanding of nested items including cause and effect
54.	Applied understanding of advanced photography tips, tricks, and techniques
55.	Describe different types and sizes of screen
56.	Apply the techniques of information and Internet searching
57.	Demonstrate the ability of design analysis
58.	Apply the techniques of drawing software
59.	Understand different types of computing platform
60.	Ability to develop project evaluation criteria that account for audience and context
61.	Ability to work under high pressure
62.	Flexibility to reschedule the timeframe of project production
63.	Applied understanding of drawing and its techniques
64.	Applied understanding of decision-making and project management
65.	Use graphic design terminology
66.	Identify characteristics of digital communications
67.	Demonstrate digital document delivery
68.	Applied understanding of history of graphic design
69.	Applied understanding of research skills and methods
70.	Ability to control cost, time, and resources with understanding the time, cost, and quality triangle
71.	Determine the costs associated with graphic design and other creative services
72.	Applied understanding of outcome evaluation
73.	Apply the techniques of filmmaking and video capturing
74.	Apply the techniques of webpage development software

Table 4.15: The Significant Competencies for Practising Digital Media Design Sorted by Mean Value

Rank	Competency
75.	Understanding of web processes and protocols
76.	Apply the techniques of 3D software
77.	Applied understanding of strategy-making
78.	Applied understanding of basic programming skills
79.	Apply the concepts of economics in graphic communications
80.	Apply the concepts of cross-media publishing and document repurposing
81.	Explain document and workflow management
82.	Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices
83.	Applied understanding of basic marketing
84.	Applied understanding of anatomy
85.	Applied understanding of history of art

4.3.6 The Differences in Perceiving Digital Media Design Competencies Between Practitioners and Academics

In this study, there were 30 participants from two different populations, 16 of them were academics and 14 were practitioners in the digital media design field. To answer RQ2 – how do practitioners and academics perceive the digital media design competencies investigated in this study, and are there any differences in those perceptions? – the independent-samples t-test was utilised on the data from the third-round questionnaire to compare the perceptions of academics with those of practitioners regarding the significant competencies.

For Hypothesis H1: There are significant differences between academics and practitioners in identifying the significant competencies for digital media design to be accepted, the t-test values need to have a significance level of $\alpha \leq 0.05$. The result of the t-test shows that there is a significant difference in the perception between academics and practitioners in the case of 19 out of the 85 competencies (for a

complete list of the t-test results for all significant competencies see Appendix O). The 19 identified are as follows:

1. 'Applied understanding of design theories and methodologies' competency: there was a significant difference between the two groups, where the academics (mean = 6.81, SD = 0.40) scored significantly higher than the practitioners (mean = 6.21, SD = 0.89). The t-value was (2.42) at a significance level of (0.024), which is less than (0.05).
2. 'Applied understanding of digital advertising' competency: there was a significant difference between the two groups, where the academics (mean = 6.88, SD = 0.34) scored significantly higher than the practitioners (mean = 6.07, SD = 1.00). The t-value was (3.03) at a significance level of (0.001), which is less than (0.05).
3. 'Applied understanding of symbols and icons' competency: there was a significant difference between the two groups, where the academics (mean = 6.81, SD = 0.40) scored significantly higher than the practitioners (mean = 6.00, SD = 1.18). The t-value was (2.60) at a significance level of (0.011), which is less than (0.05).
4. 'Apply the basics of graphic design for digital media' competency: there was a significant difference between the two groups, where the academics (mean = 6.88, SD = 0.34) scored significantly higher than the practitioners (mean = 6.00, SD = 1.24). The t-value was (2.71) at a significance level of (0.009), which is less than (0.05).
5. 'Understanding of construction of meaningful images' competency: there was a significant difference between the two groups, where the academics (mean = 6.63, SD = 0.62) scored significantly higher than the practitioners (mean = 5.86, SD = 1.46). The t-value was (1.92) at a significance level of (0.040), which is less than (0.05).
6. 'Applied understanding of drawing and its techniques' competency: there was a significant difference between the two groups, where the academics (mean = 6.56, SD = 0.63) scored significantly higher than the practitioners (mean = 5.64, SD = 1.22). The t-value was (2.65) at a significance level of (0.025), which is less than (0.05).

7. ‘Applied understanding of 2D and 3D design’ competency: there was a significant difference between the two groups, where the academics (mean = 6.75, SD = 0.45) scored significantly higher than the practitioners (mean = 5.69, SD = 1.42). The t-value was (2.57) at a significance level of (0.014), which is less than (0.05).
8. ‘Applied understanding of storyboarding’ competency: there was a significant difference between the two groups, where the academics (mean = 6.75, SD = 0.45) scored significantly higher than the practitioners (mean = 5.86, SD = 1.35). The t-value was (2.50) at a significance level of (0.027), which is less than (0.05).
9. ‘Applied understanding of prototyping’ competency: there was a significant difference between the two groups, where the academics (mean = 6.56, SD = 0.51) scored significantly higher than the practitioners (mean = 6.00, SD = 1.62). The t-value was (1.32) at a significance level of (0.025), which is less than (0.05).
10. ‘Applied understanding of presentation skills’ competency: there was a significant difference between the two groups, where the academics (mean = 6.75, SD = 0.68) scored significantly higher than the practitioners (mean = 6.21, SD = 1.25). The t-value was (1.48) at a significance level of (0.014), which is less than (0.05).
11. ‘Apply the techniques of image editing software’ competency: there was a significant difference between the two groups, where the academics (mean = 6.94, SD = 0.25) scored significantly higher than the practitioners (mean = 6.71, SD = 0.83). The t-value was (1.03) at a significance level of (0.039), which is less than (0.05).
12. ‘Apply the basics of photography for graphic design purposes’ competency: there was a significant difference between the two groups, where the academics (mean = 6.81, SD = 0.54) scored significantly higher than the practitioners (mean = 6.00, SD = 1.47). The t-value was (2.06) at a significance level of (0.025), which is less than (0.05).
13. ‘Applied understanding of advanced photography tips, tricks, and techniques’ competency: there was a significant difference between the two groups,

where the academics (mean = 6.63, SD = 0.50) scored significantly higher than the practitioners (mean = 5.79, SD = 1.48). The t-value was (2.14) at a significance level of (0.003), which is less than (0.05).

14. 'Ability to collaborate productively in large interdisciplinary teams' competency: there was a significant difference between the two groups, where the academics (mean = 6.63, SD = 0.50) scored significantly higher than the practitioners (mean = 6.36, SD = 1.08). The t-value was (0.89) at a significance level of (0.042), which is less than (0.05).
15. 'Applied understanding of technical communication skills' competency: there was a significant difference between the two groups, where the academics (mean = 6.69, SD = 0.48) scored significantly higher than the practitioners (mean = 6.14, SD = 0.86). The t-value was (2.17) at a significance level of (0.011), which is less than (0.05).
16. 'Applied understanding of using local cultural symbolism and colours' competency: there was a significant difference between the two groups, where the academics (mean = 6.63, SD = 0.62) scored significantly higher than the practitioners (mean = 6.29, SD = 1.33). The t-value was (0.92) at a significance level of (0.027), which is less than (0.05).
17. 'Ability to solve communication problems visually' competency: there was a significant difference between the two groups, where the academics (mean = 6.81, SD = 0.54) scored significantly higher than the practitioners (mean = 6.21, SD = 1.12). The t-value was (1.90) at a significance level of (0.006), which is less than (0.05).
18. 'Comprehend the basics of art appreciation' competency: there was a significant difference between the two groups, where the academics (mean = 6.31, SD = 0.95) scored significantly lower than the practitioners (mean = 6.43, SD = 0.65). The t-value was (-0.39) at a significance level of (0.013), which is less than (0.05).
19. 'The ability to differentiate between the psychology of the digital media and print audience' competency: there was a significant difference between the two groups, where the academics (mean = 6.75, SD = 0.45) scored

significantly higher than the practitioners (mean = 6.36, SD = 0.93). The t-value was (1.51) at a significance level of (0.020), which is less than (0.05).

4.4 Study II: Needed Competencies for Transition from Traditional to Digital Media Design

Study II was conducted to explore the competencies that print graphic designers need to transition into digital media design. This study therefore answers RQ3.

The significant digital media design competencies identified in Study I were used to design a new questionnaire for Study II (see Chapter 3 for more details). The population of this study was print graphic designers in Jordan. The participants in this study were asked to do a self-assessment by rating the availability of the significant digital media design competencies in themselves. A 5-point Likert-type scale was used in this questionnaire. The Internet was used to collect the data for this study via social media and emails. There were 282 responses received for this study, which represents 87% of the required sample size.

SPSS software was used to analyse the data collected in Study II. The mean and SD values were calculated to evaluate the availability of each of the needed competencies in print graphic designers.

4.4.1 Study II Normality and Reliability

4.4.1.1 Normality Test

A one-sample Kolmogorov–Smirnov test was executed to determine the data normality (Elliott & Woodward, 2007), as shown in Table 4.16 below:

Table 4.16: Normality Test/One-Sample Kolmogorov–Smirnov Test

N		282
Normal Parameters	3.99820	4.0040
	.431843	.45295
Most Extreme Differences	.032	.037
	.032	.037
	-.025	-.032
Kolmogorov–Smirnov Z		.543
Asymp. Sig. (2-tailed)		.929

Table 4.16 shows that the data has a normality distribution as the Kolmogorov–Smirnov value is (0.543) at a significance level of (0.929), which is higher than the specified value (0.05).

4.4.1.2 Reliability Test

Cronbach's alpha is the most common measure of internal consistency (or reliability). It is most commonly used when there are multiple Likert questions in a survey/questionnaire that form a scale as it allows the researcher to determine if the scale is reliable. Cronbach's alpha simply provides the researcher with an overall reliability coefficient for a set of variables. Cronbach's alpha was used to measure the reliability of the instrument items in Study II. The value of Cronbach's alpha was 96.1% on 85 items, which is considered as excellent because it is higher than the acceptable rate of 70% (Pallant, 2007).

4.4.2 Study II Statistical Analysis

The population of this study was practising graphic designers in Jordan. The total number of accepted responses was 282. The mean and frequency distribution were used to describe the characteristics of the study subjects. Frequencies and percentages were used to describe the categorical variables. The distribution of the

participants by gender, age, education level, major studied, and work experience was as follows:

4.4.2.1 Gender

Table 4.17: Distribution of Participants in Study II by Gender

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	200	70.9	70.9	70.9
Female	82	29.1	29.1	100.0
Total	282	100.0	100.0	

Table 4.17 shows that there were more male than female practitioners in the sample. There were 200 men, accounting for 70.91% of the study population and 82 women, accounting for 29.1%.

4.4.2.2 Age

Table 4.18: Distribution of Participants in Study II by Age

Age (years)	Frequency	Percent	Valid Percent	Cumulative Percent
20–29	184	65.2	65.2	65.2
30–39	84	29.8	29.8	95.0
40–49	8	2.8	2.8	97.9
50+	6	2.1	2.1	100.0
Total	282	100.0	100.0	

Table 4.18 shows that most of the participants were 20 to 29 years old, that is, 184 participants or 65.2% of the total sample. The second-largest group of participants were aged 30 to 39 years old, that is, 84 (29.8%) participants.

4.4.2.3 Education

Table 4.19: Distribution of Participants in Study II by Education Level

Education Level	Frequency	Percent	Valid Percent	Cumulative Percent
Secondary school or lower	8	2.8	2.8	2.8
Diploma	24	8.5	8.5	11.3
Bachelor's degree	210	74.5	74.5	85.8
Postgraduate qualification	40	14.2	14.2	100.0
Total	282	100.0	100.0	

Table 4.19 shows that the majority of the sample (74.5%) had a bachelor's degree, while 14.2% of them had a postgraduate qualification, 8.5% had a diploma certificate, and finally 2.8% had a secondary school or lower level of educational attainment.

4.4.2.4 Major

Table 4.20: Distribution of Participants in Study II by Major

Major		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graphic Design	178	63.1	91.8	91.8
	Interior Design	4	1.4	2.1	93.8
	Islamic Art	2	0.7	1.0	94.8
	Computer Science	2	0.7	1.0	95.9
	Plastic Art	2	0.7	1.0	96.9
	Business Administration	2	0.7	1.0	97.9
	Animation	2	0.7	1.0	99.0
	IT	2	0.7	1.0	100.0
	Total	194	68.8	100.0	
Missing	System	88	31.2		
Total		282	100.0		

Table 4.20 shows that most of the sample had a major in graphic design, that is, 63.1% of the sample. However, it should be noted that 88 (31.2%) participants did not define their major.

4.4.2.5 Experience

Table 4.21: Distribution of Participants in Study II by Experience

Experience (years)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0–4	150	53.2	53.2	53.2
	5–9	86	30.5	30.5	83.7
	10–14	22	7.8	7.8	91.5
	15–20	12	4.3	4.3	95.7
	20+	12	4.3	4.3	100.0
	Total	282	100.0	100.0	

Table 4.21 shows that 53.2% of the sample had less than 4 years of experience, while 30.5% of the sample had 5–9 years of experience. Participants with experience of 10+ years accounted for 16.3% of the sample.

4.4.3 Study II Outcomes

A self-assessment questionnaire with closed questions was used in this study, where graphic designers in Jordan were asked to rate the availability of digital media design competencies in themselves. A 5-point Likert-type scale was used in this questionnaire. Descriptive statistics were used in this study to analyse the results. The mean and SD values were calculated to evaluate the variables in the questionnaire. The competency availability was identified by the mean value, and the results were categorised into three equal groups as follows:

- A competency with a mean value from 3.67 up to 5 was considered as an available competency.

- A competency with a mean value from 2.34 up to 3.66 was considered as a poor competency.
- A competency with a mean value from 1 up to 2.33 was considered as a missing competency.

A competency with a mean value of ≤3.66 was considered as a needed competency for the transition from print to digital media design. The distribution in the participants' opinions was shown by the SD value. A competency that got a SD value of over 1.2 was considered as significant.

