University of the Western Cape

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An examination of the e-Competence requirements of potential Information Systems graduate employers in the Western Cape and the Information Systems curriculum at University X

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A thesis submitted in fulfilment of the requirements for the Master's Degree in Information Management in the Faculty of Economic and Management Sciences of the University of the Western Cape

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DECLARATION

I declare that "***An examination of the e-Competence requirements of potential Information Systems graduate employers in the Western Cape and the Information Systems curriculum at University X"*** is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

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ABSTRACT

Knowledge, skills and competences (KSC) are regarded as the new global currency of the 21st century, without which a country's investments in other resources will collapse. These strategic skills and competences, which are related to specific requirements of the knowledge-driven economy and information society, are referred to as electronic skills (e-skills) and electronic competences (e-competences). Possessing e-skills and e-competencies allows for a more effective and inclusive participation within a global knowledge-driven economy and broader society. However, with a history of inequity, South Africa has been adversely impacted by globalisation and rapidly progressing Information and Communication Technologies (ICT), resulting in the country lagging behind in global competitiveness and e-readiness. Since e-skills and e-competencies are considered a pre-requisite for securing professional employment in most of the world, there is a need for Higher Education Institutions to determine firstly, which e-competencies are required in today's society and then to ensure that these e-competencies are sufficiently provided to their students. This statement is premised on the understanding that *quality, relevant* and *adequate* e-skills and e-competences are required for a more effective and inclusive participation within a global knowledge-driven economy and broader society.

In the context of a regressing youth unemployment crisis in South Africa and with the backdrop of the global mismatch between demand and supply of e-skills and e-competences, this study investigated the alignment between demand and supply of e-competences in South Africa. Thus, the overarching aim of this study was to determine how well the Information Systems curriculum at a South African university (supply) matched the e-competence requirements of potential employers of Information Systems graduates in South Africa, specifically in the Western Cape Province (demand). This was achieved through two specific objectives which were firstly, to develop a conceptual framework that could be used to assess if there was a mismatch between demand and supply and then 2) to use the conceptual framework to make recommendations towards alignment of demand and supply.

By achieving these objectives, this study makes a significant contribution to the current e-skills dialogue and existing body of knowledge by positing a conceptual framework of

e-Competences for Information Systems graduates in the South African context, which was developed after an extensive examination of the literature related to the demand and supply of e-competences; and eleven existing e-skills and e-competence frameworks. A holistic perspective of e-competences is illustrated in this e-Competence framework, which suggests a vertical and horizontal view of the knowledge, skill and attitude (KSA) components in the e-competence definition. By using three vertical layers, the framework categorises the combination of fifty specific e-competencies expected of undergraduate and postgraduate Information Systems graduates. The first layer indicates the core competence categories, which are Cognitive Competence, Functional Competence, ICT Competence, Personal Competence (which includes Career Management, Ethical and Emotional Intelligence Competences), Global Competence (which includes Behavioural, Intercultural and Social Intelligence Competences) and lastly Meta-competences, which underscore all the other competences. The second and third layers of the framework allocated fifty specific e-competencies to these core competence categories.

The study was positioned within a qualitative, interpretive research paradigm and used a case study design. The research sites were twenty two IS graduate employers in the Western Cape Province who participate in the annual internship programme at the IS department of University X. Convenient sampling was used to collect data over a period of five years, from 2010 until 2014. The study used two data collection instruments, which were performance evaluation forms and follow up interviews. These two instruments provided rich data in both qualitative and quantitative forms and the variety of data allowed for the reliability and validity to be ensured with the qualitative data being triangulated with the quantitative data. Content analysis was used to analyse the data through a three-stage open coding process.

Nine findings were identified, which indicate that there was a mismatch between the demand and supply of e-competences in the selected case study. The mismatches were found to be either in the knowledge, skill or attitude component of e-competence. It was noted that twenty one of the fifty e-competencies in the conceptual framework were taught at University X, eleven were assumed to be embedded within the IS curriculum and eighteen e-competencies are not taught at University X. Significantly, most employers regarded *attitudes* as a more important requirement for e-competence than knowledge and skills.

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KEYWORDS

Skills gap

Skills mismatch

e-Skills

e-Competence

Digital Competence

e-Practitioner

e-Skills demand

e-Skills supply

Information Systems graduates

Information Systems curriculum

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LIST OF ABBREVIATIONS

Abbreviation	Full term
AsgiSA	Accelerated and Shared Growth Initiative for South Africa
BC	Behavioural Competence in the conceptual framework
CC	Cognitive Competence in the conceptual framework
CF	Conceptual Framework
CM	Career Management in the conceptual framework
DoC	Department of Communications
EC	Ethical Competence in the conceptual framework
e-CF	European e-Competence Framework
e-Competence	Electronic Competence
EI	Emotional Intelligence
EQF	European Qualifications Framework
e-SI	South African e-Skills Institute
e-Skills	Electronic Skills
FC	Functional Competence in the conceptual framework
GC	Global Competence in the conceptual framework
HEI	Higher Education Institutions
ICC	Intercultural Competence in the conceptual framework
ICT	Information and Communication Technology
IS	Information Systems
IT	Information Technology
Jipsa	Joint Initiative on Priority Skills Acquisition
KSC	Knowledge, skills and competences
MC	Meta-competencies
NDP	National Development Plan
NeSPA	National e-Skills Plan of Action
PC	Personal Competence in the conceptual framework
SA	South Africa
SFIA	Skills Framework for the Information Age
SI	Social Intelligence
STEM	Science, Technology, Engineering and Mathematics
WC	Western Cape
WEF	World Economic Forum

DEFINITIONS OF KEY CONCEPTS USED

The following concepts and definitions are used throughout the discussion in all the chapters.

Concept	Description	Source
Alignment	In this study, alignment is used to refer to how closely the e-competencies supplied (taught) matches against the e-competencies demanded (required by employers)	
Competence	Refers to an ability to demonstrate knowledge, skills and attitudes with responsibility autonomy and other appropriate attitudes, applied to a particular context.	(Bohlinger, 2008; Ala-Mutka, 2011)
E-competences	Electronic competences (e-competences) are generally defined as the demonstrated ability to apply skills, knowledge and attitudes to achieve observable results. It has also been defined as the "technical and managerial capabilities that organizations need to achieve their objectives". In this study, e-competence is defined as the ability to apply the relevant and adequate combination of knowledge (cognitive domain), skills (psychomotor domain) and attitudes (affective domain), in a particular context, for the effective utilisation and appropriation of information systems and technology, in order to achieve a quality output and observable results.	(Fonstad & Lanvin, 2009:7; Mitrovic, 2010)
e-Practitioner skills *(also referred to as e-Professional or ICT Practitioner skills)*	Refer to the capabilities required for researching, developing and designing, managing, producing, consulting, marketing and selling, the integrating, installing and administrating, the maintaining, supporting and service of ICT systems. In this study, e-Practitioner is used to refer to ICT professionals and IS graduates working in ICT related jobs.	(European e-Skills Forum, 2004)
E-skills	Electronic skills (e-skills) are generally defined as the specific skills required for thriving in a knowledge economy and the	(Lanvin, 2008; Lanvin &

	information-intensive societies. A more comprehensive definition is discussed in Chapter 2.	Passman, 2008)
Framework	In this study, framework refers to "any organised conceptualisation or structured set of intertwined competences which aim to enhance the digital literacy of a specific target group".	(Ferrari, Punie, & Redecker, 2012:3)
Graduate	Refers to individuals with a bachelor's degree or equivalents and higher educational qualifications, namely Honours, Masters and Doctorate degrees. In this study, the term *graduate* refers to a student who has completed the prescribed duration and requirements for a Bachelor's Degree and/or Honours degree in Information Systems.	(van der Berg & van Broekhuizen, 2012)
Intern	In this study, intern refers to IS Honours graduates who are placed at host organisations for a prescribed period of time, in order to apply theoretical knowledge and to learn practical components related to the IS discipline.	
Organisation	In this study, organisation refers to companies that have partnered with the IS department for the purposes of the internship programme and that agree to host interns for a prescribed period of time.	
Supervisor	In this study, supervisor refers to the e-Practitioner or manager that is assigned the role of mentoring and supervising the intern for the prescribed duration.	

CHAPTER 1
THESIS INTRODUCTION

1.1 BACKGROUND AND RATIONALE FOR THE STUDY

While the world is rapidly moving towards knowledge-based and innovation-driven digital economies (Gourova, Antonova & Nikolov, 2006; Tapscott, 2012), global competition has become more dependent on Information and Communication Technologies (ICT). These technologies are now broadly integrated into most processes and functions within economies, society and businesses (Corrall, 2005; Merkofer & Murphy, 2010:686). Within this global climate no market or country can operate in isolation (Johnston, Fenn, Kretschmer & Lennox, 2002). Yet "South Africa displays features of a low-growth, middle-income trap, characterised by lack of competition, large numbers of work seekers who cannot enter the labour market, low savings (hence a reliance on foreign capital inflows) and a poor skills profile" (National Planning Commission, 2011:38). A country's ability to compete globally depends on factors such as a steady throughput of competent workers and an "efficient mechanism" that transfers knowledge from universities and research organisations to the business world (Hernández-March, Martín del Peso & Leguey, 2009:1). South Africa (SA), having fallen to a global competitiveness index of 56th place (Porter, Sachs & Warner, 2014), is not impervious to the influencing factors of globalisation and the imperative of progressing towards a productive knowledge economy (Mitrovic, Taylor & Sharif, 2014; National Planning Commission, 2011; Wesso, 2008).

The survival of companies in this competitive race depends on their "ability to develop, recruit and retain a technologically sophisticated workforce" (Gourova et al., 2006:107). Knowledge, skills and competences (KSC) are regarded as the new global currency of the 21st century (OECD, 2012), without which investments in other resources, like infrastructure and technology, will collapse (Lanvin & Fonstad, 2009). These strategic skills and competences, which are related to specific requirements of the information society and knowledge economy are referred to as e-skills and e-competencies (Lanvin & Passman, 2008). Possessing e-skills and e-competencies allows for a more effective and inclusive participation in a global ICT driven economy and within the broader society (Schmidt & Stork, 2008). Thus e-skills and

e-competencies are considered a pre-requisite for securing professional employment in most of the world (Walton et al., 2009).

As a middle-income country it is important that SA leverages its knowledge and innovative products in order to compete (National Planning Commission, 2011). However, "South Africa is falling behind its peers in Africa (Kenya, Nigeria and Egypt) who are putting greater emphasis on the contribution that technology plays in economic growth" (Schofield, 2014:1). This may be due to a number of contributing factors like a lack of improvement in basic education, lack of exposure of ICT to learners, limited numbers of matriculants and graduates in the Science, Technology, Engineering and Mathematics (STEM) disciplines and failed initiatives by government (among others) (Schofield, 2014). This is evidenced in the fact that SA has dropped from 47th place in 2007 to 75th place in 2015, on the World Economic Forum (WEF)'s global e-readiness (electronic readiness) ranking (Dutta, Geiger & Lanvin, 2015). This networked readiness index is an indicator of the quality and scope of a country's ICT infrastructure and the willingness, preparedness and readiness of its consumers, businesses and governments to benefit from the use of ICTs (Dada, 2006; Economist Intelligence Unit, 2009) . A ranking of 75th place can be interpreted as a signpost that the potential benefits and social impacts of ICT have not been fully explored and that the South African government lags behind in enabling e-participation of its citizens (Dutta et al., 2015).

Factors such as a lack of adequate and relevant skills, limited geographical mobility and a lack of comprehensive job advertising details (perhaps even overstated job specifications in advertisements) can create large barriers to successful job-finding (International Labour Organisation, 2013). The elimination of poverty and reduction of inequality is at the core of SA's National Development Plan for the period leading up to 2030 (National Planning Commission, 2011). Conversely, SA seems to be failing in its plan to reduce unemployment to 6% in 2030 since the unemployment rate[1] has been increasing from 24.9% in 2012 to 25.5% in 2014 (StatsSA, 2014). Thus, SA compares unfavourably to the global unemployment index of 6.1% (International Labour Organisation, 2014:17).

[1] The unemployment rate measures the proportion of the labour force that is trying to find work (Statistics South Africa, 2015)

The current National Development Plan (NDP) Report aims to reduce unemployment to 6% by 2030. It acknowledges that in order to eliminate poverty and reduce inequality, SA needs to position itself favourably in a way that is rapidly responsive to the various developments happening in the world (National Planning Commission, 2011). In order to achieve this, one of the NDP's central goals is to expand employment, by creating more entrepreneurial opportunities and then hopefully, "by 2030, ICT will underpin the development of a dynamic and connected information society and a vibrant knowledge economy that is more inclusive and prosperous" (National Planning Commission, 2011:190). The National e-Skills Plan of Action (NeSPA) was developed by the South African e-Skills Institute, mandated by the Department of Communications. It provides a holistic and multipronged approach to achieving the targets of the NDP for 2030.

Instead of a shortage of jobs for skilled staff, it seems that the biggest crisis regarding unemployment, globally, is that there is a significant difference between the skills that employees are equipped with through education and training, and the skills that potential employers expect from the talent pool available (Trauth, Farwell & Lee, 1993). As a result of this problem, vacant posts take a long time to be filled (Accenture Research, 2008; Lanvin, 2008). This phenomenon of simultaneous unemployment and skills shortage infers a misalignment between the skills that are demanded by industry employers and the skills that are supplied by potential employees, commonly referred to as a 'skills gap' or 'skills mismatch' (De Beer, 2010; Scott et al., 2002; Trauth, Farwell & Lee, 1993). There is a broad consensus that the skills gap and mismatch is also one of the contributing factors of high unemployment (Daniels, 2007; El Achkar, 2010; Merkofer & Murphy, 2010; National Treasury, 2011; OECD, 2012; Pauw, Oosthuizen & Van Der Westhuizen, 2008).

Directly related to the skills gap or mismatch is academia and the curriculum they facilitate (Kim, Hsu & Stern, 2006) since Higher Education Institutions (HEI) are generally regarded as the main source of trained and work-ready graduates (López-Bassols, 2002; Nikolov, 2009). The discrepancy between these skill expectations could be due to minimal co-ordination between academia and industry with respect to the creation of academic syllabi (Accenture Research, 2008). There is a need for academic institutions to consistently and systemically evaluate the competences and skills required by employers and those that job-seeking

graduates possess in a rapidly evolving field such as ICT. As such, academic institutions should know and understand what the required skills are in order to adopt a systemic approach to providing a relevant curriculum for potential graduate professionals.

It is imperative, therefore, that institutions of higher learning design new curricula or continuously redesign their current curricula to align with the requisite generic and vocational competences that are required by local businesses in the industry (Accenture Research, 2008; Cilliers & Calitz, 2010; Schofield, 2009; Scholtz, Farwell & Lee, 1993; Trauth, Kim, Hsu & Stern, 2006). This will ensure that the individuals who graduate from these institutions are more suitably aligned to the industry demand and are equipped with appropriate and relevant e-competencies, exactly matching the specific need of the labour market at the time they graduate, making them industry ready and employable. This study examined the e-competence requirements of potential Information Systems (IS) graduate employers in the Western Cape and how well the IS curriculum at a South African university matched these requirements. This was done through analysing the e-competencies demonstrated and applied by IS graduates from the University, in an internship programme at some of these organisations.

1.2 DESCRIPTION OF THE PROBLEM

The ubiquity of ICT in every sphere of the economy cannot be repudiated (Dutta, Geiger & Lanvin, 2015), resulting in global competition increasingly being driven by knowledge and innovation (Babinet et al., 2014). Given this context, the first identified problem is that as a middle-income country, SA does not seem to be leveraging its knowledge and innovative products sufficiently (National Planning Commission, 2011) and has consequently fallen behind other African countries, in prioritising the integration of ICT in the country (Schofield 2014). This is evidenced by SA's ranking of 56th place on the global competitiveness report (Porter, Sachs & Warner, 2014) and the drop to 75th place on the World Economic Forum's 2015 global e-readiness ranking. These are indications that the potential benefits and social impacts of ICT have not been fully explored and that the South African government lags behind in enabling e-participation of its citizens (Dutta, Geiger & Lanvin, 2015). Thus, developing the e-skills and e-competencies of the country is imperative (Tapscott, 2012) since it will allow citizens to participate more effectively in the global information economy and society (Lanvin, 2008; Schmidt & Stork, 2008).

A second problem identified is the fact that the availability of practitioners of specialised e-skills and e-competences (e-practitioners) are failing to meet intensifying demand (Hawking & Stein, 2003; Babinet et al., 2014). The scarcity of e-practitioners is compounded by the global skills gap and mismatch, which is one cause of high unemployment (Daniels, 2007; El Achkar, 2010; Merkofer & Murphy, 2010; National Treasury, 2011; OECD, 2012; Pauw et al., 2008; Tech Partnership, 2015). While many seek employment, there are also simultaneous vacancies that cannot be filled (Accenture Research, 2008; International Labour Organisation, 2015; Lanvin 2008; Schofield, 2014). This infers a misalignment between the demand and supply of e-competencies (De Beer, 2010; Scott et al., 2002; Trauth, Farwell & Lee, 1993).

A third and main problem being addressed in this study, are the mismatches "between the current outcomes of higher education and [SA's] need for well-qualified graduates" (Council on Higher Education, 2013:54). With the backdrop of e-skills and e-competences development, this study sought to find a suitable e-competence framework that could be used to measure the level of e-competence in graduates in South Africa. From the literature conducted there was no suitable framework found for this purpose. This alludes to the understanding that if no suitable mechanism exists to measure the extent of a problem, how can it then be resolved? Therefore, even though the SA government has acknowledged this problem in their National Development Plan towards 2030, judging from the literature review conducted, this problem still persists.

By examining the perceived misalignment between the e-competencies required by prospective employers in the Western Cape (WC) in SA and the e-competencies provided by the Information Systems (IS) curriculum at one university in the Western Cape, hereafter referred to as University X, this study investigates if and where there is a mismatch.

1.3 AIMS AND OBJECTIVES OF THE STUDY

Based on the evidence of the skills gap and mismatch in the ICT industry that was identified in the problem statement in Section 1.2, the study had the following two aims:

- To determine *how* closely the e-competencies provided by the Information Systems curriculum at University X are matched to the e-competencies required by potential Information Systems employers in the Western Cape; and
- If there is a disparity, to determine how the Information Systems curriculum can be aligned as closely as possible to meet the expectations of potential Information Systems employers in the Western Cape.

Using the above aims as guidelines, the study built on existing knowledge by examining initiatives and benchmarks found in the literature on e-skills and e-competencies in order to arrive at the following two objectives:

1. To develop a conceptual framework that could be used to assess the e-competencies required by potential employers in order to determine the gaps in the IS curriculum of University X; and
2. To use the conceptual framework as a guide so that the curriculum at University X could be aligned to provide graduates with the necessary e-competencies required by potential employers in the Western Cape.

1.4 MAIN RESEARCH QUESTION AND SUB QUESTIONS

In order to address the research problem, the following main question was formulated:

How closely are the e-competencies provided in the Information Systems curriculum at University X aligned with the e-competencies required by potential Information Systems employers in the Western Cape?

Three sub-questions were used to guide the data collection and analysis processes, namely:

1. Which e-competencies are required by potential Information Systems employers in the Western Cape?
2. Which of these e-competencies are included in the Information Systems curriculum at University X?
3. How could the Information Systems curriculum at University X be designed so that it is aligned to meet the required e-competencies of potential Information Systems employers in the Western Cape?

1.5 RESEARCH METHODOLOGY

This study is positioned within an interpretive qualitative research paradigm. Qualitative research is used to understand the meaning that people ascribe to social or human problems (Creswell, 2013). From an IS perspective, the shift from investigating technological issues to managerial and organisational issues, according to Myers (1997), has resulted in more qualitative research methods being used. Benbasat, Goldstein and Mead (1987) likewise favour the use of idiographic (often qualitative) rather than nomothetic (often quantitative) research strategies in Information Systems. Similarly, Mingers (2001) argues that the pervasiveness of IS in society supports the use of multiple paradigms to draw the most information analyses. On the other hand, Silverman (2013) points out that the research approach must be appropriate to the research questions that the researcher is interested in answering and since the research question and sub-questions were qualitative in nature, it was appropriate that this study adopt an interpretive, qualitative research approach. Krauss and Putra (2006:764) also stipulate that "[t]he goal of a qualitative investigation is to understand the complex world of human experience and behaviour from the point-of-view of those involved in the situation of interest." This study, emanating from a social science discipline, aimed to gain an understanding of the complex social and cultural phenomenon of the e-skills mismatch in the SA labour market as it pertains to IS graduates. Prior studies pertaining to this topic used quantitative approaches to establish the gap between skills demand and supply (Griesel & Parker, 2009; Noll & Wilkins, 2002). Previous studies do not provide sufficient discussion of the underlying motivation and perceptions of employers. Thus, this study set out to use qualitative means to add to the existing literature. The qualitative research approach is further discussed in Section 4.4.

1.5.1 Research Design

Research designs used in qualitative studies are typically action research, ethnography or case study (Myers, 1997). This study made use of a case study design. Benbasat, Goldstein and Mead (1987), De Vries (2005), Stake (2010) and Yin (2009) all offer at least three reasons why a case study research design is suitable for a qualitative study. Firstly, it allows the researcher to study the phenomenon in a natural setting and generate theories into practice. Secondly, it allows the researcher to answer the 'why' and 'how' questions related to the nature and complexity of the process taking place. Thirdly, it allows for rich and in-depth data generation

which could add to the validity and credibility of the findings. Applying these three reasons to this study allowed the researcher to gain an understanding of the skills required by the individual organisation in the context of its environment and natural setting. This allowed for a greater understanding of exactly which e-competences are required (relevance), at what level (adequacy) and the role that the student will play in the organisation, which requires them to have these specific e-competences (relating to the how and why aspects). A detailed discussion of the case study design and its limitations is presented in Sections 4.4 and 4.4.1.

1.5.2 Research site

Twenty two (22) IS graduate employers in the Western Cape Province with whom the IS department at University X has a working relationship, were used as the research site for this study. These organisations, who hosted a total of 83 postgraduate (honours) students over a period of 5 years, from 2010 until 2014, have been selected due to their existing participation in the IS department's annual internship programme. The internship programme is an optional 6 month period of intense work-integrated learning (WIL) where students in the Honours level, hereafter referred to as interns, work at participating host organisations. A comprehensive description of the research site is provided in Section 4.5.1.

1.5.3 Research participants

The study used a non-probability, convenient sampling method to select the research participants (Kothari, 2004). Convenience sampling, which entails the researcher choosing the sample based on the availability and ease of access to respondents, is reported to be the most common form of qualitative sampling (Coyne, 1997; Dongre et al., 2009; Latham, 2007; Ritchie & Lewis, 2003). Convenient sampling was deemed most suitable because the study used the supervisors from the twenty two host organisations, who supervised and mentored the registered IS Honours students who worked at these host organisations during the five year period (2010-2014) as research participants. The internship programme provided companies with a six month period of working with the IS graduates, which was important for credibility and validity purposes. A detailed description is provided in Section 4.5.2.

1.5.4 Data collection instruments

The study used two data collection instruments. The first instrument was an existing performance evaluation form used by the IS department at University X for the internship

programme. The form consisted of eight sections which were completed by both the interns (Sections 2, 6 and 7), and the supervisors (Sections 1, 2, 3, 4, 5 and 8) at the host organisations. It should be noted that only the supervisors' responses were used in the data analysis process because the focus of the study was on what e-competencies they required on behalf of their companies. The second instrument was follow-up telephonic and face-to-face interviews with the supervisors where clarification was needed about some of their responses and comments made on the performance evaluation forms. Further detail is provided in Section 4.5.3.

1.5.5 Data analysis process

The data gathered was both quantitative and qualitative. Sections 2, 3 and 8 in the performance evaluation form were quantitative in nature and the analysis of the responses is provided in graphs in Appendix D. The remaining sections were qualitative in nature as well as the responses from the interviews and these responses were analysed through content analysis, which is a three stage open coding process, following Creswell (2013), Henning (2004) and Neuman (1997). A detailed description of the process in provided in Section 4.5.4.

1.6 ETHICAL CONSIDERATIONS

Permission to conduct the study and collect the data was obtained. All information received from participants was treated with the strictest confidentiality. Anonymity was enforced by replacing the organisation's name with an alphabetical letter, for example 'Organisation X'. Likewise, to protect students' identities they were referred to as 'interns'. For the same reasons, the academic institution used in this study is referred to as 'University X'.

1.7 SIGNIFICANCE OF THIS RESEARCH

More than the high unemployment of youth in SA, there is also evidence of simultaneous unemployment of skilled professionals and many vacancies remaining unfilled. This has been shown to be due to a skills gap and mismatch between the competences that employment seekers have and the competencies required by employment providers. Since Higher Education Institutions (HEI) are regarded as the main source of trained and work-ready graduates, it makes sense that academic institutions need to understand what the required competences are in order to provide the relevant curricula to maximise the employment opportunities of potential graduate professionals, especially in a rapidly evolving field like ICT.

This study is therefore relevant because it has attempted to understand what the required competences for current IS graduates are and whether these competences are provided in the current IS curriculum at University X. This study furthermore contributes a framework that could be used as a guide for the combination of competences required by IS graduates. It is hoped that this information will assist in reducing the skills mismatch and skills gap, at least where it pertains to University X and its IS graduates.

1.8 THESIS STRUCTURE AND CHAPTER LAYOUT

There are six chapters in this thesis. Following this introductory chapter, which seeks to describe the context for this study, the rest of the thesis takes the following shape:

There are two parts to the literature review, namely part 1, which is Chapter 2 and part 2, which is Chapter 3. Part 1 seeks to conceptualise competence types and to understand e-competences in the broader framework of e-skills. The concept of competence is conceptualised and the term e-competence is defined by examining what the construct means within the broader framework of e-skills. In the process of conceptualising the term e-competence, distinctions are also made between skills and competence as well as between competences and competencies. The rest of the chapter examines eleven (11) frameworks and models that in some way or another, classify e-skills and e-competences. Finally, the latter part of the chapter briefly unpacks the relevance of e-competences for South Africa.

Part 2 (Chapter 3), carries on from part 1 and focuses on the demand and supply of e-competences by reiterating the importance of this study in the current context of the mismatch between demand and supply of e-competences. The rest of the chapter discusses the demand for e-competences from a global perspective and then the supply of e-competences from an academic perspective. At the end of the chapter, a conceptual framework is presented that was arrived at by considering all the definitions and frameworks discussed in part 1 and part 2.

The research methodology and rationale for strategies used to conduct this study are discussed in Chapter 4 and the empirical data is tested against the conceptual framework in Chapter 5. The findings from the data analysis is used to refine the conceptual framework,

which is then matched against the IS curriculum at University X in order to identify gaps. Chapter 6 concludes this thesis by interpreting the findings from Chapter 5, as aligned with the research objectives and research questions, and then proposes recommendations. The limitations of the study are noted, and suggestions for future research are also made. Finally, the Appendix section contains additional information about areas discussed throughout the thesis as well as examples of the data collection instruments.

CHAPTER 2
LITERATURE REVIEW (PART 1): E-SKILLS AND E-COMPETENCE

2.1 INTRODUCTION

The literature reviewed for this study is presented in two parts. Part 1, which is this chapter, examines the available literature and explores a number of frameworks and models in order to gain a conceptual understanding of e-skills and e-competences pertaining to e-Practitioners. This aided in achieving Research Objective 1. First, the chapter deconstructs the terms e-skills and e-competence by developing an understanding of the meaning of skills and competence. Thereafter, a number of e-competence frameworks are explored in order to evaluate if there is one that is most suitable for the purposes of this study. The chapter ends off by discussing the importance of e-competences in the SA context. The literature review extends to part 2 which is presented in Chapter 3. Part 2 discusses the demand and supply of e-competences according to various international and local studies found in the literature, and how this relates to academia. The suggested conceptual framework, which is used as the basis for analysing the empirical data, is presented at the end of Chapter 3.

2.2 CONCEPTUALISING E-SKILLS AND E-COMPETENCES

In order to understand how electronic skills (e-skills) and electronic competences (e-competences) relate to IS graduates and prospective employers it is necessary to understand these concepts better. Thus, the definitions of e-skills and e-competences are unpacked below in order to conceptualise the terminology.

2.2.1 Defining Electronic Skills (e-Skills)

The rapidly evolving nature of the ICT field makes it difficult to coin a generic definition to e-skills since contexts and requirements often change for different countries and situations, which means that these concepts may also change, depending on the framework used (Romani, 2009). Lanvin (2008:4) advises that it is a challenging task to completely define e-skills because firstly, it would require "a precise and stable description of relevant skills, to allow the building of time series and comparability across countries" and secondly, it would require "a flexible approach to such a description, to make it resilient to future changes in technologies and processes, which are bound to modify the skills required to use and implement them". Some classify e-skills as synonymous with *ICT skills* (for example Frinking,

Ligtvoet, Lundvin, & Oortwijn, 2005; Lanvin & Passman, 2008) while others regard ICT skills as a subset of e-skills (for example Lotriet, Matthee, & Alexander, 2010) and yet others refer to it as the ability to efficiently and critically *use* ICT (for example Ben Youssef, Dahmani, & Omrani, 2012).