The mean and SD values were calculated for the statements on digital media design competencies in Jordan. Table 4.16 shows the descriptive statistics for the statements in order of mean value of competency:

Table 4.22: Study II Descriptive Statistics

No.	Competency	Mean	SD
1.	Desire to improve and clarify	4.75	0.56
2.	Be able to learn and comprehend	4.66	0.56
3.	Apply design and innovative concepts	4.56	0.57
4.	Ability to plan and organise the logo design process	4.53	0.74
5.	Ability to work under high pressure	4.51	0.70
6.	Ability to perform creative thinking	4.49	0.53
7.	Apply the techniques of image editing software	4.49	0.69
8.	Ability to be flexible, nimble, and dynamic in practice	4.48	0.71
9.	Apply the basics of photography for graphic design purposes	4.47	0.61
10.	Ability to plan and lead design projects	4.46	0.71
11.	Apply the techniques of information and Internet searching	4.43	0.67
12.	Be able to convey an idea, feeling, and belief	4.42	0.72
13.	Understand of different types of computing platform	4.40	0.69
14.	Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions	4.39	0.74

Table 4.22: Study II Descriptive Statistics

No.	Competency	Mean	SD
15.	Demonstrate the ability of design analysis	4.36	0.69
16.	Applied understanding of using local cultural symbolism and colours	4.36	0.72
17.	Understanding composition and its construction mechanisms	4.34	0.70
18.	Comprehend the basics of art appreciation	4.33	0.67
19.	Applied understanding of design appraisal	4.32	0.69
20.	Use graphic design terminology	4.31	0.75
21.	Applied understanding of how to communicate and sell ideas and designs to clients	4.31	0.75
22.	Identify and fulfil customer needs	4.30	0.81
23.	Applied understanding of technical communication skills	4.29	0.68
24.	Understanding aesthetics and aesthetic criteria	4.28	0.68
25.	Applied understanding of design theories and methodologies	4.27	0.70
26.	Ability to work in a global environment with an understanding of cultural preservation	4.27	0.78
27.	Applied understanding of colour theory and psychology	4.26	0.68
28.	Applied understanding of symbols and icons	4.26	0.81
29.	Ability to collaborate productively in large interdisciplinary teams	4.26	0.81
30.	Understanding of nested items including cause and effect	4.26	0.79
31.	Applied understanding of research skills and methods	4.24	0.75
32.	Applied understanding of presentation skills	4.20	0.75
33.	Ability to solve communication problems visually	4.19	0.83
34.	Applied understanding of decision-making and project management	4.18	0.89
35.	Flexibility to reschedule the timeframe of project production	4.18	0.91

Table 4.22: Study II Descriptive Statistics

No.	Competency	Mean	SD
36.	Understanding visual design psychology and visual literacy	4.17	0.73
37.	Applied understanding of prototyping	4.16	0.72
38.	Applied understanding of and ability to utilise tools and technology	4.16	0.73
39.	Apply the techniques of drawing software	4.16	0.92
40.	Apply the basics of graphic design for digital media	4.15	0.88
41.	Applied understanding of drawing sketches	4.13	0.86
42.	Applied understanding of typography and its judicial application	4.12	0.94
43.	Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions	4.12	0.86
44.	Applied understanding of graphic design communication trends	4.09	0.86
45.	Apply design principles to digital platforms	4.08	0.95
46.	Demonstrate digital document delivery	4.08	0.80
47.	Apply the techniques of preparing portfolios	4.07	0.88
48.	Understanding construction of meaningful images	4.06	0.82
49.	Applied understanding of digital advertising	4.05	0.89
50.	Understanding media communication theory	4.05	0.90
51.	Applied understanding of outcome evaluation	3.99	0.86
52.	Apply the concepts of cross-media publishing and document repurposing	3.95	0.86
53.	Applied understanding of 2D and 3D design	3.93	1.01
54.	Apply the techniques of page layout and publishing software	3.93	1.07
55.	Applied understanding of drawing and its techniques	3.91	0.93
56.	Explain document and workflow management	3.91	0.88
57.	Applied understanding of basic marketing	3.89	1.03
58.	Understanding of web processes and protocols	3.87	1.03

Table 4.22: Study II Descriptive Statistics

No.	Competency	Mean	SD
59.	Determine the costs associated with graphic design and other creative services	3.85	0.95
60.	Understanding of how to visualise information in the digital age	3.85	0.95
61.	Ability to control cost, time, and resources with understanding the time, cost, and quality triangle	3.83	1.05
62.	Ability to develop project evaluation criteria that account for audience and context	3.81	0.88
63.	Applied understanding of strategy-making	3.79	0.85
64.	Applied understanding of interactive design	3.78	1.03
65.	Applied understanding of history of graphic design	3.77	0.95
66.	Ability to differentiate between the psychology of the digital media and print audience	3.77	1.10
67.	Applied understanding of advanced photography tips, tricks, and techniques	3.76	1.10
68.	Apply the concepts of economics in graphic communications	3.71	1.04
69.	Applied understanding of anatomy	3.67	0.98
70.	Applied understanding of storyboarding	3.63	1.06
71.	Describe different types and sizes of screen	3.59	1.23
72.	Applied understanding of history of art	3.59	0.99
73.	Applied understanding of editorial design for digital media	3.54	1.17
74.	Apply the techniques of multimedia creation software	3.54	1.08
75.	Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices	3.52	1.04
76.	Identify characteristics of digital communications	3.48	1.02
77.	Applied understanding of lighting techniques	3.30	1.08
78.	Apply basic knowledge of Gestalt psychology to digital media design	3.26	1.06

Table 4.22: Study II Descriptive Statistics

No.	Competency	Mean	SD
79.	Apply the techniques of webpage development software	3.21	1.21
80.	Applied understanding of animation and motion graphics	3.21	1.18
81.	Ability to design and work with mobile applications	3.10	1.40
82.	Applied understanding of user experience in digital media	3.05	1.20
83.	Applied understanding of basic programming skills	2.97	1.20
84.	Apply the techniques of 3D software	2.78	1.17
85.	Apply the techniques of filmmaking and video capturing	2.74	1.26

Table 4.22 indicates the attitudes of the sample towards digital media design competencies, where the means were between 2.74 and 4.75. The table shows that most Jordanian designers have most digital media design competencies, except for 16 out of 85 competencies where the mean value for these competencies was ≤ 3.66. These 16 competencies are:

1. 'Apply the techniques of filmmaking and video capturing' (Mean = 2.74, SD = 1.26).
2. 'Apply the techniques of 3D software' (Mean = 2.78, SD = 1.17).
3. 'Applied understanding of basic programming skills' (Mean = 2.97, SD = 1.20).
4. 'Applied understanding of user experience in digital media' (Mean = 3.05, SD = 1.20).
5. 'Ability to design and work with mobile applications' (Mean = 3.10, SD = 1.40).
6. 'Applied understanding of animation and motion graphics' (Mean = 3.21, SD = 1.18).
7. 'Apply the techniques of webpage development software' (Mean = 3.21, SD = 1.21).
8. 'Apply basic knowledge of Gestalt psychology to digital media design' (Mean = 3.26, SD = 1.06).
9. 'Applied understanding of lighting techniques' (Mean = 3.30, SD = 1.08).

10. ‘Identify characteristics of digital communications’ (Mean = 3.48, SD = 1.02).
11. ‘Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices’ (Mean = 3.52, SD = 1.04).
12. ‘Apply the techniques of multimedia creation software’ (Mean = 3.54, SD = 1.08).
13. ‘Applied understanding of editorial design for digital media’ (Mean = 3.54, SD = 1.17).
14. ‘Applied understanding of history of art’ (Mean = 3.59, SD = 0.99).
15. ‘Describe different types and sizes of screen’ (Mean = 3.59, SD = 1.23).
16. ‘Applied understanding of storyboarding’ (Mean = 3.63, SD = 1.06).

4.5 Summary

From the analysis of the preliminary study, which used a semi-structured interview method to gather data from academics and practitioners from the digital media field, the following six themes emerged:

1. The differences between print media and digital media;
2. Design education and students’ preparedness for the digital media design profession in Jordan;
3. The career trends of university graduates in graphic design;
4. Experience of the transition from print to digital media design;
5. Demand for digital media designers in the labour market;
6. The missing competencies that graphic designers need in order to practise digital media design.

In addition, the participants in the preliminary study suggested 27 competencies that graphic designers need in order to practise digital media design.

In Study I, which used a modified Delphi method, a panel of experts were asked to identify the significant competencies for digital media design in Jordan. The panel identified 77 competencies in the first round and suggested 17 new

competencies be added to the first-round questionnaire competencies. Seven of these competencies were accepted and added to the next-round questionnaire. In the second round, 84 competencies were identified by the panel of experts and they suggested 11 new competencies for the next round. Just one of these competencies was accepted and added to the next round. In this third and final round, 85 competencies gained a consensus and validation from the panel of experts as being required for digital media design.

The independent-samples t-test was utilised on the third-round questionnaire data to understand the differences in the perceptions of digital media competencies between practitioners and academics. The results showed that there were significant differences in how the two groups perceived 19 out of the 85 competencies.

Study II was conducted to determine the competencies that print graphic designers need to transition into digital media design. Practising print graphic designers were asked to complete a self-assessment questionnaire to rate the availability of the competencies identified in Study I in themselves. The results showed that graphic designers need to be equipped with 16 new competencies to transition into digital media design as these were identified as poor or missing by participants in Study II.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Overview

This chapter recapitulates the aim and objectives of this research, discusses the findings, and describes how the research was undertaken to answer the research questions. It also discusses the limitations of the study, makes some suggestions for future studies, and presents the contributions to knowledge made by this research.

Technological advances in recent years have affected the graphic design profession dramatically. Indeed, digital technology has had an effect on the graphic design field since the emergence of the computer as a design tool to replace the manual tools that were used previously (Meggs & Purvis, 2012). This development has greatly helped to improve design outcomes, shorten the implementation time, and reduce the production cost. Recently, digital technology has started to affect the communicate medium itself; the digital medium has become a strong competitor of the print medium that has been used for hundreds of years for visual communication. The new technologies have created a challenge for graphic designers who need to acquire new competencies to get involved in digital media design (Wood, 2009).

Therefore this research aimed to identify the competencies that print graphic designers need to transition into digital media design in Jordan. The research was divided into three studies. First, a preliminary study was undertaken, which involved the use of a semi-structured interview approach to explore some digital media design experts' viewpoints about the preparedness of Jordanian university graduates to practise digital media design. A second aim of the preliminary study was to gather data in order for the researcher to propose competencies that are considered as significant for digital media designers. The following two major studies (Study I and

Study II) were conducted consecutively. The aim of Study I was to obtain a consensus on and validation of the significant competencies for digital media design in Jordan from a panel of experts and also to understand and discuss the differences in the perceptions of practitioners and academics regarding the validated competencies. Study II was conducted to explore the needed competencies for print graphic designers to transition into digital media design. A summary of the results of these studies is provided in the next section.

5.2 Findings and Discussion

The following discussion of the research findings is presented according to the research questions. This study was guided by the following research questions:

RQ1: What are the most important competencies that digital media design practices need in Jordan?

RQ2: How do practitioners and academics perceive the digital media design competencies investigated in this study? where are the differences in those perceptions?

RQ3: How would print graphic designers in Jordan transition into digital media design?

5.2.1 What Are the Most Important Competencies That Digital Media Design Practices Needs in Jordan?

This first research question was answered by achieving the first objective of this research, which was to obtain a consensus and validation from a panel of experts in identifying the significant competencies for digital media design in Jordan. This research question was answered by Study I of this research, where a Delphi method was used to obtain consensus and validation from a panel of experts. A series of questionnaires was designed and presented to the panel of experts, who were asked to evaluate the significance of the proposed competencies in three rounds.

The first round results (see Table 4.12) shows that the panellists gave creative and innovation abilities the highest scores in this round, where the 'Applying design and innovative concepts' and 'Ability to perform creative thinking' competencies were given the two highest scores, respectively, while the two lowest scoring competencies were 'Applied understanding of basic programming skills' and 'Applied understanding of history of art', respectively. In the second round (see Table 4.13), the 'Ability to perform creative thinking' competency remained the highest scoring competency by mean value; however, a different competency, namely the 'Apply the techniques of image editing software' competency came in second place. The lowest scoring competencies were the same as the ones in the first round. The highest scoring competencies remained the same in the final round of this study (see Table 4.14), but their positions were reversed with the 'Apply the techniques of image editing software competency' becoming the highest scoring competency with a mean value of 6.83 and 'Ability to perform creative thinking' getting the second-highest mean value of 6.77. This situation reflects the findings of Fleischmann (2012), who considers that the designer's role is not limited to one of creativity, but should also encompass the technical side of projects. The two competencies with lowest mean values were 'Applied understanding of anatomy' and 'Applied understanding of history of art', respectively. The anatomy competency was deduced from the preliminary study but the history of art competency is one of the competencies that academics normally consider as an important competency for any art and design student (AbuAwad, 2012; National Association of Schools of Art and Design, 2013; Wang, 2006).

The results of the third and last round of the Study I questionnaire showed the attitudes of the panel of experts towards the significant digital media design competencies, where the means were between 5.23 and 6.83 and the SD values were between 0.55 and 1.36. A total of 85 digital media design competencies obtained a consensus and validation from the panel of experts. The high mean values that all 85 competencies scored could be explained by the source that these competencies came from, that is, some of these competencies were deduced from studies and articles that reflect the current state of the digital media discipline. Another source for these

competencies was the preliminary study in this research which explored the Jordanian design marketplace. And finally, the panellist themselves who evaluated these competencies had the opportunity to suggest modifications to any proposed competency or propose new ones. The number of validated competencies was slightly higher than that in other studies that identify competencies for design disciplines: Dharavath (2003) identifies 57, Wang (2006) 63, and AbuAwad (2012) 68 competencies. However, the number of competencies has no relation to the value of the score given to them by the members of the panel of experts, but it is related to the significance of the competency. The in-depth literature review resulted in the proposition of 70 competencies, and the door was open to the experts to propose new ones or to reject any of the proposed competencies. The mean values of the competencies were close. This might be due to the large number of competencies and the scoring range of between 5 and 7 that was used to rate a competency as significant. Also, some of the validated competencies like the drawing competency were not solely a digital competency. However, such competencies could be regarded as a supporting competency that the designer might need to have in order to prepare effectively for the design stage.

The panel members gave the highest scores to 14 competencies (see Table 5.1), so these may be considered more significant that the other 71 competencies. These competencies scored a mean value of over 6.5. Their significance is also supported by their having a relatively low SD value of between 0.55 and 0.90, which is indicative of the dispersion of respondents' opinions.

Table 5.1: Significant Competencies with the Highest Mean Scores

No.	Competency	Mean	SD
1.	Apply the techniques of image editing software	6.83	0.59
2.	Ability to perform creative thinking	6.77	0.77
3.	Applied understanding of colour theory and psychology	6.67	0.80
4.	Applied understanding of interactive design	6.67	0.55

Table 5.1: Significant Competencies with the Highest Mean Scores

No.	Competency	Mean	SD
5.	Applied understanding of user experience in digital media	6.67	0.55
6.	Apply design and innovative concepts	6.57	0.82
7.	Ability to differentiate between the psychology of the digital media and print audience	6.57	0.73
8.	Understanding composition and its construction mechanisms	6.53	0.57
9.	Applied understanding of design theories and methodologies	6.53	0.73
10.	Understanding visual design psychology and visual literacy	6.53	0.68
11.	Applied understanding of drawing sketches	6.53	0.68
12.	Applied understanding of and ability to utilise tools and technology	6.53	0.63
13.	Be able to convey an idea, feeling, and belief	6.53	0.78
14.	Ability to solve communication problems visually	6.53	0.90

Therefore, by the end of the third round of the Delphi method, the panel of experts had reached a consensus on and validated 85 competencies that they considered as significant for practising digital media design. These competencies were categorised by the researcher into five groups as follows:

I. Design principles and elements:

1. Applied understanding of colour theory and psychology
2. Apply basic knowledge of Gestalt psychology to digital media design
3. Apply design principles to digital platforms
4. Apply design and innovative concepts
5. Understanding composition and its construction mechanisms
6. Applied understanding of design theories and methodologies
7. Applied understanding of anatomy

8. Understanding media communication theory.

II. Accurate specialisations:

1. Applied understanding of digital advertising
2. Use graphic design terminology
3. Applied understanding of typography and its judicial application
4. Applied understanding of symbols and icons
5. Applied understanding of graphic design communication trends
6. Apply the basics of graphic design for digital media
7. Applied understanding of editorial design for digital media
8. Understanding construction of meaningful images
9. Applied understanding of interactive design
10. Ability to plan and organise the logo design process.

III. Cognitive studies and skills:

1. Understanding aesthetics and aesthetic criteria
2. Understanding visual design psychology and visual literacy
3. Ability to perform creative thinking
4. Applied understanding of user experience in digital media
5. Describe different types and sizes of screen
6. Applied understanding of basic marketing
7. Apply the concepts of economics in graphic communications
8. Identify characteristics of digital communications
9. Applied understanding of history of art
10. Applied understanding of history of graphic design
11. Apply the concepts of cross-media publishing and document repurposing
12. Applied understanding of research skills and methods
13. Apply the techniques of information and Internet searching
14. Understanding of web processes and protocols
15. Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices
16. Ability to control cost, time, and resources

17. Determine the costs associated with graphic design and other creative services
18. Demonstrate the ability of design analysis
19. Applied understanding of strategy-making
20. Applied understanding of outcome evaluation
21. Ability to differentiate between the psychology of the digital media and print audience
22. Understanding of how to visualise information in the digital age.