There is thus no currently agreed upon or unanimously accepted definition for e-skills (OECD, 2005:6), however, e-skills is considered to incorporate "a wide range of capabilities (knowledge, skills and competences) and issues with an e-skills dimension span over a number of economic and social dimensions" (European e-Skills Forum, 2004:5). The 2012 e-Skills Manifesto states that e-skills refers to "the deep knowledge and capacity to learn lifelong about all appropriate areas of the digital revolution, its technologies, applications, uses and opportunities for transformation" (Tapscott, 2012:9).

In a similar vein, the e-Skills Institute (e-SI) in SA, initiated by the Department of Communications (DoC) in 2007, defines e-skills as: "the ability to use and develop ICTs within the context of an emerging South African Information Society and global Knowledge Economy, and associated competencies that enable individuals to actively participate in a world in which ICT is a requirement for advancement in government, business, education and society in general" (NeSPA, 2010:2) and "to achieve equitable prosperity and global competitiveness in general, and to improve their life opportunities in: (i) personal and educational space, (ii) work environments, (iii) community interactions and (iv) participation in government processes" (NeSPA, 2012:9). This broad definition is the one that was followed in this study.

2.2.2 Defining Competences

Before conceptualising the term e-competence, it would be useful to understand the meaning of competence and how it differs to a 'competency'. Most of the current conception of competence was first published by David McClelland in 1973 (Athey & Orth, 1999) when he initiated the competency approach as an alternative to measuring performance based on intelligence and traits (McClelland, 1973). He argued that competencies should be viewed from a social perspective in terms of life outcomes, such as leadership, interpersonal skills, and not only in terms of occupational outcomes (McClelland, 1973).

It is generally understood that the term 'competence' refers to being able to perform a task sufficiently and the term is often used interchangeably to refer to skill, knowledge or ability (Sultana, 2009). While there seems to be no consensus on a definition, the concepts of competence and competency seem to be confusing terms to distinguish between, both conceptually and grammatically. The terminological confusion stems from procedural and philosophical differences (Rothwell & Lindholm, 1999) as well as inconsistent usage of the terms and different cultural and political traditions from the Latin, English, French and Dutch origins, pertaining to its meaning (Sultana, 2009), for example in the English language competence relates to outcomes whereas the word is input-oriented in German (Bohlinger, 2008). Epistemological differences also exist in how competence is perceived, which has been operationalised to reflect various national contexts (Sultana, 2009). For example, the behaviouristic view of competence originated in the USA, the functionalistic view originated in the UK and a holistic, multidimensional approach to competence originated from Europe, namely France and Germany (Delamare Le Deist & Winterton, 2005; Sultana, 2009).

While referring to this distinction as a *fuzzy concept*, Delamare Le Deist and Winterton (2005) regard competence as denoting functional areas and competency as denoting behavioural areas. In the same vein, Boyatzis (2008) puts forth that competencies are a behavioural approach to intelligence and the capability within these sets of behaviours are organised around the underlying construct of *intent*. Cheetham and Chivers (1998) similarly, regard reflection as the primary professional competency, which is pertinent to acquiring all the other competences and for maintaining openness for continuous improvement. Their model includes Knowledge/Cognitive competence (practical, theoretical, procedural and contextual), Functional competence (occupation-specific, organisation process, cerebral and psychomotor), Personal/behavioural competence (social/vocational and intraprofessional) and Values/ethical competence (personal and professional). They also include meta-competencies such as Communication, Self-development, Creativity, Analysis, Problem solving (Cheetham & Chivers, 1998).

Moore, Mei-I, and Dainty (2002) clarify that competence refers to an area of work; competency refers to the behaviour(s) that support an area of work; and competencies (also

the plural form of competency) are the attributes underpinning behaviour. Competence, according to their explanation, is concerned with a particular area of competence or profession, for example IT programming or management. To determine if an individual exhibits competency in that area, it would need to be determined if they have exhibited the correct or relevant behaviour, required in that area of competence. If the individual failed to display the required behaviour, it may be that their lack of competency could be attributed to a deficiency in one or more of the attributes that underpin the competency, for example, a lack of knowledge in creating a tiered database in a particular programming language, e.g. SQL. The attribution of multiple meanings to the term fosters ambiguity and creates comprehension challenges, which Clark and Winch (2006:256) refer to as "conceptual inflation" (Sultana, 2009). Nonetheless, many have attempted to provide typological and historical distinctions (see for example Delamare Le Deist & Winterton 2005; Jeris, Johnson, Isopahkala, Winterton, & Anthony 2005; Winterton, Delamare-Le Deist, & Stringfellow, 2005; Rothwell & Lindholm, 1999).

It is generally accepted that competence is the ability to demonstrate knowledge and skills (Ala-Mutka,2011;Bohlinger,2008). Ala-Mutka (2011:18) further adds that competence requires the demonstration of "responsibility, autonomy and other appropriate attitudes, applied to the context of work, leisure or learning". Similarly, Athey and Orth (1999:216) define competence as "a set of observable performance dimensions, including individual knowledge, skills, attitudes, and behaviors, as well as collective team, process, and organizational capabilities, that are linked to high performance, and provide the organization with sustainable competitive advantage"

According to Boyatzis (2008:7), competence is constituted of i) cognitive competencies (such as systems thinking and pattern recognition); ii) emotional intelligence competencies (including self-awareness and self-management competencies, such as emotional self-awareness and emotional self-control); and iii) social intelligence competencies (including social awareness and relationship management competencies, such as empathy and teamwork). Similarly, Leat (1993) argues that competence is a state of balance between cognition, feelings (emotions) and behaviour; and that poor performance can often be linked to a desynchrony between the three concepts Ala-Mutka (2011) states that competence is

comprised of cognitive competence, technical competence and emotional competence. Winterton et al. (2005) and Delamare Le Deist & Winterton (2005) similarly outline cognitive competence, functional competence and meta-competencies as crucial competences but Delamare Le Deist and Winterton (2005) adds social competences (behavioural and attitudinal) where Winterton et al. (2005) adds personal competence instead.

One of the most influential typologies of competence is Bloom's taxonomy, which is based on three domains of educational activities: the *cognitive domain* is related to mental skills (in referring to knowledge, in the e-skills context), the *psychomotor domain* is concerned with manual or physical skills (referring to skills, in the e-skills context), and the *affective domain* is related to growth in feelings or emotional areas (referring to attitudes, in the e-skills context). This taxonomy is often related to learning outcomes in education and training (Winterton, Delamare-Le Deist & Stringfellow, 2005). A suitable definition of competence is also cited in Sultana (2009:21),

> "Competence includes: (i) cognitive competence involving the use of theory and concepts, as well as informal tacit knowledge gained experientially; (ii) functional competence (skills or know-how), those things that a person should be able to do when they are functioning in a given area of work, learning or social activity; (iii) personal competence involving knowing how to conduct oneself in a specific situation; and (iv) ethical competence involving the possession of certain personal and professional values (European Commission, 2005 cited in Sultana, 2009:21)".

Newer approaches seem to view competence holistically and as a multi-dimensional construct. Sundberg (2001) posits a holistic approach to competence development and views competence through a pragmatic lens, which includes knowledge (learned in education); experience (gathered in the job, workplace or social life) and abilities (required to use one's knowledge and experience).

According to Sultana (2009:19), competence refers "to an overall job done well, as measured against a system of minimum standards, and as demonstrated by performance and outputs". In the European Qualifications Framework (EQF), competence is perceived as the most

advanced element in the framework and is defined as "the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development" (CEN, 2010:13).

The clarification of the term competence assists in the conceptualisation of e-competence. Different types of competences emanated from literature, which will be discussed briefly in the sub-sections that follow.

2.2.2.1 Cognitive, Behavioural, Functional and other competences

Outstanding performance in a work environment, according to Boyatzis (2008:7), requires i) expertise and experience; ii) knowledge (i.e. declarative, procedural, functional and metacognitive); and iii) an assortment of basic cognitive competencies, such as memory and deductive reasoning.

2.2.2.2 Emotional Intelligence (EI) Competence

Smith (2002) stresses the importance of Emotional Intelligence (EI[2]), and recommends that it should be taught to IS undergraduate students and formally evaluated. EI has 5 key components, which are to know oneself and one's emotions; to manage one's emotions; to motivate oneself; to recognise and understand others' emotions and to manage relationships. A brief breakdown is provided in Table 2.1 below. Daniel Goleman, who popularised the concept of EI, states that when he "calculated the ratio of technical skills, IQ, and emotional intelligence as ingredients of excellent performance, emotional intelligence proved to be twice as important as the others for jobs at all levels (Goleman, 2004:5). While these skills appear to be less relevant to business since they are referred to as "soft", Goleman has proven that direct links exist between EI, measurable business results and outstanding leadership performance (Goleman, 1998).

[2] Abbreviated as EI in Goleman (2004) and adopted as such in this document as well.

Table 2.1: Emotional Intelligence components defined by Goleman (2004:4)

EI component	Definition	Hallmarks
Self-awareness	the ability to recognize and understand your moods, emotions, and drives, as well as their effect on others	self-confidence realistic self-assessment self-deprecating sense of humour
Self-regulation	the ability to control or redirect disruptive impulses and moods the propensity to suspend judgment–to think before acting	trustworthiness and integrity comfort with ambiguity openness to change
Motivation	a passion to work for reasons that go beyond money or status a propensity to pursue goals with energy and persistence	strong drive to achieve optimism, even in the face of failure organizational commitment
Empathy	the ability to understand the emotional makeup of other people skill in treating people according to their emotional reactions	expertise in building and retaining talent cross-cultural sensitivity service to clients and customers
Social skill	proficiency in managing relationships and building networks an ability to find common ground and build rapport	effectiveness in leading change persuasiveness expertise in building and leading teams

2.2.2.3 Social Intelligence (SI) Competence

Social intelligence is defined as the "ability to connect to others in a deep and direct way, to sense and stimulate reactions and desired interactions" (Daviesm et al., 2011:8). Boyatzis (2008) explains that there are 3 clusters of competencies that differentiate average performance from outstanding performance and these 3 clusters are: Cognitive, Emotional and Social intelligence competencies. There competencies are seen as a behavioural approach to Cognitive, Emotional and Social intelligence, according to Boyatzis (2008:7).

2.2.2.4 Meta-competencies (MC)

Due to the rapidity of technological advancements and organisational dynamism, competences and competencies are not sufficient on their own. Contemporary work environments place greater emphasis on meta-competencies required to allow professionals to adapt to the uncertainties and challenges that will arise in the future (Winterton, 2001). Meta-competencies underpin the learning and application of all other competencies. Winterton et al. (2005) sees meta-competence as the knowledge of one's own intellectual

strengths and weaknesses, the application of skills and knowledge to various contexts and the acquisition of competences that one does not have. Meta-competencies include higher-order abilities such as developing self-knowledge and identity awareness; being adaptable and flexible; able to anticipate and create; being able to cope with uncertainty; learning to learn and continuous learning; the ability to assimilate new knowledge; creativity; mental agility; communication; analysis and problem solving; critical thinking and reflection; adaptability (Winterton, 2001; Winterton, Delamare-Le Deist & Stringfellow, 2005; Romani, 2009; Bezuidenhout, 2011). Rothwell & Lindholm (1999:104) indicate that due to the rapidly changing environmental conditions and a dynamic global marketplace, when reference is made to meta-competence, it often includes "knowledge competence, (which may be fixed) and learning competence (which may be changeable over time)", thus fostering an attitude for lifelong learning. In addition to learning and reflection, meta-competencies also involve the ability to cope with uncertainty and "(l)earning competence equates to the meta-competence 'learning how to learn'" (Winterton et al., 2005:36).

Table 2.2 below provides a grid of the types of competences categorised by the authors cited in the discussion above.

Table 2.2: Reference to different types of competence definitions

Competence	Boyatzis (2008)	Bloom	Ala-Mutka (2011)	Leat (1993)	Winterton et al (2005)	DeLamare et al (2005)	Sultana (2009)	Cheetham & Chivers (1998)
Cognitive competence	X	X	X	X	X	X	X	X
Functional competence					X	X	X	X
Emotional Intelligence	X		X					
Behavioural competence				X				X
Psychomotor (physical)		X						
Affective (feelings)		X		X				
Social competence	X					X		
Technical competence			X					
Meta-competences					X	X		X
Personal competences					X		X	X
Ethical competence							X	X

2.2.3 Defining Electronic Competence (e-Competence)

From the above conceptualisation of competence, it can be established that being competent means having appropriate knowledge, skills and the capability to be efficient in something.

Hence, digital competence is therefore having the appropriate knowledge, skills and capability to be efficient with digital processes and devices (Ala-Mutka, 2011). Ferrari, Punie and Redecker (2012:43) adds that digital competence is a

> set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment.

Since competence is generally seen as an extension of skill, it can be understood that e-competence is an extension of e-skills and since some literature refers to the two concepts as synonymous (Ferrari, 2012), digital competence, as defined above, is seen here as tantamount to e-competence. These are knowledge, skills and attitudes (KSA) that have been made critical by the pervasiveness and rapid evolution of ICTs.

The European e-Competence Framework defines e-competence as "a demonstrated ability to apply *knowledge, skills* and *attitudes* for achieving observable results" (CEN, 2013:5), with *knowledge* referring to a set of "know-whats", *skills* referring to "the ability to carry out managerial or technical tasks" and *attitudes* referring to the "cognitive and relational capacity" of the individual, for example analysis capacity, synthesis capacity, flexibility and pragmatism (Mitrovic, 2010:12).

Romani (2009:43) expands on the above definition by linking e-competences to digital technologies and defines e-competences as "a set of capabilities, skills and abilities to exploit tacit and explicit knowledge, enhanced by the utilisation of digital technologies and the strategic use of information". Simply stated, e-competences are the technical and managerial capabilities that organisations require in order to operate effectively and meet their objectives (Fonstad & Lanvin, 2009, 2010). This includes not only competences that are essential for ICT sector stakeholders but for the growing number of sectors that depend on ICT to operate (Fonstad & Lanvin, 2010) because e-competence is seen as a *transversal* competence that is required to enable the acquiring of other key competencies such as language and communication, mathematical ability, learning to learn, cultural awareness,

etcetera. (Ala-Mutka, 2011; Ferrari et al., 2012). E-competences are more than just knowing how to do something based on education or experience. It also focuses on how a skill is applied to a contextual situation, with many other contributing environmental, socio-economic, cognitive, functional, technical, personal, social, emotional and behavioural factors. E-competences are thus e-skills with a stronger emphasis on interpersonal and business application of knowledge (Lanvin & Fonstad, 2010) as well as intrapersonal competencies, which "includes notions of motivation, a vital ingredient in any conception of competence" (Leat, 1993:502).

Since a universal definition of the term 'e-competence' was not found and some use the term to refer to generic ICT skills, it is accepted that the meaning of the term depends on the context in which it is used, which could vary from basic ICT skills to advance professional competence (Ala-Mutka, 2011). However, an acceptable definition for e-competences is that, more than just referring to the use of ICT, e-competences appears to reflect the appropriate application of knowledge, the proficient use of data and information and the efficient use of technology, in various changing contexts, and displaying the correct dispositions and attitudes, whether that is individually or in a team, in order to achieve a desired outcome.

A number of underlying components related to the concept of e-competence have been identified in the literature, namely i) e-awareness; ii) technological literacy; iii) informational literacy; iv) digital literacy; v) media literacy; (Ala-Mutka, 2011; Romani, 2009), as well as vi) data literacy and e-Astuteness (Mitrovic, 2015). These concepts are defined in Table 2.3.

Table 2.3: Components of e-competences

Component	Description	Source
e-Awareness	Relates to the user's awareness of ICTs, their understanding of the information society and its implications as well as the appreciation of the relevance of ICT in the information society. It highlights the importance of lifelong learning and citizenship, taking into account legal and ethical aspects. It is the capability to use ICTs as a medium to facilitate individual or collective development of knowledge, skills and new capabilities in both social and professional life.	Ala-Mutka, 2011; Mitrovic, 2015; Romani, 2009
Technology literacy	Refers to the confident and critical use of electronic media, represented by the ability to interact with hardware and software, as well as trending and evolving	Lankshear & Knobel, 2008; Romani 2009

	applications and devices. Includes the efficient use of ICT tools for the storage and management of information and understanding potential risks.	
Information literacy	Refers to the ability to read with meaning, to understand critically and to evaluate, connect and integrate different information, data, knowledge and other sources in order to evaluate the reliability and quality of information and then make informed judgement about what is found.	Romani, 2009
Digital literacy	Refers to the proficiency of using ICT to identify information need, retrieve relevant information, manage and produce new knowledge, represent the information in ICT environments and then share, exchange and communicate the information in multiple formats, either textual or multimedia.	Romani, 2009
Media Literacy	Refers to understanding the new media landscape, understanding new formats, platforms and ways of communication and interaction and being able to produce meaning (construct reality) and understand the social, legal, economic and political implications.	Romani, 2009
Data literacy	Denotes competence in finding, manipulating, managing, and interpreting data, including reading graphs and charts, etc and to draw correct conclusions from data in order to inform decision making.	Mitrovic, 2015
e-Astuteness	Denotes the capacity to continuously appropriate ICT and apply the required e-skills into personal work, education, business, social and family contexts in order to develop personal and communal socio-economic development through the efficient use of ICT and information.	Mitrovic, 2015; Mitrovic et al., 2013

It is accepted that, in accordance with the European e-Competence Framework, e-competence requires a combination of *knowledge, skills* and *attitudes* (Ferrari, 2012). Each of these three factors will be discussed briefly in the following sub-sections.

2.2.3.1 Knowledge

As a key resource for the effective functioning of professionals in an information driven society, *knowledge* is the accumulation of facts, principles, theories and practices pertaining to a specific area of work or study from which meaning is derived through learning and the assimilation of information (Ala-Mutka, 2011; Bohlinger, 2008; CEN, 2010). It is a socially constructed outcome of the capacity (intelligence) and the opportunity (situation) to learn (Winterton, Delamare-Le Deist & Stringfellow, 2005), and is accordingly a source of competitive advantage not only to the organisation, but also on an individual level (Sudzina, Kirchner & Razmerita, 2009). Waghid (2002) posits that in the transformational SA, the

production of disciplinary knowledge (referred to as “Mode 1” knowledge) must be supplemented by socially distributed knowledge (referred to as “Mode 2” knowledge).

A distinction is made between basic life knowledge, which is essential to any and all occupational contexts; and knowledge that is only relevant to a particular sector or occupational context (Winterton, Delamare-Le Deist & Stringfellow, 2005). This distinction between theoretical and factual knowledge is also adopted by The European Qualifications Framework (EQF). In addition, appropriate work-related knowledge is outlined in Winterton (2001) to include:

- tacit/practical knowledge, including specific functional competences;
- technical/theoretical knowledge, representing the underlying principles and theories;
- procedural knowledge, involving the how, what and when of more routine tasks;
- contextual knowledge, background knowledge that is specific to the organization and sector in which the manager operates.

Winterton et al. (2005) also distinguish between declarative knowledge (knowing what) and procedural knowledge (knowing how) and “it is often argued that the acquisition of declarative knowledge (explicit factual knowledge) must precede the development of procedural knowledge, which relates to the utilization of knowledge in context.” (Winterton et al., 2005:9)

For e-competence, the required knowledge “includes the understanding of the functioning of main computer applications; of the risks of the internet and online communication; of the role of technologies in supporting creativity and innovation; of the validity and reliability of online information; of the legal and ethic principles behind the use of collaborative tools”(Ferrari et al. 2012:12).

It is befittingly and interestingly articulated that “[i]n agrarian and pre-agrarian times the centre of the community was its defence systems (fortresses, walled towns, etc.), in industrial age the centre of a community was its processing capacity (factories, etc.) and in the

information age the centre of a community needs to be based on innovation and applied knowledge production" (NeSPA, 2010:v).

2.2.3.2 Skill

The word skill is widely used as a focus for research, in policy interventions, as a unit of measure with economic implications and as a key indicator in the discussion on youth unemployment yet there appears to be "no consensus among social scientists about the meaning of the concept of 'skill'' (Green, 2011:4). Generally, skill is defined as i) the ability to use one's knowledge effectively and readily in execution or performance; ii) dexterity or coordination especially in the execution of learned physical tasks; and iii) a learned power of doing something competently: a developed aptitude or ability (Merriam-Webster Dictionary, 2015). A similar definition is offered by the Oxford Dictionary (2015) as i) the ability to do something well or expertise. Likewise, The Chambers Dictionary (2014) also refers to dexterity and expertness, but adds that skill could also be defined as i) a talent, craft or accomplishment, naturally acquired or developed through training; and ii) aptitudes and abilities appropriate for a specific job.

In a professional context, skill refers to the ability to *apply* knowledge and "know-how" (Ala-Mutka, 2011; Winterton et al., 2005) with accuracy and speed in order to complete particular tasks and solve problems (Bohlinger, 2008;CEN, 2010;Winterton, Delamare-Le Deist & Stringfellow, 2005;). The application of skill also results in "competent, expert, rapid and accurate performance" (Welford, 1986:12-13 cited in Winterton et al., 2005). In the context of the European Qualifications Framework skills are categorised as either cognitive or practical, where cognitive skills involve the use of logical, intuitive and creative thinking and practical skills involve manual dexterity and the use of methods, materials, tools and instruments.

A comprehensive analysis of the term *skill* in the social sciences discipline is offered by Green (2011) as he explores the various inter-disciplinary understandings of the concept of skill and their implications. He proposes the PES concept to define the term skill and posits that skill is a personal quality with three key features. The acronym stands for Productive (using skill is productive of value); Expandable (skills are enhanced by training and development); Social (skills are socially determined). López-Bassols (2002) distinguishes between a skill (the ability

to perform a task) and an occupation (work requiring a particular set of skills). As skills are not easy to measure, observable characteristics (or indicators) are captured using different proxies, for example educational attainment on the supply side and occupations on the demand side of the skills equation.

The skills needed for e-competence involves "the ability to manage information; the capacity to distinguish the virtual from the real world and to see the connections between these two domains; the ability to use Internet-based services and to use technologies to support critical thinking, creativity and innovation" (Ferrari, 2012:12). Since the context of this study examines the e-skills and e-competences related to the employability of IS graduates, it is perhaps also pertinent to note that Shah (2008) defines skill as the combination of characteristics that would make a person employable, which includes knowledge, know-how, attitudes and behaviours.

2.2.3.3 Attitude

The acquisition of competence in today's digital environment, requires that users of ICT have the correct mind-set to adapt to changes and new requirements demanded by constantly evolving technology. The appropriation of technology by users (in how they engage with and integrate technology into their social lives, as well as their beliefs and values about it) requires a particular *attitude* for applying knowledge and skills in different contexts and environments (Ferrari, 2012; Romani, 2009).

"Knowledge and technical usage skills of specific tools and media are required elements but need to be complemented with cognitive skills and *attitudes*, which should guide the individual activities" (Ala-Mutka, 2011:15). Attitudes, in relation to e-competence, refer to the way people think and their motivations for acting, and therefore attitudes shape people's activities in digital environments. Some of these attitudes are often considered integral to the application of skills, for example critical information skills (Ala-Mutka, 2011).

In the SA context, with a diversity of cultures in the contemporary workplace, knowledge (what we know) and skills (what we can do with what we know) are complemented by attitudes (*how* we do it or, what we can do with what we know) to create a suitable process in

order to reach a desired outcome (Pop & Barkhuizen, 2010). Personal assets, experiences, histories, beliefs, values, culture, views about global issues, etc. of graduates, have a profound impact on their eventual employability and success in the workplace (Garrido, Sullivan & Gordon, 2012). In addition to transferable employability skills, employers pay particular attention to positive attitudes and outlooks of applicants, such as motivation, tenacity and commitment (Lowden et al., 2011). These personal characteristics should be integrated into the curriculum so that e-Practitioners will have the opportunity to build these competencies (Chyung, Stepich & Cox, 2006). The attitudes essential for e-competence requires "that citizens are critical and reflective towards information, that they are responsible users and interested in engaging in online communities and networks" (Ferrari et al., 2012:12).

2.2.3.4 Working definition of e-competence for this study

For the purposes of this study, e-competence is defined as the ability to apply the relevant and adequate combination of knowledge (cognitive domain), skills (psychomotor domain) and attitudes (affective domain), in a particular context, for the effective utilisation and appropriation of information systems and technology, in order to achieve a quality output and observable results.

2.3 APPROACHES TO CLASSIFYING E-SKILLS AND E-COMPETENCES

Before the e-competences can be identified in the IS curriculum at University X, there needs to be a clear understanding of the categorisation of e-skills and e-competences used in the context of this study. This is because the effects of e-skills and e-competences are not common across all contexts and what is considered as basic skills in the developed world may be considered as sophisticated skills in many developing or transitioning countries (Walton et al., 2009). The e-competences required to perform effectively in certain professional ICT roles have been formalised into competence frameworks and models. These can provide granular details and guidelines to academics when designing curricula and to employers (HR) when defining job roles and recruitment requirements.

The following section starts by discussing the most basic models for categorising ICT skills (e-skills) to more complex and comprehensive frameworks for e-skills and e-competences for e-practitioners. A thorough perusal of the literature has pointed to a number of ICT skills frameworks, which ranged from classifying critical IS skill sets into *technology skills*, *business*

skills and *behavioural skills* (Lee, Trauth & Farwell, 1995) to classifying IS skills by usage levels like *Basic User*, *Advanced User* and *ICT specialist* (Blanco & Lopez Boo, 2010). However, only 11 frameworks and models pertinent to the aim of classifying e-competences (also referred to as digital competence in some frameworks) in the workplace and related to e-Practitioner skills were presented in this discussion. A brief description of the origin, function or purpose of each framework or model is provided below.

2.3.1 European e-Skills Forum classification of e-skills

The European e-Skills Forum (2004) established three classifications of e-skills which are ICT user skills, e-Practitioner skills and e-Business skills. These are defined as follows:

Table 2.4: Classification of e-skills (Source: European e-Skills Forum, 2004)

E-skills categories	Description
ICT user skills	These are the capabilities required for effective application of ICT systems and devices by the individual. ICT users apply systems as tools in support of their own work, which is, in most cases, not ICT. User skills cover the utilisation of common generic software tools and the use of specialised tools supporting business functions within industries other than the ICT industry
ICT practitioner skills (also called e-Professional skills)	These are the capabilities required for researching, developing and designing, managing, producing, consulting, marketing and selling, the integrating, installing and administrating, the maintaining, supporting and service of ICT systems
E-Business skills (also called e-Leadership skills [3])	These are the capabilities needed to exploit opportunities provided by ICT, notably the Internet, to ensure more efficient and effective performance of different types of organisations, to explore possibilities for new ways of conducting business and organisational processes, and to establish new businesses

The European e-Skills Forum also recognises the following "broad set of skills" as part of e-skills:

- Cross-disciplinary, cognitive and problem-solving skills as well as an understanding of the fundamentals of business and communication skills, including competence in foreign languages (Fonstad & Lanvin, 2010:10)
- Wider context of a core set of competences equipping all European citizens for the knowledge-based economy and society and lifelong learning (Fonstad & Lanvin, 2010:10)

[3] (Hüsing et al., 2013)

2.3.2 e-Skills Institute (e-SI) classification of e-skills

The Meraka e-Skills Institute in SA, mandated by the Department of Communications, to improve e-skills in SA through various initiatives, initially extended the European e-Skills Forum's above three e-skills classifications to include a fourth category, **e-Literacy skills**, which are defined as the capabilities needed to socially appropriate ICTs for local development (Wesso, 2008). This concept extends the digital literacy concept as defined by the European e-Skills Forum, namely that being digitally literate implies being able to search and retrieve information, to navigate and communicate on-line, to participate in digital and virtual communities (Wesso, 2008). Perceived as a key element to overcome social exclusion in the Information Society, e-literacy is seen as a prerequisite for and linked to acquiring the other types of e-skills (Mitrovic, 2010). At the first e-Skills Summit in 2010, however, it was realised that this taxonomy (referring to ICT user skills, ICT practitioner skills, e-Business skills and e-Literacy skills) is limiting in the SA context (Mitrovic, Taylor & Sharif, 2014). Based on the agreement that e-skills should encompass people's abilities to use and create all forms of ICT to improve opportunities in their personal and educational spaces, work environments, community interactions as well as to engage and contribute to governance processes (Department of Communications and the e-Skills Institute, 2010), a more extensive taxonomy was provided in NeSPA 2010, which adds **e-Participation** and **e-Democracy skills, e-Government skills** and **e-Community skills** to the existing categories described above.

Table 2.5: Classification of e-skills (NeSPA, 2010)

E-skills categories	Description
e-Literacy skills	aimed at employment readiness, particularly targeting unemployed and unskilled youth and rural society (including starting own small business
e-Participation and e-Democracy Skills	focusing on enhancing citizen interactive engagement with communities, local, provincial and national governance processes to increase participation, self-reliance and equity
e-Government /Governance Skills	focusing on increasing efficiency and productivity interactive bimodal approaches to service delivery of governments and its agencies across all ICT platforms including new cell phone technology, community radio, and the like
e-Business Skills	aimed at increasing organizational efficiency productivity
e-User Skills	focusing on enhancing efficiency of public and private sector knowledge workers
e-Practitioner Skills	aimed at enhancing capacity of public and private sector to manage, support and service ICT
e-Community Skills	aimed at increasing self-reliance, participation and community support in a socio-economic setting to build social cohesion in ways that can better build local solutions to societal matters such as crime, health, education and the like

2.3.3 Classification of professional ICT skills

Blanco and Lopez Boo (2010) classify e-Practitioner skills by end-user's level of competence with regards to ICT tools. The distinction here is between basic, advanced and specialist user skills. These distinctions are explained in Table 2.6 below.

Table 2.6: Classification of e-skills by usage (Source: Blanco & Lopez Boo, 2010)

e-Skills classification	Description
Basic user skills	These skills involve the competent usage of generic tools (Word processing, email, power point, etc.)
Advanced user skills	These skills involve the competent usage of advanced and sector specific software tools
ICT specialist skills	These skills involve the ability to develop, operate and maintain ICT systems

López-Bassols (2002:21) similarly classify e-skills by the function that is performed by the user and distinguishes between *Basic IT literacy skills* (being able to use basic ICT tools for basic tasks and learning), *Applied IT skills* (being able to apply general ICT tools in non-ICT workplaces) and *Professional IT skills* (being able to use, develop, repair or create advanced IT tools). They further classify three main types of *Professional ICT skills*, which IT firms usually require a combination of (López-Bassols, 2002:21). These are technical, business management and personal skills.

Table 2.7: Classification of Professional ICT skills (Source: López-Bassols, 2002)

e-skills classification	Description
Technical skills	which are primarily IT skills, but also quantitative analysis/data modelling, digital media, technical writing, etc.
Business/management skills	in particular marketing, strategy and business writing
Personal skills	communication, leadership, teamwork, problem-solving ability

General skills, such as those used by ICT end-users (for example, word-processing and emailing, keyboard skills) also qualify as scarce skills, in addition to high level and specialised ICT skills, according to Akoojee, Arends and Roodt (2007). They categorise ICT skills by the type of occupation the user fills, which will require either lower level skills, intermediate level skills or high level skills.

2.3.4 ICT technical and non-technical skills framework

Maneschijn, Botha and Van Biljon (2013) contribute to the above frameworks by further classifying ICT skills into two distinct categories, namely 1) Technical computer-based ICT

skills, and 2) Non-Technical computer-based ICT skills. This is illustrated in Figure 2.1 and Figure 2.2 respectively. Technical computer-based ICT skills include all the capabilities that involve the usage of digital ICT skills to organise, present or share information. These skills are categorised into 5 subcategories, which are *Basic skills* (to complete general tasks like those pertaining to operating systems and hardware), *Productivity packages*, *Internet skills*, *Digital media skills* and *Specialisation skills*.

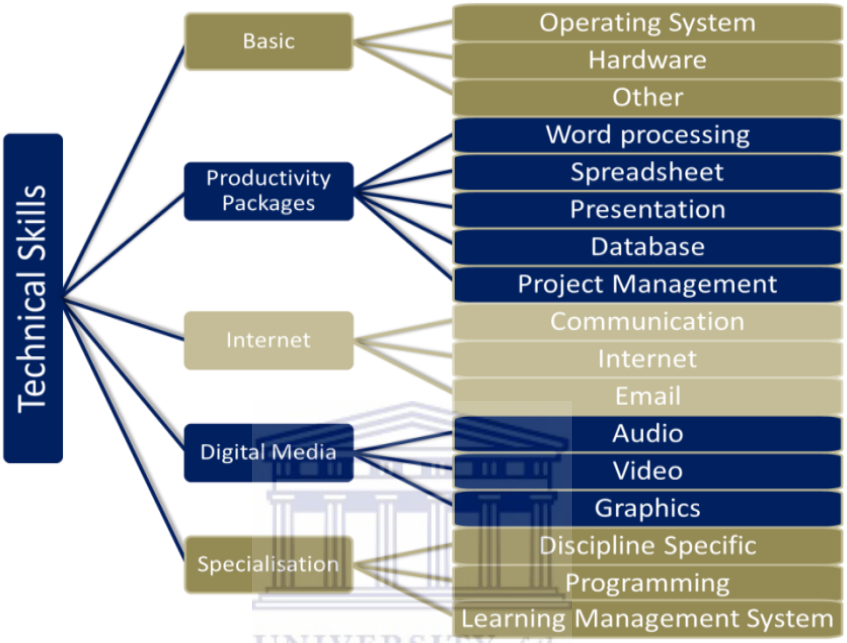

Figure 2.1: Classification of technical e- skills (Source: Maneschijn et al. 2013)

Maneschijn et al. (2013) further suggest the clustering of what they term "non-technical" skills, which pertain to those skills that require the usage of computers to solve problems and address social and organisational matters in an effective, productive and responsible manner. These non-technical skills are divided into problem solving skills, critical thinking, information handling, ICT planning as well as social responsibility. While Maneschijn et al. (2013) point out the importance of *security*, they found no evidence for it in their literature.

Figure 2.2: Classification of non-technical e-skills (Source: Maneschijn et al., 2013)

2.3.5 EuroCIO's e-competence matrix (e-CM)

Developed by the European organisation of Chief Information Officers, this model, presented in Table 2.8, defines seven main strategic capability areas that are important for any organization that relies on ICT to achieve its business objectives (Fonstad & Lanvin 2010:27). While these are not directly related to the individual competences that graduates are expected to have, it provides a snapshot into the e-competence areas that companies require in to compete and is therefore relevant to IS graduates who will be working in these functional areas.

Table 2.8: EuroCIO e-competence matrix (Source: Fonstad & Lanvin, 2010)

Capabilities	Description
1.	**Strategy and Innovation:** Translate or drive business strategy to IT strategic plans with the following activities: function and service improvements, business process improvement, business innovation, and afterwards, determine technical direction.
2.	**Enterprise Architecture:** Define and maintain the information & enterprise architecture, including process, information, applications, and infrastructure.
3.	**Demand Management:** Identify business and automated solutions. Maintain IT portfolio. Define and manage service levels.
4.	**Global Sourcing Management**: Define and maintain sourcing strategy. Manage suppliers and supplier performance. Procure IT resources: people, software, hardware, and licenses.
5.	**Project Delivery:** Specify, build, test and deploy business and IT solutions. Manage change. Educate end-users. Manage projects.
6.	**IT Support and Execution (IT Infrastructure Services):** Manage service delivery management. Manage operations. Control Master Data.
7.	**Quality, Risk and Compliance:** Define IT process, organization and relationships. IT administration. Provide IT Governance. Monitor and control IT performance, internal control and regulatory compliance. Assess and manage IT risks. Manage quality.

2.3.6 INSEAD eLab Skills Pyramid for e-competence

Collaboration between the World Economic Forum and INSEAD e-Lab revealed data that support a strong correlation between global competitiveness and a strong set of e-skills. (Lanvin & Fonstad, 2009). This led to the development of the skills pyramid with three levels (tiers) that correlate to competitiveness, namely literacy and basic skills; occupational skills; and global knowledge-economy (GKE) skills. This skills pyramid is meant to help the European government and business leaders identify the skills gap (Lanvin & Fonstad, 2009). The Skills Pyramid has been mapped to the EuroCIO e-competence matrix (e-CM) in order to illustrate the high impact areas for e-competence curricula development (See Lanvin & Fonstad 2010:9). These e-skills are classified further in Table 2.9.

Table 2.9: Classification of e-skills by INSEAD eLab (Lanvin & Fonstad, 2009; 2010)

e-skills classification	Description
Literacy and basic skills	The first (base) tier of the Skills Pyramid includes the fundamental skills and knowledge that an individual needs to live in modern European societies. They include not only the traditional literacies (writing and counting) but, increasingly, IT literacy
Occupational skills	The second (middle) tier refers to the knowledge and capacities which must be acquired to qualify for specific jobs. Much of such skills can be generated through formal education (e.g. by engineering schools, law schools or universities). However, an increasing part of those skills are acquired 'on the job'.
Global knowledge economy talents	The third (top) tier includes the more subtle - and less easily quantified – skills required to lead and manage multi-cultural teams, to work in virtual teams, and to address, anticipate and steer change. Those skills are critical for innovation, and addressing new challenges and issues.

2.3.7 ICTs for learning framework

In contrast to categorising skills per functional level, Claro et al. (2012:1042) defines ICT literacy as "the capacity to solve problems of information, communication and knowledge in digital environments". In their view, defining ICT skills is shifting from being functionally orientated, which could be viewed as more restrictive, towards a broader definition that considers ICT skills significant for participating productively in all areas of "contemporary social life" (Claro et al. 2012:1043). This framework divides ICT skills into three categories, namely information fluency, effective communication, and ethics and social impact. Each category is then further sub-categorised as illustrated in Figure 2.3.

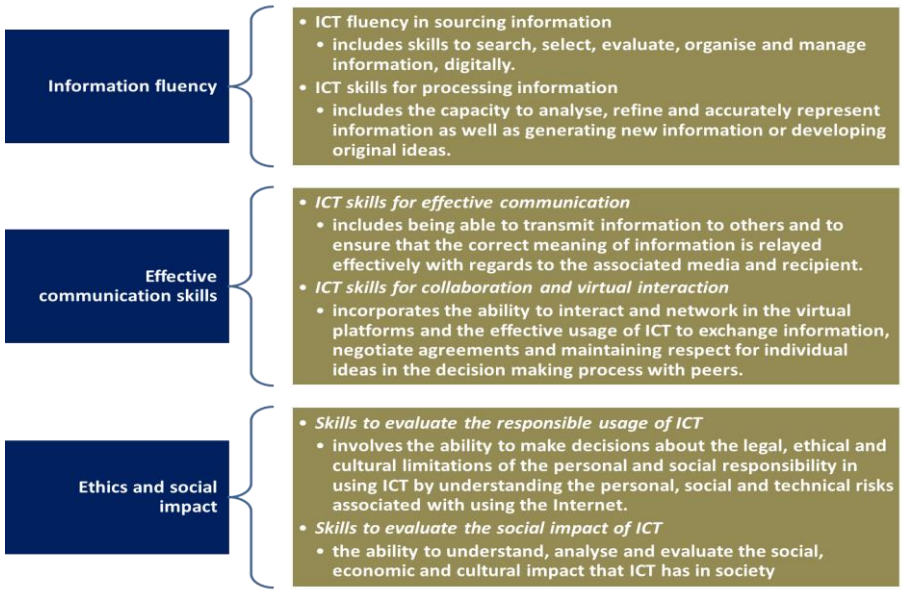

Figure 2.3: ICT skills for learning framework (Source: Claro et al., 2012)

Information fluency involves the ability to search, select, process, evaluate and organise information in today's digital society and then to further create new knowledge by transforming information or by sourcing information for new ideas.

Effective communication is important for students to engage and interact with communities, in order to make a meaningful contribution. It is therefore important that these social skills be considered to enhance students' skills for personal expression.

Ethics and social impact is significant when ICT delivers information that allows students to contemplate on their role and responsibility toward other individuals in society and their place in a changing digital world. The skills that Claro et al., (2012) describe here would contribute to the general citizenship and a foundation to the general ethical consciousness of students , which they will face through specific ethical dilemmas generated by ICT usage in a knowledge society, such as security issues. The study supports the view that the broad spectrum of abilities needed in contemporary society should drive the impact that ICT has on human abilities.

2.3.8 DIGCOMP: Digital Competence Framework

Ferrari, Punie & Brečko (2013) provides an insightful framework, similar to the structure of the European e-Competence Framework. The DIGCOMP produced two outputs. The first is a self-assessment grid that proposes 5 competence areas with descriptors for three proficiency levels. The 5 competence areas are Information, Communication, Content-creation, Safety and Problem-solving.

Table 2.10: Digital competence framework (Source: Ferrari, Punie, & Redecker, 2012)

Competence Area	Description
Information Management	the knowledge, skills and attitudes needed to identify, locate, access, retrieve, store and organise information
Collaboration	the knowledge, skills and attitudes for linking with other users, participate in networks and online communities, and interact with others constructively and with a sense of responsibility
Communication and sharing	the knowledge, skills and attitudes for communicating through online tools, taking into account privacy, safety and netiquette.
Creation of content and knowledge	the expression of creativity and the construction of new knowledge through technology and media, and also to the integration and re-elaboration of previous knowledge and content and its dissemination through online means.

Ethics and responsibility	is understood as the knowledge, skills and attitudes needed to behave in an ethical and responsible way, aware of legal frames
Evaluation and problem-solving	is understood in more than one case study as the identification of the right technology and or media to solve the identified problem or to complete a task and also as the assessment of information retrieved or the media product consulted
Technical operations	is the area that refers to the knowledge, skills and attitudes one needs for effective, efficient, safe and correct use of technology and media.

The second output is a more detailed framework, with 5 dimensions. The first Dimension contains the 5 competence areas. Dimension 2 lists the 21 specific competencies that are pertinent for each area. Dimension 3 indicates descriptors for 3 proficiency levels. Dimension 4 provides examples of knowledge, skills and attitudes for each of the competencies. Lastly, Dimension 5 provides examples of applicability of the competencies for different purposes. This framework is insightful, however, not exhaustive or extensive enough for use as a measure in this study.

Table 2.11: DIGCOMP: Digital Competence Framework (Ferrari, Punie & Brečko, 2013)

Dimension 1	Dimension 2
Competence areas	**Competences**
1. Information	1.1 Browsing, searching and filtering information
	1.2 Evaluating information
	1.3 Storing and retrieving information
2. Communication	2.1 Interacting through technologies
	2.2 Sharing information and content
	2.3 Engaging in online citizenship
	2.4 Collaborating through digital channels
	2.5 Netiquette
	2.6 Managing digital identity
3. Content creation	3.1 Developing content
	3.2 Integrating and re-elaborating
	3.3 Copyright and licences
	3.4 Programming
4. Safety	4.1 Protecting devices
	4.2 Protecting personal data
	4.3 Protecting health
	4.4 Protecting the environment
5. Problem solving	5.1 Solving technical problems
	5.2 Identifying needs and technological responses
	5.3 Innovating and creatively using technology
	5.4 Identifying digital competence gaps

2.3.9 European e-Competence Framework (e-CF)

First published in 2008 and now on version 3.0, the e-CF is the outcome of the CEN/ISSS Workgroup on ICT skills, which is a multi-stakeholder collaboration between industry, academia and government in Europe. Among the stakeholders who helped to develop the e-CF where members from AITTS, CIGREF and SFIA frameworks (discussed below). The e-CF was developed to establish a common understanding of e-competences required in Europe, to promote better e-skills among users and to support the inclusion of e-skills for employability (Fonstad & Lanvin, 2010). The e-CF has four dimensions that reflect different levels of business and HR planning requirements as well as ICT job proficiency guidelines. These are explained in Table 2.12.

Table 2.12: Dimensions of the e-CF (Source: European e-Competence Framework 3.0)

Dimension 1	uses 5 e-competence areas, derived from the ICT business processes to group the e-competences. These are PLAN – BUILD – RUN – ENABLE – MANAGE
Dimension 2	presents a set of reference e-competencies for each area, providing a generic description for each competence. There are 40 e-competencies identified in total that make up the European generic reference definitions of the e-CF 3.0
Dimension 3	provides proficiency levels of each e-competence, which provide European reference level specifications on e-competence levels e-1 to e-5, also related to the EQF levels 3 to 8.
Dimension 4	provides samples of knowledge and skills related to the e-competencies in dimension 2. They are provided to add value and context and are not intended to be exhaustive. Attitude is, however, embedded in all three dimensions (2, 3 and 4)

While this framework lacks the competences related to ICT research (Mitrovic, 2010) and is also too basic for those interested in pursuing more sophisticated and specialised ICT training or academic pathways in computer science (Babinet et al., 2014), it serves as a useful tool to identify the competences that entry level graduates have (dimension 2) and to match them to suitable business processes (dimension 1). The e-CF differentiates between the basic competences and those that refer to a greater cognitive domain and further suggests that different levels of competency can be reached (Ferrari, 2012).

2.3.10 Skills Framework for the Information Age (SFIA)

The British Computer Society, e-Skills UK (the Sector Skills Council for ICT), the Institution of Electrical Engineers and the Institute for the Management of Information Systems, formed the SFIA Foundation to develop the Skills Framework for the Information Age (SFIA) (Winterton, Delamare-Le Deist & Stringfellow, 2005). First published in 2003 in the UK and

currently disseminating version 6.0, the SFIA framework is a two dimensional matrix that represents the most clear and widely used descriptions of professional ICT skills on the one axis and seven levels of attainment/responsibility on the other axis. It is a practical resource for e-Practitioners who work or manage in Information Systems-related roles (SFIA Foundation, 2015). The framework holds the view that each professional skill is accompanied by behavioural skills and knowledge, which is validated by the practitioner's experience and qualifications.

The SFIA framework is comprehensive with generic definitions for each e-skill and descriptors for each proficiency level related to each e-skill, which makes it very complex and saturated with detail. SFIA provides descriptions of each e-Practitioner skill, at various levels of proficiency (from new entrant to strategist i.e. level 1 to 7), viewed in terms of autonomy, influence, complexity and business skills. This granular level of detail makes it suitable for career development because it provides a common language that can be used for Job Descriptions (JD) and it creates transparency within the organisation because practitioners can map their own career goals and progress and there will be no discrepancy as to the requirements for horizontal or vertical movement within job functions, which ultimately leads to individual motivation. This level of detail is also beneficial to curriculum designers and academics that could use the framework to empower students with career planning skills and goal setting.

On the vertical axis, it provides a list of 97 e-Practitioner skills, which are grouped into six categories (Table 6.9) for convenience. These six categories are then further divided into sub-categories pertinent to the different work areas or areas of personal work responsibility. These categories and subcategories provide a navigation aid, for convenience and ease of use for the user. Each e-skill is provided with an overall definition , which is presented within its category and subcategory and each definition consists of a skill code, skill name, overall description (broad definition of the skill) and lastly level descriptors (definitions of the skill at each of the proficiency levels). The phrasing of the definitions of the skills at the levels renders it as competences.

Table 2.13: SFIA Categories

SFIA categories
Strategy and Architecture
Change and Transformation
Development and Implementation
Delivery and Operation
Skills and Quality
Relationships and Engagement

Table 2.14: SFIA Levels

SFIA levels	
7	Set strategy/inspire/mobilise
6	Initiate/influence
5	Ensure/advise
4	Enable
3	Apply
2	Assist
1	Follow

On the horizontal axis, definitions for 7 different levels of attainment or proficiency are provided, from entry level to strategist level (Table 6.10), for each e-skill. Each of the 7 levels has its own generic definition, expressed in terms of four headings, namely *Autonomy, Influence, Complexity and Business skills*. The flexibility of the framework and its adaptability to difference contexts is its biggest strength. However, the same characteristics (the generic nature of the skill definitions and the extensive number of skills included) also make this framework very challenging to present to employers since it is viewed as too complex. A discussion of the strengths and limitation of the selected frameworks (SFIA and e-CF) is provided in Section 3.5.1 alongside the rationale for the design of a new suggested conceptual framework of e-competences for this study, which is presented in Section 3.5.2.

2.3.11 Conceptual model of digital competence

Ala-Mutka (2011) provides a conceptual model of knowledge, skills and attitudes and uses the idea of building blocks to illustrate the progressive nature of learning skills and acquiring knowledge. Skills and knowledge are grouped in this model in the view that skills are about applying knowledge. Attitudes, which are the ways of thinking that leads the application of knowledge, is provided as well (Ala-Mutka, 2011).

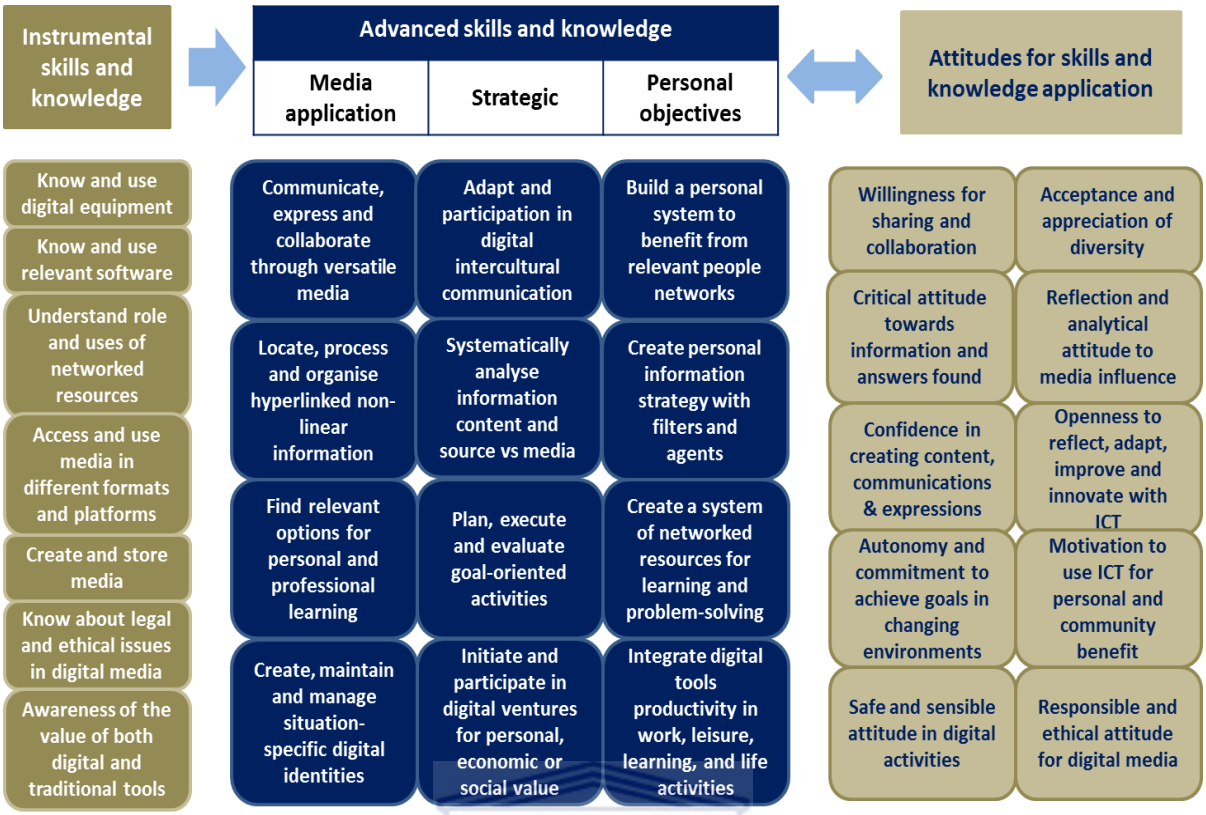

Figure 2.4: Conceptual model of digital competence (Source: Ala-Mutka, 2011)

The conceptual model, reproduced in Figure 2.4, presented clarity in terms of the attitudes required to accompany key ICT competencies. However, it was also found to be limiting and too specific, given the rapid transitioning and evolution of ICT and the subsequent need for adaptive and transferable skills. This model omitted a number of e-skills mentioned in broader frameworks, such as SFIA.

2.4 IMPORTANCE OF e-SKILLS AND e-COMPETENCES IN SOUTH AFRICA

2.4.1 A competitive knowledge economy

The pervasiveness of ICT in every sphere of the economy cannot be denied (Dutta, Geiger & Lanvin, 2015), hence global competition is increasingly driven by knowledge and innovation (Babinet et al., 2014). This is acknowledged in SA's National Development Plan for 2030 and the National e-Skills Plan of Action (NeSPA). ICTs are not only able to "provide developing nations with an unprecedented opportunity to meet vital development goals" (Blanco & Lopez Boo, 2010:2). Moreover, the usage of ICT also modifies the scope, borders and content of learning, which is why many European universities changed their pedagogical concepts to

efficiently integrate ICT into their curricula (Youssef, Dahmani & Omrani, 2012). E-skills and e-competencies are thus crucial for competitiveness, productivity, innovation, professionalism and employability (Tapscott, 2012). Yet the availability of skilled ICT workers or "e-workers" are sorely failing to meet intensifying global demand (Hawking & Stein, 2003; Babinet et al., 2014). Notably, the probability of high e-skills levels is positively influenced by the completion of secondary and specifically tertiary education, which is seen as the best indicator of e-skills (Hagan, 2004; Schmidt & Stork, 2008).

Lanvin (2008:3) articulates that "[w]hether or not e-skills are available in sufficient numbers and quality will determine how countries succeed or fail as knowledge societies", because possessing e-skills allows people to participate more effectively in the global information economy and society (Schmidt & Stork, 2008).

To this end, the Media, Information and Communication Technologies (MICT) Sector Education and Training Authority (SETA) has released a priority skills list (MICT, 2015). This is a result of an annual data gathering process of accumulating information about occupations that employers find difficulty in recruiting qualified people for (scarce skills) and a list of the top ten scarce skills per sub-sector identified by employers and confirmed by research, according to the MICT SETA, is produced. A number of ICT professions (those specialising in e-skills and e-competences) were listed as priority skills areas in each of the sub-sectors, that is, Advertising, Film and Electronic Media, Electronics, Information Technology and Telecommunications. This further affirms that a greater concentration needs to be afforded to the development of these e-skills and e-competences if SA is to alleviate these gaps.

In order to strategically enhance e-skills and e-competences, Lanvin and Passman (2008) posit the concept of the "ICE triangle", which represents the three independent objectives (Innovation, Competitiveness and Employability) that businesses and governments should pursue. They point out that ICT and e-skills play a critical role in developing the last of these objectives, employability, since, firstly, e-skills becomes a requirement not only for graduates to enter the workplace, but also for them to benefit from upward and horizontal mobility once they become employed; and secondly, "e-inclusion" can be used to build higher levels of competitiveness whilst fighting inequalities (Lanvin & Passman, 2008). There is urgency for

HEI, employers and other stakeholders to engage in dialogue about e-skills and e-competence requirements because as graduates enter the workplace, "they are more likely to resemble headless chickens than knowledge workers if the competencies associated with their roles are ill defined" (McCormack, 2010:53). Thus, it is imperative to realise that the value of the workforce is directly proportional to their level of e-competences (Romani, 2009).

2.4.2 Mismatch between skills demanded and supplied

Literature shows that there is a discrepancy between the e-skills and e-competencies expected by potential employers and those that graduates are perceived to have (De Beer, 2010; Scholtz, Cilliers & Calitz, 2010; Frinking et al., 2005; Tech Partnership, 2015; Trauth, Farwell & Lee, 1993;) and this has become an integral part of the graduate unemployment problem (Pauw et al., 2008). Referred to as the skills gap or mismatch, this discrepancy is one of the main causes of youth unemployment. Consequently, it is important for SA and HEIs to firstly understand what is causing the mismatch and secondly, to devise mechanisms to address the problem. The skills gap and its causes are discussed in more detail in Section 3.2.

2.4.3 Employability and e-competence in a contemporary workplace

From a graduate's perspective, employability is an indicator of the potential to self-sufficiently navigate the labour market in order to achieve sustainability in employment and career growth (Andrews & Higson, 2010; Corrall, 2005; Thijssen, Van der Heijden & Rocco, 2008; Yorke & Knight, 2004). For an employer, employability is an indicator of how well supply matches the demand of e-competences and for the economy employability has a direct reflection on the employment rate of the country (Thijssen, Van der Heijden & Rocco, 2008). Employability is a multidimensional concept that requires an individual to survive in the internal or external labour market and to contribute to the overall productivity of the economy. This, through factors like learning, flexibility, cognitive and physical suitability, adaptation and mobility, inter alia (Cranmer, 2006; Thijssen, Van der Heijden & Rocco, 2008; West & Garrido, 2008; Coetzee & Esterhuizen, 2010).

Globalisation and rapid technological advancements have precipitated a new working environment that requires high-performance and innovation (Overtoom, 2000). Thus, for e-practitioners to be able to really add value, they need 'practical intelligence' in addition to technical competencies and academic intelligence (Yorke & Knight, 2004:2). The

contemporary workplace necessitates the ability to effectively handle the dynamics of the environment and therefore, requires a broad range of skills and competencies (Cleary et al., 2007).

Having employability skills (also called transferable, generic or essential skills) should enable graduates to effectively apply their discipline-specific knowledge and technical skills, including co- and extra-curricular achievements, to the workplace (Bridgstock, 2009; Lowden et al., 2011; Yorke & Knight, 2004;). A range of transferable competencies, often regarded as "soft" skills, because they have an interpersonal orientation, are required. These transferable competencies include communication skills, team work, collaboration, critical thinking, decision making and general social skills, inter alia (Garrido, Sullivan & Gordon, 2012). Graduates who demonstrate this highly competent blend of technical and interpersonal skills are recognised as having a competitive edge that attract employers (Overtoom, 2000).