IV. Practical and technical skills:

1. Applied understanding of drawing and its techniques
2. Applied understanding of 2D and 3D design
3. Applied understanding of drawing sketches
4. Applied understanding of storyboarding
5. Applied understanding of prototyping
6. Applied understanding of presentation skills
7. Applied understanding of and ability to utilise tools and technology
8. Apply the techniques of drawing software
9. Apply the techniques of page layout and publishing software
10. Apply the techniques of image editing software
11. Understanding of different types of computing platforms
12. Explain document and workflow management
13. Applied understanding of basic programming skills
14. Apply the basics of photography for graphic design purposes
15. Applied understanding of advanced photography tips, tricks, and techniques
16. Apply the techniques of webpage development software
17. Apply the techniques of 3D software
18. Apply the techniques of preparing portfolios
19. Demonstrate digital document delivery
20. Apply the techniques of multimedia creation software
21. Apply the techniques of filmmaking and video capturing
22. Applied understanding of lighting techniques

23. Applied understanding of animation and motion graphics
24. Ability to design and work with mobile applications.

V. Behaviour and attitude:

1. Ability to collaborate productively in large interdisciplinary teams
2. Applied understanding of technical communication skills
3. Be able to convey an idea, feeling, and belief
4. Applied understanding of how to communicate and sell ideas and designs to clients
5. Identify and fulfil customer needs
6. Be able to learn and comprehend
7. Ability to plan and lead design projects
8. Ability to be flexible, nimble, and dynamic in practice
9. Ability to work under high pressure
10. Flexibility to reschedule the timeframe of project production
11. Applied understanding of decision-making and project management
12. Comprehend ethical behaviours, intellectual property rights (IPR), and copyright issues in the design professions
13. Applied understanding of using local cultural symbolism and colours
14. Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions
15. Desire to improve and clarify
16. Ability to solve communication problems visually
17. Ability to work in a global environment with an understanding of cultural preservation
18. Understanding of nested items including cause and effect
19. Ability to develop project evaluation criteria that account for audience and context
20. Comprehend the basics of art appreciation
21. Applied understanding of design appraisal.

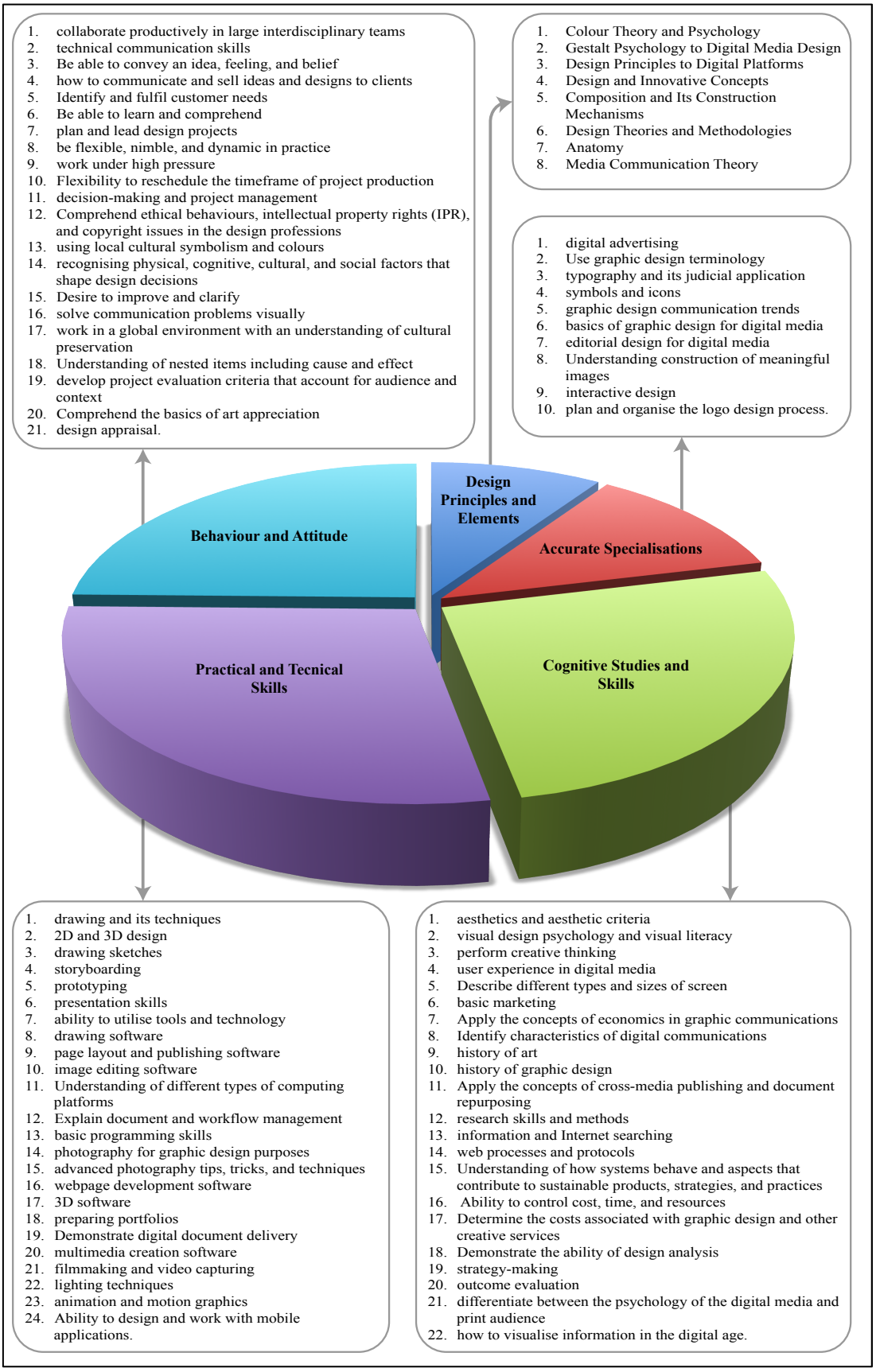

Figure 5.1: Digital Media Competencies

The results show that 85 competencies were identified as a significant for practising digital media design (see Figure 5.1), which gained consensus and validation from the panel of experts. Seventy out of the 85 competencies were deduced from the literature review; 37 competencies were from published articles and books, and another 33 competencies were from previous related studies. The interviewees in the preliminary study suggested another seven new competencies. The remaining eight competencies were proposed by the panel of experts and were added during the application of the Delphi method in Study I.

5.2.2 How Do Practitioners and Academics Perceive the Digital Media Design Competencies Investigated in This Study? Where Are the Differences in Those Perceptions?

The second research question was answered by achieving the second objective of this research, which was: to understand and discuss the differences between practitioners' and academics' perceptions of the validated competencies. This research question was answered by Study I of this research, where the independent-samples t-test was utilised on the data from the third-round questionnaire to compare the perceptions of academics with those of practitioners regarding the significant competencies (see Appendix O).

The results show that the academics generally rated all the competencies highly, with mean values ranging between 5.44 and 6.94. In contrast, the practitioners' mean values ranged between 5.00 and 6.71. Also, the Academic group gave 42 out of the 85 competencies a mean value of over 6.5. On the other hand, only five competencies scored a mean value of over 6.5 in the practitioner group. In descending order these were: 'Apply the techniques of image editing software', 'Applied understanding of user experience on digital media', 'Ability to perform creative thinking', 'Applied understanding of interactive design', and 'Be able to learn and comprehend'. All these competencies also achieved a mean value of over 6.5 in the Academic group, except for one competency, 'Be able to learn and comprehend', which got a mean value of 6.44. This score may be due to academics

placing greater importance on competencies of knowledge and skill than behavioural ones. However, the 'Apply the techniques of image editing software' competency scored the highest mean value in both groups, which is in agreement with (Malvik, 2012), who found that the skill most desired by employers in a graphic designer is the ability to use Photoshop as an image editing software.

Furthermore, nine competencies scored a mean value of less than 5.5 in the practitioner group, but only one competency scored a mean value of less than 5.5 in the academic group: 'Applied understanding of history of art'. The nine competencies that scored a mean value of less than 5.5 in the practitioner group are in ascending order: 'Applied understanding of history of art', 'Applied understanding of anatomy', 'Applied understanding of basic marketing', 'Apply the techniques of filmmaking and video capturing', 'Explain document and workflow management', 'Apply the concepts of cross-media publishing and document repurposing', 'Apply the concepts of economics in graphic communications', and 'Applied understanding of strategy-making'. However, both groups agreed that the 'Applied understanding of history of art' competency had the lowest significance. Nevertheless, there is an ongoing debate among academics and practitioners in the field of graphic design about the value of students taking history courses (AbuAwad, 2012; Wang, 2006). It was also clear from the results that practitioners did not give the management and economic competencies any priority in their evaluation of the desired competencies, even though these have been recommended in many previous studies (AbuAwad, 2012; AIGA, 2008; Hsieh et al., 2010; Wang, 2006) and were also identified as important by the participants in the preliminary study in this research.

The t-test results revealed that there is a difference in academics' and practitioners' perception in respect of 19 out of the 85 competencies at a significance level of $\alpha \leq 0.05$. These 19 competencies are:

1. 'Applied understanding of design theories and methodologies' ($\alpha = 0.024$): Academics scored this competency higher than practitioners with a mean value of 6.81 and 6.21, respectively. However, both groups considered it as a significant competency, which agrees with what McCoy (1998) and the

Design Council (2014) say about the reliance of digital media designers on traditional graphic design theories and methods. The National Association of Schools of Art and Design (2013) also identify this competency as an important competency for digital media design. The difference in the two groups' evaluations for this competency may relate to the traditional argument between the two groups about the priority of practical or theoretical courses.

2. 'Applied understanding of digital advertising' ($\alpha = 0.001$): Academics scored this competency higher than practitioners with a mean value of 6.88 and 6.07, respectively. It is clear that the gap between the two groups is wider than that for the above competency. Nevertheless, the Information and Communications Technology Council (2014) asserts that digital media design plays an important role in advertising. Also, Mallia and Windels (2011) point out that there is a trend for advertising to rely on smartphones, tablets, and other digital media. However, the practitioner group gave a lower score to this competency than did the academics. This may be due to the other tasks that practitioners think that the digital media designer could play pivotal role in, such as motion graphics, interaction design, and web design.
3. 'Applied understanding of symbols and icons' ($\alpha = 0.011$): Academics scored this competency higher than practitioners with a mean value of 6.81 and 6.00, respectively. The use of metaphorical symbols is a very important part of designing a GUI (Erlhoff & Marshall, 2008). Recently, the use of symbols and icons has increased in designing for digital media, especially for smartphones and tablets. An academic interviewee in the preliminary study asserts that there is a need for iconography design, which is defined by Encyclopaedia Britannica (2017) as "the science of identification, description, classification, and interpretation of symbols, themes, and subject matter in the visual arts".
4. 'Apply the basics of graphic design for digital media' ($\alpha = 0.009$): Academics scored this competency higher than practitioners with a mean value of 6.88 and 6.00, respectively. However, there is a high dispersion in respondents' opinions in the practitioner group as reflected in the SD value of 1.240. These

values give some indication that academics believe that graphic design and its basics are at the root of digital media design basics, but practitioners were unanimous in their opinion. Many authors agree on this point (Allen, 2012; Heller & Talarico, 2011; Wang, 2006) and they assert that graphic design basics and elements are important for digital media design. The interviewees in the preliminary study in this research also asserted that graphic design basics are crucial to digital media design; four practitioners and three academics consider it as a needed competency.

5. 'Understanding of construction of meaningful images' ($\alpha = 0.040$) is another competency that academics scored higher than practitioners with a mean value of 6.63 and 5.86, respectively. The results also showed that the practitioner group had a high dispersion in their opinions regarding this competency, where the SD value was 1.460. This competency is one the challenges that designers face due to the Modernism movement (DiMarco, 2010). The AIGA (2008) also considers it as an important competency that future designers should acquire.
6. 'Applied understanding of drawing and its techniques' ($\alpha = 0.025$): Academics scored this competency higher than practitioners with a mean value of 6.56 and 5.64, respectively. The practitioner group had a high SD value of 1.216, which indicates a high dispersion in the group members' opinions about this competency. This competency was proposed in the preliminary study in this research by two academics who asserted the importance of drawing skills for digital media design that enable designers to draw characters and storyboards.
7. 'Applied understanding of 2D and 3D design' ($\alpha = 0.014$): Academics scored this competency higher than practitioners with a mean value of 6.75 and 5.79, respectively. There was a high dispersion in the practitioner group members' opinions about this competency, which was indicated by a high SD value of 1.424. Four academics and one practitioner proposed this competency in the preliminary study of this research as they consider it as an important competency that gives designers a better understanding of designing for 2D and 3D environments. The higher number of academics who mentioned this

competency may reflect the difference in the perception of it between the two groups.

8. 'Applied understanding of storyboarding' (α = 0.027): Academics scored this competency higher than practitioners with a mean value of 6.75 and 5.86, respectively. The practitioner group had a high SD value of 1.351 that indicates a high dispersion in the group members' opinions about this competency. DiMarco (2010) and Erlhoff and Marshall (2008) argue that storyboarding is important for many forms of media production such as CD-ROMs, motion graphics, and animation. This competency was also proposed by two practitioners and three academics in the preliminary study in this research because these participants considered this competency as an important skill for digital media designers.
9. 'Applied understanding of prototyping' (α = 0.025): Academics scored this competency higher than practitioners with a mean value of 6.75 and 5.86, respectively. However, the practitioner group had a high SD value of 1.617, which indicates a high dispersion in the group members' opinions about this competency, which reflects the high level of disagreement among the group members. AIGA (2008) found this competency to be a significant for designers. Prototyping is more important these days in light of the need to test interactive projects so that they provide a good user experience.
10. 'Applied understanding of presentation skills' (α = 0.014): Academics scored this competency higher than practitioners with a mean value of 6.75 and 6.21, respectively. However, the practitioner group had a high SD value of 1.251, indicating a high dispersion in group members' opinions about this competency. Keating (2004) states that graphic designers' presentation skills are helpful for digital media design. On the other hand, Neves (2013) argues that there are differences between academics and practitioners in terms of the content, presentation, and scope of graphic design meaning, which also have revealed in study.
11. 'Apply the techniques of image editing software' (α = 0.039): Academics scored this competency higher than practitioners with a mean value of 6.94 and 6.71, respectively. However, this competency scored the highest mean

value out of all 85 competencies in both groups, which means that it should be seen as a very important competency. This competency is a competency that is commonly mentioned in the previous related studies that have been reviewed in this research (Dharavath, 2003; Wang, 2006; AIGA, 2008; Hsieh et al., 2010). It was also highly recommended by six interviewees in the preliminary study in this research; five of them were practitioners, who asserted that this competency was important for digital media design.

12. 'Apply the basics of photography for graphic design purposes' ($\alpha = 0.025$): Academics scored this competency higher than practitioners with a mean value of 6.81 and 6.00, respectively. However, the practitioner group had a high SD value of 1.468 which means that there was a high dispersion in group members' opinions about this competency. This competency became one of the competencies that designers needed to acquire when computers began to be used in the design process (Raizman, 2003), and it is considered to be one of tasks that designers should perform (Harland, 2011; van der Waarde, 2009). The studies reviewed in this research that sought to identify the needed competencies for graphic design also considered photography to be a needed competency (Dharavath, 2003; Hsieh et al., 2010; Wang, 2006).
13. 'Applied understanding of advanced photography tips, tricks, and techniques' ($\alpha = 0.003$): Academics scored this competency higher than practitioners with a mean value of 6.63 and 5.79, respectively. However, the practitioner group had a high SD value of 1.477 indicating a high dispersion in group members' opinions about this competency. It is clear from the mean value that the two groups considered this competency to be less important than the basics of photography competency. This competency was proposed by one of the panellists in the academic group at the first-round questionnaire stage and it was then presented to the panel of experts in the second round, and gained consensus and validation in the last round.
14. 'Ability to collaborate productively in large interdisciplinary teams' ($\alpha = 0.042$): Academics scored this competency higher than practitioners with a mean value of 6.63 and 6.36, respectively. Graphic design is one of the disciplines that requires collaboration within the design team (Dharavath,

2003; AIGA, 2008). However, digital media designers have to collaborate in interdisciplinary teams (Fleischmann, 2011, 2012; Keating, 2004; Wood, 2009).