These employability skills "represent essential functional and enabling knowledge, skills and attitudes [KSA] required by the 21st century workplace" (Overtoom, 2000:2). A combination of KSA denotes e-competence, thus in order for graduates to be employable, they need to have e-competence, in order to contribute and derive benefit on a micro, meso or macro level, in a globalised knowledge economy. Therefore, an increase in e-skills and e-competencies will raise the degree of employability of a graduate and thus inevitably raise the value of the workforce (Romani, 2009). The concept of employability is therefore significant to discuss in this study because it sheds light on the lens through which employers view the quality of graduate applications and the relevant mix of KSC that employers associate with being employable (Lowden et al., 2011; Shah, 2008; Singh & Singh, 2008).

In summary, Griesel and Parker (2009) point out that over the past twenty years employability has become a more nuanced and complex subject matter and in order to accurately articulate competence requirements, a holistic approach is required. Recent approaches, which are more cognitively grounded, focus on capabilities and dispositions of graduates as well as their ability to continuously learn in the workplace (Griesel & Parker, 2009).

2.4.4 Employability, e-competence and tertiary education

The question can be asked, why do universities even need to be concerned about the factors that affect employability? The traditional view is that universities prepare students with a long term academic focus. Universities create and disseminate knowledge but the ability of an academic institution to ensure immediate employability of its students has become an indicator of institutional *quality* as well as a marketing tool (Maharasoa & Hay, 2001).

> "Employability does not sit comfortably in a discrete module or unit standard; rather it is another perspective on the fitness of purpose of the curriculum. This suggests that improving graduate employability is an important aspect of quality development" (Griesel & Parker 2009:17).

Furthermore, it seems that both public and private sector employers in SA expect HEIs to ensure "that the majority of graduates are employable in a new sense", with the correct mix of high level skills and tacit knowledge needed for immediate employment (Council on Higher Education 2003:84). Furthermore, the new contemporary and culturally aware workplace requires graduates to be increasingly more adaptable. Andrews and Higson (2010:411) emphasise that "[u]niversities across the globe are increasingly required to produce highly skilled graduates who are able to respond to the ever changing and complex needs of the contemporary workplace".

As organisations reshape themselves to adapt to the many global pressures surrounding competitive markets, there has been a shift away from traditional careers towards 'boundaryless' and 'protean' careers (Bell, Lee & Yeung, 2006; Bezuidenhout, 2011; De Grip, van Loo & Sanders, 2004; Rothwell & Lindholm, 1999; Thijssen et al., 2008). A boundaryless career transcends the boundaries of an occupation, organisation or discipline. This contemporary career model is characterized by less predictable responsibilities. The underlying flexibility of a protean career expects that employees should adapt to change and acquire new skills and competencies as the need arises (Rothwell & Lindholm, 1999; de Grip, van Loo & Sanders, 2004; Bell, Lee & Yeung, 2006; Thijssen, Van der Heijden & Rocco, 2008; Bezuidenhout, 2011). As more organisations transform to virtual offices, the need increases for boundaryless careers and for employees who have the flexibility to adapt (Athey & Orth,

1999; Bezuidenhout, 2011). With this increasing flexibility, graduate employability skills and meta-competencies of self-directedness, autonomy, adaptability, identity awareness and lifelong learning become even more important (Castells, 2004; Bridgstock, 2009; Bezuidenhout, 2011).

It is therefore the responsibility of universities, as a primary source of discharging e-skilled and e-competent employees in a developing knowledge economy, to ensure that graduates are equipped with the most relevant and current employability skills, which should include discipline specific as well as generic transferable skills.

Driven by expectations of government, industry and other stakeholders, the role of higher education institutions in preparing students for the working world has shifted from merely preparing graduates for employment, to a role more concentrated on developing *employability* and graduate attributes expected by employers (Knight & Yorke, 2003; Griesel & Parker, 2009). Earlier debates on the matter of employability have suggested that higher education should at least prepare graduates to better fulfil their role within society, and more recent discussions hold the opinion that every academic course should include employability enhancing content (Cranmer, 2006).

The networked economy and the rapid evolution of technology have precipitated the need for work-based learning, adaptive training and the replacement of supply-driven education with demand-driven competence-based models (Delamare Le Deist & Winterton, 2005). There is a new requirement for universities to shift towards becoming *eUniversities*, which integrates ICT in all university activities, including the ones related to the outside knowledge intensive organizations (Nikolov, 2009a). It is suggested that the concept of an evolved higher education institution, *University 2.0,* should be embraced, by integrating Web 2.0 and Enterprise 2.0 technologies in all university activities, which would also enhance relationships with corporate institutions (Nikolov, 2009b).

The level of tertiary education is also argued to be one of the key factors in employability (Van der Berg & Van Broekhuizen, 2012; Griesel & Parker, 2009; Hernández-March et al., 2009; Maharasoa & Hay, 2001). Universities have therefore tried to adapt by developing and fostering generic graduate attributes, which are expected to enable graduates to be appealing

to a variety of employers across different disciplines and work contexts (Bridgstock, 2009). Bridgstock (2009) writes that graduate attributes can be seen as those characteristics that a university intends for its graduates to develop during their study at the institution and that will contribute to their fulfilment as a professional and citizen. While these graduate attributes are expected to be aligned to all academic course outcomes and teaching and learning methods, it however, does not serve as a true measure of a graduate's employability. Pool and Sewell (2007) point out that it is not sufficient to determine employability by looking at whether graduates found employment after graduation. It is more important to determine whether the graduates are using the graduate attributes in their careers afters graduation. Essentially, it should be understood that "[e]mployability is not the same as employment, just as education is not the same as training" (Cox & King, 2006:263).

Pool and Sewell (2007) have devised a model that depicts components regarded as essential to a graduate's employability. These components are career development learning, work and life experience, degree subject knowledge and skills, generic skills and emotional intelligence. They advise that providing students with the tools to access and develop these components during their academic studies, will lead to higher levels of self-efficacy, self-esteem and self-confidence in graduates, that are crucial to enhanced employability (Pool and Sewell, 2007).

However, Bridgstock (2009) goes further and argues that if the goal is enhanced graduate outcomes and sustained employability then even generic skills development is insufficient. The rapidly changing information and knowledge-intensive economy requires universities to promote career management competence in students. Hence, "for optimal economic and social outcomes, graduates must be able to proactively navigate the world of work and self-manage the career building process" (Bridgstock, 2009:31). Bridgstock's model of graduate attributes for employability is illustrated in Figure 2.5, below.

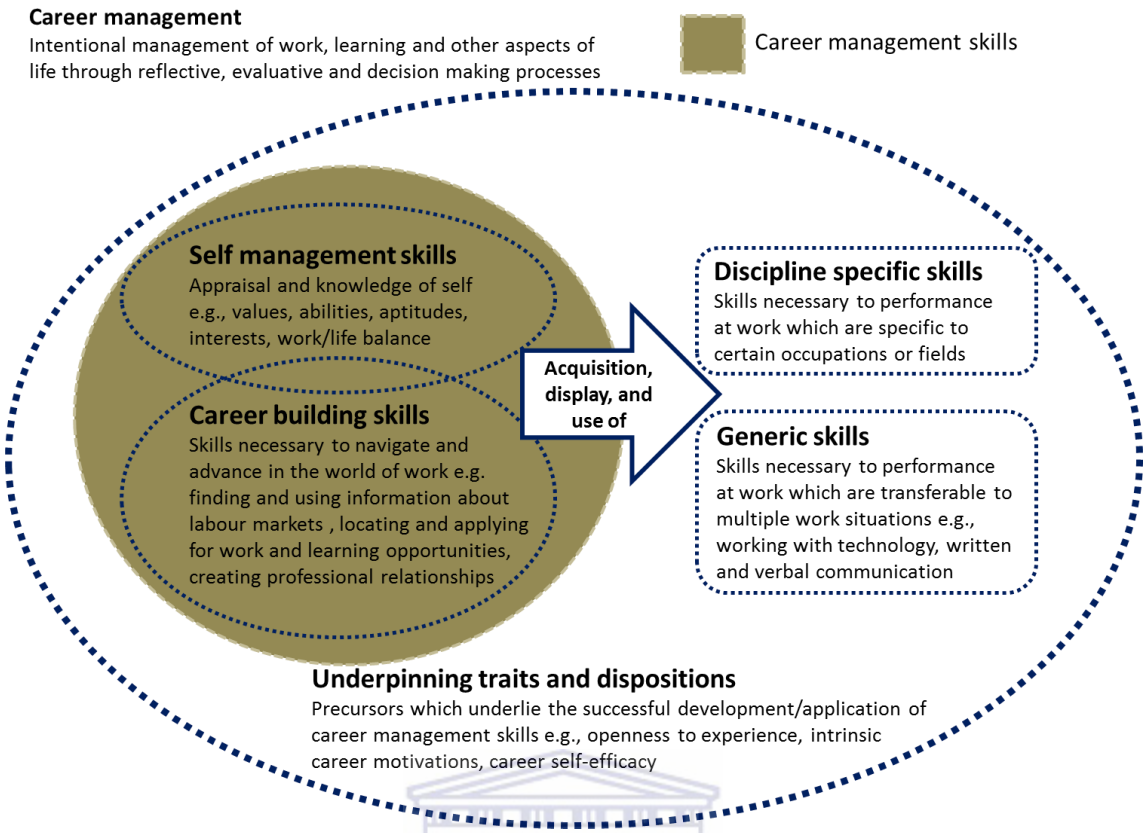

Figure 2.5: Model of graduate attributes for employability (Source: Bridgstock, 2009)

It is important to note that this study is interested in the definition of employability in order to find answers to the research question, that is, which specific criteria and e-competences employers consider as important when recruiting and hiring graduates. As such, the purpose of this study is not to attempt to measure the employability of the IS graduates at University X because of the complexity of the many factors involved in measuring employability.

2.4.5 The changing role of universities in a globalised era

In today's global knowledge-driven society, the provision of *quality* education is considered to be essential to the economic prosperity and social welfare of a country (Hernández-March, Martín del Peso & Leguey, 2009). For South Africa to achieve equity, development, justice and democracy, HEIs need to become powerhouses of knowledge production, dissemination and diffusion in order to cultivate critical thinking in the new generations (Badat, Singh & Jonathan, 2001). Chambers (2010:11) points out four main purposes of universities: 1) to produce and disseminate knowledge in order to develop our understanding of the natural and social worlds around us; 2) to enable cognitive competence in students; 3) to be committed to

truth finding by encouraging intellectual inquiry and 4) to effectively produce and disseminate knowledge.

On the other hand, universities appear to be remarkably "inefficient and ineffective in the way that they leverage their own information resources to advance that core activity" (Nikolov, 2003:5). Since the knowledge economy is based on the large scale production and exchange of new knowledge, using ICT (Nikolov, 2003) and universities are the centre and foundation of knowledge production, it seems logical that universities, along with other HEIs would be at the forefront of the evolution of the knowledge economy and information society.

This traditional role of higher education is rapidly changing. Peter Drucker, who in the 1950s coined the term "knowledge worker" (Drucker, 1999), stated that change within universities are inevitable. He predicted that the future of universities in its traditional setup will become obsolete (Lenzner & Johnson, 1997). Similarly, the role of the university has been challenged in Maharasoa and Hay (2001:140), suggesting that universities have outlived their purpose; that universities will not survive the acid test that the free market will soon impose on them and furthermore, that universities are factories where prices are high, efficiencies low and outcomes are questionable.

It is perceived that universities, unlike colleges, concentrate mainly on teaching students the theoretical aspects of the subject matter with very little, if any, practical experience involved (Hernández-March, Martín del Peso & Leguey, 2009). While graduates are seen to have very strong technical skills, these skills appear to be focused and typically only in one area, inferring that graduates are perhaps not as versatile and flexible as expected, since universities often do not adapt to reflect business needs (Alger et al., 2001). Some employers therefore perceive that HEIs are not performing well enough at equipping graduates with relevant ICT skills (Kolding & Kroa, 2007).

López-Bassols (2002) indicates that while HEIs were viewed as the main source of ICT skilled professionals in the past, recent developments seem to contest this view. Skills are now also being acquired through initiatives from governmental structures and local and international

enterprises. Companies such as Cisco, CA Southern Africa, SAP, Microsoft South Africa are conducting skills academies to bridge the skills gap and to assist graduates in becoming work-ready (Schofield, 2014). The 2014 Joburg Centre for Software Engineering (JCSE) ICT Skills Survey indicates that the majority of skills are acquired through mentoring and on-the-job training. However, the report also points out that employees' first preference to acquire skills is through knowledge sharing with peers and thereafter academic institutions are preferred. Furthermore, academic institutions remain ahead of commercial training companies in employers' preferences for skills training and universities are also employers' institution of preference for recruitment (Schofield, 2014). These statistics support the view that employers recognise the value of the type of knowledge that graduates acquire from universities, which is essentially, a more solid knowledge base with the assimilation and analytical capacity that enables continuous learning and creation of new knowledge (Hernández-March, Martín del Peso & Leguey, 2009).

Moreover, the emergence of a knowledge-based economy in SA, and the attempt to keep up with global trends, has meant that the economic pressures facing SA take on a specific form, given the demands of social transformation and access to education (Council on Higher Education, 2003). During this transformation process, in order to make a quality higher education possible, it is necessary that university degrees are adapted to societal demands (Hernández-March, Martín del Peso & Leguey, 2009).

Thus, governments and stakeholders are realising the significance that a tertiary education has in preparing students for the constantly changing world of work (Bridgstock, 2009). Andrews and Higson (2010) also emphasise the importance that HEIs play in the development of a knowledge-centric economy. However, in order to effect change and to provide employers with the critical skills that they require, it is important to understand the challenges involved in the supply of e-skills in a changing landscape and the responsibility that universities have in a knowledge economy.

2.5 SUMMARY

This chapter defined e-competence in relation to the concept of e-skills and different types of competences. Conceptualising e-skills, e-competence and the significant competences, aids in the discussion of the demand and supply of e-competences in the following chapter. For a holistic perspective of competence, it was determined that the most importance competences are Cognitive, Functional, Behavioural, Emotional Intelligence Competence, Social Intelligence Competence and Meta-competencies. These competences are included in the conceptual framework, which is introduced in the next chapter in Section 3.5.

CHAPTER 3
LITERATURE REVIEW (PART 2): DEMAND AND SUPPLY

3.1 INTRODUCTION

The previous chapter developed a conceptual understanding of the definition of e-skills and e-competence in part 1 of the literature reviewed. This chapter answers research sub-question 1 and 2 by addressing the conceptual understanding of i) e-competencies required by potential employers of IS graduates (demand), and ii) e-competencies taught by tertiary IS curricula (supply). It does this by first examining the perceived mismatch between demand and supply, and then discussing employability criteria, employers' demand and their expectations of academic supply. The chapter ends by presenting a conceptual framework based on the literature reviewed in part 1 (Chapter 2) and part 2 (this chapter).

3.2 MISMATCH BETWEEN DEMAND AND SUPPLY OF E-COMPETENCES

Even though SA has a long history of unemployment, which has been a persistent problem for the last forty years (Lam, Leibbrandt & Mlatsheni, 2008), it is still faced with alarmingly low participation of youth in the labour market (Lam, Leibbrandt & Mlatsheni, 2008; Mlatsheni & Rospabé, 2001; Schirmer et al., 2009; Verick, 2011; Yu, 2013). Many researchers and policy makers have worked to determine employability factors (Banerjee, Galiani, Levinsohn, McLaren & Woolard, 2008; Coetzee & Esterhuizen, 2010; Daniels, 2007; Griesel & Parker, 2009; Kingdon & Knight, 2004; Kingdon & Knight, 2007; Maharasoa & Hay, 2001; Mayer, 2011; Pauw et al., 2008; Scholtz et al. 2010; Sebusi, 2007; van der Berg & van Broekhuizen, 2012; Yu, 2013). In South Africa, the growing unemployment among youth, referring to those job seekers aged 15–34 years, points to a national crisis, which demands urgent action (National Treasury, 2011; Statistics South Africa, 2015). With a youth unemployment rate of 36,9% in 2015 (Statistics South Africa, 2015), South Africa compares unfavourably with the global youth unemployment rate of 13,1% (International Labour Organisation, 2015). The Western Cape appears to have the lowest youth unemployment rate (29,9%) and highest absorption rate (43,2%) among all the provinces.

Youth unemployment means that the younger generation are not acquiring the necessary competences and experience to drive the economy forward, which inhibits SA's economic

development (Altman, 2007). Thus, as the rate of poverty inclines, the state has a larger burden to provide social assistance (National Treasury, 2011). Additionally, high levels of unemployment also contribute to high levels of poverty and crime (Maree, 2007). Since employment denotes achievement, independence, innovation and the preservation of dignity (National Treasury, 2011), the frustration that youth may feel in the face of disappointment could also be seen as a potential threat to the political stability of the country (Schirmer et al., 2009). It is therefore perceived that the longer one is unemployed, the harder it is to reverse the negative effects on self-esteem and the perception of low self-worth (Altman, 2007:4).

Factors like the increasing capital intensity, trade liberalisation, high labour costs and HIV/AIDS may contribute to this high unemployment rate (Barker, 2003; Sebusi, 2007). Weak job searching skills, poor use of resources and negative messages provided by peer groups related to job finding may also contribute to low employment levels (Altman, 2007; Altbeker et al., 2012). Other influencing factors include: a deficient demand for labour (Altbeker et al., 2012; Kingdon & Knight, 2007; Maree, 2007; Rankin, Roberts & Schöer, 2012); a lack of practical experience (Altman, 2007; National Treasury, 2011); poor educational levels and a lack of skills (Lam, Leibbrandt & Mlatsheni, 2008; Pauw, Oosthuizen & Van Der Westhuizen, 2008).

The unequal educational opportunities of the apartheid regime and the subsequent exclusion of the majority from the labour market have resulted in poor quality of education, especially for 'black' students, unequal distribution of wealth, high levels of unemployment and extreme poverty, inequality and social inequities in SA (Council on Higher Education, 2003; Sebusi, 2007; National Treasury, 2011).

However, despite the many factors compounding the youth unemployment problem, a study conducted by Van der Berg and Van Broekhuizen (2012) showed that if the term graduate is defined correctly, then there is in fact no crisis regarding those with a higher education degree. They claim that while the number of degree holders in the market grew from 463 000 in 1995 to 1,1 million in 2011, just under 5% of university degree holders were unemployed (Van der Berg & Van Broekhuizen, 2012). In 2015, this figure increased to 8,3% (304 000 youth), representing unemployed people with a tertiary education (Statistics South Africa,

2015). This is in contrast to the 55% (1682 000 youth) who had less than a matriculation and the 36,4% (1327 000 youth) who had at least a matriculation in 2015 (Statistics South Africa, 2015).

The result of Van der Berg and Van Broekhuizen's (2012) study vindicates the claims made that education is directly proportional to employment and that any post-school qualification increases one's job prospects (Lam, Leibbrandt & Mlatsheni, 2008; Statistics South Africa, 2014). However, the International Labour Organisation (2015) points out that even though there has been a trend in the attainment of a higher education, the youth unemployment crisis persists. This indicates that it is not only education that is important, but that relevant and adequate skills are also crucial (Mayer, 2011; Pauw, Oosthuizen & Van Der Westhuizen, 2008). To this end, Van der Berg and Van Broekhuizen (2012) clarify that instead of graduate unemployment, the actual issue requiring urgent attention is in fact the skills gap or mismatch in the country, which is also an international status quo.

> "…This does not mean that there need be no concern about the ***quality*** **and** ***relevance*** of university studies … it means that greater attention should again be paid to the argument that South Africa's economic growth is held back by a **lack of skills** ..." (Van der Berg & Van Broekhuizen, 2012:21).

There appears to be an undeniable discrepancy between the skills expected by potential employers and the skills that graduates are perceived to have (De Beer, 2010; Frinking et al., 2005; Hernández-March et al., 2009; Lim et al., 2011; Modestino, 2010; Scholtz et al., 2010; Tech Partnership, 2015; Trauth et al., 1993) and this has become an integral part of the youth unemployment problem (Pauw et al., 2008). The disparity between the *quality*, *relevance* and *adequacy* of e-skills possessed by IS graduates and those required by the ICT industry could be referred to as a **skills gap**, **shortage** or **mismatch** (Aceto et al., 2009; Accenture Research, 2008; Frinking et al. 2005; Kim et al. 2006; Lim et al. 2011; Scott et al. 2002; West & Garrido 2008) or even an **expectation gap** (Trauth, Farwell & Lee, 1993), although there are slight differences between each of these concepts as indicated in the table below.

Table 3.1: Literature based clarification of terminology for skills gap

Term	Definition	Source
Shortage	describes an insufficient number of skilled people in the labour market or in an occupational segment	(European e-Skills Forum, 2004)
Gap	competence shortfall between the current and needed competence levels of individual staff within organizations	(European e-Skills Forum, 2004)
Mismatch	disparity between the competence of the trainee or graduating student/learner and the expected competence needs of the employers	(Modestino, 2010).

In an effort to understand this skills gap the Department of Labour issued a 'National Master Scarce Skills' list at the end of 2007 which indicated that the ICT sector had been unable to fill 37 565 positions at the time (ITWeb, 2008). Clearly many jobs remained vacant while the total number of unemployed during September 2007 was 3623, according to the revised version (StatsSA, 2009). A more recent survey conducted by Tech Partnership reports that 96% of companies indicated deficiencies in technical skills, 95% indicated gaps in business and IT management skills, 93% expressed a deficiency in sector knowledge or experience and a further 88% and 87% of companies respectively, expressed that interpersonal skills and client interactions were concerns (Tech Partnership, 2015). Furthermore, "[o]n average, employers reported that where there is a skills gap, technical specialists have 79% of the skills needed for the job – i.e. there is a 21% gap in required proficiency" (Tech Partnership, 2015:20).

It is perceived that the lack of engagement between industry and academia leads to industry's skills needs and tertiary institutions' offerings being out of sync (Scholtz, Cilliers, & Calitz, 2010). Misperceptions, such as e-practitioners believing that managerial and organisation issues are more significant than emerging issues and academics regarding the inverse as important (Noll & Wilkins, 2002), can be reduced by having open discussions between industry and academia.

Some suggest that the fault of the skills crisis lies with academic offering (Mlambo-Ngcuka, 2006) and that the solution is to have academic institutions, industry and government work together (Merkofer & Murphy, 2010) to develop sustainable and robust syllabi. While it is perceived that universities' main purpose is to produce employable graduates who are knowledgeable, well-informed and "able to meet the needs of a country" (Rao & Jani,

2012:184), it is, however a huge challenge to do this when the knowledge and skill requirements keep changing due to the nature of the ICT industry. There is thus a need to consistently investigate the skills, knowledge and attitudes needed by IS professionals and compare this to what tertiary institutions are providing in their IS curricula (Scholtz et al., 2010). Engagement between industry and academia can be in the form of joint research projects, technology transfer agreements (Hernández-March, Martín del Peso & Leguey, 2009), partnerships and internships, which have been used with great success within IS academic programmes (Palmer, 2002; Saltz, Serva, & Heckman, 2013). The idea of integrating course work with work-based learning "creates a rich synergy in student learning" (Saltz, Serva, & Heckman, 2013:122). It is further articulated that "to cultivate industry partnerships and find sustainable markets for their knowledge "products", universities can be easily persuaded that their primary engagement interlocutors (and beneficiaries) should be from the corporate world" (Singh, 2003:13).

On the other hand, De Beer (2010) asserts that the solution to this crisis lies instead within the power of ICT industry companies to combine resources and adopt a culture of teaching and mentoring; and that contrary to many sources, tertiary institutions do not have the required responsiveness to solve this crisis (De Beer, 2010). De Beer (2010) further asserts that the ICT industry cannot afford to wait for government to provide solutions to the skills crisis and that the industry will have to own, and solve, the crisis through an ecosystem of scalable initiatives. A culture of "learn[ing] from at least one other, and train[ing] twice as many" is required (De Beer, 2010:19). He proclaims that it is the responsibility of every e-Practitioner to contribute towards alleviating the skills crisis through succession planning, which should ultimately be the prime directive.

Lifelong learning is suggested to be important in remedying the skills gap, as the then SA deputy president, Phumzile Mlambo-Ngcuka (2006:4) is reported to have said that "[I]n a country such as ours where skills shortage and skills inadequacy is so glaring, lifelong learning must be seen as a way of life … it has to be a way for self-improvement to move from being qualified to being able".

Lanvin (2008) provides an illustration of the demand side of e-skills by grouping industry requirements into quantifiable (quantitative) and non-quantifiable (qualitative) needs. This qualitative and quantitative view of the skills gap, in Figure 3.1, is also discussed by Gourova et al. (2006), who mention that qualitative aspects of the skills gap refer to the shortages of skilled staff and the quantitative aspects relate to the shortages and mismatches in availability of needed skills.

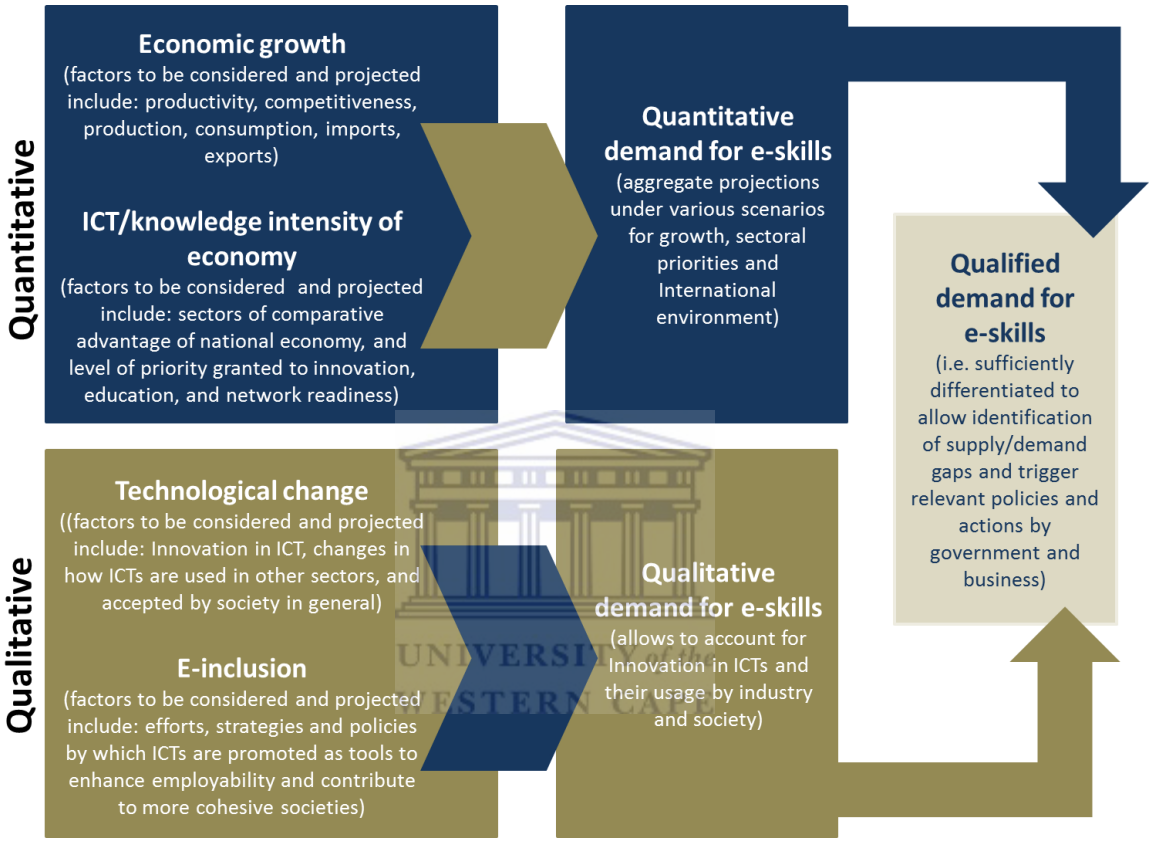

Figure 3.1: Medium-long term factors of demand for e-skills (Source: Lanvin, 2008)

In identifying ICTs as one of the drivers of economic growth and social development, SA, through the Department of Communications, has prioritised the development of e-skills in the country by establishing the e-Skills Institute (e-SI), now part of NEMISA. The then, e-SI embarked on a process of engaging various stakeholders ranging from government, business, education, civil society and international partners, which culminated in the first national e-skills summit held in 2010 and the subsequent publication of the NeSPA 2010 and later NeSPA 2012. According to Lanvin (2008), the specific actions required to reduce e-skills mismatch and improve the e-readiness index of a country include sharing a compelling e-vision between

all stakeholders, strengthening e-skills MSPs, formulating a national e-curricula, promoting Mathematics and Science at school level and enhancing lifelong learning.