15. 'Applied understanding of technical communication skills' (α = 0.011): Academics scored this competency higher than practitioners with a mean value of 6.69 and 6.14, respectively. It is clear that there are different points of view about this competency; however, it is highly recommended by previous studies that identify graphic designer competencies such as (Wang, 2006), (AIGA, 2008), and (Hsieh et al., 2010). Fleischmann (2011) also asserts that this competency is important for digital media designers.
16. 'Applied understanding of using local cultural symbolism and colours' (α = 0.027): Academics scored this competency higher than practitioners with a mean value of 6.63 and 6.29, respectively. The practitioner group had a high SD value of 1.326, which indicates a high dispersion in group members' opinions about this competency. This competency has been identified by AIGA (2008) for their perception about designer's competencies in 2015, which puts the cultural considerations as design determinates.
17. 'Ability to solve communication problems visually' (α = 0.006): Academics scored this competency higher than practitioners with a mean value of 6.81 and 6.21, respectively. The practitioner group had a SD value of 1.122 that is indicative of a high dispersion in group members' opinions about this competency. This competency has been identifies as an important competency for 2015 designer by AIGA (2008). Fleischmann (2012) also asserts that this competency is significant for digital media designers as all communication designers should be able to put forward visual solutions for communication problems.
18. 'Comprehend the basics of art appreciation' (α = 0.013): This is the only competency that practitioners scored higher than academics with a mean value of 6.43 and 6.31, respectively. This competency is also identified in a few studies that sought to identify the needed competencies for graphic designers (AIGA, 2008; Hsieh et al., 2010; Wang, 2006).

19. 'Ability to differentiate between the psychology of the digital media and print audience' (α = 0.020): Academics scored this competency higher than practitioners with a mean value of 6.75 and 6.36, respectively. This competency was proposed by one of the panellists from the academic group at the first-round questionnaire stage and it was presented to the panel of experts in the second round, and then gained consensus and validation in the last round.

The above competencies reflect the differences in how practitioners and academics perceive the identified competencies, where each group has its own point of view on how best to prepare students for the marketplace. However, the generally high scores that academics gave for many of the competencies might be one of the reasons why there were significant differences between the groups in how the competencies were perceived. Authors and scholars also have different points of view about the significant competencies for digital media design. For instance, Malvik (2012) focuses on the needed skills for practising digital media design. However, the National Association of Schools of Art and Design (2013) focuses on the knowledge and understanding competencies for a BFA in Digital Media.

The difference between academics and practitioners in terms of their perception of the validated competencies is particularly apparent in the case of the those competencies that fall under the practical and technical skills group with eight out 19 competencies showing a significant difference between academics and practitioners. This is followed by the behaviour and attitude group where there is a difference between the two groups for five competencies and the accurate specialisations group where academics and practitioners differ in respect of their perception about four competencies. There is also a significant difference in perception between the two groups in respect of one competency in each of the design principles and elements, and cognitive studies and skills groups.

However, the result of this study reveals that the differences between practitioners' and academics' perceptions of the validated competencies will not

affect the validated competencies or the competencies needed in the marketplace because all the competencies that have a significant difference scored a mean value of over 5 in both groups, and these are identified as significant competencies. The lowest mean values for the competencies that were perceived differently by practitioners' and academics' were 5.64 for the 'Applied understanding of drawing and its techniques' competency, followed by the 'Applied understanding of 2D and 3D design' and 'Applied understanding of advanced photography tips, tricks, and techniques' competencies each with a mean value of 5.79.

5.2.3 How Would Print Graphic Designers in Jordan Transition into Digital Media Design?

The third research question was answered by achieving the third objective of this research, which was: to explore the needed competencies for print graphic designers to transition into digital media design. This research question was answered by Study II, where a self-assessment questionnaire with 5-point Likert-type scale was distributed to practising print graphic designers in Jordan who were asked to assess whether they themselves possessed the required competencies for practising digital media design.

The results of Study II revealed the attitudes of the sample towards digital media design competencies, where the means values ranged between 2.74 and 4.75. The study result shows that print graphic designers in Jordan have most of the required digital media design competencies except for 16 out of 85 competencies that have a mean value ≤ 3.66. All 16 of these competencies were rated as poor and there were no competencies rated as missing. These 16 competencies are sorted into the above-mentioned five groups as follows:

- **Design principles and elements:**

1. 'Apply basic knowledge of Gestalt psychology to digital media design' (mean = 3.26): This one the competencies that print graphic designers should have (Wang, 2006), but it seems that there is a problem with equipping students with this competency because 88.7% of the participants in this study

were holding a bachelor's degree or higher. However, it is still needed for webpage layout and other screen designs (Keating, 2004; Lynch & Horton, 2008). This competency scored a mean value of 6.33 in Study I and there was no significant difference between academics and practitioners in their perception of this competency.

- **Accurate specialisations:**

1. 'Applied understanding of editorial design for digital media' (mean = 3.54): Editorial design is one of the competencies that print graphic designers should have (Hsieh et al., 2010), and it is also needed for digital media design. This competency could be employed in designing magazines for digital media (Allen, 2012) and it enables designers to control elements (Wood, 2009) and to present an information design effectively (Keating, 2004). This competency scored a mean value of 6.47 in Study I, and there was no significant difference between academics and practitioners in terms of their perception of this competency. However, the academic group mean value for this competency was 6.75, which shows that they consider this competency to be very important.

- **Cognitive studies and skills:**

1. 'Applied understanding of user experience on digital media' (mean = 3.05): This was considered as a new competency for designers, which is related to interaction design and digital media design. An understanding of the user experience will enable designers to provide designs that meet users' needs (Lynch & Horton, 2008; Buchanan, 2000; Frain, 2012). This competency was deduced from the literature review and supported by interviewees in the preliminary study. It was scored highly with a mean value of 6.67 in Study I, and there was no significant difference between academics and practitioners in their perception of this competency. However, the competency was scored slightly higher by practitioners than by academics, which reflects the importance that the former give to this competency.
2. 'Describe different types and sizes of screen' (mean = 3.59): Digital media designers deal normally with screens and they should understand the different types and sizes that exist (Lynch & Horton, 2008; Frain, 2012; Steane,

2010a). It scored a mean value of 6.2 in Study I and there was no significant difference between academics' and practitioners' perception of this competency. However, academics scored this competency higher than practitioners.

3. 'Identify characteristics of digital communications' (mean = 3.48): Digital media designers should be aware of the characteristics of digital communications so that they can deal with them effectively when working on design projects (National Association of Schools of Art and Design, 2013). This competency scored a mean value of 6.03 in Study I and there was no significant difference between academics and practitioners in their perception of this competency. However, academics scored this competency higher than practitioners.
4. 'Applied understanding of history of art' (mean = 3.59): As the graphic design discipline is related to art and design, designers need to understand their foundations. The history of art is a needed competency for the graphic designer (Wang, 2006) as well as for digital media designer (National Association of Schools of Art and Design, 2013). It scored a mean value of 5.23 in Study I and there was no significant difference between academics and practitioners in terms of how they perceived this competency. However, academics scored this competency higher than practitioners.
5. 'Understanding of how systems behave and aspects that contribute to sustainable products, strategies and practices' (mean = 3.52): Designers have to understand digital media and how it behaves in the same way that they had to understand the printing process (Coyle, 2011; Margolin, 2011). Understanding the medium will help designers to find a clear and easy way to design for the target audience (Grannell, 2011; Stone, 2013) and will contribute to sustainable design (AIGA, 2008). This competency scored a mean value of 5.7 in Study I and there was no significant difference between academics and practitioners in their perception of this competency. Indeed, both the academic and practitioner groups scored it almost equally.

- **Practical and technical skills:**

1. 'Applied understanding of storyboarding' (mean = 3.63): This competency is important for many forms of media production like CD-ROMs, motion graphic, and animation (DiMarco, 2010; Marshall, 2012). It is necessary for any project that changes over time, which is normally the case for many digital media projects. In the preliminary study for this research two practitioners and three academics proposed this competency as significant for digital media designers. It scored a mean value of 6.33 in Study I and there was no significant difference between academics and practitioners in how they perceived this competency, but the academic group scored it more highly than the practitioner group with a mean value of 6.75 and 5.86, respectively.
2. 'Applied understanding of basic programming skills' (mean = 2.97): Many authors and scholars have argued that this is an important competency for designers (Engholm, 2002; Lynch & Horton, 2008), but others consider that having an understanding of the basics of coding is adequate (Buckler, 2013; Keating, 2004; Reed & Davies, 2006), while others believes that designers must learn some of the programming languages (Zeldman, 2001). Learning basic programming skills would be beneficial (Buckler, 2013) for designers and give them the ability to understand what the programmer can do (Miller, 2013). This competency scored a mean value of 5.77 in Study I and there was no significant difference between academics and practitioners in terms of their perception of this competency. However, academics scored this competency higher than practitioners.
3. 'Apply the techniques of webpage development software' (mean = 3.21): Webpage design has now become one of the main tasks that designers should master (Fleischmann, 2012; Frain, 2012; Lynch & Horton, 2008). Hence, designers should be equipped with the latest software to enable them to design webpages effectively (Wang, 2006). This competency scored a mean value of 5.90 in Study I and there was no significant difference between academics and practitioners in their perception of this competency. However, academics scored this competency higher than practitioners.

4. ‘Apply the techniques of 3D software’ (mean = 2.78): This competency got the second lowest score from the respondents of this study. However, some projects in graphic design could need 3D modelling especially packaging designs, which make this competency desirable for some practitioners (Wang, 2006). In the preliminary study, three academics and one practitioner suggested this competency should be included in the needed competencies for practising digital media design. It scored a mean value of 5.80 in Study I and there was no significant difference between the academics’ and practitioners’ perception of this competency. However, academics scored this competency higher than practitioners.
5. ‘Apply the techniques of multimedia creation software’ (mean = 3.54): Using multimedia in design projects has now become commonplace and this competency was also included in Wang (2006), who sought to identify the needed competencies for graphic designers over a decade ago. Six academics and two practitioners suggested that this competency be included in the needed competencies for the digital media designer. It scored a mean value of 6.27 in Study I and there was no significant difference between academics and practitioners in how they perceived this competency. However, academics scored this competency higher than practitioners.
6. ‘Apply the techniques of filmmaking and video capturing’ (mean = 2.74): This competency had the lowest mean value out of all the validated competencies for digital media design that were rated by graphic designers in Jordan. Some experts, two practitioners and one academic in the preliminary study suggested that this competency should be included in the needed competencies for digital media design because it could enable digital media designers to capture and edit video for their projects themselves. This competency scored a mean value of 5.93 in Study I and there was no significant difference academics and practitioners in terms of their perception of this competency. However, academics scored this competency higher than practitioners.
7. ‘Applied understanding of lighting techniques’ (mean = 3.30): Using and controlling light is a significant issue about which photographers are

normally aware. Wang (2006) identifies using lighting techniques for photography as a desirable competency for the graphic designer. One academic and one practitioner suggested this competency be included in the needed competencies for digital media design. It scored a mean value of 6.30 in Study I and there was no significant difference between academics and practitioners in how they perceived this competency. However, academics scored this competency higher than practitioners.

8. 'Applied understanding of animation and motion graphics' (mean = 3.21): Animation and motion graphics have become tasks that graphic designers or digital media designers should perform (Saldanha, 2003; van der Waarde, 2009). Yee (2006) also considers animation as one of the designer elements. This competency scored a mean value of 6.50 in Study I and there was no significant difference between academics' and practitioners' perception of this competency. However, academics scored this competency higher than practitioners.
9. 'Ability to design and work with mobile applications' (mean = 3.1): This competency was suggested by a practitioner in the panel of experts in the first round of Study I. Mobile applications have become an alternative to websites with interactive design, and they could offer the designer greater control over the design elements (Grannell, 2011). This competency scored a mean value of 6.33 in Study I and there was no significant difference between academics and practitioners in their perception of this competency. However, academics scored this competency higher than practitioners.

Study II reveals that print graphic designers need to be equipped with the above-stated 16 competencies to transition into digital media design. The needed competencies come from four of the six groups: nine competencies are from the practical and technical skills group, five are from the cognitive studies and skills group, one is from the accurate specialisations group, and one is from the design principles and elements group. The results revealed that graphic designers need to acquire new knowledge and skills that will enable them to transition into digital media design (Heavey, 2008; McCoy, 1998; Heller, 2015).

The results reveal that most of the needed competencies for a transition into digital media design are new competencies that Jordanian universities do not currently offer to students. However, there are three 'poor' competencies that graduating print graphic designers should have acquired through their studies at university, which are:

1- Apply basic knowledge of Gestalt psychology to digital media design
2- Applied understanding of history of art
3- Applied understanding of editorial design for digital media.

Universities and other institutions should therefore review their curricula to identify how to better equip their students with these print graphic design competencies.

5.3 Limitations of the Study

Like any other research study, this study was expected to have some limitations. Limitations are usually beyond the researcher's control, but it is important to acknowledge that they can have an effect on the research results. In this research, the researcher recognised a number of possible limitations, including the lack of specialist academics in digital media design in Jordan. However, all the chosen academic participants were teaching digital media design courses at their universities or colleges.

Another possible limitation is the bias of the graphic designers who participated in Study II. This is because they were asked to evaluate themselves by completing a self-assessment questionnaire that included a set of competencies they may or may not have had. However, all the outlier respondents were excluded from the study to reduce the effect of this limitation.

5.4 Contributions to Knowledge

To meet the increased demand for designers who are able to design for both print and digital media, designers who want to transition from print to digital media design need to equip themselves with a set of competencies so that they can get involved in digital media design (Hunter, 2014). The literature review in this research revealed that some studies have been conducted to identify the significant competencies for graphic design, sign design, and other related areas. However, there is a lack of studies that focus on determining digital media design competencies. Hence the aim of this research was to address this aspect and bridge the gap in knowledge scientifically. Additionally, this research aimed to identify the significant digital media design competencies that graphic designers in Jordan have and do not have.

The findings of this research are beneficial in several ways. The results of Study I of this research, which identified the significant digital media design competencies, can be used to design curricula for the digital media design discipline. The results could also be used to develop existing curricula and study plans for graphic design so that they include print and digital media design, particularly because Al Qur'an (2012) argues that there is a weakness in preparing Jordanian university graduates in graphic design to meet the needs of the marketplace.

The significant digital media design competencies identified in this research can also be employed by companies to determine the job description of the profession in the marketplace, which can be used for employment and promotion decisions as well as to maximise human capital potential and improve company performance.

The results of Study II of this research, which determined the needed competencies for print graphic designers to transition into digital media design, can be used as a base for building specialised courses in training institutes or continuous

education programmes to equip graphic designers with the needed competencies to transition into digital media design.

5.5 Recommendations for Future Research

The results of this research can be used as a basis upon which to conduct new research to improve the design curriculum for digital media design in educational institutions to suit marketplace requirements and needs because this study was based on the opinions of academics and practitioners in the digital media design profession who have the ability to identify the required digital media design competencies.

Also, it would be useful to conduct a research study on university graduates to determine which of the significant identified digital media competencies they have acquired and which ones they have not, which will contribute to developing the current curricula to suit marketplace needs.

Technology is changing constantly, therefore it is necessary to build on this research and for the various stakeholders to continue to cooperate in curriculum development whenever needed to ensure that graduates are armed with the proper competencies to enter the digital media design profession.

Digital media competencies could vary depending on the geographical area of the marketplace. Therefore it is recommended that a study of the type presented in this thesis is applied to other geographic areas in order to determine if academics and practitioners in those other areas also perceive that there is a need to build a new set of competencies that better suit their marketplace needs.

APPENDICES

Appendix A:
Dharavath (2003) Technical Competencies
in the Graphic Communications Technology Curriculum

Number	Competency
1.	Identify production requirements
2.	Identify and provide customer needs
3.	Select appropriate production materials
4.	Analyse production problems
5.	Communicate directly with the customers
6.	Evaluate the capabilities of production equipment
7.	Describe the relationships of tel./multimedia
8.	Apply concepts of training and development
9.	Demonstrate electronic document delivery
10.	Apply production standards
11.	Analyse and interpret data statistically
12.	Prepare production costing and estimating
13.	Shop floor management
14.	Working well with others
15.	Communicating effectively
16.	Technical writing
17.	Decision making skills
18.	Understand different types of computing platforms
19.	Basic programming skills
20.	Access digital documents using CD-ROM/networking
21.	Describe different types of screening technologies
22.	Explain document and workflow management
23.	Demonstrate graphic and imaging software
24.	Explain digital graphic file formats: TIFF, PDF, EPS, DCS, and JPEG
25.	Describe image setting technology
26.	Explain desktop publishing system
27.	Evaluate page makeup and graphic software
28.	Prepare final design specifications
29.	Apply design principles to printing process
30.	Describe electronic/digital colour separation
31.	Identify computer network systems
32.	Identify various digital storage devices
33.	Describe digital proofing system
34.	Explain halftone photography

Number	Competency
35.	Explain colour reproduction process
36.	Explain colour theory
37.	Explain operations of colour scanner
38.	Differentiate between film assembly and imposition
39.	Define electro-photography
40.	Describe front-end platforms for digital printing
41.	Describe prepress preflight process
42.	Articulate print registration system
43.	Describe difference between various printing processes
44.	Describe different formats of web and sheetfed presses
45.	Identify various characteristics of paper
46.	Explain how the characteristics of paper affect print
47.	Identify types and characteristics of printing inks
48.	Apply standard printing trade customs
49.	Describe how characteristics of paper affect the printing process
50.	Describe the relationship between the printing and general economy
51.	Identify various print production processes
52.	Utilise various binding methods
53.	Evaluate postpress production operations
54.	Recognize mail and distribution regulations
55.	Identify mechanical binding methods
56.	Name miscellaneous binding and finishing operations
57.	Outline the opportunities for printer involvement in distribution of printed materials

Appendix B:
Wang (2006) Graphic Design Competencies

Appendix C:
Consent to Participate in Interviews

CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by Mahmoud Ahmad Ibrahim AbuShawali of the Department of Creative Multimedia at the Multimedia University, Cyberjaya. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant Name: _____ (Please print)

Participant Signature: _____

Date: _____

Appendix D:
Consent to Participate in Study I

CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by Mahmoud Ahmad Ibrahim AbuShawali of the Department of Creative Multimedia at the Multimedia University, Cyberjaya. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

Participant Name: _____ (Please print)

Participant Signature: _____

Date: _____

Appendix E:
First-round Cover Letter

Dear Sir or Madam:

Thank you for agreeing to serve on the panel to identify competencies for digital media design in Jordan. I am sending you the "First Round" survey questionnaire.

Please complete and return the instrument by May 21, 2013.

After I have received all the panel members' responses, I will analyse them then return them back to you for "Second Round" rating. Items are rated on a 1 to 7 scale from strongly disagree to strongly agree.

Comments can also be included with your rating. You can add new competencies, which you feel necessary to be included. All questionnaires are coded; however, your responses will be kept confidential. The final results will be shared with participants.

Again, thank you for your cooperation. Please do not hesitate to contact me directly if you have any questions or need assistance!

Sincerely,
Mahmoud AbuShawali
PhD Research Student
Faculty of Creative Multimedia
Multimedia University

mah_shawali@yahoo.com
Mobile: 07 9529 0838

Appendix F:
Study I Participant Information Sheet

Participant Information Sheet
Identifying the significant competencies for Digital Media Design in Jordan

You are invited to participate in the research project explained below. Thank you for taking the time to read this information. Please make sure that you have read all the pages before consenting to take part.

What is the purpose of the study?
The main purpose of this study is to identify required competencies for the traditional graphic designer to transit into digital media design in Jordan.

Why have I been chosen?
You have been chosen as someone who is an expert in teaching or practicing digital media design.

What will happen if I don't want to carry on with the study?
You are free to withdraw from the research study at any time.

Will my input be kept confidential?
All information will be kept strictly confidential. All information will be anonymised and access to this information will be kept strictly within the research team.

Who do I contact for further information?
If you need any more information please contact:

Mahmoud AbuShawali
PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Malaysia

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Email: mah_shawali@yahoo.com

Dr. Lim Yan Peng
Director of Studies
Deputy Dean
Faculty of Creative Multimedia
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Malaysia

Tel: +(60) 3 8312 5620
Email : forest.lim@mmu.edu.my

Appendix G:
First-round Questionnaire

1. **Name:** ……

2. **Gender:**
   ☐ Male
   ☐ Female

3. **Age**
   ☐ 20-29 years old
   ☐ 30-39
   ☐ 40-49
   ☐ 50 +

4. **Education**
   ☐ Secondary school and less
   ☐ Diploma
   ☐ Bachelor degree
   ☐ Higher education

5. **Experience**
   ☐ 0-4 years
   ☐ 5-9
   ☐ 10-14
   ☐ 15-20
   ☐ 20 +

6. **Working field**
   ☐ Academic
   ☐ Practitioner

7. **Residence:**……

To what extent do you agree with each of the following statements as a significant competency in Digital Media Design? Please indicate your answer by ticking (√) one box only for each statement.

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. Applied understanding of colour theory	❑	❑	❑	❑	❑	❑	❑
2. Apply basic knowledge of Gestalt psychology to digital graphic design	❑	❑	❑	❑	❑	❑	❑
3. Apply design principles to digital platforms	❑	❑	❑	❑	❑	❑	❑
4. Apply design and innovative concepts	❑	❑	❑	❑	❑	❑	❑
5. Understanding composition and its construction mechanisms	❑	❑	❑	❑	❑	❑	❑
6. Applied understanding of design theories and methodologies	❑	❑	❑	❑	❑	❑	❑
7. Applied understanding of anatomy	❑	❑	❑	❑	❑	❑	❑
8. Applied understanding of digital advertising	❑	❑	❑	❑	❑	❑	❑
9. Use graphic design terminology	❑	❑	❑	❑	❑	❑	❑
10. Applied understanding of typography and its judicial application	❑	❑	❑	❑	❑	❑	❑
11. Applied understanding of symbols and icons	❑	❑	❑	❑	❑	❑	❑
12. Applied understanding of graphic design communication trends	❑	❑	❑	❑	❑	❑	❑
13. Apply the basics of graphic design for digital media.	❑	❑	❑	❑	❑	❑	❑
14. Applied understanding of editorial design for digital media	❑	❑	❑	❑	❑	❑	❑
15. Understanding construction of meaningful images	❑	❑	❑	❑	❑	❑	❑
16. Applied understanding of interactive design	❑	❑	❑	❑	❑	❑	❑
17. Understand aesthetics and aesthetic criteria	❑	❑	❑	❑	❑	❑	❑
18. Understanding visual design psychology and visual literacy	❑	❑	❑	❑	❑	❑	❑
19. Ability to perform creative thinking	❑	❑	❑	❑	❑	❑	❑
20. Applied understanding of user experience in digital media	❑	❑	❑	❑	❑	❑	❑
21. Describe different types and sizes of screens	❑	❑	❑	❑	❑	❑	❑
22. Applied understanding of basic marketing	❑	❑	❑	❑	❑	❑	❑
23. Apply the concepts of economics in graphic communications	❑	❑	❑	❑	❑	❑	❑

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
24. Identify characteristics of digital communications	❑	❑	❑	❑	❑	❑	❑
25. Applied understanding of history of art	❑	❑	❑	❑	❑	❑	❑
26. Applied understanding of history of graphic design	❑	❑	❑	❑	❑	❑	❑
27. Apply the concepts of cross-media publishing and document repurposing	❑	❑	❑	❑	❑	❑	❑
28. Applied understanding of research skills and methods	❑	❑	❑	❑	❑	❑	❑
29. Apply the techniques of information and Internet searching	❑	❑	❑	❑	❑	❑	❑
30. Understanding of web processes and protocols	❑	❑	❑	❑	❑	❑	❑
31. Understanding of how systems behave and aspects that contribute to sustainable products, strategies and practices.	❑	❑	❑	❑	❑	❑	❑
32. Ability to control cost, time and resources	❑	❑	❑	❑	❑	❑	❑
33. Determine the costs associated with graphic design and other creative services	❑	❑	❑	❑	❑	❑	❑
34. Demonstrate the ability of design analysis	❑	❑	❑	❑	❑	❑	❑
35. Applied understanding of strategy-making	❑	❑	❑	❑	❑	❑	❑
36. Applied understanding of outcome evaluation	❑	❑	❑	❑	❑	❑	❑
37. Applied understanding of drawing and its techniques	❑	❑	❑	❑	❑	❑	❑
38. Applied understanding of 2D and 3D design	❑	❑	❑	❑	❑	❑	❑
39. Applied understanding of drawing sketches	❑	❑	❑	❑	❑	❑	❑
40. Applied understanding of storyboarding	❑	❑	❑	❑	❑	❑	❑
41. Applied understanding of prototyping	❑	❑	❑	❑	❑	❑	❑
42. Applied understanding of presentation skills	❑	❑	❑	❑	❑	❑	❑
43. Applied understanding of and ability to utilise tools and technology	❑	❑	❑	❑	❑	❑	❑
44. Apply the techniques of drawing software	❑	❑	❑	❑	❑	❑	❑
45. Apply the techniques of page layout and publishing software	❑	❑	❑	❑	❑	❑	❑
46. Apply the techniques of image editing software	❑	❑	❑	❑	❑	❑	❑
47. Understand different types of computing platform	❑	❑	❑	❑	❑	❑	❑

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
48. Explain document and workflow management	❑	❑	❑	❑	❑	❑	❑
49. Applied understanding of basic programming skills	❑	❑	❑	❑	❑	❑	❑
50. Apply the basics of photography for graphic design purposes	❑	❑	❑	❑	❑	❑	❑
51. Apply the techniques of webpage development software	❑	❑	❑	❑	❑	❑	❑
52. Apply the techniques of 3D software	❑	❑	❑	❑	❑	❑	❑
53. Apply the techniques of preparing portfolios	❑	❑	❑	❑	❑	❑	❑
54. Demonstrate digital document delivery	❑	❑	❑	❑	❑	❑	❑
55. Apply the techniques of multimedia creation software	❑	❑	❑	❑	❑	❑	❑
56. Apply the techniques of filmmaking and video capturing	❑	❑	❑	❑	❑	❑	❑
57. Applied understanding of lighting techniques	❑	❑	❑	❑	❑	❑	❑
58. Applied understanding of animation and motion graphics	❑	❑	❑	❑	❑	❑	❑
59. Ability to collaborate productively in large interdisciplinary teams	❑	❑	❑	❑	❑	❑	❑
60. Applied understanding of technical communication skills	❑	❑	❑	❑	❑	❑	❑
61. Be able to convey an idea, feeling, and belief	❑	❑	❑	❑	❑	❑	❑
62. Applied understanding of how to communicate and sell ideas and designs to clients	❑	❑	❑	❑	❑	❑	❑
63. Identify and fulfil customer needs	❑	❑	❑	❑	❑	❑	❑
64. Be able to learn and comprehend	❑	❑	❑	❑	❑	❑	❑
65. Ability to plan and lead design projects	❑	❑	❑	❑	❑	❑	❑
66. Ability to be flexible, nimble and dynamic in practice	❑	❑	❑	❑	❑	❑	❑
67. Applied understanding of decision-making and project management	❑	❑	❑	❑	❑	❑	❑
68. Comprehend ethical behaviors, intellectual property rights (IPR), and copyright issues in the design professions	❑	❑	❑	❑	❑	❑	❑
69. Applied understanding of using local cultural symbolism and colours	❑	❑	❑	❑	❑	❑	❑
70. Applied understanding of recognising physical, cognitive, cultural and social factors that shape design decisions	❑	❑	❑	❑	❑	❑	❑
71. Desire to improve and clarify	❑	❑	❑	❑	❑	❑	❑

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
72. Ability to solve communication problems visually	❑	❑	❑	❑	❑	❑	❑
73. Ability to work in a global environment with an understanding of cultural preservation	❑	❑	❑	❑	❑	❑	❑
74. Understanding of nested items including cause and effect	❑	❑	❑	❑	❑	❑	❑
75. Ability to develop project evaluation criteria that account for audience and context	❑	❑	❑	❑	❑	❑	❑
76. Comprehend the basics of art appreciation	❑	❑	❑	❑	❑	❑	❑
77. Applied understanding of design appraisal	❑	❑	❑	❑	❑	❑	❑

Please list any other competencies that you think should be considered:

1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

7. .....

8. .....

9. .....

Appendix H:
Second-round Cover Letter

Dear Sir or Madam:

Thank you for continued support to identify competencies for digital media design in Jordan. I am sending you the "Second Round" survey questionnaire.

Please complete and return the instrument by May 27, 2013 by email.

Many new competencies were suggested by the panel, and those have been included in the questionnaire. The "second round" will be the last opportunity for you to add new competencies. After I have received all the panel members' responses, I will analyse them and return them to you for "Third Round" rating. Items are rated on a 1 to 7 scale from strongly disagree to strongly agree. Comments can also be included with your rating.

Please note that the next points have been edited or deleted as the panel suggested:

1. *Applied understanding of colour theory.* ***Became:*** **Applied understanding of colour theory and psychology.**
2. *Ability to control cost, time and resource.* ***Became:*** **Ability to control cost, time and resource with understanding the time, cost, and quality triangle.**

Again, thank you for your continuing cooperation. Please do not hesitate to contact me directly if you have any questions or need assistance!

Sincerely,

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University

mah_shawali@yahoo.com
Mobile: 07 9529 0838

Appendix I:
Second-round Questionnaire

Competencies in Digital Media Design
Second Round Instrument

Participant Name: .....

To what extent do you agree with each of the following statements as a significant competency in Digital Media Design? Please indicate your answer by ticking **(X)** one box only for each statement.