3.3 THE DEMAND FOR E-COMPETENCES: SKILLS THAT EMPLOYERS EXPECT

There is a limited amount of information available on skills and competencies required in the workplace in SA (Hernández-March, Martín del Peso & Leguey, 2009; Kingdon & Knight, 2007). This is possibly because companies find it difficult to identify and articulate their skills needs (Kingdon & Knight, 2007; Schofield, 2014) causing employers to provide mixed signals regarding the skills demanded (Schofield, 2014). It could also be because the rate at which technology changes has necessitated more dynamic and diverse requirements for different organisations, which makes required competences difficult to specify. Noll and Wilkins (2002) explain that while the need for more skilled IS professionals are clearly documented, the identification of the specific skills required by employers of IS graduates, for the variety of positions available in IS, is not clear. This could suggest that traditional recruitment processes are arguably not an efficient measure or true reflection of the competences that applicants may possess. Nonetheless, identification of the competences that employers seek will aid in assisting HEIs in providing better directed education, may improve role clarification (Strasser, London & Kortenbout, 2005) and thereby reduce the identified skills mismatch.

Employers express a shortage of “dual thinkers”, who are able to understand how to manage business with ICT competence (Fonstad & Lanvin, 2010:19; Hüsing et al., 2013:149). In addition, there appears to be an expectation for graduates to “hit the ground running” and be “work ready” immediately upon graduating (Griesel & Parker, 2009:6), which means that graduates need a broad range of functional and ‘soft’ skills to be able to transition seamlessly to the working world (Pop & Barkhuizen, 2010). The latter includes being willing and able to work well in a team, effective communication, leadership, critical thinking, problem solving and managerial abilities (Lowden et al., 2011). Many employers state that graduates are not work-ready due to a lack of confidence, emotional issues, and other psychological issues. However, regardless of the ICT skill levels, employers expect some level of digital competence (e-competence), formal education, the ability to learn new things quickly, work experience to demonstrate the ability to operate in the workplace and a good social network for finding and keeping work (Garrido, Sullivan & Gordon, 2012). Furthermore, graduates are expected to be

able to synthesize and assimilate new knowledge, harness key competences that are discipline specific as well as to possess transferable generic knowledge, skills, dispositions and attitudes that can be applied to various occupational situations and contexts (Bridgstock, 2009).

Literature indicates that employers have high expectations for interpersonal soft-skills and that a lack thereof is perceived to result in unsuccessful job placements. These soft skills include communication (written, oral, reporting and presentation skills), business etiquette (which includes little things like being on time, knowing how to behave in different work situations and personal presentation), teamwork and collaboration, conflict management, problem-solving, goal-directedness, emotional intelligence (self-awareness, self- motivation, positive self-esteem, self-management skills, self-promotion, self-confidence), effective learning skills and a willingness to learn, career management skills, balance to work and home life, ability to deal with pressure, displaying flexibility and adaptability, leadership, creativity and innovation, research skills and having common sense and a sense of humour (Knight & Yorke, 2003; Pop & Barkhuizen, 2010; Shah, 2008). In addition, values such as loyalty, dependability, diligence, commitment, honesty and integrity, enthusiasm, reliability also seem to be important (Shah, 2008). This is supported in the statement:

> "…The so-called 'soft skills' such as teamwork and collaboration, planning and leading projects, presentation delivery, and writing skills will be critical for success in the Information Systems profession" (Noll & Wilkins, 2002:143).

In order for SA to improve its e-readiness index and to sufficiently position itself as a knowledge and networked economy, it is important to benchmark against international perceptions. It is noted, however, that these findings cannot be generalised given the difference and diversity in structure, climate, culture, history, economies, policies and demographics and contexts. Therefore, these studies serve to illuminate the e-competencies that employers seek, globally and are therefore relevant for consideration in this study.

3.3.1 European perspective

Andrews and Higson (2010) conducted a study by interviewing thirty business graduates and twenty employers across four European countries, namely UK, Austria, Slovenia and Romania. Three significant themes pertaining to graduate employability emerged from their study, which are business specific issues (hard business-related knowledge and skills); interpersonal competencies (soft business-related skills) and work experience and work-based learning. Employers across the four countries shared similar views about the skills and competencies required, which suggests that similar expectations are made of graduates across the world.

In terms of business specific issues critical thinking, analytical and problem solving skills as well as business acumen and knowledge about the business world are important. It was perceived that even though a degree was deemed important for employability, it failed to prepare graduates with relevant business programmes and formal business documentation skills. Employers expected graduates to be flexible and able to adjust to the work environment with little supervision. In terms of interpersonal competencies demanded, Andrews and Higson's (2010) findings support those of Knight and Yorke (2003); Pop and Barkhuizen (2010) and Shah (2008). While some employers stated that "the discipline isn't so important, it's the other skills learned at university that are important" (Andrews & Higson, 2008:417), it was pointed out that graduates who were able to "think outside the box" and demonstrate innovation and creativity, were sought after. Lastly, in terms of work experience and work-based learning, it was suggested that students with real experiences of the work environment were most employable. It was indicated that experience is appreciated, even more than a good degree in some cases. Overall, employers expected that graduates would be 'employment-ready' upon graduation, equipped with the required skills and competencies and be able to work with little supervision. A key recommendation was that "business schools need to develop programmes in which undergraduates are actively encouraged to acquire and hone 'softer' communication skills" (Andrews & Higson, 2010:419). Similarly, Noll and Wilkins (2002:144) confirm the requirements for domain specific and soft skills and add that new graduates lack the needed business knowledge about "specific industries or new areas such as electronic commerce and business process re-engineering".

Hernández-March, Martín del Peso and Leguey (2009) conducted a quantitative study with 875 Spanish companies as well as a follow on of 40 qualitative interviews with Human

Resources (HR) and Business managers. They established that while technical domain-specific knowledge is valued, so are interpersonal skills and elements of personality such as the graduate's attitude and motivation towards the work. They confirmed the findings in favour of soft skills. They added that while employers believed that there was a gap between what students studied and the reality of the workplace, which was caused by the HEIs being too theoretical, they still valued that HEIs teach students how to learn. The ability of graduates to rapidly assimilate new knowledge is one of the most highly valued competencies in the labour market. Nonetheless, employers perceived the methods used for teaching and assessments to be inconsistent with the criteria that industry uses to evaluate competence, since companies in the study hardly took the academic grades into consideration and placed more emphasis on graduates' competencies. It was advised that universities assess students "based on the degree to which they obtain certain abilities and skills" (Hernández-March, Martín del Peso & Leguey, 2009:13) and not so much on the content of subjects. Furthermore, in agreement with the findings of Andrews and Higson (2010), work placements coordinated and supervised by the university, during the course of the degree, provided the best way for graduates to acquire and improve the competencies that are work-related.

3.3.2 Malaysian perspective

Quek (2005) surveyed 32 graduate employees, who had been employed for at least two years. It was found that employers preferred graduates who were able to apply classroom learning to their workplace as well as being able to effectively communicate with others and add value by resolving problems quickly. The findings of the study confirmed that interpersonal skills are important and added that resourcefulness, value-improving skills, diversity awareness and global understanding were rated as important personal orientation skills. Computer skills and cognitive skills like numerical skills were also indicated as being important for the success of graduates in the workplace however, not as highly regarded as the interpersonal skills (Quek, 2005).

Shah (2008) categorised the employability skills required by employers. Employers ranked these skills in order of importance, as indicated in the table below. The four highest rated skills by employers of ICT related companies are *positive attitude, initiative, team working and awareness of own strengths and weaknesses*. When asked about what the key features of an

employable person is, employers referred to the essential Skills, transferable skills, personal competencies and job seeking skills, listed in Table 3.2. It is significant that more than half of respondents spoke about "attitude". In addition, 78% of employer respondents gave negative feedback regarding the educational state of the graduates, stating that academic institutions focused too much on theory (Shah, 2008).

Table 3.2: Key skills from Malaysian studies conducted by Shah (2008)

Essential Attributes	Personal competencies	Transferable skills	Job seeking skills
1. Positive attitude 2. Honesty and integrity 3. Responsibility 4. Willingness to work 5. Self-discipline 6. Reliability 7. Understanding of actions and consequences 8. Basic social skills 9. Basic personal presentation	1. Initiative 2. Proactivity 3. Self-motivation 4. Diligence 5. Confidence 6. Judgement 7. Assertiveness 8. Act autonomously	1. Team working 2. Problem solving 3. Adaptability 4. Basic ICT skills 5. Reasoning 6. Job-specific skills 7. Work-process management 8. Basic interpersonal and communication skills 9. Emotional and aesthetic customer service skills 10. Writing	1. Awareness of strengths and weaknesses 2. Interview skills/presentation 3. Ability to complete CVs/application forms 4. Awareness and effective use of informal social networks

3.3.3 South African perspective

Griesel and Parker (2009) commissioned a study for in Higher Education South Africa (HESA) that compared what employers expect to get in terms of graduate skills and what they currently get from graduates. They used the notion of employability by Yorke and Knight (2006) which posits that the four broad components of employability are: i) skilful practices; ii) deep understandings grounded in discipline base; iii) efficacious beliefs about personal identity and self-worth and iv) metacognition (self-awareness and the ability to reflect on, in and for action).

The study categorised the findings of graduates' attributes along four main themes, as indicated in Table 3.3, and calculated the gap between what employers get and what they expect for each of the components. The findings of their study are shown in Table 3.3, which indicates the identified gap in the last column of the table. It can be seen that the biggest gaps were found to be in communication (oral and written), technical and computer literacy, rapid

conceptualisation of issues, distinguishing between important information, recognising a problem, understanding workplace culture and differences, self-confidence, negotiation and mediation skills as well the other categories identified in Table 3.3 below.

Table 3.3: Findings of graduates' attributes (Source: Griesel & Parker, 2009)

Ranked components	Revised constructs	Gap
Theme 1: Basic skills and understanding		
• Proficiency in English • Written communication skills • Oral communication skills	Communicative competence in English, including the "tools", concepts & strategies through which to demonstrate skills & understanding	1.10
• Prior exposure to work • Knowing the organisation	Understanding the world of work	0.70
• Technical ability • Computer literacy • Ability to find & access information		1.10
Theme 2: Knowledge and intellectual ability		
• Ability to follow & construct logical arguments • Rapid conceptualisation of issues	Intellectual ability grounded in both discipline and general knowledge and an appropriate approach to knowledge production and cognitive "openness" to continue learning	1.10
• Understanding core principles • General knowledge about local & global affairs • Subject/discipline knowledge		1.00
• Interest in ideas & desire to continue learning		0.79
Theme 3: Workplace skills and applied knowledge		
• Ability to deal with different cultural practices • Understanding of changing workplace practices		1.27
• Ability to recognise a problem situation • Ability to choose appropriate information to address problems • An appropriate approach to problem-solving tasks	A proactive approach to problem-solving, located within a context of cultural diversity & changing workplace practices	1.30
Theme 4: Interactive and personal skills		
• Sense of identity & self-confidence • Negotiation & mediation skills	A strong sense of self in relation to others & to context	1.10
• Contribution to teambuilding & work • Ability to relate to wide range of people • Appreciation of different cultural contexts	Work in a team & understand & accept differences between people	1.00
• Openness & flexibility		1.70

3.3.4 Futuristic perspective

Rather than predicting what the landscape will look like for future ICT jobs, which is unlikely to be accurate because of the rapid pace of change in the technological world, Daviesm, Fidler and Gorbis (2011:6) discuss six disruptive forces "that will reshape the workforce landscape". These six drivers of change also underpin the ten skills that will be most demanded over the next century. These drivers are: extreme longevity; the rise of smart machines and systems; new media ecology; the rise of a computational world; superstructured organisations; and the globally connected world. Wilen-Daugenti (n.d.) adds a seventh force, which she refers to as the emergence of the "VUCA world". This acronym stands for Volatile environments, Uncertain marketplaces, Complex business and Ambiguous future. The ideal worker of the future, should be, what Daviesm et al. (2011:11) term as "T-shaped", which means that workers should be proficient in and have a deep understanding of one field but also have the capacity to effectively identify with the language of a broader range of disciplines (Daviesm et al., 2011:11). The ten key skills that they predict for the future are listed below.

Table 3.4: Ten skills for the future workforce (Source: Daviesm et al., 2011)

Key skill	Definition
Sense-Making	ability to determine the deeper meaning or significance of what is being expressed
Social Intelligence	ability to connect to others in a deep and direct way, to sense and stimulate reactions and desired interactions
Novel And Adaptive Thinking	proficiency at thinking and coming up with solutions and responses beyond that which is rote or rule-based; having "situational adaptability", which is the ability to respond to unique unexpected circumstances of the moment
Cross-Cultural Competency	ability to operate in different cultural settings; diversity will become a core competency for organisations
Computational Thinking	ability to translate vast amounts of data into abstract concepts and to understand data-based reasoning
New-Media Literacy	ability to critically assess and develop content that uses new media forms, and to leverage these media for persuasive communication
Transdisciplinary	literacy in and ability to understand concepts across multiple disciplines
Design Mindset	ability to represent and develop tasks and work processes for desired outcomes
Cognitive Load Management	ability to discriminate and filter information for importance, and to understand how to maximize cognitive functioning using a variety of tools and techniques
Virtual Collaboration	ability to work productively, drive engagement, and demonstrate presence as a member of a virtual team

The literature reviewed above served to provide a perspective on the demand of e-skills and e-competences, and is used in the conceptual framework at the end of this chapter.

3.4 THE SUPPLY OF E-COMPETENCES: ACADEMIA AND THE CURRICULUM

3.4.1 The imperative for embedding e-competences into an IS curriculum

There is a "need for a formal education structure and National Curriculum and Competency Framework that supports the development of a range of e-skills for employment and fuller participation in both a national and global society" (NeSPA, 2012:10). Considering this view, it is important for universities to provide transferable employability skills in addition to providing the demanded cognitive, functional and technical competencies. A conducive environment for students to enhance these e-competencies in order to learn how to create knowledge for themselves is therefore required.

The question could then be asked, can these transferable "soft skills" be taught in an academic institution? Pool and Sewell (2007:284), argue that since "emotional intelligence is not fixed genetically, nor does it only develop during early childhood, then it seems to be something people can *learn*, which would suggest that this is something that higher education institutions (HEIs) can successfully *teach*" (Goleman, 1998:7). Boyatzis (2008:10), also points out that initiatives such as cognitive behavioural therapy, self-help programmes, psychotherapy, training and education has, for decades, recognised that people have the ability to change their behaviour, moods and self-image.

In Section 3.2 it was put forth that tertiary institutions play a crucial role in alleviating the mismatch between the skills that are required by industry companies (demand) and the skills that academic institutions provide (supply). IS curricula are often not well aligned to business needs (Lee, Trauth & Farwell, 1995) causing some to hold the view that HEIs should be accused of not addressing these challenges sufficiently:

> The phenomenon of unemployed graduates, who are without abilities to self-employ and self-determine, after spending three to four years of post-secondary education is an indication to all of us of the challenge in our education at a tertiary level…the curriculum developers are not paying enough attention to issues of relevance and

> ensuring that we all pay attention to the skills and competencies learners require when they come out of higher education… we need a skills revolution in the curriculum of tertiary education (Mlambo-Ngcuka, 2006).

Academia must become aware that the skills and competences that are easiest to teach and assess, are also the easiest to automate, digitise or outsource (OECD, 2012). With machines taking over most routine and rote functions, the demand shifts to skills that machines are not good at, which are the "higher-level thinking skills that cannot be codified. We call these sense-making skills, skills that help us create unique insights critical to decision making" (Daviesm et al., 2011:8). The current age we live in requires that we develop new ways of thinking, which involves creativity and innovation, critical thinking, problem-solving and decision-making. We also need to develop new ways of working that harness communication and collaboration and use new tools for working that include the capacity to recognise and exploit the potential of new technologies (OECD, 2012). In addition, there is also the perceived dramatic declining interest in the IS field (De Beer, 2010; Fonstad & Lanvin, 2009, 2010; Hüsing et al., 2013). The curriculum is not the only contributing factor in this decline but an outdated curriculum that does not meet global needs can be a sufficient reason to deter a prospective student (Topi et al., 2010).

It is obvious then that the design of the course material needs to be relevant and impart currently required e-competencies to students. However, Lightfoot (1999) argues that this is not an easy task. He states that due to the rapid changing IT environment, it is extremely difficult for IS departments to prepare students adequately for the working world that they will face after graduation. IS departments therefore face a dilemma because the curriculum needs to give students the necessary skills in current industry practice to satisfy requirements for an entry level position but at the same time it must provide students with the fundamental background and abilities to learn new things throughout their careers (Lightfoot, 1999). This is important because teaching current skills helps students secure their first job, whereas teaching fundamentals helps them get subsequent jobs (Lightfoot, 1999). A generic curriculum that is expected to meet the needs of all future IS professionals is therefore archaic and the mandate has risen for a curriculum that is career-driven and tailored to meet the needs of different IS careers; and that adopts a multi-disciplinary approach with

educational innovations that add depth, breadth and relevance to content matter (Lee, Trauth & Farwell, 1995).

Better forecasting is required for jobs and skills that are required so that students have a lead of at least 10 years before technologies and trends change in this fast paced industry (Ives & Rubin, 1993; Merkofer & Murphy, 2010). One of the main barriers to enhancing e-skills at universities is the competence of the academic staff who teach IS (Tapscott, 2012; Babinet et al., 2014). It can then be argued that IS lecturers need to be trained, qualified and well equipped with new and relevant knowledge in order to ensure that IS students receive the benefit of current competences. This suggests that academic staff need to maintain their development professionally as well as scholarly (Topi et al., 2010). The IS 2010 curriculum guidelines model recommends that the institution should support the continuing development of its faculty members because this is a joint responsibility of the institution as well as the individual (Topi et al., 2010), given how rapidly technology evolves.

> "The program is enhanced significantly when faculty acquire practical experience in the profession through activities such as… industry exchange programs…" (Topi et al., 2010:32)

Yorke and Knight (2004:2) state that auditing the curriculum regularly, serves as a means of "testing how and where employability-related learning is incorporated into curricula. It may also point to the need to rethink pedagogic and/or assessment practices". However, Noll and Wilkins (2002) advise that several factors need to be assessed before changes can be made to curricula. These factors involve potential business recruiters' needs, current curricula, students, resources, and the skills of available staff.

The model that they suggest for curriculum development, presented in Figure 3.1, involves assessing these factors and then reviewing the current environment in order to identify the critical skills needed. Thereafter the critical skills can be organised into a structure that is most suitable to the available resources. This model provides an insightful breakdown of all the internal and external factors to be considered before changes can be made to the curriculum.

The view taken in this model is significant in the context of this study although not all the factors described in it were explored in this research.

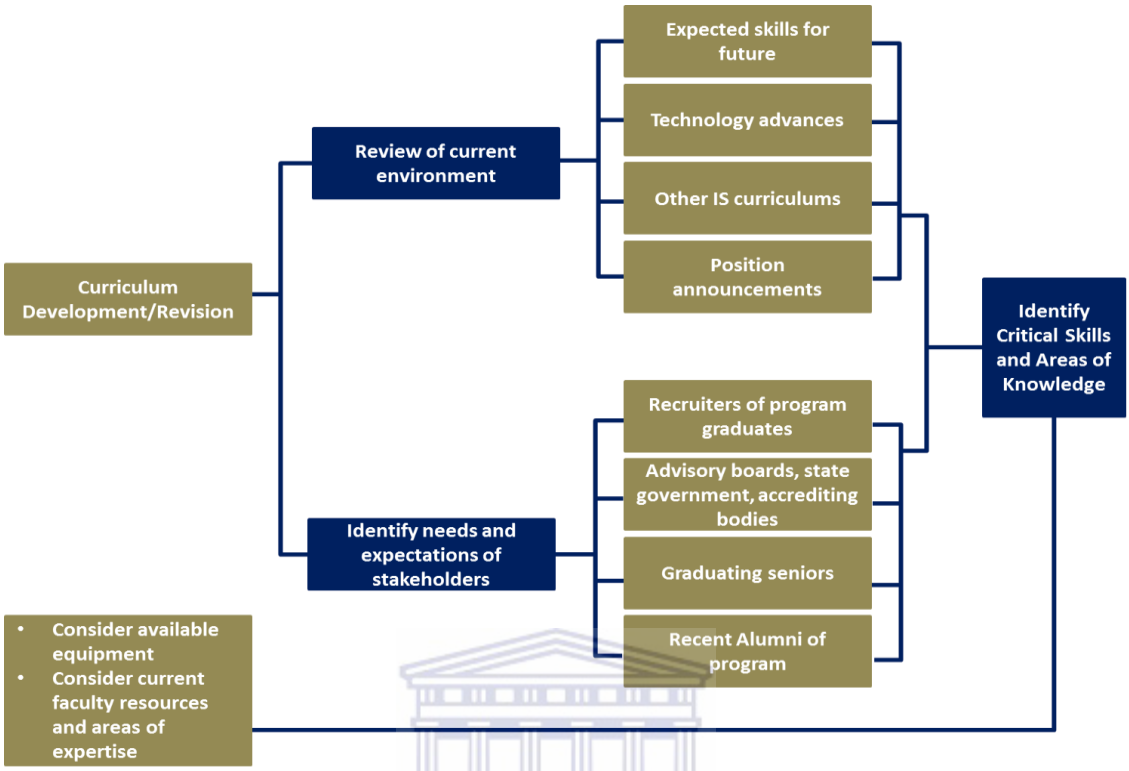

Figure 3.2: Curriculum Development Model (Source: Noll & Wilkins, 2002)

Employability is encompassed by both individual and contextual factors since the need for flexibility and the investment in the continuous up-skilling of the individual depends largely on the sector in which the individual is employed (De Grip et al., 2004). Therefore, in addition to incorporating these competences into the curriculum, Knight and Yorke (2003) suggest four ways that HEIs can enhance graduate employability: i) Work experience; ii) entrepreneurships; iii) Career advice; and iv) Portfolios, profiles and records of achievement.

3.4.2 Ensuring relevance, adequacy and quality of e-competencies

Measuring e-competence should be seen on a continuum or as a matter of degree (Strasser, London & Kortenbout, 2005), being either more or less competent at certain capabilities. Three factors are considered when evaluating e-competences, namely *quality* (Aken & Michalisin, 2007), *adequacy* (Scott et al., 2002; Kim, Hsu & Stern, 2006) and *relevance* (Trauth, Farwell & Lee, 1993). In order for e-competencies to have quality, they have to be relevant and adequate to the demand.

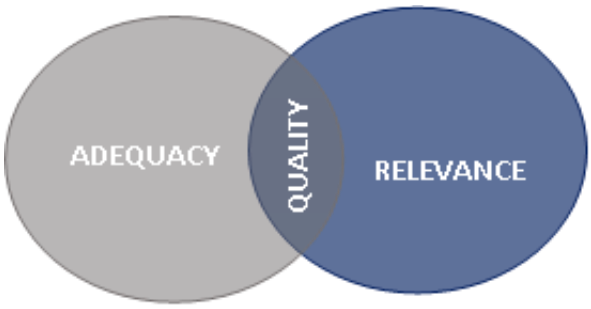

Figure 3.3: Concepts relevant to the measurement of e-competences

Relevance

Due to the fast changing and ubiquitous nature of the field of ICTs, academic IS departments are expected to provide education that is not only *relevant* to the current global environment and need but also forward-looking and adjustable to the future (Politis & Danielson, 2004). At the same time, IS departments must ensure that the content they are teaching is what prospective employers actually require. The rate at which technologies evolve puts pressure on IS departments to maintain a curricula that includes current trends in the ICT industry, which allows students who graduate after 3 or 4 years to be marketable and to be able to have 'transferable' skills. Therefore, in the context of this study, *relevance* pertains to skills that a graduate e-Practitioner is expected to possess in order to most suitably match what employers are looking for at the juncture when the graduates enter the job market.

Adequacy

A skills shortage infers that there are not enough relevant skills in the market and this furthers indicates that there is a disparity between the quality and adequacy of the supply and demand of required competences (Scott et al., 2002). Therefore, adequacy relates to providing the needed skills and competencies to meet the demand within industry, that is, whether graduates have all the expected technical, business and inter-personal skills required by employers. In the context of this study, adequacy refers to whether graduate e-Practitioners have the required e-competencies at the expected level that companies require, to meet the demand for being able to immediately fill entry level vacancies in the labour market.

Quality

Usually quality is regulated by industry and even though HEIs provide the training, they are only a "medium" that facilitate knowledge (Akoojee, Arends & Roodt, 2007). The validation of the competence is assessed by an employer. One aspect of the measure of *quality* is the employers' perceptions of the *relevance* and *adequacy* of graduates' skills and competencies in the workplace. Improving graduate employability is therefore an important aspect of *quality* since it relates to whether the curriculum is fit for purpose (Griesel & Parker, 2009).

In summary, it is proposed that *quality* becomes the result of having the correct mix of the most required set of competences that are needed at any particular point in time by employers *(relevance)* and at the same time having the correct level of knowledge, skills and attitudes to apply these competences in a given context *(adequacy).*

3.4.3 IS 2010 model curriculum for IS competences

Changes in technology have necessitated the need to introduce new IS courses, which reflect the requirements of the industry (Topi et al., 2010). Such a reference framework serves as a benchmark to compare IS programmes across academic institutions (MacKinnon, 2003). The IS 2010 model curriculum is a guiding framework for IS curricula. The IS 2010 model curriculum, in Figure 3.4, identifies seven high level capabilities that IS graduates are expected to have upon graduation. These overall capabilities are congruent with the rapid changes in the nature of jobs that IS graduates are expected to fill. The model acknowledges the contribution that IS can make to non-business sectors such as government, education, non-profit organisations, healthcare, etc. and therefore the seven high level capabilities are not limited to a specific domain. Instead, the outcomes are driven by organisational needs and are expected to be more stable and abstract than knowledge and skills. The overall high level capabilities are translated into three knowledge and skills categories which are *IS specific knowledge and skills*, *Foundational knowledge and skills* and *Domain fundamentals*. The model was considered in the design of the suggested conceptual framework.

One important aspect for academia and employers to consider is whether employability should be judged on national or international standards and criteria. It could be debated that international standards are not particularly relevant to and cannot readily be applied to the

SA context. In addition to this, it is also difficult to compare employability of students graduating at different institutions because each institution has different systems, methodologies, expectations, outcomes, etc.

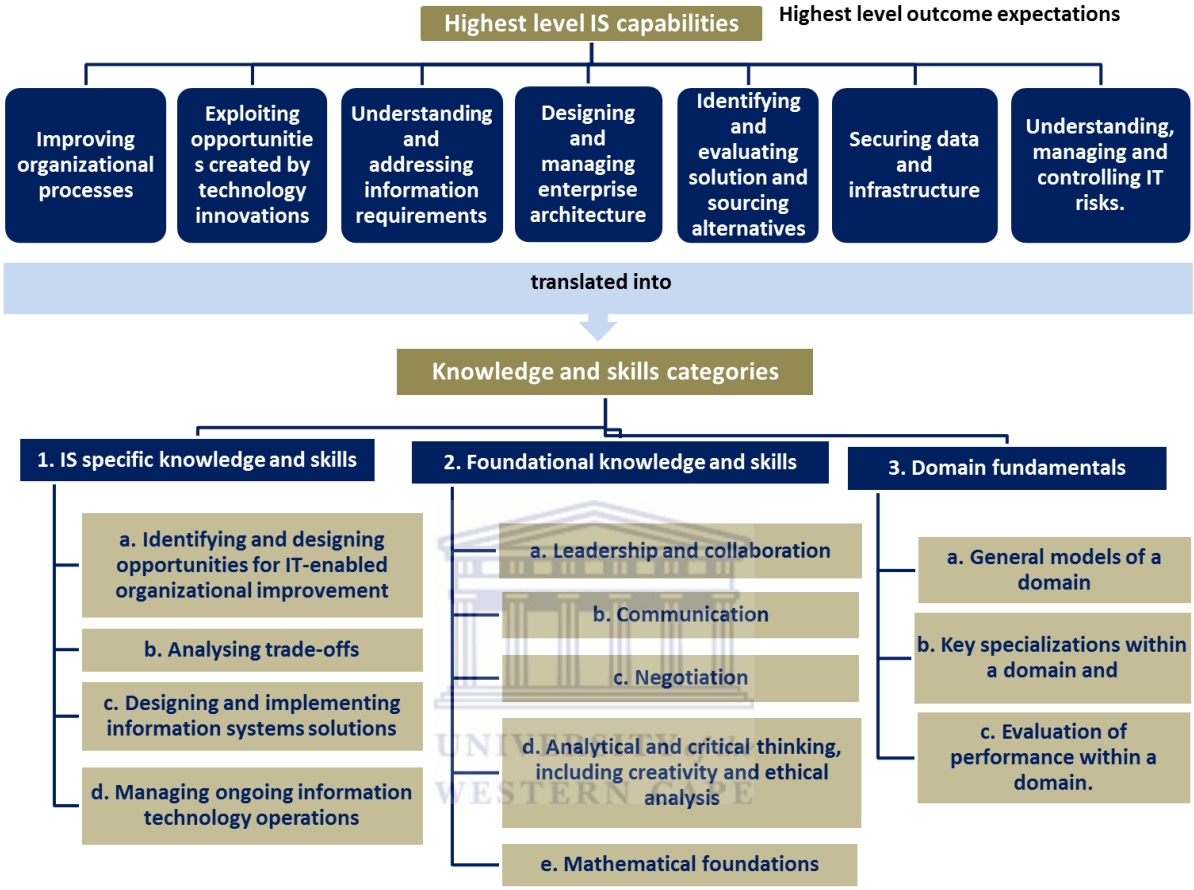

Figure 3.4: Classification of key IS competences in IS2010 model curriculum

3.5 THE CONCEPTUAL FRAMEWORK

3.5.1 Support for a holistic perspective to competence modelling

Delamare Le Deist and Winterton (2005:2) state that "one-dimensional frameworks of competence are inadequate and are giving way to multi-dimensional frameworks". Multidimensional, holistic approaches should be adopted, that consider the significance of social life and the workplace environment in influencing competence (Sundberg, 2001). In addition, holistic competence approaches should integrate the knowledge, understanding, skills, values and attitudes that personify a professional (Winterton et al., 2005). Thus, a holistic approach "is useful in identifying the combination of competences that are necessary

for particular occupations and to promote labour mobility" (Delamare Le Deist & Winterton, 2005:27). By focusing on *knowing* (cognitive), *doing* (functional or behaviouristic) and *being* (personal, social and meta-competence), holistic competence frameworks have become more prominent and favoured in order to develop a more universal understanding of competence (Delamare Le Deist & Winterton, 2005; Sultana, 2009; Winterton et al., 2005).