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. Applied understanding of colour theory and psychology	☐	☐	☐	☐	☐	☐	☐
2. Apply basic knowledge of Gestalt psychology to digital graphic design	☐	☐	☐	☐	☐	☐	☐
3. Apply design principles to digital platforms	☐	☐	☐	☐	☐	☐	☐
4. Apply design and innovative concepts	☐	☐	☐	☐	☐	☐	☐
5. Understanding composition and its construction mechanisms	☐	☐	☐	☐	☐	☐	☐
6. Applied understanding of design theories and methodologies	☐	☐	☐	☐	☐	☐	☐
7. Applied understanding of anatomy	☐	☐	☐	☐	☐	☐	☐
8. Applied understanding of digital advertising	☐	☐	☐	☐	☐	☐	☐
9. Use graphic design terminology	☐	☐	☐	☐	☐	☐	☐
10. Applied understanding of typography and its judicial application	☐	☐	☐	☐	☐	☐	☐
11. Applied understanding of symbols and icons	☐	☐	☐	☐	☐	☐	☐
12. Applied understanding of graphic design communication trends	☐	☐	☐	☐	☐	☐	☐
13. Apply the basics of graphic design for digital media	☐	☐	☐	☐	☐	☐	☐
14. Applied understanding of editorial design for digital media	☐	☐	☐	☐	☐	☐	☐
15. Understanding construction of meaningful images	☐	☐	☐	☐	☐	☐	☐
16. Applied understanding of interactive design	☐	☐	☐	☐	☐	☐	☐
17. Understanding aesthetics and aesthetic criteria	☐	☐	☐	☐	☐	☐	☐
18. Understanding visual design psychology and visual literacy	☐	☐	☐	☐	☐	☐	☐
19. Ability to perform creative thinking	☐	☐	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
20. Applied understanding of user experience in digital media	☐	☐	☐	☐	☐	☐	☐
21. Describe different types and sizes of screens	☐	☐	☐	☐	☐	☐	☐
22. Applied understanding of basic marketing	☐	☐	☐	☐	☐	☐	☐
23. Apply the concepts of economics in graphic communications.	☐	☐	☐	☐	☐	☐	☐
24. Identify characteristics of digital communications	☐	☐	☐	☐	☐	☐	☐
25. Applied understanding of history of art	☐	☐	☐	☐	☐	☐	☐
26. Applied understanding of history of graphic design	☐	☐	☐	☐	☐	☐	☐
27. Apply the concepts of cross-media publishing and document repurposing	☐	☐	☐	☐	☐	☐	☐
28. Applied understanding of research skills and methods	☐	☐	☐	☐	☐	☐	☐
29. Apply the techniques of information and Internet searching	☐	☐	☐	☐	☐	☐	☐
30. Understanding of web processes and protocols	☐	☐	☐	☐	☐	☐	☐
31. Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices	☐	☐	☐	☐	☐	☐	☐
32. Ability to control cost, time, and resource with understanding the time, cost, and quality triangle	☐	☐	☐	☐	☐	☐	☐
33. Determine the costs associated with graphic design and other creative services	☐	☐	☐	☐	☐	☐	☐
34. Demonstrate the ability of design analysis	☐	☐	☐	☐	☐	☐	☐
35. Applied understanding of strategy-making	☐	☐	☐	☐	☐	☐	☐
36. Applied understanding of outcome evaluation	☐	☐	☐	☐	☐	☐	☐
37. Applied understanding of drawing and its techniques	☐	☐	☐	☐	☐	☐	☐
38. Applied understanding of 2D and 3D design	☐	☐	☐	☐	☐	☐	☐
39. Applied understanding of drawing sketches	☐	☐	☐	☐	☐	☐	☐
40. Applied understanding of storyboarding	☐	☐	☐	☐	☐	☐	☐
41. Applied understanding of prototyping	☐	☐	☐	☐	☐	☐	☐
42. Applied understanding of presentation skills	☐	☐	☐	☐	☐	☐	☐
43. Applied understanding of and ability to utilise tools and technology	☐	☐	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
44. Apply the techniques of drawing software	☐	☐	☐	☐	☐	☐	☐
45. Apply the techniques of page layout and publishing software	☐	☐	☐	☐	☐	☐	☐
46. Apply the techniques of image editing software	☐	☐	☐	☐	☐	☐	☐
47. Understand different types of computing platforms	☐	☐	☐	☐	☐	☐	☐
48. Explain document and workflow management	☐	☐	☐	☐	☐	☐	☐
49. Applied understanding of basic programming skills	☐	☐	☐	☐	☐	☐	☐
50. Apply the basics of photography for graphic design purposes	☐	☐	☐	☐	☐	☐	☐
51. Applied understanding of advanced photography tips, tricks, and techniques	☐	☐	☐	☐	☐	☐	☐
52. Apply the techniques of webpage development software	☐	☐	☐	☐	☐	☐	☐
53. Apply the techniques of 3D software	☐	☐	☐	☐	☐	☐	☐
54. Apply the techniques of preparing portfolios	☐	☐	☐	☐	☐	☐	☐
55. Demonstrate digital document delivery	☐	☐	☐	☐	☐	☐	☐
56. Apply the techniques of multimedia creation software	☐	☐	☐	☐	☐	☐	☐
57. Apply the techniques of filmmaking and video capturing	☐	☐	☐	☐	☐	☐	☐
58. Applied understanding of lighting techniques	☐	☐	☐	☐	☐	☐	☐
59. Applied understanding of animation and motion graphics	☐	☐	☐	☐	☐	☐	☐
60. Ability to collaborate productively in large interdisciplinary teams	☐	☐	☐	☐	☐	☐	☐
61. Applied understanding of technical communication skills	☐	☐	☐	☐	☐	☐	☐
62. Be able to convey an idea, feeling, and belief	☐	☐	☐	☐	☐	☐	☐
63. Applied understanding of how to communicate and sell ideas and designs to clients	☐	☐	☐	☐	☐	☐	☐
64. Identify and fulfil customer needs	☐	☐	☐	☐	☐	☐	☐
65. Be able to learn and comprehend	☐	☐	☐	☐	☐	☐	☐
66. Ability to plan and lead design projects	☐	☐	☐	☐	☐	☐	☐
67. Ability to be flexible, nimble and dynamic in practice	☐	☐	☐	☐	☐	☐	☐
68. Applied understanding of decision-making and project management	☐	☐	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
69. Comprehend ethical behaviors, intellectual property rights (IPR) and copyright issues in the design professions	☐	☐	☐	☐	☐	☐	☐
70. Applied understanding of using local cultural symbolism and colours	☐	☐	☐	☐	☐	☐	☐
71. Applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions	☐	☐	☐	☐	☐	☐	☐
72. Desire to improve and clarify	☐	☐	☐	☐	☐	☐	☐
73. Ability to solve communication problems visually	☐	☐	☐	☐	☐	☐	☐
74. Ability to work in a global environment with an understanding of cultural preservation	☐	☐	☐	☐	☐	☐	☐
75. Understanding of nested items including cause and effect	☐	☐	☐	☐	☐	☐	☐
76. Ability to develop project evaluation criteria that account for audience and context	☐	☐	☐	☐	☐	☐	☐
77. Comprehend the basics of art appreciation	☐	☐	☐	☐	☐	☐	☐
78. Applied understanding of design appraisal	☐	☐	☐	☐	☐	☐	☐
79. Ability to differentiate between the psychology of the digital media and print media audience	☐	☐	☐	☐	☐	☐	☐
80. Ability to work under high pressure	☐	☐	☐	☐	☐	☐	☐
81. Flexibility to reschedule the timeframe of project production	☐	☐	☐	☐	☐	☐	☐
82. Understanding media communication theory	☐	☐	☐	☐	☐	☐	☐
83. Understanding of how to visualise information in the digital age	☐	☐	☐	☐	☐	☐	☐
84. Ability to design and work with mobile applications	☐	☐	☐	☐	☐	☐	☐

Please list any other competencies that you think should be considered:

1.

2.

3.

4.

5.

6.

7.

8.

9.

Thank you for your time. Should you have any questions, please contact myself, or Dr. Lim Yan Peng at:

Mahmoud AbuShawali
PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Malaysia

Tel: 07 9529 0838
Email: mah_shawali@yahoo.com

Dr. Lim Yan Peng
Director of Studies
Deputy Dean
Faculty of Creative Multimedia
Multimedia University
Malaysia

Tel: +(60) 3 8312 5620
Email : forest.lim@mmu.edu.my

Appendix J:
Third-round Cover Letter

Dear Sir or Madam:

Thank you for continued support to identify competencies for digital media design in Jordan. I am sending you the "Third Round" survey questionnaire.

Please complete and return the instrument by May 30, 2013 by email.

This is the final stage to identify competencies for digital media design in Jordan. You should not add new competencies. Only one new competency has been included in the questionnaire. Items are rated on a 1 to 7 scale from strongly disagree to strongly agree.

Again, thank you for your continuing cooperation. Please do not hesitate to contact me directly if you have any questions or need assistance!

Sincerely,

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University

mah_shawali@yahoo.com
Mobile: 07 9529 0838

Appendix K:
Third-round Questionnaire

Competencies in Digital Media Design
Third Round Instrument

Participant Name: .....

To what extent do you agree with each of the following statements as a significant competency in Digital Media Design? Please indicate your answer by ticking **(X)** one box only for each statement.

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. Applied understanding of colour theory and psychology	☐	☐	☐	☐	☐	☐	☐
2. Apply basic knowledge of Gestalt psychology to digital graphic design	☐	☐	☐	☐	☐	☐	☐
3. Apply design principles to digital platforms	☐	☐	☐	☐	☐	☐	☐
4. Apply design and innovative concepts	☐	☐	☐	☐	☐	☐	☐
5. Understanding composition and its construction mechanisms	☐	☐	☐	☐	☐	☐	☐
6. Applied understanding of design theories and methodologies	☐	☐	☐	☐	☐	☐	☐
7. Applied understanding of anatomy	☐	☐	☐	☐	☐	☐	☐
8. Applied understanding of digital advertising	☐	☐	☐	☐	☐	☐	☐
9. Use graphic design terminology	☐	☐	☐	☐	☐	☐	☐
10. Applied understanding of typography and its judicial application	☐	☐	☐	☐	☐	☐	☐
11. Applied understanding of symbols and icons	☐	☐	☐	☐	☐	☐	☐
12. Applied understanding of graphic design communication trends	☐	☐	☐	☐	☐	☐	☐
13. Apply the basics of graphic design for digital media	☐	☐	☐	☐	☐	☐	☐
14. Applied understanding of editorial design for digital media	☐	☐	☐	☐	☐	☐	☐
15. Understanding construction of meaningful images	☐	☐	☐	☐	☐	☐	☐
16. Applied understanding of interactive design	☐	☐	☐	☐	☐	☐	☐
17. Understanding aesthetics and aesthetic criteria	☐	☐	☐	☐	☐	☐	☐
18. Understanding visual design psychology and visual literacy	☐	☐	☐	☐	☐	☐	☐
19. Ability to perform creative thinking	☐	☐	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
20. Applied understanding of user experience in digital media	☐	☐	☐	☐	☐	☐	☐
21. Describe different types and sizes of screens	☐	☐	☐	☐	☐	☐	☐
22. Applied understanding of basic marketing	☐	☐	☐	☐	☐	☐	☐
23. Apply the concepts of economics in graphic communications	☐	☐	☐	☐	☐	☐	☐
24. Identify characteristics of digital communications	☐	☐	☐	☐	☐	☐	☐
25. Applied understanding of history of art	☐	☐	☐	☐	☐	☐	☐
26. Applied understanding of history of graphic design	☐	☐	☐	☐	☐	☐	☐
27. Apply the concepts of cross-media publishing and document repurposing	☐	☐	☐	☐	☐	☐	☐
28. Applied understanding of research skills and methods	☐	☐	☐	☐	☐	☐	☐
29. Apply the techniques of information and Internet searching	☐	☐	☐	☐	☐	☐	☐
30. Understand of web processes and protocols	☐	☐	☐	☐	☐	☐	☐
31. Understanding of how systems behave and aspects that contribute to sustainable products, strategies, and practices	☐	☐	☐	☐	☐	☐	☐
32. Ability to control cost, time, and resource with understanding the time, cost, and quality triangle	☐	☐	☐	☐	☐	☐	☐
33. Determine the costs associated with graphic design and other creative services	☐	☐	☐	☐	☐	☐	☐
34. Demonstrate the ability of design analysis	☐	☐	☐	☐	☐	☐	☐
35. Applied understanding of strategy-making	☐	☐	☐	☐	☐	☐	☐
36. Applied understanding of outcome evaluation	☐	☐	☐	☐	☐	☐	☐
37. Applied understanding of drawing and its techniques	☐	☐	☐	☐	☐	☐	☐
38. Applied understanding of 2D and 3D design	☐	☐	☐	☐	☐	☐	☐
39. Applied understanding of drawing sketches	☐	☐	☐	☐	☐	☐	☐
40. Applied understanding of storyboarding	☐	☐	☐	☐	☐	☐	☐
41. Applied understanding of prototyping	☐	☐	☐	☐	☐	☐	☐
42. Applied understanding of presentation skills	☐	☐	☐	☐	☐	☐	☐
43. Applied understanding of and ability to utilise tools and technology	☐	☐	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
44. Apply the techniques of drawing software	☐	☐	☐	☐	☐	☐	☐
45. Apply the techniques of page layout and publishing software	☐	☐	☐	☐	☐	☐	☐
46. Apply the techniques of image editing software	☐	☐	☐	☐	☐	☐	☐
47. Understand different types of computing platform	☐	☐	☐	☐	☐	☐	☐
48. Explain document and workflow management	☐	☐	☐	☐	☐	☐	☐
49. Applied understanding of basic programming skills	☐	☐	☐	☐	☐	☐	☐
50. Apply the basics of photography for graphic design purposes	☐	☐	☐	☐	☐	☐	☐
51. Applied understanding of advanced photography tips, tricks, and techniques	☐	☐	☐	☐	☐	☐	☐
52. Apply the techniques of webpage development software	☐	☐	☐	☐	☐	☐	☐
53. Apply the techniques of 3D software	☐	☐	☐	☐	☐	☐	☐
54. Apply the techniques of preparing portfolios	☐	☐	☐	☐	☐	☐	☐
55. Demonstrate digital document delivery	☐	☐	☐	☐	☐	☐	☐
56. Apply the techniques of multimedia creation software	☐	☐	☐	☐	☐	☐	☐
57. Apply the techniques of filmmaking and video capturing	☐	☐	☐	☐	☐	☐	☐
58. Applied understanding of lighting techniques	☐	☐	☐	☐	☐	☐	☐
59. Applied understanding of animation and motion graphics	☐	☐	☐	☐	☐	☐	☐
60. Ability to collaborate productively in large interdisciplinary teams	☐	☐	☐	☐	☐	☐	☐
61. Applied understanding of technical communication skills	☐	☐	☐	☐	☐	☐	☐
62. Be able to convey an idea, feeling and belief	☐	☐	☐	☐	☐	☐	☐
63. Applied understanding of how to communicate and sell ideas and designs to clients	☐	☐	☐	☐	☐	☐	☐
64. Identify and fulfil customer needs	☐	☐	☐	☐	☐	☐	☐
65. Be able to learn and comprehend	☐	☐	☐	☐	☐	☐	☐
66. Ability to plan and lead design projects	☐	☐	☐	☐	☐	☐	☐
67. Ability to be flexible, nimble and dynamic in practice	☐	☐	☐	☐	☐	☐	☐
68. Applied understanding of decision-making and project management	☐	☐	☐	☐	☐	☐	☐

Statement	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
69. Comprehend ethical behaviors, intellectual property rights (IPR), and copyright issues in the design professions	☐	☐	☐	☐	☐	☐	☐
70. Applied understanding of using local cultural symbolism and colours	☐	☐	☐	☐	☐	☐	☐
71. Applied understanding of recognising physical, cognitive, cultural and social factors that shape design decisions	☐	☐	☐	☐	☐	☐	☐
72. Desire to improve and clarify	☐	☐	☐	☐	☐	☐	☐
73. Ability to solve communication problems visually	☐	☐	☐	☐	☐	☐	☐
74. Ability to work in a global environment with an understanding of cultural preservation	☐	☐	☐	☐	☐	☐	☐
75. Understanding of nested items including cause and effect	☐	☐	☐	☐	☐	☐	☐
76. Ability to develop project evaluation criteria that account for audience and context	☐	☐	☐	☐	☐	☐	☐
77. Comprehend the basics of art appreciation	☐	☐	☐	☐	☐	☐	☐
78. Applied understanding of design appraisal	☐	☐	☐	☐	☐	☐	☐
79. Ability to differentiate between the psychology of the digital media and print media audience	☐	☐	☐	☐	☐	☐	☐
80. Ability to work under high pressure	☐	☐	☐	☐	☐	☐	☐
81. Flexibility to reschedule the timeframe of project production	☐	☐	☐	☐	☐	☐	☐
82. Understanding of media communication theory	☐	☐	☐	☐	☐	☐	☐
83. Understanding of how to visualise information in the digital age	☐	☐	☐	☐	☐	☐	☐
84. Ability to design and work with mobile applications	☐	☐	☐	☐	☐	☐	☐
85. Ability to plan and organise the logo design process	☐	☐	☐	☐	☐	☐	☐

Thank you for your time. Should you have any questions, please contact myself, or Dr. Lim Yan Peng at:

Mahmoud AbuShawali
PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Malaysia

Tel: 07 9529 0838
Email: mah_shawali@yahoo.com

Dr. Lim Yan Peng
Director of Studies
Deputy Dean
Faculty of Creative Multimedia
Multimedia University
Malaysia

Tel: +(60) 3 8312 5620
Email : forest.lim@mmu.edu.my

Appendix L:
Reminder Message for Study I Participants

Dear Mr./Ms.,

Thank you for your continuing support. I sent you the last questionnaires on May 28; however, I have not received your response. Please complete and return the questionnaires to me at your earliest convenience.

For every Delphi Technique study, a high return response rate is required. Therefore, without your participation, completing this research would become extremely difficult. I am sending you this reminder because your response is very important to this research, and it is valuable for digital media design field development.

If you have returned the questionnaires, please discard this message. Again, thank you for your cooperation. Please do not hesitate to contact me directly if you have any questions or need assistance!

Sincerely,

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University

mah_shawali@yahoo.com
Mobile: 07 9529 0838

Appendix M:
Jordanian Ministry of Planning & Information Cooperation
Department of Statistics Email

Subject:	Re: طلب بيانات
From:	Mahmoud AbuShawali (mah_shawali@yahoo.com)
To:	Nuha.AbedQader@DOS.GOV.JO;
Date:	Monday, January 6, 2014 3:26 PM

شكرا جزيلا انسة نهى

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Cyberjaya, Malaysia

On Monday, January 6, 2014 9:02 PM, Nuha Abed Qader <Nuha.AbedQader@DOS.GOV.JO> wrote:

السيد محمود المحترم

اود تأكيد لكم بان العدد المذكور سابقا وهو 2110 هو عدد مصممي الجرافيك وليس المكاتب كما ورد سابقاً

مع الاحترام

From: Mahmoud AbuShawali [mailto:mah_shawali@yahoo.com]
Sent: Monday, January 06, 2014 2:44 PM
To: Nuha Abed Qader; Stat
Subject: Re: طلب بيانات

الانسة نهى عبدالقادر المحترمة

اود بداية ان اشكرك على ردك وتفاعلك معي.
ارجو منك التأكيد لي اذا كان هذا هو عدد مكاتب التصميم في الاردن ام عدد المصممين العاملين في الشركات الأردنية؟؟

واذا كان هذا عدد المكاتب، فهل هناك اي حصر لعدد المصممين العاملين في هذه الشركات؟

مع الشكر والتحية

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Cyberjaya, Malaysia

On Monday, January 6, 2014 8:38 PM, Mahmoud AbuShawali <mah_shawali@yahoo.com> wrote:
الانسة نهى المحترمة

اود بداية ان اشكرك على ردك وتفاعلك معي.

ارجو منك التأكيد لي اذا كان هذا هو عدد مكاتب التصميم في الاردن ام عدد المصممين العاملين في الشركات الأردنية؟؟

واذا كان هذا عدد المكاتب، فهل هناك اي حصر لعدد المصممين العاملين في هذه الشركات؟

مع الشكر والتحية

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Cyberjaya, Malaysia

On Monday, January 6, 2014 8:32 PM, Nuha Abed Qader <Nuha.AbedQader@DOS.GOV.JO> wrote:

السيد محمود المحترم
اشارة الى طلبكم حول عدد مكاتب مصممي الجرافيك في الاردن
نود اعلامكم بان عددهم بلغ 2110 حسب مسح الاستخدام لعام 2011
مع الاحترام

Nuha Abdel Qader
Head of PR Division
PR & Media Directorate
Tel. +962 6 5300700 Ext. 1103
Fax. +962 6 5300700
Email: nuha@dos.gov.jo
Web. www.dos.gov.jo

From: Mahmoud AbuShawali [mailto:mah_shawali@yahoo.com]
Sent: Monday, January 06, 2014 12:45 PM
To: Stat
Subject: Re: طلب بيانات

تحية طيبة وبعد

لقد قمت بإرسال طلب لبعض البيانات حول تصميم الجرافيك في الاردن خلال الاسبوع الماضي. ولكني للأسف لم أتلقى أي رد حتى الآن. أرجو إجابتي حول استفساري إذا كان يتوفر لديكم مثل هذه المعلومات أو لا.

مع التحية

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Cyberjaya, Malaysia

On Monday, December 30, 2013 8:44 PM, Mahmoud AbuShawali <mah_shawali@yahoo.com> wrote:
تحية طيبة وبعد،

انا المدعو محمود احمد ابوشوالي، اردني الجنسية، واقوم الان بالاعداد لرسالة الدكتوراه في جامعة الملتيميديا /. ماليزيا. ويتعلق البحث بتصميم الجرافيك في الاردن
عنوان البحث:
The Transition from Traditional to Digital Graphic Design in Jordan
وانا بحاجة لمعرفة **عدد مصممي الجرافيك العاملين في السوق الاردني** اذا كانت هذه المعلومات متوفرة لديكم او اي جهة اخرى يمكنني التواصل معهم.

ارجو منكم تزويدي بهذه المعلومات مع الشكر الجزيل
واذا كان هناك اي اجراء اخر علي اتباعه فأرجو إعلامي بذلك.

وتفضلوا بقبول فائق الاحترام

Mahmoud AbuShawali

PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Cyberjaya, Malaysia

Appendix N:
Study II Cover Letter and Questionnaire

Digital Media Design
Competencies Questionnaire

Dear Ms / Mr:

It would be highly appreciated if you could participate in this survey. This questionnaire is part of a PhD study, which aims to identify required competencies for the traditional graphic designer to transit into digital media design in Jordan.

Please be assured that your responses will be only used for academic purpose and it will be kept in confidential. Should you require a copy of the results of this study we will be happy to e-mail you a copy of the executive summary at the end of the research.

Please complete and return the instrument by October 27th.

Again, thank you for your cooperation. Please do not hesitate to contact me directly if you have any questions or need assistance!

Sincerely,
Mahmoud AbuShawali
PhD Research Student
Faculty of Creative Multimedia
Multimedia University
Malaysia

mah_shawali@yahoo.com
Mobile: 07 9529 0838

السيد الفاضل / السيدة الفاضلة

تحية طيبة وبعد،

نقدر لكم مشاركتكم في هذا الاستبيان حيث أنه جزء من دراسة دكتوراه تهدف إلى تحديد الكفاءات اللازمة لمصمم الجرافيك التقليدي ليصبح مصمما جرافيكياً للوسائط الرقمية في الأردن.

أرجو العلم بأن إجاباتكم ستستخدم فقط للأغراض العلمية، وسيتم حفظها بشكل سري. وإنه لمن دواعي سروري أن أزودكم بنسخة من النتائج النهائية لهذه الدراسة عبر البريد الالكتروني في حال رغبتكم في ذلك.

أرجو استكمال واعادة هذا الاستبيان قبل تاريخ ٢٧ / ١٠.

أشكر تعاونكم معنا مرة أخرى. وأرجو منكم عدم التردد بالاتصال بي في حال وجود أي استفسار أو احتياجكم لأي مساعدة.

وتفضلوا بقبول فائق الاحترام،،

محمود أبوشوالي

Section (A): Biography Data البيانات الشخصية

1. **Gender الجنس:**
   - ☐ Male ذكر
   - ☐ Female أنثى

2. **Age العمر:**
   - ☐ 20-29 years old
   - ☐ 30-39
   - ☐ 40-49
   - ☐ 50 +

3. **Education المستوى التعليمي :**
   - ☐ Secondary school and less ثانوية عامة أو أقل
   - ☐ Diploma دبلوم
   - ☐ Bachelor degree بكالوريوس
   - ☐ Higher education دراسات عليا

4. **Study Background التخصص الدراسي :** .....

5. **Experience الخبرة العملية :**
   - ☐ 0-4 years
   - ☐ 5-9
   - ☐ 10-14
   - ☐ 15-20
   - ☐ 20 +

Section (B): To what extent do you agree with each of the following statements as a competency you have gained by your study and experience as a graphic designer? Please indicate your answer by ticking **(X)** one box only for each statement.

إلى أي مدى تتفق مع كل من العبارات التالية ككفاءات قمت باكتسابها من خلال دراستك وعملك كمصمم جرافيك؟ ارجو تحديد الاجابة **بالتأشير (X) على خيار واحد فقط.**

Statement العبارة	Strongly Disagree غير موافق بشدة	Disagree غير موافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
1. I have applied understanding of colour theory and psychology لدي معرفة تطبيقية لنظريات اللون وسيكولوجيته.	☐	☐	☐	☐	☐
2. I can apply basic knowledge of Gestalt psychology to digital graphic design بإمكاني تطبيق المعرفة الأساسية لنظرية الجشتالت على تصميم الجرافيك للوسائط الرقمية.	☐	☐	☐	☐	☐
3. I can apply design principles to digital platforms بإمكاني تطبيق مبادئ التصميم على سطح رقمي.	☐	☐	☐	☐	☐
4. I can apply design and innovative concepts بإمكاني تطبيق مفاهيم إبداعية في التصميم.	☐	☐	☐	☐	☐
5. I have applied understanding composition and its construction mechanisms لدي معرفة تطبيقية للتكوين وآلية بناءه.	☐	☐	☐	☐	☐
6. I have applied understanding of design theories and methodologies لدي معرفة تطبيقية لنظريات ومناهج التصميم.	☐	☐	☐	☐	☐
7. I have applied understanding of anatomy لدي معرفة تطبيقية للتشريح الفني.	☐	☐	☐	☐	☐
8. I have applied understanding of digital advertising لدي معرفة تطبيقية للاعلان الرقمي.	☐	☐	☐	☐	☐
9. I can use graphic design terminology استطيع توظيف مصطلحات التصميم.	☐	☐	☐	☐	☐
10. I have applied understanding of typography and its judicial application لدي معرفة في استخدامات التيبوغرافي ومعايير تطبيقاته.	☐	☐	☐	☐	☐
11. I have applied understanding of symbols and icons لدي معرفة تطبيقية للرموز والايقونات.	☐	☐	☐	☐	☐
12. I have applied understanding of graphic design communication trends لدي معرفة تطبيقية اتجاهات التواصل في تصميم الجرافيك.	☐	☐	☐	☐	☐
13. I can apply the basics of graphic design for digital media استطيع تطبيق اساسيات تصميم الجرافيك للوسائط الرقمية.	☐	☐	☐	☐	☐
14. I have applied understanding of editorial design for digital media لدي معرفة تطبيقية في الاخراج الصحفي للوسائط الرقمية.	☐	☐	☐	☐	☐
15. I understand construction of meaningful images أفهم بنائية الصور التعبيرية.	☐	☐	☐	☐	☐
16. I have applied understanding of interactive design لدي معرفة تطبيقية للتصميم التفاعلي.	☐	☐	☐	☐	☐

Statement العبارة	Strongly Disagree غير موافق بشدة	Disagree غير موافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
17. I understand aesthetics and aesthetic criteria أفهم علم الجمال ومعايير الجمال.	☐	☐	☐	☐	☐
18. I understand visual design psychology and visual literacy. أفهم سيكولوجية التصميم البصري والمعرفة البصرية.	☐	☐	☐	☐	☐
19. I have the ability to perform creative thinking لدي القدرة على ممارسة التفكير الابداعي.	☐	☐	☐	☐	☐
20. I have applied understanding of user experience in digital media لدي معرفة تطبيقية في تجربة المستخدم (UX) في الوسائط الرقمية.	☐	☐	☐	☐	☐
21. I can describe different types and sizes of screens أستطيع وصف أنواع وأحجام الشاشات المختلفة.	☐	☐	☐	☐	☐
22. I have applied understanding of basic marketing لدي معرفة تطبيقية في أساسيات التسويق.	☐	☐	☐	☐	☐
23. I can apply the concepts of economics in graphic communications يمكنني تطبيق المفاهيم الاقتصادية في أدوات التواصل الجرافيكية.	☐	☐	☐	☐	☐
24. I can identify characteristics of digital communications أستطيع تحديد خصائص التواصل الرقمي.	☐	☐	☐	☐	☐
25. I have applied understanding of history of art لدي معرفة تطبيقية في تاريخ الفن.	☐	☐	☐	☐	☐
26. I have applied understanding of history of graphic design لدي معرفة تطبيقية في تاريخ تصميم الجرافيك.	☐	☐	☐	☐	☐
27. I can apply the concepts of cross-media publishing and document repurposing أستطيع تطبيق مفاهيم النشر عبر الوسائط المختلفة وتطويع التصاميم لأغراض أخرى.	☐	☐	☐	☐	☐
28. I have applied understanding of research skills and methods لدي معرفة تطبيقية لطرق ومهارات البحث.	☐	☐	☐	☐	☐
29. I can apply the techniques of information and Internet searching يمكنني تطبيق تقنيات البحث عبر الانترنت والمعلومات.	☐	☐	☐	☐	☐
30. I understand web processes and protocols أفهم عمليات وبروتوكولات شبكة الانترنت.	☐	☐	☐	☐	☐
31. I understand how systems behave and aspects that contribute to sustainable products, strategies, and practices أفهم آلية تصرف الأنظمة والنواحي التي تساهم في إدامة المنتجات والاستراتيجيات والممارسات.	☐	☐	☐	☐	☐
32. I have the ability to control cost, time and resource with understanding the time, cost, and quality triangle لدي القدرة على ضبط التكاليف والوقت والموارد.	☐	☐	☐	☐	☐
33. I can determine the costs associated with graphic design and other creative services يمكنني تحديد التكاليف المرتبطة بتصميم الجرافيك والخدمات الإبداعية الأخرى.	☐	☐	☐	☐	☐
34. I have the ability of designs analysis لدي القدرة على تحليل التصاميم.	☐	☐	☐	☐	☐
35. I have applied understanding of strategy-making لدي معرفة تطبيقية في بناء الاستراتيجيات.	☐	☐	☐	☐	☐
36. I have applied understanding of outcome evaluation لدي معرفة تطبيقية في تقييم المخرجات.	☐	☐	☐	☐	☐
37. I have applied understanding of drawing and its techniques لدي معرفة تطبيقية في الرسم وتقنياته.	☐	☐	☐	☐	☐

Statement العبارة	Strongly Disagree غير موافق بشدة	Disagree غير موافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
38. I have applied understanding of 2D and 3D design لدي معرفة تطبيقية في التصميم الثنائي والثلاثي الأبعاد.	☐	☐	☐	☐	☐
39. I have applied understanding of drawing sketches لدي معرفة تطبيقية في رسم السكتشات (الرسوم الأولية).	☐	☐	☐	☐	☐
40. I have applied understanding of storyboarding لدي معرفة تطبيقية في إعداد الكوادر التصويرية لمضون القصة (Storyboarding).	☐	☐	☐	☐	☐
41. I have applied understanding of prototyping لدي معرفة تطبيقية في عمل النماذج التصميمية.	☐	☐	☐	☐	☐
42. I have applied understanding of presentation skills لدي معرفة تطبيقية في مهارات العرض.	☐	☐	☐	☐	☐
43. I have applied understanding of and ability to utilise tools and technology لدي المعرفة التطبيقية والقدرة على توظيف الأدوات والتكنولوجيا.	☐	☐	☐	☐	☐
44. I can apply the techniques of drawing software يمكنني استخدام برمجيات الرسم.	☐	☐	☐	☐	☐
45. I can apply the techniques of page layout and publishing software يمكنني استخدام برمجيات تنسيق الصفحات والنشر المكتبي.	☐	☐	☐	☐	☐
46. I can apply the techniques of image editing software. يمكنني استخدام برمجيات معالجة الصور الرقمية.	☐	☐	☐	☐	☐
47. I understand different types of computing platform أستطيع التعامل مع مختلف أنظمة التشغيل في الحاسوب.	☐	☐	☐	☐	☐
48. I can explain document and workflow management يمكنني توضيح آلية إدارة المستندات وسير العمل.	☐	☐	☐	☐	☐
49. I have applied understanding of basic programming skills لدي معرفة تطبيقية في أساسيات البرمجة.	☐	☐	☐	☐	☐
50. I can apply the basics of photography for graphic design purposes يمكنني تطبيق التصوير الفوتوغرافي لغايات التصميم الجرافيكي.	☐	☐	☐	☐	☐
51. I have applied understanding of advanced photography tips, tricks, and techniques لدي معرفة تطبيقية متقدمة في التصوير الضوئي وتقنياته.	☐	☐	☐	☐	☐
52. I can apply the techniques of webpage development software يمكنني استخدام برمجيات تصميم وتطوير المواقع الالكترونية.	☐	☐	☐	☐	☐
53. I can apply the techniques of 3D software يمكنني استخدام برمجيات التصميم ثلاثي الأبعاد.	☐	☐	☐	☐	☐
54. I can apply the techniques of preparing portfolios. يمكنني استخدام تقنيات اعداد ملفات حفظ نماذج الأعمال (Portfolios).	☐	☐	☐	☐	☐
55. I can demonstrate digital document delivery يمكنني تسليم مستندات رقمية مختلفة حسب طبيعة المنتج.	☐	☐	☐	☐	☐
56. I can apply the techniques of multimedia creation software يمكنني استخدام برمجيات الوسائط المتعددة.	☐	☐	☐	☐	☐
57. I can apply the techniques of filmmaking and video capturing يمكنني استخدام برمجيات صناعة الأفلام والتقاط أفلام الفيديو.	☐	☐	☐	☐	☐
58. I have applied understanding of lighting techniques لدي معرفة تطبيقية في تقنيات الإضاءة.	☐	☐	☐	☐	☐