The conceptual framework considers this holistic viewpoint as well as the OECD's notion of 21st century skills, which considers the "skills and competencies young people will be required to have in order to be effective workers and citizens in the knowledge society" (Ala-Mutka, 2011:39). Against a backdrop of global, organisational and technological changes, it is important that the impact that ICT has on human competencies should be related to the broad spectrum of e-competencies required in contemporary society.

While some sources have discussed a purely behaviouristic or functional approach and others a purely cognitive approach to competence frameworks, this study follows a social constructivist approach to designing this holistic perspective of e-competences. It accepts the internal structure of e-competence to comprise of *knowledge, skills and attitudes* with "an additional element that brings all the parts together in special ways in response to specific situations" (Sultana,2009:25). Thus, because *context* is seen as important, it should be accepted that personal, social and cultural issues form a significant part of e-competence.

3.5.2 Rationale for developing a new conceptual framework for e-competence

After evaluating the frameworks discussed in Section 2.3, the two most suitable and comprehensive frameworks for *e-Practitioner* skills appeared to be the European e-Competence framework (e-CF) and the Skills Framework for the Information Age (SFIA). From the discussion in Chapter 2, it is understood that a distinction should be made between a competency and a skill, which is evident in the e-CF but not so much in the SFIA framework. However, unlike the e-CF, the SFIA framework lacks the distinction between a skill and a competency and between the associated knowledge, skill and attitude components. While the e-CF was favoured due to the comprehensive list of e-competencies and associated knowledge and skills (attitudes are not explicitly indicated) to be expected in each competence area, it was deemed that the SFIA, with 97 e-skills, provided the broadest list,

both horizontally and vertically, of recognised e-Practitioner skills was better. With no suitable existing tool found to provide a benchmark to evaluate the e-skills demand in SA, the more extensive list of the SFIA was used to get an initial indication of demand for the WC in the gathering of data in 2012 (the SFIA framework is discussed in Section 2.3.10).

However, the feedback received from the supervisors was that the comprehensive list of ICT capabilities in the SFIA framework was identified as a constraint (the list was too long, tedious and time consuming). It is important to note that both frameworks (e-CF and SFIA) were developed from a European perspective, which meant that many of the e-skills listed in the framework were not particularly relevant to the interns in the SA demographic and context. Many of the supervisors mentioned that there were few skills on the questionnaire that they actually use. This could be due to the fact that the template appeared to be too lengthy so they may not have actually *read* through the descriptors properly due to time constraints, which could possibly be remedied with a simpler design of the questionnaire in future research. Nonetheless, supervisors were given weeks to complete the questionnaire so it was more likely that the e-skills did not appear to be relevant to the work contexts that the interns were in. It could also mean that limited exposure was given to these interns, since it was only a 6 month programme, which meant that interns were not exposed to a vast array of functions. Another limitation that was identified is that the SFIA does not separate the core competencies identified in this study. While the framework does indicate that the phrasing of each generic descriptor allows it to be used as professional competencies (SFIA Foundation, 2011), it does not provide descriptors of associated knowledge, skills and attitudes, which are key components of e-competence, as discussed above. In addition, after analysing all the e-skills on the SFIA framework, it was evident that there are very few meta-competencies and "soft-skills" noted in the descriptors. Some that were identified, hidden within descriptors, are communication, leadership, teamwork and relationship management. Since the literature highlighted these interpersonal and intrapersonal competences as important, it was yet another reason why the SFIA could not be used in isolation, for this study.

It was considered that a combination of the strength of the SFIA (the flexibility of a comprehensive list of *e-Practitioner* skills with various proficiency level descriptors) and the strength of the e-CF (the easy layout, the distinction between skills and competencies and the

indication of specific knowledge, skills and attitudes associated with each competency) would lead to the development of a suitable measuring tool for the aims of this study. This inspired the development of the conceptual framework, which attempted to incorporate all the e-competences and concepts discussed in the previous chapter and preceding section.

3.5.3 Design of the suggested conceptual framework

Following the constraints identified above, the suggested framework was envisaged to be adaptable to South Africa's e-skills and e-competence developmental needs. It also had to include a holistic perspective of competence. Based on these requirements, the following conceptual framework was constructed. Three layers were decided upon. The first layer comprises of 6 *Core Competence* Categories (coloured in red) namely: Cognitive Competence, Functional Competence, ICT Competence, Personal Competence (intrapersonal), Global Competence (interpersonal) and Meta-competencies. The Core Competence Categories were observed from the literature and each one is deemed to be important, in the combination of competencies required of an e-practitioner. Scarborough (1998:229) cited in Delamare Le Deist and Winterton (2005:27) explains that the core competence approach "recognises the complex interaction of people, skills and technologies that drives firm performance and addresses the importance of learning and path dependency in its evolution".

It should be noted that the Cognitive Competence category corresponds with Bloom's Taxonomy's referral to the "cognitive domain" as well as to the e-SI component of "knowledge" in the definition of e-competence. The Functional Competence category and the ICT Competence category in the diagram match to the Bloom's Taxonomy's referral to "psychomotor domain" and the "skills" component in the e-SI definition. In the conceptual framework, the Personal Competence category and the Global Competence category relate to the "affective domain" referred to in Bloom's Taxonomy and what is referred to as "attitudes" component in the e-SI definition of e-competence, also referred to as interpersonal and intrapersonal competences. In addition, Meta-competencies, which are competencies that are fundamental to the successful application and appropriation of the other five Core Competence Categories, are listed on the far right side of the diagram. The underlying understanding is that, with a relevant and adequate combination of each of the five Core

Competence as well as the foundational Meta-competencies, a graduate should have acquired the desired "work readiness" that prospective employers require.

Each of these Core Competence Categories is divided into specific *Key Focus Areas* (coloured in blue) which is the second layer. For example, the Cognitive Competence category has four main *Key Focus Areas* which are: Tacit/Practical knowledge, Technical/Theoretical knowledge, Procedural knowledge and Contextual knowledge. The other five *Core Competence Categories* are similarly divided into specific *Key Focus Areas* pertaining to that particular competence category. The specific competencies (coloured in beige) identified in the literature make up the third layer and have been allocated to a specific *Key Focus Area* and by extension, a specific *Core Competence Category*. Each competency can be executed at various levels of proficiency. The SFIA framework lists seven levels of proficiency, each with its own descriptors of what qualifies for that particular proficiency level. This study has adopted the SFIA's proficiency levels but has also added an 8th level which incorporates a zero proficiency (PO) in a particular competency. This suggests that a student could have cognitive knowledge or awareness about a competency but be lacking in either the skill or attitude component and hence not be regarded as completely e-competent in that competency. For example someone can know, talk or write about a particular competency but not have the capacity to "do" it.

It is important to note that this framework does not suggest that an individual should have all of these competencies at any particular point in time. Instead, this conceptual framework should be taken as a baseline indication of the combination of competencies that a graduate could be expected to exhibit and apply when required, in a particular work context. While this framework is the ideal combination of required core competences, based upon the literature, it is noted that for any one professional, at any particular time, it is quite unrealistic to expect all of these competencies, at the highest proficiency level. Competencies should be measured on a continuum, not as binary. This means that instead of saying that an intern either possesses or does not possess a particular competency, it should be determined how well (at which proficiency level) an intern is able to perform a particular competency, within a given context. Therefore, it is suggested that this framework should serve as a guideline for academics, curriculum developers and students, so that these Core Competences can become embedded in education and training from undergraduate level. This will enable graduates to

have a comfortable understanding of how to apply these competences when they get to the workplace. It will also help them to identify what competencies industry employers require.

Lastly, it is important to note that this framework advocates the view that Knowledge, Skills and Attitudes are applied both vertically and horizontally, meaning that while Personal and Global competence categories fall within the area of attitudes and dispositions in the definition of e-competence (vertically), it was realised that the implementation of a particular competency also requires a combination of Knowledge, Skills and Competence across that individual competency (horizontally). For example, 'Inquiry focused' as a competency, requires knowledge in order to know what being inquiry focused is, what research is, etc., it requires a skill or knowing what to do and how to go about finding information and lastly it also required the correct attitude in being open and motivated to finding answers. The conceptual framework is depicted in Figure 3.5 below.

This framework is limited in the sense that it does not provide descriptors for all the competencies as the SFIA or e-CF does, although it does provide sufficient detail to define each Core Competence Category and Key Focus Area, in The Definition of Key Concepts used and it provides definitions for each competency in Appendix C. It should therefore be noted that this framework does not intend to replace the SFIA or e-CF. Instead, it aims to add to the dialogue by focusing on a holistic combination of competencies required of work-ready IS graduates or e-practitioners, in SA. It could also be regarded as limited because of some overlap between the Core Competence Categories. However, for the purposes of this study, the researcher has chosen to re-allocate the competencies where it was deemed most suitable. For example, according to Goleman (2004:3), Emotional Intelligence (EI) comprises of 1) Self-awareness, which involves knowing one's own strengths, weaknesses, drives, values and impact on other; 2) Self-regulation, which involves being able to control and redirect disruptive impulses and moods if they occur; 3) Motivation, which includes relishing one's achievements; 4) Empathy, which requires one to understand other people's emotional makeup; and 5) Social skill, which involves building rapport with others in order to move them in desired directions. It is also noted that there are other definitions for EI such as Boyatzis (2008:7) who refers instead to self-management competencies that comprises of emotional self-awareness and emotional self-control (in addition to self-awareness). It is further noted

that Daviesm et al. (2011:8) and other sources, regard Social Intelligence as a competence on its own and defines it as “the ability to connect to others in a deep and direct way, to sense and stimulate reactions and desired interactions”. In order to indicate the meaning of all the concepts used in the conceptual framework, a definition of each is presented below in Table 3.2. In addition, the descriptors of all the competencies (third layer) are presented in Appendix C.

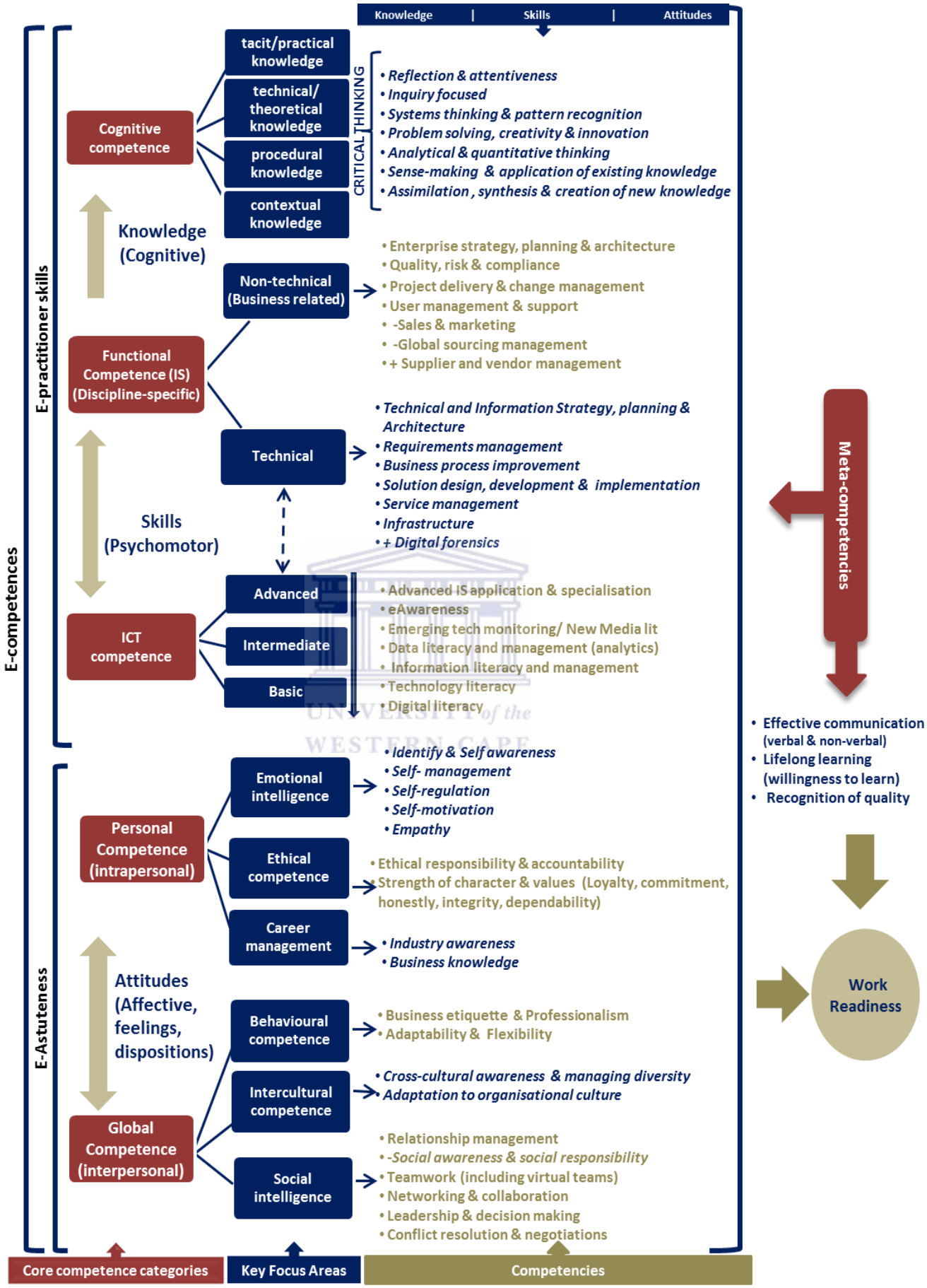

Figure 3.5: Conceptual Framework of e-Competences for IS graduates

Table 3.2: Key concepts used in the conceptual framework

Key concepts used in the conceptual framework		
Knowledge	Refers to the accumulation of facts, principles, theories and practices pertaining to a specific area of work or study from which meaning is derived through learning and the assimilation of information. In this study knowledge refers to the cognitive and functional competences involved in the acquisition, assimilation, synthesis and application of tacit/practical knowledge, technical/theoretical knowledge, procedural knowledge and contextual knowledge, in order to use and appropriate ICT, systems and digital media efficiently, in a particular context, to accomplish a particular goal.	Ala-Mutka (2011), CEN (2010) and Bohlinger (2008)
Cognitive Competence	Refers to knowledge and intellectual ability, which involves the use of theoretical concepts and informal tacit knowledge gained experientially; thinking and devising solutions (problem-solving) and responses that go beyond what is rote and rule-based; the ability to think and act in an insightful and innovative way; to access, select and critically evaluate information in order to assimilate knowledge	Daviesm, Fidler & Gorbis (2011); Ferrari et al. (2012); Griesel & Parker (2009); Sultana (2009); Winterton, Delamare-Le Deist & Stringfellow (2005)
Tacit/ practical knowledge	In the definition of knowledge, tacit and practical knowledge refers to the specific functional competences	Winterton (2001)
Technical/ theoretical knowledge	In the definition of knowledge technical and theoretical knowledge represents the underlying principles and theories	Winterton (2001)
Procedural knowledge	In the definition of knowledge procedural knowledge involves the how, what and when of routine work tasks.	Winterton (2001)
Contextual knowledge	In the definition of knowledge, contextual knowledge refers to the background knowledge that is specific to the organisation and sector in which the manager operates.	Winterton (2001)
Skills	Refers to the ability to *apply* knowledge and "know-how" with accuracy and speed in order to complete particular tasks and solve problems. In this study, skills refer to the observable physical ability to adequately apply functional and technical knowledge in order to utilise and appropriate ICT, systems and digital media with accuracy, speed and aptitude, in a particular context.	CEN (2010), Bohlinger (2008) and Winterton et al. (2005)
Functional Competence	Relates to the skills and know-how; things that a person is expected to do when functioning in a given area of work, learning or social activity; refers to the domain specific or subject specific competences, which includes functional and cognitive competences.	(Winterton, Delamare-Le Deist & Stringfellow, 2005; Sultana, 2009)
Non-technical	those skills that require the usage of computers to solve problems and address social and organisational matters in an effective, productive and responsible manner. These may include problem solving skills, critical thinking, information handling, ICT planning, information security as well as social responsibility	(Maneschijn, Botha & Van Biljon, 2013)
Technical	skills, which pertain to those skills that require the usage of computers to solve problems and address	(Maneschijn, Botha & Van Biljon, 2013)

	social and organisational matters in an effective, productive and responsible manner. These non-technical skills are divided into problem solving skills, critical thinking, information handling, ICT planning as well as social responsibility.	
ICT Competence	Digital literacy involving the exploration of new technological contexts in a flexible and responsible way; the safe and critical use of technologies in a networked society for work, leisure and communication	(Castillo-Chavez et al., in press; Ferrari, 2012)
Basic ICT skills	This category refers to basic being able to use basic ICT tools for basic tasks and learning	(López-Bassols, 2002)
Intermediate ICT skills	This category refers to being able to apply general ICT tools in non-ICT workplaces	(López-Bassols, 2002)
Advanced ICT skills	This category of ICT skills include all the capabilities that involve the usage of digital ICT skills to organise, present or share information.	(López-Bassols, 2002; Maneschijn, Botha & Van Biljon, 2013)
Attitudes	refer to the way people think and their motivations for acting, and therefore attitudes shape people's activities in digital environments. Some of these attitudes are often considered integral to the application of skills. In this study, attitudes refer to the correct mindset and openness to continuously learn and engage with fast changing and constantly evolving ICT, systems and digital media, which includes having a suitable combination of emotional, ethical, behavioural, intercultural (diversity) and social awareness and dispositions in order to effectively engage with and integrate ICT, systems and digital media into social lives and environments	(Ala-Mutka, 2011)
Personal (intrapersonal) Competence	Describes the willingness and ability of an individual, to understand, analyse and judge the development chances, requirements and limitations in one's family, job and social life, to develop one's own skills as well as to decide on and develop life plans. It refers to knowing how to conduct oneself in any situation and includes personal characteristics like independence, critical abilities, self-confidence, reliability, responsibility and awareness of duty, as well as professional and ethical values.	(Cheetham & Chivers, 1998; Winterton, Delamare-Le Deist & Stringfellow, 2005; Sultana, 2009)
Emotional competence	Consciousness of one's own feelings and emotions as well as others'; being able to regulate and control one's emotions; sensitivity to others' emotions and awareness of the effects of emotions; managing our own and others' emotions well. Comprises of self-awareness, self-regulation, motivation, empathy and social skills.	(Goleman, 1998; Smith, 2002; Yorke & Knight, 2004; Brüssow, 2007; Cleary et al., 2007; Pool & Sewell, 2007; Andrews & Higson, 2008; Boyatzis, 2008)
Ethical Competence	Refers to the possession of appropriate personal and professional values and having the ability to make sound judgements based upon these values in work-related situations; interacting with ICT in a responsible way	(Winterton, Delamare-Le Deist & Stringfellow, 2005; Sultana, 2009; Ala-Mutka, 2011)
Career Management	Refers to the ability to build one's career by intentionally managing the interaction of work, learning and all other aspects of one's life. It includes the abilities required to	(Bridgstock, 2009; Bezuidenhout, 2011)

	proactively navigate the working world based on attributes such as lifelong learning and adaptability and comprises of a combination of self-management skills and career building skills.	
Global (interpersonal) competence	This area was adapted from the INSEAD eLab Skills Pyramid where they coin the term Global Knowledge Economy Talents (GKE). It refers to those skills that are required to lead and manage multi-cultural teams, to work in virtual teams, and to address, anticipate and steer change. These skills are critical for innovation and addressing new challenges and issues. In the conceptual framework Global competence encapsulates all skills that have an outward focus (interpersonal) and relating to interaction with stakeholders and colleagues. Behavioural, social and intercultural aspects are grouped within global competence, in this framework.	(Lanvin & Fonstad, 2010)
Behavioural Competence	Refers to how an activity or situation is approached. Behavioural competencies differ from skills, as in how to perform a task and they also differ from knowledge as in knowing the solution to a Maths problem. Instead, they refer to the specific attributes that distinguish an exceptional performance from a mediocre performance. Some regard behavioural competence as internal and thus refer to it as personal competences. This study saw behavioural competence as impacting society and the immediate environment, thus interpersonal. Hence it has been grouped with Global competence.	(Cheetham & Chivers, 1998; McInnes Cooper, 2010; "A guide to behavioural competencies", 2011)
Intercultural Competence	Since different cultural contexts influence how competence is understood, cultural competency here refers to the ability of one to operate in different cultural settings. It is important to consider group identities such as race, gender and class in the holistic view of competence development.	(Castillo-Chavez et al., in press; Winterton, Delamare-Le Deist & Stringfellow, 2005; Davies, Fidler & Gorbis, 2011)
Social competence	Refers to the willingness and ability to connect with people in a deep and direct way, to sense and stimulate reactions and desired interactions. Socially intelligent employees have the ability to quickly assess the emotions of those around them and adapt their words, tone and gestures accordingly to foster strong relationship building	Mitrovic, Taylor, Sharif, Claassen & Wesso (2013); Daviesm, Fidler & Gorbis (2011)
Meta-competencies	Refers to higher order abilities which relates to an individual's intellectual knowledge about their own strengths and weaknesses; the recognition of and acquisition of skills that one does not have and the ability to apply appropriate skills and knowledge in various situations;	(Winterton, 2001; Winterton, Delamare-Le Deist & Stringfellow, 2005; Romani, 2009; Bezuidenhout, 2011)

3.6 SUMMARY

This chapter examined the e-skills and e-competencies that are expected to be included in higher education curricula, by examining literature frameworks pertaining to all related ICT skills as well as examining literature about employer expectations. These demands for e-competencies led to the development of a conceptual framework which was used to discuss and interpret the empirical findings in Chapter 5. The research methodology chapter is presented next.

CHAPTER 4
RESEARCH METHODOLOGY

4.1 INTRODUCTION

The previous chapter discussed literature pertaining to the demand and supply of e-competencies and arrived at a conceptual framework which was used to examine the e-competencies required by prospective IS employers in Chapter 5. This chapter provides a detailed explanation and justification of the research methodology process followed. It begins with re-stating the aims and objectives as well as the main and sub-questions of the study in order to align the chosen design to the initial purpose of the study. Thereafter, a discussion and explanation of the selected research approach, research design and research methods used, are provided. The chapter concludes with a summary of what was discussed.

4.2 AIMS AND OBJECTIVES OF THE STUDY

Based on the evidence of the skills gap and mismatch in the ICT industry that was identified in the problem statement in Section 1.2, the study had the following two aims:

- To determine *how* closely the e-competencies provided by the Information Systems curriculum at University X are matched to the e-competencies required by potential Information Systems employers in the Western Cape; and
- If there is a disparity, to determine how the Information Systems curriculum can be aligned as closely as possible to meet the expectations of potential Information Systems employers in the Western Cape.

Using the above aims as guidelines, the study built on existing knowledge by examining initiatives and benchmarks found in the literature on e-skills and e-competencies in order to arrive at the following two objectives:

1. To develop a conceptual framework that could be used to assess the e-competencies required by potential employers in order to determine the gaps in the IS curriculum of University X; and
2. To use the conceptual framework as a guide so that the curriculum at University X could be aligned to provide graduates with the necessary e-competencies required by potential employers in the Western Cape.

4.3 MAIN RESEARCH QUESTION AND SUB QUESTIONS

In order to address the research problem, the following main question was formulated:

How closely are the e-competencies provided in the Information Systems curriculum at University X aligned with the e-competencies required by potential Information Systems employers in the Western Cape?

Three sub-questions were used to guide the data collection and analysis processes, namely:

1. Which e-competencies are required by potential Information Systems employers in the Western Cape?
2. Which of these e-competencies are included in the Information Systems curriculum at University X?
3. How could the Information Systems curriculum at University X be designed so that it is aligned to meet the required e-competencies of potential Information Systems employers in the Western Cape?

4.3.1 SITUATING THE STUDY WITHIN AN INTERPRETIVE QUALITATIVE PARADIGM

Research is defined as a process that people undertake to find out things, in a systematic manner, in order to increase their knowledge (Saunders, Lewis & Thornhill, 2009). However, there are varying views of what research actually entails, *how* it adds to existing knowledge and *how* it should be carried out, across the various disciplines. Research is therefore "based on some underlying assumptions about what constitutes 'valid' research and which research methods are appropriate" (Myers, 1997:3). When undertaking research it is important to consider a research *paradigm*, which relates to the parameters that describe perceptions, beliefs, assumptions and the nature of truth and reality, since all these aspects can affect the way the research is conducted (Flowers, 2006). According to Krauss and Putra (2005), it is important for a researcher to indicate *philosophical assumptions* or *a theoretical paradigm* about the nature of reality, since this is the identification of the underlying basis used to construct the scientific investigation. This is crucial in order to understand the rationale behind the overall design and approach of the research study (Krauss & Putra, 2005). As a model for observation and understanding what researchers observe and how they

understand it (Babbie, 2011), paradigms essentially guide the decisions researchers make while designing and carrying out the research.

The term 'paradigm' is often confused within literature due to the assignment of multiple meanings. Some refer to it as philosophical assumptions/perspectives (Krauss & Putra, 2005; Myers, 1997), research philosophies (Saunders, Lewis & Thornhill, 2009), theoretical paradigms/ views (Creswell et al., 2007; Krauss & Putra, 2005) or world views (Creswell, 2014; Guba & Lincoln, 1994; Healy & Perry, 2000). The classic definition of the term was coined by Kuhn (1970:viii) "as universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners". Although the term has been re-defined by Burrell and Morgan (1979), some relevant descriptions are that a paradigm is "[t]he most fundamental set of assumptions adopted by a professional community that allows its members to share similar perceptions and engage in commonly shared practices" (Hirschheim & Klein, 1989:1201). Furthermore, that "a paradigm is a way of examining social phenomena from which particular understandings of these phenomena can be gained and explanations attempted" (Saunders et al., 2009:118). Therefore, a paradigm is basically a way of looking at the world through a particular lens, which is the predefined set of assumptions shared by a community of scientists.

The beliefs that researchers hold, due to these theoretical structures, "often lead to embracing a qualitative, quantitative or mixed methods approach to their research" (Creswell 2014:6). It follows then that each paradigm can use either qualitative or quantitative data (Scotland, 2012). Some claim that the qualitative research approach is governed primarily by positivism, postpositivism, critical theory and constructivism (Guba & Lincoln, 1994), while others have added realism (Healy & Perry, 2000) and associated pragmatism and transformative paradigm (Creswell, 2014) with qualitative research.

Each paradigm is based on its own philosophical assumptions relating to five key concepts, namely the science of how we know what we know (epistemology), the nature of reality (ontology), the science of discovering things in scientific investigations (methodology), the specific techniques and activities that are used to carry out the chosen methodology

(methods) and what is valued (axiology), which often differs across disciplines (Mingers, 2001; Creswell et al., 2007; Scotland, 2012). These terms are defined below:

Table 4.1: Definitions of key philosophical concepts based on literature reviewed

Concept	Definition	Source
Epistemology	Being concerned with the nature and form of knowledge, epistemological assumptions relate to *how* knowledge is created, acquired and communicated. It can therefore be defined as the science of knowing or a system of *how we know what we know.*	(Babbie 2011; Creswell et al. 2007; Scotland 2012)
Ontology	The nature of reality that is concerned with how things really are and how things really work. It therefore relates to *what is* and pertains to the physical, social and technical world surrounding information systems.	(Hirschheim & Klein, 1989; Creswell et al., 2007; Scotland, 2012)
Axiology	The researcher's view of the role of values in research	(Mingers, 2001; Creswell et al., 2007; Saunders, Lewis & Thornhill, 2009)

In the IS discipline, a general shift in research studies from investigating technological issues to managerial and organisational issues, has resulted in increased application of qualitative research methods (Myers, 1997). In addition, Mingers (2001) argues that the pervasive and fundamental nature of IS in society means that the discipline is linked to a wide range of other disciplines, which supports the use of multiple paradigms to draw the most information analyses. Saunders et al. (2009:121) discuss Burke (2007)'s examination of the most relevant and useful research paradigms for IS management research. They state that "…although there were possibilities of usefulness in different contexts … the interpretive [research paradigm] is the most useful and the one that will give the richest results". Similarly, Orlikowski and Baroudi (1991) examined one hundred and fifty five (155) IS research articles and posit that the dominant philosophical perspectives in IS are positivist, interpretive and critical.

The research question and sub-questions were qualitative in nature, thus making this study appropriate for an interpretive, qualitative research approach. Fundamentally, research involves finding answers to questions and developing hypotheses in order to better understand the world we live in and our environment (Hancock & Algozzine, 2011). The research *approach* must be appropriate to the research questions that the researcher is interested in answering (Silverman, 2013). Cropley and Harris (2004) distinguish between

qualitative methodologies that focus more on understanding and describing the nature of a complex system, rather than quantifying the associated characteristics or factors involved. Krauss and Putra (2006: 764) stipulate that "[t]he goal of a qualitative investigation is to understand the complex world of human experience and behaviour from the point-of-view of those involved in the situation of interest." This study, emanating from a social science discipline, aims to gain an understanding of a complex social and cultural phenomenon, which is the current skills and competence mismatch in the SA labour market and involves the e-competence requirements of potential employers when employing IS graduates.

Furthermore, the distinction between which method to use often depends on whether open-ended (qualitative) or closed-ended (quantitative) questions will be used in the collection of data and whether words (qualitative) or numbers (quantitative) will be used to describe the findings (Creswell 2014). In addition, Hancock and Algozzine (2011) differentiates that qualitative researchers use words to describe trends and patterns in the research setting, while numbers, in the form of statistics, are used by quantitative researchers in order to describe phenomena.

Despite the differences between qualitative and quantitative research, qualitative research can be assessed with the same broad criteria used to assess quantitative research but in a different way (Malterud, 2001). In the discussion of the e-competence demand in Chapter 3, prior studies were mentioned that used quantitative means to establish the gap between the skills supplied and demanded (Griesel & Parker, 2009; Noll & Wilkins, 2002). These studies do not provide sufficient discussion of the underlying motivation and perceptions of employers when seeking to employ IS graduates and what specific competencies employers required from IS graduates. Thus, this study is situated in a qualitative research paradigm to add to the existing literature because it attempted to gain a thorough understanding of the perceptions and underlying motivations of employers when selecting and retaining IS graduates for employment.

4.3.2 Critique of qualitative research

In the process of choosing the most suitable research approach for this study, it is important to also consider the criticisms that are levelled against qualitative research. The most widely

published areas of critique revolve around the *reliability* and *validity* of qualitative research studies which are elements that contribute to the quality of the qualitative research study (Seale, 1999; Wahyuni, 2012). Further areas of critique, according to Cropley and Harris (2004), are (a) *arbitrariness*, which refers to the dependence that the qualitative research has on the creative thoughts and ideas of the researcher, in the planning of the research design. They further mention (b) a *lack of proof,* as a second area of weakness, which arises due to the lack of statistical or objective methods and (c) that qualitative research can also be criticised on the basis of *banality* if it repeats what common knowledge already explains (Cropley & Harris, 2004).

To counter this critique, the advocates of qualitative research highlight that the absence of the traditional measures of validity and reliability, often associated with quantitative research, must not be loosely translated into the absence of reliability and validity in the findings of qualitative research (Silverman, 1993). Babbie and Mouton (2009) and Yin (2009) suggest that there should be differentiation in how one views notions of objectivity between quantitative and qualitative researches. Babbie and Mouton (2009:275) add: "[w]hen enhancing validity and reliability in the qualitative paradigm we would be more concerned with triangulation, writing extensive field notes, member checks, peer review, reasoned consensus, audit trail, etc.". Therefore, qualitative researchers can overcome the challenges by ensuring that the data is triangulated, and that discussions and interpretations are supported by empirical evidence and sound theories (Babbie & Mouton, 2009; Flick, 2009; Wahyuni, 2012). The researcher attempted to follow this advice in this study by ensuring that the qualitative data was triangulated with the quantitative data and all discussions and interpretations in the data analysis chapter (Chapter 5) were supported by evidence from the literature in Chapter 2 and 3.

4.4 RATIONALE FOR A CASE STUDY RESEARCH DESIGN

Whether qualitatively or quantitatively driven, research designs are specific techniques and procedures that are used to collect and analyse data (Scotland, 2012). Research designs used in qualitative studies are typically action research, ethnography or case study (Myers, 1997). This study made use of a case study design which leaves room for both phenomenological (qualitative) and positivistic (quantitative) research methods (Yin, 2009).

A case study design allows for multiple sources of evidence and methods of data collection to be used (Benbasat et al., 1987; Stake, 2006; Yin, 2009). Similarly, Benbasat, Goldstein and Mead (1987:370) offer three reasons why a case study research design is viable for Information Systems studies. Firstly, it allows the researcher to study the information system in a natural setting and generate theories into practice. Secondly, it allows the researcher to answer the "why" and "how" questions related to the nature and complexity of the process taking place. Lastly, the case approach is appropriate to research an area that is fairly new and where few previous studies have been carried out. Benbasat et al. (1987) favour the use of idiographic (often qualitative) rather than nomothetic (often quantitative) research strategies in Information Systems. Since then, researchers such as Babbie and Mouton (2009, 2011), Creswell (2014), Stake (1996, 2006) and Yin (2009) all support the views of Benbasat et al. (1987). Applying these three reasons to this study has provided an understanding of the skills required by the individual organisations in the context of its environment and 'natural setting'. This allowed for a greater understanding of exactly what competences are required (relevance), at what level (adequacy) and the role that the student will play in the organisation, which requires them to have these specific competencies (relating to the how and why aspects). In addition, since the problem in this study involved human perceptions, such as attitudes, confidence levels and emotions, among others, it was deemed appropriate to use a case study research design. This assisted the researcher to understand complex social phenomena (Creswell, 2014, Stake, 2006, Yin, 2009) involved in this study.

As such, a case study design was used for this research because the investigation attempted to find answers to the research questions, in order to gain an understanding of the e-competence mismatch of IS graduates which has not been fully understood or explored in the University X environment before. In particular, it wanted to identify which competencies potential IS/IT employers evaluate graduates on, the e-competencies that were demanded and supplied in the current context of University X's curriculum, and which factors should be considered to match the curriculum to industry's e-competences and e-skills' requirements.

4.4.1 Challenges of the case study design

It is generally argued that case study research is complex and as a result of this, challenges arise (Baxter & Jack, 2008; Lewis & Ritchie, 2003; Stake, 2006). Baxter and Jack (2008) and Creswell (2007) outline three challenges that researchers using case studies might face, namely: the identification of a case, number of cases to be studied, and deciding on the boundaries of the case. The identification of a case, according to Baxter and Jack (2008), is not an easy task but challenging for both experienced and novice researchers. They further explain that the case is basically the unit of analysis and determining this unit is dependent on the questions the researcher wishes to answer (Baxter & Jack, 2008). Thus, this study's research questions guided the researcher to select the unit of analysis, which were the supervisors of the internship host organisations. With the supervisors representing the need of industry, it ensured that the findings are reliable and valid.

Challenge number two has to do with the identification of a single or multiple cases and this could, therefore, be problematic. Creswell (2007:76) provides motivation for a single case study stating that, where an in-depth analyses is desired, "[t]he study of more than one case dilutes the overall analysis and the more cases an individual studies, the less depth is obtained". A single case study was deemed appropriate because rich and in-depth descriptions were central to this study.

The last challenge relates to the boundaries of a case or cases. Creswell (2007) suggests that in a research project there might be several potential aspects related to a case which may be seen as worthy to be included, but the problem is that such an inclusion could result in long and lengthy data collection processes which may or may not be useful. To avoid this problem, Baxter and Jack (2008:546) suggest that researchers need to "bind a case" by situating the case (i) by time and place, (ii) time and activity, and (iii) by definition and context, to ensure that the study remains within the research scope. The researcher attempted to strengthen reliability and validity by having a defined unit of analysis, a specific timeframe in which the data was collected, and an explanation of the research site, the research participants, the data collection instruments, and the data analysis process.

4.5 THE RESEARCH METHODOLOGY

Referred to as the science of *finding out*, a research methodology is a strategy that describes the actions taken during the research process in order to determine the *why, what, from where, when* and *how* questions pertaining to the collection and analysis of data (Babbie, 2011; Scotland, 2012). The research process is depicted diagrammatically below in Figure 4.1. The study adopted deductive reasoning, in a phased yet iterative approach. A deductive approach, which is initiated by a "why" question, moves from the general to the specific, taking a theoretical pattern and testing whether the pattern occurs within a context (Babbie, 2010). With the theoretical understanding of the mismatch in the supply and demand of e-skills, the study tested the literature in the empirical research and then used the empirical research findings to feed back into adjusting the design of the conceptual framework before analysing the curriculum**.** Figure 4.1 below illustrates the phases and the path of discovery that this research followed.

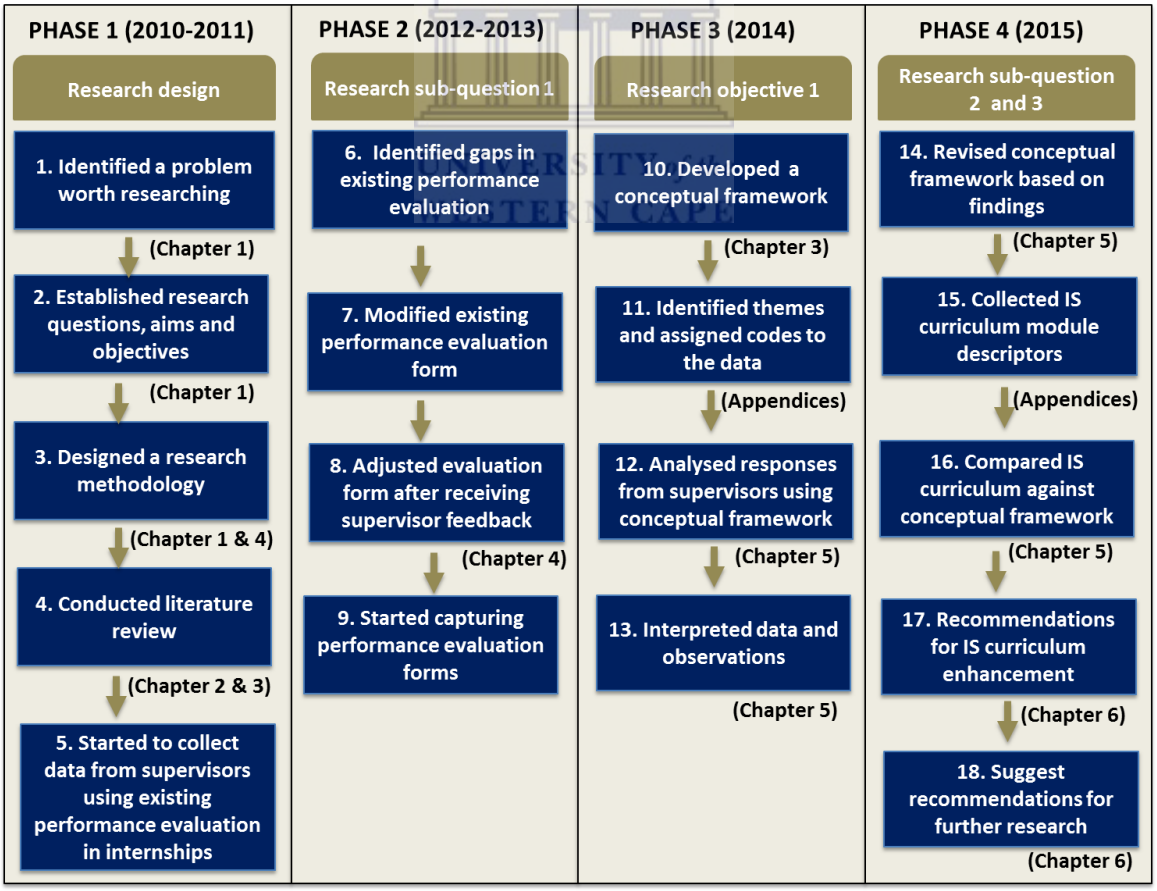

Figure 4.1: Research process undertaken

Phase 1: After the problem statement was established, research questions and objectives were defined, which led to a preliminary investigation of literature on research methodologies and paradigms. This phase culminated in a road map, which guided the rest of the study. The study used a postgraduate internship programme to collect data (as will be discussed in Section 4.5.1). This meant that there was an existing *performance evaluation form* available and this was used to collect data since Phase 1 (2010).

Phase 2: After deconstructing the study topic and understanding all the constructs that impacted on and were impacted by the topic, an extensive examination of the current literature was conducted for the main constructs. A number of frameworks were analysed from the literature (Section 2.3) in order to identify a model or framework that was most relevant to this study. Some gaps were identified in the existing *performance evaluation form*. Changes were made and the performance evaluations forms were improved. The SFIA was initially included in the performance evaluation form but feedback from supervisors indicated that it was too complex and lengthy. This caused further adjustments to the data collection process.

Phase 3: It also became apparent that the SFIA was not holistically suitable for this study because of various reasons (discussed in Section 3.5.2). It was then decided to omit the SFIA from the data analysis and to rather develop a conceptual framework to test the data emanating from this study, which included relevant knowledge obtained from all the literature. Some gaps were identified and the conceptual framework was adjusted to reflect the demand expressed by the research sample (internship supervisors). Thereafter, the IS curriculum was assessed against the conceptual framework. This was done by collecting the module descriptors for all registered modules, both undergraduate and postgraduate, in the IS curriculum offering.

Phase 4: Based on the insights emanating from the data analysis process, recommendations were made to inform and align the IS curriculum. Suggestions were also made for further research.

4.5.1 Research site

Twenty two (22) IS graduate employers in the Western Cape Province with whom the IS department at University X has a working relationship, were used as the research site for this study. These organisations, who hosted a total of 83 postgraduate (honours) students over a period of 5 years, from 2010 until 2014, have been selected due to their existing participation in the IS department's annual internship programme. The internship programme is an optional 6 month period of intense work-integrated learning (WIL) where students in the Honours level, hereafter referred to as interns, work at participating host organisations. In order to ensure anonymity and confidentiality, the organisations' names were replaced with an alphabetical letter, as indicated in Table 4.2 below. The industries represented by the participating organisations, are illustrated in Figure 4.2 below. Table 4.2 indicates the core function/work area of expertise for each host company while Figure 4.2 shows the groupings of these host companies per industry.

Table 4.2: Breakdown of host organisations by business type (2010-2014)

Organisation	Type of business
Company A	Management consulting, technology and outsourcing
Company B	IT infrastructure services & technology solutions
Company C	Research consulting
Company D	IT consulting and software development
Company E	Digital solutions
Company F	IT consulting and software development
Company H	Petroleum
Company I	ICT services
Company J	IT Auditing
Company K	Financial Services
Company L	Financial Services
Company M	IT Auditing
Company N	Digital solutions
Company O	Mobile marketing
Company P	Digital solutions
Company Q	Business solutions (SAGE)
Company R	Government
Company S	IT/SAP consulting
Company T	Petroleum
Company U	Consumer goods: Fashion
Company V	Process, Project and Change Management
Company W	Financial Services

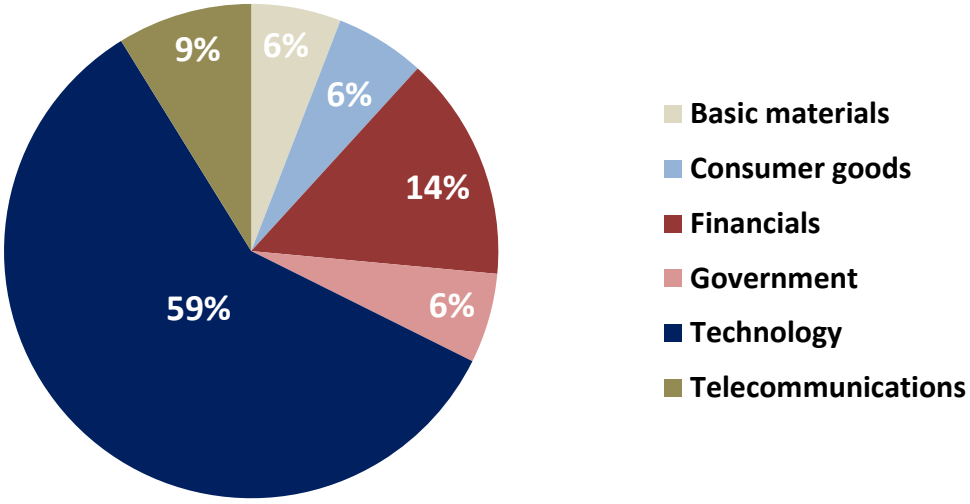

Figure 4.2: Breakdown of host organisations by industry (2010-2014)

While these companies differ in size, industry and function, what they do have in common is that they are all potential employers of IS graduates and have been participating host companies in the IS Honours Internship Programme at various times, between 2010 and 2014.

A supervisor[4] is provided for each intern. The supervisors are IS practitioners and managers who also act as mentors for the interns thereby making the overall learning experience for meaningful for the interns. They are expected to become fully immersed and integrated into the work environment and culture at the host organisation in order to get a real lived perspective of the working world. Work that interns are required to perform spans across all the functional areas of the organisation. The assigned supervisor liaised with the internship co-ordinator at University X on a regular basis and provided two official performance evaluations of the interns. Goals and expectations were discussed with the supervisor and the intern at the start of the internship so each assessment ended with the supervisor providing feedback of progress to the intern. One assessment is completed a few weeks after the start of the internship and the other is done near the middle of the internship, in order to determine if there was an improvement or change in performance since the first feedback

[4] The supervisor and mentor can be the same person or two different people. Some organisations appointed more than one supervisor or mentor for each intern. Hereafter this person is referred to as the supervisor.

was provided. These internships form part of the honours student's academic performance and in combination with other practical and research assignments, the supervisor assessments contribute to the student's final performance evaluation.

4.5.2 Research participants

A non-probability, convenient sampling, also referred to as a deliberate sampling strategy (Kothari, 2004) was selected for this study. Convenience sampling, which entails the researcher choosing the sample based on the availability and ease of access to respondents, is reported to be the most common form of qualitative sampling (Coyne, 1997; Dongre et al., 2009; Latham, 2007; Ritchie & Lewis, 2003). Coyne (1997:627) further indicates that all sampling in qualitative research is purposeful since care is taken in "selecting information-rich cases, that is, cases that are selected purposefully to fit the study". This type of sampling was deemed most suitable because the study chose to use the supervisors from the twenty two host organisations, who supervised and mentored the 83 registered IS Honours students who worked at these host organisations over during the five year period (2010-2014) as research participants. The rationale for this decision was to gain a deep understanding of the context and underlying issues related to the e-competence demand of employers. It was deemed necessary that the employers being questioned should have employed University X IS graduates for a suitable length of time. The internship provided companies with a 6 month period of working with the IS graduates, which meant that their responses met validity and reliability criteria because their responses in the performance evaluation forms and follow-up interviews for each year were compared and triangulated across the five year period. A breakdown of how many interns per organisation per year is presented in Table 4.3 below.

Table 4.3: Interns per organisation per year (2010 – 2014)

Organisation	Year 1 - 2010	Year 2 - 2011	Year 3 - 2012	Year 4 - 2013	Year 5 - 2014	Total interns per organisation
Organisation A	3	5	5	2	2	**17**
Organisation B	5	5				**10**
Organisation C	2	2				**4**
Organisation D	1	1		1		**3**
Organisation E	1					**1**
Organisation F		1				**1**
Organisation H		1				**1**
Organisation I		1				**1**
Organisation J		1				**1**
Organisation K		2				**2**
Organisation L		2				**2**
Organisation M			1	2		**3**
Organisation N			1	1		**2**
Organisation O			1			**1**
Organisation P			1			**1**
Organisation Q				2	2	**4**
Organisation R				8	2	**10**
Organisation S				2		**2**
Organisation T					13	**13**
Organisation U					1	**1**
Organisation V					1	**1**
Organisation W					2	**2**
Total interns per year	**12**	**21**	**9**	**18**	**23**	**83**

4.5.3 Data collection instruments

Two data collection sets were used to collect the data. The first instrument produced the first and second data sets. These were the performance evaluation forms (these forms were used by the IS department at University X), which supervisors were required to complete twice (thereby providing two data sets per internship period), once at the start of the internship and again near the end of the internship. These performance evaluations were based on each intern's demonstration of e-skills and e-competence capabilities during the internship period. The form was modified in 2012 because there were gaps found that the literature pointed out should be included. As more knowledge was gained from the literature, the performance evaluation was improved to reflect more detailed competence evaluations.

The supervisors reflected on the performance of the interns and their reflections form part of the interns' final assessment mark at University X**.** The first section of the performance evaluation form was presented in a structured, tabular format. This was important due to the extensive list of competencies in the conceptual framework. Listing the competencies in a tabular format allowed for the many competencies to be presented in a structured manner that allowed the supervisors to reflect on the relevance of each, and then choose, add or omit e-competencies related to the specific intern and their particular work context. The rest of the questions in the remaining seven sections were left open ended in order to capture qualitative perspectives of the supervisors and to provide supervisors with the opportunity to add relevant competencies that were not already captured in the questionnaire. The performance evaluation comprised of 8 sections, as shown in the example provided in Appendix B.

Section 1: Asked supervisors to describe, in detail, the type of work that students carried out during the internship period. This section provided a detailed account of the functional areas that the interns were allocated to and what IS related work they performed in these areas. The questionnaire provided guidelines for supervisors to discuss the feedback within the headings of Analysis, Design, Development, Programming, Facilitation, Testing and Documentation. An open-ended section, referred to as "Other" was also provided for supervisors to specify if there were any additional or alternative work areas that the student was involved with. Furthermore, a part of this section also left room for supervisors to list and describe any tasks where the interns used their initiative, i.e. work that was not assigned to them but which they completed.

Section 2: Provided an extract from the SFIA framework, listing 70 e-skills using the lowest level or generic descriptions in shortened form, alongside the SFIA codes (for the researcher to be able to track it back original SFIA framework). The 8 proficiency levels were provided, with descriptors for each proficiency level provided in a separate sheet. This section was evidence-based so the interns were required to indicate which of the e-skills they felt applied to the work they were doing during the internship period and at which proficiency level they feel they were able to execute the selected competencies. The evidence is provided by the

students and the supervisors sign off or amend their selection after they discuss it with the interns.

Section 3: This section provides a list of abilities that the intern is expected to exhibit during the internship, based on previous input from host organisations. The supervisor is asked to evaluate the intern's performance in these competencies by selecting one of 5 ratings (from whether they did not meet expectations to whether they exceeded expectations). There was also an option to indicate if the particular competency was not applicable to the organisation or the scope of work that the student was performing. Furthermore, at the end of the table, supervisors were provided with space to append any other competencies that they thought were also relevant.

Section 4: Supervisors were asked to provide detailed feedback about what they perceived to be the strengths and areas for further development that the intern needed to focus on. This section was open and allowed the supervisors to write as much as they felt was relevant. It seemed as though the richest data came from this section as supervisors clearly articulated what they valued in the student cohort and where the gaps were found.

Section 5: This was also an open section that asked supervisors to add any e-skills that were not listed in the SFIA extract in Section 2 of the questionnaire. There were a number of additions, which will be discussed in Chapter 5.

Section 6: A table containing a mixture of competencies and values that appeared to be important to employers, from the preliminary search of the literature, was included in this section. This section asked organisation to rate each of the items on a scale of 1 to 5, where 1 is crucial to the employers and 5 is not applicable to the employer.

Section 7 and 8: These sections were completed by the interns. In Section 7 they were asked to reflect on their growth and to discuss their learning points. They could refer to the portfolio of evidence that they have to submit at the end of the internship. Section 8 allowed the interns to write any comments that they wanted to add to the feedback that the supervisor

had provided. These two sections were not discussed in Chapter 5 because it does not fall within the scope of the study.

The third data set was from the follow–up telephonic and face-to-face interviews, where needed, with the supervisors in order to clarify feedback provided in the performance evaluation forms. The follow-up interviews were beneficial due to the granular level of detail required in the questionnaires.

The benefit of using this approach embedded into the internship programmes, as opposed to a once off interview or questionnaire meant that the researcher gained an in-depth perspective of how companies perceive the e-competences of IS graduates at University X and this informed the way the supervisor's responses were understood, within context. In addition, it also afforded the researcher with the opportunity to collect sufficient data for triangulation purposes.

Data was collected in two stages during the second semester of each year (2010 until 2014). The first stage involved the collection of documents, frameworks, previous studies, and the IS curriculum course outlines at University X in 2010 and 2011, as well as the administration of the questionnaire and the performance assessment forms completed by the supervisors at the different host organisations.

Stage two covered the remaining three years (2012 – 2014). Changes were made to the data questionnaire in 2012. The SFIA framework was incorporated into the performance evaluations in order determine which e-skills supervisors. The existing performance assessment contained gaps and did not have many e-skills and e-competences. There were further limitations identified with the SFIA (as discussed in Section 3.5.2) and in the end the conceptual framework was developed and used to analyse the data.

At the end of the 5 year period, twenty data sets were collected with four data sets per year, namely: the two performance evaluation forms, follow-up interview responses, and the IS curriculum at University X.

4.5.4 Data analysis

The data gathered was both quantitative and qualitative. Sections 2, 3 and 8 in the performance evaluation form were quantitative in nature and the analysis of the responses is provided in graphs in Appendix D.

The remaining sections in the performance evaluation form were qualitative in nature as well as the responses from the follow-up interviews. These responses were analysed through content analysis, which is a three stage open coding process, following Creswell (2013), Henning (2004) and Neuman (1997).

Stage one involved a general reading of all the responses in order to get a sense of what the supervisors were communicating. Thereafter each performance evaluation and interview response was manually captured onto Excel spreadsheets. Once all the data was captured, the data was checked and verified by the researcher and a research assistant, for accuracy and completeness.

Stage two involved a further, in-depth reading of the captured spreadsheets, in order to identify categories and themes, which then led to the consolidation of the data so that there were five data files, one for each year. One workbook was created for each year's responses and within each year, one worksheet captured the responses for each section of the performance evaluation, and a separate worksheet captured the responses from the follow-up interviews.

Stage three of the open-coding process involved linking the data to the conceptual framework, which meant coding the data according to the six Core Competence Categories in the conceptual framework (for example Meta-competencies were coded as MC, Cognitive Competences were coded as CC, etc. as in the List of Abbreviations), on five new Excel spreadsheets. Each line of response from the supervisors was read, after which themes and codes were assigned to all relevant competencies. This allowed for filtering and sorting of the data later on in the process and it also ensured that the data was suitable to be used in Pivot Tables, a data analytics function provided by Ms Excel, which provides different views of the data, depending on criteria selected.

Due to many factors, (especially the complexity of the data) there were a number of iterations in the process, which meant that the data was rechecked by the researcher and her research assistant, and verified by one of the researcher's supervisors. Copies of the data analysis process (Excel spread sheets) are provided as Appendix F.

The IS module descriptors which described the curriculum followed per year, from first year to Hons level were data set number 5. The module descriptors were obtained from the academic calendar of University X's IS department and the content thereof is presented in tabular form in Table 5.2.

4.6 SUMMARY

This chapter provided a detailed description of the research process and design used to undertake this study, and provided justification for the rationale that motivated the chosen strategies and decisions. Working with the qualitative data of 5 years was found to be challenging because the validity and reliability of the data needed to be ensured every step of the process. This was confounded by the fact that the data collection tool preceded the development of the conceptual framework. However, this did not alter the objectives or validity of the study. The research methodology process provided great insight about research and sparked a desire to continue researching phenomenon of interest. The discussion now moves to Chapter 5, where the data is analysed, discussed and interpreted.

CHAPTER 5
ANALYSIS AND INTERPRETATION OF DATA

5.1 INTRODUCTION

In this chapter, the empirical data is analysed and interpreted using the conceptual framework. This is done by addressing the research questions and then discussing relevant data using the 6 Core Competence Categories of the conceptual framework, as indicated in Figure 3.5. Throughout the chapter, the findings are linked to the literature reviewed in order to triangulate the data. The chapter concludes with a synthesis of the analysis and discussions.