Statement العبارة	Strongly Disagree غير موافق بشدة	Disagree غير موافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
59. I have applied understanding of animation and motion graphics لدي معرفة تطبيقية في الرسوم المتحركة والأشكال الجرافيكية المتحركة (Animation and Motion Graphic).	☐	☐	☐	☐	☐
60. I have the ability to collaborate productively in large interdisciplinary teams لدي المقدرة على التعاون بشكل منتج ضمن مجموعات العمل الأكبر.	☐	☐	☐	☐	☐
61. I have applied understanding of technical communication skills لدي معرفة تطبيقية في تقنيات ومهارات التواصل.	☐	☐	☐	☐	☐
62. I am able to convey an idea, feeling, and belief لدي القدرة على نقل الفكرة والاحساس والاعتقاد.	☐	☐	☐	☐	☐
63. I have applied understanding of how to communicate and sell ideas and designs to clients لدي معرفة تطبيقية في كيفية التواصل وترويج الأفكار والتصاميم للعميل.	☐	☐	☐	☐	☐
64. I can identify and fulfil customer needs يمكنني تحديد وإشباع رغبات العميل.	☐	☐	☐	☐	☐
65. I am able to learn and comprehend لدي القابلية على التعلم والفهم.	☐	☐	☐	☐	☐
66. I have the ability to plan and lead design projects لدي المقدرة على التخطيط وقيادة إنتاج التصاميم.	☐	☐	☐	☐	☐
67. I have the ability to be flexible, nimble and dynamic in practice لدي القابلية لأكون ليّن، فطن وديناميكياً في الحياة العملية.	☐	☐	☐	☐	☐
68. I have applied understanding of decision making and project management لدي معرفة تطبيقية في اتخاذ القرارات وادارة المشاريع.	☐	☐	☐	☐	☐
69. I do comprehend ethical behaviors, intellectual property rights (IPR), and copyright issues in the design professions أدرك السلوكيات الأخلاقية، حقوق الملكية الفكرية، حقوق النسخ في مجال التصميم.	☐	☐	☐	☐	☐
70. I have applied understanding of using local cultural symbolism and colours لدي معرفة تطبيقية في استخدام الرموز والألوان للثقافة المحلية.	☐	☐	☐	☐	☐
71. I have applied understanding of recognising physical, cognitive, cultural, and social factors that shape design decisions لدي معرفة تطبيقية في إقرار العوامل المادية والمعرفية والثقافية والاجتماعية التي تشكل قرار التصميم.	☐	☐	☐	☐	☐
72. I do desire to improve and clarify أرغب في تحسين وتوضيح قدراتي.	☐	☐	☐	☐	☐
73. I have the ability to solve communication problems visually لدي القدرة على حل مشاكل الإتصال البصري.	☐	☐	☐	☐	☐
74. I have the ability to work in a global environment with an understanding of cultural preservation لدي القدرة على العمل في بيئة عالمية مع الاخذ بعين الاعتبار الحفاظ على التراث الثقافي.	☐	☐	☐	☐	☐
75. I do understand nested items including cause and effect أفهم طريقة تراكب وتداخل العناصر في الصتميم بما فيها عوامل التأثير والتأثر.	☐	☐	☐	☐	☐

Statement العبارة	Strongly Disagree غير موافق بشدة	Disagree غير موافق	Neutral محايد	Agree موافق	Strongly Agree موافق بشدة
76. I have the ability to develop project evaluation criteria that account for audience and context لدي القدرة على وضع معايير تقييم المشاريع والتي تتوقف على الجمهور والمضمون.	☐	☐	☐	☐	☐
77. I do comprehend the basics of art appreciation أستوعب أسس التذوق الفني.	☐	☐	☐	☐	☐
78. I have applied understanding of design appraisal لدي معرفة تطبيقية في تقييم التصاميم.	☐	☐	☐	☐	☐
79. I have the ability to differentiate between the psychology of the digital media and print media audience لدي القابلية للتفريق بين سيكولوجية جهور الوسائط الرقمية وجهور الطباعة.	☐	☐	☐	☐	☐
80. I have the ability to work under high pressure لدي القابلية للعمل تحت ضغط العمل العالي.	☐	☐	☐	☐	☐
81. I have the flexibility to reschedule the timeframe of project production لدي مرونة في اعادة جدولة الإطار الزمني لإنتاج المشروع.	☐	☐	☐	☐	☐
82. I do understand media communication theory أفهم نظرية وسائل الإتصال.	☐	☐	☐	☐	☐
83. I do understand how to visualise information in the digital age أفهم آلية التصور البصري للمعلومات في العصر الرقمي.	☐	☐	☐	☐	☐
84. I have the ability to design and work with mobile applications لدي القدرة على التصميم والعمل على تطبيقات الهواتف الذكية.	☐	☐	☐	☐	☐
85. I have the ability to plan and organise the logo design process لدي القدرة على تخطيط وتنظيم عملية تصميم الشعارات.	☐	☐	☐	☐	☐

Thank you for your time.

Appendix O:
t-test Results for the Significant Digital Media Competencies

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
1.	Applied understanding of colour theory and psychology.	6.81	0.403	6.50	1.092	1.067	0.062
2.	Apply basic knowledge of Gestalt psychology to digital graphic design.	6.38	0.885	6.29	1.069	0.250	0.962
3.	Apply design principles on digital platforms.	6.75	0.447	6.21	1.122	1.761	0.051
4.	Apply design and innovative concepts.	6.75	0.447	6.36	1.082	1.331	0.084
5.	Understanding composition and its construction mechanism.	6.63	0.500	6.43	0.646	0.937	0.166
6.	Applied understanding of design theories and methodologies.	6.81	0.403	6.21	0.893	2.418	0.024
7.	Applied understanding of Anatomy.	5.75	1.125	5.29	1.490	0.970	0.319
8.	Applied understanding of digital advertising.	6.88	0.342	6.07	0.997	3.033	0.001
9.	Use graphic design terminology.	6.06	0.772	6.00	0.877	0.208	0.944
10.	Applied understanding of typography and its judicial application.	6.69	0.479	6.14	0.770	2.358	0.136
11.	Applied understanding of symbols and icons.	6.81	0.403	6.00	1.177	2.599	0.011
12.	Applied understanding of graphic design communication trends.	6.69	0.602	6.29	0.726	1.657	0.279

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
13.	Apply the basics of graphic design for digital media.	6.88	0.342	6.00	1.240	2.713	0.009
14.	Applied understanding of editorial design for digital media.	6.75	0.447	6.14	0.864	2.462	0.144
15.	Understanding construction of meaningful images.	6.63	0.619	5.86	1.460	1.919	0.040
16.	Applied understanding of interactive design.	6.75	0.447	6.57	0.646	0.889	0.077
17.	Understanding aesthetics and aesthetic criterion.	6.38	0.806	6.29	0.726	0.317	0.485
18.	Understanding visual design psychology and visual literacy.	6.63	0.719	6.43	0.646	0.782	0.946
19.	Ability to perform creative thinking.	6.88	0.342	6.64	1.082	0.815	0.097
20.	Applied understanding of user experience on digital media.	6.63	0.619	6.71	0.469	-0.440	0.284
21.	Describe different types and sizes of screens.	6.38	0.719	6.00	0.961	1.220	0.613
22.	Applied understanding of basic marketing.	5.94	0.854	5.29	1.490	1.494	0.126
23.	Apply the concepts of economics in graphic communications.	6.00	1.095	5.43	1.284	1.316	0.526
24.	Identify characteristics of digital communications.	6.38	0.885	5.64	1.447	1.696	0.164
25.	Applied understanding of history of art.	5.44	1.263	5.00	1.301	0.933	0.625
26.	Applied understanding of history of graphic design.	6.31	1.078	5.64	1.499	1.418	0.184

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
27.	Apply the concepts of cross-media publishing and document repurposing.	6.00	1.033	5.43	0.938	1.578	0.879
28.	Applied understanding of research skills and methods.	6.00	0.894	6.00	1.038	0.000	0.285
29.	Apply the techniques of information and Internet searching.	6.38	0.806	6.00	0.961	1.163	0.951
30.	Understand web processes and protocols.	6.06	1.237	5.50	1.286	1.220	0.613
31.	Understanding of how systems behave and aspects that contribute to sustainable products, strategies and practices.	5.69	1.250	5.71	1.139	-0.061	0.744
32.	Ability to control cost, time and resources.	6.19	1.167	5.79	1.578	0.800	0.433
33.	Determine the costs associated with graphic design and other creative services.	5.94	1.482	5.93	1.072	0.019	0.414
34.	Demonstrate the ability of design analysis.	6.06	1.063	6.36	0.633	-0.905	0.492
35.	Applied understanding of strategy-making.	6.06	1.124	5.43	1.284	1.443	0.462
36.	Applied understanding of outcome evaluation.	6.06	1.289	5.79	1.122	0.623	0.933
37.	Applied understanding of drawing and its techniques.	6.56	0.629	5.64	1.216	2.651	0.025
38.	Applied understanding of 2D and 3D design.	6.75	0.447	5.79	1.424	2.573	0.014

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
39.	Applied understanding of drawing sketches.	6.75	0.577	6.29	0.726	1.950	0.146
40.	Applied understanding of storyboarding.	6.75	0.447	5.86	1.351	2.498	0.027
41.	Applied understanding of prototyping.	6.56	0.512	6.00	1.617	1.320	0.025
42.	Applied understanding of presentation skills.	6.75	0.683	6.21	1.251	1.481	0.014
43.	Applied understanding of and ability to utilise tools and technology.	6.56	0.727	6.50	0.519	0.267	0.325
44.	Apply the techniques of drawing software.	6.44	0.629	5.93	1.269	1.420	0.065
45.	Apply the techniques of page layout and publishing software.	6.44	1.031	6.21	0.802	0.655	0.893
46.	Apply the techniques of image editing software.	6.94	0.250	6.71	0.825	1.031	0.039
47.	Understand different types of computing platforms	6.19	1.047	6.21	0.802	-0.078	0.868
48.	Explain document and workflow management	6.00	0.816	5.43	1.158	1.578	0.067
49.	Applied understanding of basic programming skills	5.94	1.289	5.57	1.399	0.746	0.401
50.	Apply the basics of photography for graphic design purposes.	6.81	0.544	6.00	1.468	2.063	0.025
51.	Applied understanding of advanced photography tips, tricks and techniques.	6.63	0.500	5.79	1.477	2.142	0.003

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
52.	Apply the techniques of webpage development software.	5.94	1.181	5.86	1.231	0.182	0.798
53.	Apply the techniques of 3-D software.	6.25	0.775	5.29	1.267	2.552	0.108
54.	Apply the techniques of preparing portfolios.	6.50	0.632	6.07	0.997	1.424	0.142
55.	Demonstrate digital document delivery	6.38	0.957	5.64	1.082	1.967	0.795
56.	Apply the techniques of multimedia creation software.	6.63	0.619	5.86	0.864	2.823	0.481
57.	Apply the techniques of filmmaking and video capturing.	6.44	0.629	5.36	1.082	3.397	0.125
58.	Applied understanding of lighting technique	6.50	0.516	6.07	0.917	1.604	0.289
59.	Applied understanding of animation and motion graphics	6.63	0.500	6.36	0.842	1.076	0.199
60.	Ability to collaborate productively in large interdisciplinary teams	6.63	0.500	6.36	1.082	0.889	0.042
61.	Applied understanding of technical communication skills.	6.69	0.479	6.14	0.864	2.172	0.011
62.	Be able to convey an idea, feeling and belief.	6.63	0.619	6.43	0.938	0.685	0.182
63.	Applied understanding of how to communicate and sell ideas and designs to clients.	6.56	0.727	6.29	1.383	0.699	0.250

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
64.	Identify and provide customer needs	6.50	0.516	6.36	1.393	0.382	0.110
65.	Be able to learn and comprehend.	6.44	0.512	6.57	0.852	-0.530	0.406
66.	Ability to plan and lead design projects.	6.44	0.629	6.43	0.646	0.038	0.923
67.	Ability to be flexible, nimble and dynamic in practice	6.38	0.619	6.50	0.855	-0.463	0.526
68.	Applied understanding of decision-making and project management.	6.31	0.704	5.86	1.167	1.313	0.107
69.	Comprehend ethical behaviours, Intellectual Property Rights (IPR) and copyright issues in design professions.	6.44	0.629	6.21	1.188	0.655	0.096
70.	Applied understanding of using local cultural symbolism and colours	6.63	0.619	6.29	1.326	0.917	0.027
71.	Applied understanding of recognising physical, cognitive, cultural and social factors that shape design decisions.	6.56	0.512	6.14	1.099	1.369	0.231
72.	Desire to improve and clarify.	6.56	0.727	6.36	1.336	0.532	0.420
73.	Ability to solve communication problems visually.	6.81	0.544	6.21	1.122	1.897	0.006

No.	Competency	Academic		Practitioner		t	α
		Mean	S.D	Mean	S.D		
74.	Ability to work in a global environment with understanding of cultural preservation	6.56	0.629	6.07	1.385	1.278	0.151
75.	Understanding of nested items including cause and effect	6.50	0.632	6.00	1.414	1.278	0.090
76.	Ability to develop project evaluation criteria that account for audience and context	6.38	0.619	6.00	1.109	1.163	0.446
77.	Comprehend the basics of art appreciation.	6.31	0.946	6.43	0.646	-0.386	0.013
78.	Applied understanding of design appraisal.	6.56	0.629	6.43	0.852	0.494	0.480
79.	The ability to differentiate between the psychology of the digital media audience and that of the print.	6.75	0.447	6.36	0.929	1.507	0.020
80.	The ability to work under high pressure	6.19	1.109	6.21	1.122	-0.066	0.734
81.	The flexibility of reschedule time frame of project production.	6.44	0.814	5.93	1.141	1.420	0.602
82.	Understanding media communication theory.	6.69	0.479	6.14	0.770	2.358	0.136
83.	Understanding visualising information in digital age.	6.75	0.447	6.14	0.663	2.974	0.354
84.	Ability to design and work with mobile applications.	6.50	0.632	6.14	1.099	1.108	0.102
85.	Ability to plan and organise logo design process.	6.56	0.814	6.43	0.938	0.419	0.502

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