5.2 E-COMPETENCIES REQUIRED BY POTENTIAL IS EMPLOYERS

This section analyses the responses of the internship supervisors using the conceptual framework. Under each category, the data derived from the questionnaires and follow up interviews are discussed, with regards to Knowledge, Skills and Attitudes (KSA). The conceptual framework posits a vertical and horizontal view of the knowledge (cognitive), skills (psychomotor) and attitude (affective) components of e-competence so the discussions in this chapter take the same format. Therefore, this chapter discusses the conceptual framework from a horizontal and vertical KSA perspective.

Only the data corresponding with the conceptual framework will be presented in the discussion. To avoid repetition, organisations are coded alphanumerically. For example, in order to indicate a response from the supervisor at Organisation A in 2014, the code A-2014 will be used. In the instances where data was consistent across the 5 years these cases, it was consolidated and discussed once. Bezuidenhout (2011:61) submits that there are a number of other constructs, such as “optimism, propensity to learn, openness, internal locus of control, and generalized self-efficacy” that combine cognitively and affectively within an individual to help them optimise work opportunities. Therefore, understanding the functional work and tasks that interns were required to perform at the various organisations provided a good indication of the competencies embedded in those tasks, and this assisted in identifying the competencies that employers require. It should be noted that the qualitative data is discussed first in Section A and the quantitative data thereafter, in Section B.

5.2.1 Qualitative Data Analysis

5.2.1.1 Cognitive Competence (Knowledge)

In the definition of e-competence (CEN, 2013) and in the conceptual framework, cognitive competence relates to the "knowledge" aspect, which is realised through critical thinking.

Knowledge component of e-competence

Supervisors had mixed responses about the cognitive component of ***reflection and attentiveness*** during the internship. M-2013 expressed that *"[the intern] cannot identify and articulate reportable items"* indicating that the intern lacked the cognition that is required to filter and evaluate information. A-2012 similarly commented that the intern *"…needs to work on paying more attention to detail on his work especially communication with the stakeholders"*, indicating that the lack of attentiveness (cognitive aspect) affected the quality of the communication and work that he was delivering (psychomotor aspect). Pertaining to being ***inquiry focused***, R-2014 held that interns lacked a firm understanding of *"research methodology"*. It also appeared that interns at W-2014 lacked the knowledge related to performing "secondary research".

For ***systems thinking and pattern recognition***, A-2011 and B-2011 indicated that interns performed well in *"providing trend analysis for calls [system issues] logged and resolved"* and *"trending on resolved incident data, which was easily picked up after the first training session"*, respectively. These tasks required interns to identify patterns emerging from the call logs and produce periodic reports indicating insights discovered. If this report is to be insightful then the intern must view the calls logged through a systems thinking viewpoint in order to identify emerging patterns, foresee problematic areas and identify areas of impact, which some interns seemed to do well. For ***problem solving, creativity and innovation*** in the context of solution development, the data supported the findings of Andrews and Higson (2010), indicating that organisations want graduates to *"think outside the box"*. This relates to the cognitive aspect of creative and innovative problem solving. It was significant that many organisations expressed a need for lateral and logical thinking, stating that these and the ability to reason were found to be deficient in the interns' academic training. Notwithstanding these gaps, an intern at Q-2014 was appraised for *"exploring other options and not just one*

solution". In ***analysis and quantitative thinking***, C-2011 was pleased that the intern *"understood the concepts of analysis and how they should be applied"*. Analysis, in terms of the cognitive component, seemed to be a strength for many interns. In terms of knowledge related to ***sense-making and the application of existing knowledge***, B-2010 indicated that the intern was able to successfully *"understand and implement business and system concepts to issues at hand"*. Conversely, A-2010 indicated that their intern *"struggled to align theory to the practical processes being applied to the unit"*. The first example is evidence that the intern possessed the cognitive and psychomotor aspects required as opposed to the second example. The fact that these were two opposing reviews received from the same cohort of interns might suggest that attention should also be afforded to the factors that influence how interns process and apply knowledge.

In terms of the ***assimilation, synthesis and creation of new knowledge***, it appeared that supervisors valued speed and commented positively on *rapid* learning. T-2014 reported that the intern "*absorbs information at a fast rate and applies himself well to the tasks at hand",* indicating that the intern's cognitive strength supported his application of the psychomotor capacity. Some other comments supporting this observation were: *"she is able to grasp/comprehend instructions the first time around"* (M-2012); *"ability to learn quickly and to diversify"* (M-2012); *"pickup new software very quickly"* (A-2012); "*he absorbs technical information quickly* (A-2013); and "s*he has the ability to understand concepts quickly* (A-2010). While there were overall mixed responses, most of the feedback related to the interns demonstrating the cognitive strength of learning new technology or firm-specific knowledge quickly. This was demonstrated through psychomotor abilities by efficiently applying the knowledge gained, in work processes or new technology.

Skills component of e-competence

Supervisors viewed the successful application of ***reflection and attentiveness*** during the internship as a weakness. F-2011 noted that *"[the intern] needs to focus more closely on the details of documents and systems functionality and the details of what is said and written"*, indicating that the intern lacked the mental focus and attention to detail (cognitive aspect) required for the associated psychomotor output. This suggests that skills are enabled by knowledge. Pertaining to the ***inquiry focused*** competency, C-2011 expected an intern to

conduct research on mobility for a client. The intern spent two weeks learning about research methodology before she could start the project. C-2011 identified gaps in the skills pertaining to the visualisation of data, layout, text, etcetera. However, B-2011 commented that *"[The intern] has the ability to conduct extensive research once directed appropriately"*. These mixed responses could be due to the subjectivity and perception of the supervisor or more likely reflective of the individual capacity of the intern to demonstrate knowledge acquired at university.

In relation to ***systems thinking and pattern recognition*****,** it seemed to be an underlying assumption that interns would think of systems holistically in the functional work they performed, especially those related to Systems Design, Development and Implementation. A-2011 indicated that a "*bigger picture view of the solution will come with experience and will assist his delivery of unit testing",* which points out that the intern did not demonstrate the ability to view the particular testing task in the context of the entire system. Therefore, it can be inferred that the cognitive and psychomotor components are supported by underlying knowledge. In terms of ***Problem solving, creativity and innovation*** skills, M-2012 related an intern's *"common sense and ability to think logically"* (cognitive component), to the same intern's ability to *"generate good ideas"* (psychomotor component), indicating that the two components are interdependent. A-2010 also highlighted that an intern *"demonstrated a logical and systematic thought process regarding the designing of solutions"*, indicating again that the cognitive components of a logical thought process resulted in the psychomotor components, which were the solution designs (evidence of skills).

For ***analysis and quantitative thinking***, the same intern at C-2011 (mentioned in the knowledge section above) successfully "*applied analytical skills to analyse and graphically present data to illustrate their utilisation so as to identify areas for consolidation"*. This indicates a strength in the skills demonstrated and emphasises how the psychomotor was reinforced by the cognitive component. The intern at P-2012 was also able to successfully apply quantitative skills to perform *"web analytics using analysis tools and providing input data for reporting purposes"*. However, supervisors in 2014 said that the interns require more exposure to analytical techniques and the ability to analyse data and patterns in the data was insufficient in the training provided at university. In terms of the ***rapid assimilation, synthesis***

and creation of new knowledge, A-2012 stated that *"[the intern] has managed to build core skills in a very short space of time on the project" and "picks up new software very quickly"* and M-2012 stated that *"[the intern] is able to grasp/comprehend instructions the first time around"*. In this example, attitude enabled the quick assimilation of knowledge, which was demonstrated in the form of a skill, which was to use the new technology effectively. Therefore it is inferred that knowledge, skills and attitudes are interrelated and interdependent. This also infers that Personal Competence, Meta-competence and Cognitive Competence are required for effectively acquiring Technical and Functional competences. In addition to rapid learning, employers valued when interns displayed an ability to be an independent seeker of knowledge, showing autonomy and ensuring that they can take it upon themselves to find out how to do something, if they did not have prior knowledge. For example: *"She was given testing to perform without any knowledge and managed to display a good understanding of the work given"* (D-2010).

Attitudes component of e-competence

Most interns possessed favourable affective qualities for ***reflection and attentiveness*** such as an openness and willingness towards the enablement of this competency. R-2013 viewed the "*open minded"* attitude of an intern as a strength. However, sometimes students displayed a mixture of positive and negative attitudes, as indicated by L-2011 who said that *"[the intern] did everything asked of her with enthusiasm and determination"*. However later in the same interview the supervisor indicated that *"at times it seemed that she was testing just because we asked her to and not to see that the system was doing what it was designed to do"*. This emphasises the importance of attitudes in the effectiveness of competencies. The intern's lack of enthusiasm about some tasks as opposed to her general enthusiasm caused the supervisor to think that the intern was not interested in the quality of the work deliverable. It also indicates that the intern's lack of attentiveness while testing and reflectiveness about the importance of her task (specifically her attitude towards it), resulted in a limited viewpoint as opposed to a holistic systems viewpoint.

Pertaining to being ***inquiry focused***, supervisors often praised interns for being *"research-oriented"* or *"inquisitive"*, which indicates a proactive attitude and curiosity for discovering answers to questions. Favourable attitudes related to ***systems thinking and pattern***

recognition were seen in the interns' acknowledgement and awareness of gaps and areas for improvement. They seemed to be very willing to learn and grow. When referring to ***problem solving*** as a strength, supervisors mentioned it alongside being *"solution-driven"*, which refers to a critical, open-minded and proactive attitude of interns in the creation of innovative business solutions. When supervisors referred to problem-solving as a weakness they indicated that more *"focus"* should be given to problem solving in the curriculum. Attitudes for ***analysis and quantitative thinking*** were mostly favourable but there were some areas of concern expressed as well. The statement, *"[the intern] was not able to analyse correctly and needed to be micro managed to complete tasks"*, indicates that the intern lacked autonomy and was unable to work independently. This means that the intern was lacking in the desired *affective qualities*. Another example of a poor attitude displayed is in the case of L-2011, where the supervisors indicated disappointment with an intern who "*was requested to write a requirements document for adding attachments to web pages. She did not do analysis but used existing analysis and instructions to complete the document*". This indicates a lack of professionalism and dedication to the work. It could even be inferred that it reflects the lack of work ethic and integrity. Conversely, an example of a good attitude was stated by the supervisor at Organisation B in 2011: *"[the intern] portrays a keen interest in his mathematical abilities in relation to compiling extensive formulae".*

Interns took a keen and active approach to forming linkages between existing theoretical knowledge and new practical knowledge in order to successfully ***apply knowledge***. They did this by discussing situations with academics and the internship co-ordinator, revisiting lecture notes and forming collaborative forums through monthly update sessions and social media. It was clear that companies valued interns who were able to *quickly* learn what they needed to learn and get on with the work. With the vast amount of information available today and IS knowledge changing and increasing rapidly, it appears to be imperative for interns to have a willingness to learn quickly and be proactive and flexible in empowering themselves, without complaining. In terms of desired attitudes regarding technology and the ***rapid assimilation of knowledge***, Q-2013 was pleased with their intern who "*very comfortable with new technology"*.

Interpretation of responses

Some interns seemed to lack the knowledge (cognitive) and skills (psychomotor) components for ***reflection and attentiveness*** but did well in the attitudes (affective) component. Supervisors generally indicated that interns were ***inquiry focused*** but lacked the underlying knowledge and skills related to research and finding answers. The data proved to be in support of literature indicating that the focus is on how interns learn what they need to know (Quek, 2005; Griesel & Parker, 2009). It seems that organisations expected graduates to possess the foundational understanding of research methodologies as it pertains to business-related research and to have the skills to find pertinent information that would address relevant issues. Some interns appeared to be lacking in the knowledge and skills related to finding information but more specifically, the gap identified pertained to the underlying understanding of research methodologies and approaches. Supervisors had mixed responses about interns' ability to demonstrate ***systems thinking and pattern recognition***. Some interns lacked the ability to view tasks in the context of the entire system, particularly in testing scenarios, which was often erroneously done in isolation. However, most interns seemed to do well with pattern recognition.

Supervisors also had mixed responses about interns' competence in ***problem solving, creativity and innovation***. It appears that organisations require students to have business acumen, demonstrate logical and lateral thinking in order to devise creative solutions that will solve business problems innovatively. Daviesm et al. (2011:11) refers to this competency as Novel and Adaptive Thinking by, which entails demonstrating competence in "coming up with solutions and responses beyond that which is rote or rule-based" and is regarded as a component of critical thinking.

Analytical and quantitative thinking are perceived to be embedded in many of the Functional Competences**.** Quantitative skills were not discussed as much as analysis, which suggests that it was not frequently or separately required in the functions that interns were assigned to during the internship period (meaning that it could be embedded in other competencies). The lack of data could also be due to the fact that no explicit questions were asked about this competency. There were mixed responses from supervisors who stated that interns displayed a good analytical capacity and others who mentioned repeatedly that interns needed to work

on their "analytical reasoning" and development of "critical thinking". The data supported the views of Keller et al. (2011:6) that analytical and critical thinking skills are important for IS graduates to "be able to translate ideas and stakeholder needs into various IS solution options, and apply their systems analysis skills to new situations". B-2010 stated that *"the interns provided good recommendations to improve the request management within various accounts, based on knowledge gained from analysis of incidents logged"*. Some of the analysis that the interns performed led them to make informed suggestions for improvement.

Supervisors seemed to expect interns to come with relevant theoretical knowledge and then make sense of contextual work situations and content by ***applying*** their ***existing*** tacit and explicit ***knowledge***. However, there were mixed responses from supervisors related to interns' ability to contextually apply relevant knowledge, which means that some interns were not able to successfully apply knowledge to the work environment and other were able to. Supervisors' responses indicated that employers noticed and valued when interns grasped concepts quickly and independently. Rapidly assimilation knowledge seemed to be a strength for most interns, in all three components (knowledge, skills and attitudes) and they were especially keen and willing to gain new knowledge and skills related to new technologies. In summary, the responses from the supervisors support Lowden et al. (2011)'s view that employers value cognitive competencies such as reflection, attentiveness, creativity and others, which are enabled through critical thinking, as this is required for innovation as well as for anticipating and leading change. The enablement of competencies are inwardly oriented, which means that it is demonstrated differently by each intern and should therefore not be seen as a reflection of the curriculum. Where students performed well, it could be assumed that it was due to the students' individual cognitive intelligence. Cognisance should also be taken that all feedback from supervisors is subjective, albeit reflective of what employers regard as important. However, it should also be agreed upon that universities can provide platforms for students to enhance these competencies.

5.2.1.2 Functional Competence (Psychomotor/Skills)

In the definition of e-competence (CEN, 2013) and in the conceptual framework, functional competence relates to the "skills" aspect. These relate to the discipline-specific skills and know-how that an e-practitioner is expected to perform when functioning in a given context

and it also refers to the domain specific or subject specific competences (Winterton, Delamare-Le Deist & Stringfellow, 2005; Sultana, 2009).

Knowledge component of e-competence

For ***Enterprise strategy, planning and architecture*** and ***Technical and Information Strategy and Architecture***, it was observed that not many interns were exposed to these high-level functions, being entry level candidates. Some interns were allowed to observe the process and in one instance it was noted that a couple of interns were found lacking in the fundamental *"understanding of system architecture"*. In contrast, R-2014 noticed that *"[the intern] has a clear understanding of the strategic planning process"*. A-2010 and B-2010 commended interns for having a *"sound understanding of the strategy formulation process"* and good understanding of *"strategic planning"*. ***In terms of quality, risk and compliance***, M-2012 noted that interns lacked knowledge (and skills) in *"auditing databases, operating systems and application security"* and *"general computer controls such and change control and security"*. M-2012 suggested that the interns fill in the gaps with online courses to compliment the mentorship during the period of the internship. In the following year, M-2013 submitted reviews that there was a significant gap experienced in the knowledge (and skills) related to *"methodologies specific to digital forensics"*. The interns had no previous exposure to these topics.

Project and Change Management is a fairly popular function of e-practitioners, which was evidenced in volume of data on this topic and no knowledge gap was identified. In terms of knowledge related to ***Technical and Information Strategy and Architecture***, B-2010 expressed that interns lacked an understanding of *"policy formulation and development"*. ***Requirements Management*** involves two activities, one being a psychomotor activity (Requirements Elicitation) and the other being a cognitive process (Requirements Analysis). In terms of Requirements Analysis, this was regarded as a strength displayed by the interns. In terms of ***design, development and implementation of solutions***, there seemed to be a gap in the knowledge of systems development life cycle (SDLC) methodologies and techniques used for business analysis. ***In terms of business process management***, B-2010 highlighted that there were *"gaps found in process knowledge and there was no prior knowledge of work done in this area"*. 13 interns positioned at T-2014 had a primary task of mapping activities and

processes in various departments and divisions. The interns found it difficult to apply the theoretical knowledge to the work they were given and hence required a lot of mentorship and on-the-job training during the internship. In terms of ***infrastructure***, supervisors also complained that interns lacked the required understanding of hardware, networking and relevant controls.

Skills component of e-competence

In terms of skills related to ***Technical and Information Strategy and Architecture***, in 2013 supervisors indicated a lack of skills in *"policy development, analysis and evaluation"* as well as a gap in *"strategy development"* (cognitive and psychomotor). Supervisors in 2014 also expressed a gap in *"strategic business skills, planning and leadership"* abilities. These were highlighted as areas where the interns needed more development and training. It should be noted that these specific responses were from different industry sectors. Related to ***quality, risk and compliance***, interns were required to conduct the IS9000 SHEQ audit and present the outcome but they lacked the skills to do it, highlighting a gap in the curriculum.

Interns exhibited strength in the skills and techniques required for ***project delivery and change management***. Most of the interns were involved in end to end project management and some were asked to manage projects autonomously after demonstrating initiative and competence. However, for most interns this presented as a challenge since they lacked the confidence to affect the leadership associated with the role. It also appeared to be difficult for them to manage resources (especially the rest of the team's contributions), which affected time management. This observation will be discussed further in the Key Focus Area of Emotional Intelligence. For example, B-2011 provided the intern with the autonomy to lead a project but advised that in terms of Scope Management, "*she should work on actively managing the scope and focus on containing it"*, in terms of Planning, she acquired these skills only during the internship, which underscores the need for work-integrated learning. In terms of Execution, being an intern while managing the project meant that it was challenging for her to assertively mobilise team members to deliver on time, although "s*he did show great courage in specific escalations when it was needed"*, according to her supervisor. The intern was also advised to become more involved in Change Management and to focus on assessing risks. At A-2012, an intern was assigned to lead an application development project. He was

able to display a high level or proficiency in the delivery of the project and received the following feedback: "*he completed his tasks at a high standard. He is well organised and shows a good ability to organise his own work efforts"*.

In terms of the skills component of ***Requirements Management***, interns demonstrated competence in the elicitation, analysis and documentation processes and well as in translating requirements into successful designs and functional solutions. B-2010 was pleased that "t*he intern completed a technical design based on functional requirements"* and then succeeded in the development of the web application. However, A-2012 critiqued that interns needed to *"grow business analyst skills"* and that *"more exposure to SDLC processes and methodologies [are required in the academic training]"*, inferring a gap in the business analysis skills (and knowledge) required for the ***design, development and implementation of solutions***. Many interns were exposed to testing and they performed well in this area, even though they had no previous experience in testing. The theoretical knowledge was sufficient for students to demonstrate relevant and adequate skills in practical contexts. This was evidenced in the following statements: A-2011 indicated that *"[the intern] has been conducting system functional testing on the store's processes and functionality. He has conducted assembly and systems integration testing".* The supervisor added that *"he has delivered this with high quality and stuck to good testing principles. He has managed to report back statuses in a timely and efficient manner to his supervisor".* K-2011 said that the intern "*assisted in system integration analysis with the separate towers of service within the business"* and *"initiated end to end business cycle testing"* O-2012, M-2012 and P-2012 indicated that interns were able to "*execute the test cases using the Testing tools. Learn HP Quality Center test management tool"*, *"test SAP developments completed by functional team member"* and *"design test cases and export to test management tool. Execute the designed test cases and log defects"*. These statements infer that testing is not an area that requires focus in the IS curriculum because interns performed very well in this regard.

In terms of ***business process management***, interns at A-2012 successfully *"designed a process flow diagram for one of the client engagements"*. Likewise, the intern at L-2011 performed well in *"developing high level business process maps to aid client understanding of future process structures"*. In terms of ***service management***, the work that the intern at C-2010

performed was client facing to some extent and the intern displayed *"excellent communication skills and lead analysis discussions with key clients such as Dimension Data and BCX, key stakeholders 3 weeks into the internship - with supervision*". A-2011 also indicated that the intern *"was instrumental in facilitating a client training session on the POS, SRS and HPQC systems. This session was held with business owners and representatives".* In both cases the interns demonstrated professionalism and outstanding work.

Attitudes component of e-competence

Overall, interns displayed good affective dispositions related to functional work. Some of these pertained to project management, for example supervisors recognised that interns in 2014 were *"change management driven"* and is a *"potential change manager – pragmatic and understands factors involved in implementing change"*. These statements are indicative of favourable attitudes required for ***change management and project implementation***. Interns also displayed interest and excitement when they were able to identify theoretical concepts in the work they performed or within the broader work environment. In terms of ***business process management***, R-2014 said that the intern was *"continuous improvement driven",* which meant that the intern was constantly looking for ways of doing things better, in terms of work flow and efficiency. Furthermore, T-2014 commended interns for being "*driven towards process improvement"*. The intern at H-2011 displayed a collaborative and engaging attitude when tasked with the *"design of a system to collaboratively engage all [H-2011]'s IS staff in the mapping process"*. Related to ***service management***, two supervisors in 2013 commended interns for being *"customer service orientated"*, indicating a positive and professional disposition towards engaging with clients.

Interpretation of responses

Not many interns were exposed to these high-level functions of ***Enterprise strategy, planning and architecture*** and ***Technical and Information Strategy and Architecture***, being entry level candidates. There were mixed responses for those who were exposed to these functions, indicating that more practical exposure is required. However, it should be remembered that cognitive assimilation of information and the ability to apply knowledge to the workplace are attributed to the individual capability of the student. Since there was mixed feedback in this area, it is possibly not indicative of a significant gap, but one that should be noted

nonetheless. Some of the work performed by interns fell into the ***quality, risk and compliance*** area, which involved the Safety, Health, Environmental and Quality (SHEQ) Integrated Management Audit - ISO 9000. Interns were required to complete the audit and present the results. There was an evident gap in the interns' knowledge and exposure to IT auditing and computer controls. This competency seems to be more relevant to IT auditing companies because it was only Organisation M and J who mentioned this gap in digital forensics. Since not many of the interns were absorbed into this type of business, it may not be significant but it was nonetheless highlighted as a gap in the academic knowledge that interns possessed.

Digital forensics is not covered in the curriculum so it may be important for the IS department at University X to investigate the relevance of these e-skills in the industry and benchmark it against IS curriculum models and e-skills frameworks to determine if it should be taught. The responses indicate that the interns fare well in the area of ***project delivery and change management***, which means that it is being taught effectively in the curriculum. Another reason could be because interns were also taught Project Management in third year Management modules, which is hosted in the School of Business and Finance (EMS Undergraduate calendar 2014). Knowledge of project management is also reinforced at the Honours level, from a strategic high level perspective. There seems to be no gap in the competency of project delivery and change management but there were deficiencies identified in associated inter and intrapersonal competencies such as leadership and self-confidence, which indicates that these affective areas need to be reinforced and embedded in the curriculum.

Much of the ***user management and support*** involved customer service or service desk functions. Most interns are temporarily placed in the service desk (help desk) at the start of the internship, so that they can familiarise themselves with the various functional areas and processes of the business before they are allocated to functional teams. Interns performed well in these areas, in terms of applying knowledge, skills and attitudes. From the lack of data in this area it can be inferred that the interns, being entry-level graduates, were not exposed to the client-facing areas of the business and projects during the internship programme. Some of the follow up interviews support this inference as Q-2014 explained that their clients were

not keen on interns accompanying the consultants, due to the sensitivity of information and I-2011 stated that *"in terms of communication with clients (verbal/telephonically), [the intern] had limited opportunity during this internship to engage with external clients, so further exposure in this area will improve her confidence and therefore her ability to engage verbally with clients more confidently and therefore effectively"*. It is suggested that some organisations failed in their duty to provide sufficient exposure to the interns. It can therefore be inferred that there was a lack of deep, quality mentorship on the part of the supervisors for not exposing the interns to the relevant client-facing work, which limited the interns' learning during the internship. This was not the case with all employers though. The lack of exposure in this area makes it difficult to indicate if there is a gap in the competence that students displayed in this area against what organisations expected. The lack of data coded for User management and support also indicates that while the SFIA framework adds these e-skills, they are not necessarily relevant to potential IS graduate employers in SA. Nonetheless, where the interns were placed in client–facing positions, they performed very well and maintained high levels of professionalism.

The evidence suggests that interns performed sufficiently in the area of ***Requirements Management***. No deficiencies or gaps were identified, which infers that it is sufficiently taught in the curriculum. In ***solution design, development and implementation***, interns performed well but a gap was identified in the knowledge of SDLC methodologies and Business Analysis skills. This infers that these concepts need to be reinforced with practical exposure, in the curriculum. On the other hand, interns performed well with all testing tasks. Since testing was only theoretically covered in the curriculum it could be inferred that testing was an easy concept for interns to apply and they did not require extensive practical training for testing, in the curriculum.

In terms of business process management, gaps were identified in the knowledge and skills related to Business Process Mapping, however this was not the case in all the years. A gap were identified only once in 2010 but was highlighted thirteen times in 2014. It can be inferred that Business Process Mapping was an area that students were able to demonstrate knowledge and skills but that they need practical reinforced in the curriculum. This gap was bridged through mentorship and on-the-job experience during the internship. Related to

service management, it was observed that while not all interns were placed in client-facing jobs, those who were tasked with dealing with clients had done so professionally. As with *user management and support*, it was noted few interns were placed in client-facing jobs, but when they were, they performed very well and maintained high levels of professionalism. This infers that the cohort of employers participating in this study did not find this competency very important or that they lacked in the mentoring and exposure provided to interns.

5.2.1.3 ICT Competence (Psychomotor/Skills)

In the definition of e-competence (CEN, 2013) and in the conceptual framework, ICT competence relates to the "skills" aspect but it is listed separate to Functional Competence in the conceptual framework. This is so because ICT competences refer to the underlying digital competence that all disciplines rely on in a knowledge economy and is different to Functional Competences, even in an IS discipline.

Knowledge component of e-competence

In terms of ***advanced IS application & specialisation*** there were more than 11 references made to programming and the lack thereof, displayed by interns. Companies who required interns to have programming skills, were often disappointed, which meant that interns had to teach themselves the required knowledge or supervisors had to organise formal or on-the-job training for them. A-2010 noted that they required the interns to have SQL knowledge in order to modify SQL queries. However, A-2010 noted that *"in terms of programming, it was not a strong interest or strength and SQL was a new language for him"*. In terms of ***data and information management***, interns seemed to possess the required knowledge and underlying understanding of how to manage data and information. There were not gaps identified. In terms of ***technology literacy***, interns seemed to lack knowledge about infrastructure and technology. For example, Q-2013 highlighted that the intern lacked knowledge about *"general computer hardware"*. V-2014 complained that the interns *"lacked an understanding of networking and technical skills"*. In terms of ***digital literacy***, a deficiency was identified in the interns' lack of cognitive and psychomotor abilities when it came to being fluent and efficient in using a computer.

Skills component of e-competence

In terms of the ***advanced IS application & specialisation***, there was a gap in the skills related to programming. Supervisors across the 5 years mentioned variations of the sentiment that interns lacked *"technical competency in terms of programming"* (Q-2014). Where students lacked the required competencies, they were proactively acquired the knowledge and skills through independent learning and mentoring during the internship. O-2012 noted that the interns needed to *"learn PHP and JAVA basics"*. M-2012 required the intern to learn *"Oracle Financials Pack"* in order to complete work on a weekly basis. Interns were also required to *"develop PHP reporting application"* (D-2013) and *"develop mobile forms, interpretations & binary collation"* (A-2012), *"setup in Oracle Fusion Applications"* (F-2011), *"write SQL queries and ad hoc requests for various departments"* (B-2011), which many of the interns struggled with. F-2011 wrote that the intern had "*no existing knowledge of SQL. Touching on SQL Programming [now in the internship]"*. In addition, J-2011 required *"a web interface as designed and developed by [the intern], which required programming that he is familiar with. He also needed to research programming tools to develop some of the specifications required*".

In terms of ***data and information management***, some of what interns were required to do involved data capturing in order to later manage or analyse the data. This was integrated into some of their other functions and involved the *"contribution to project documents, minutes, presentation and data capture from analysis"* (B-2011); *"SIM card logging and updating of database with details - data capturing"* (A-2012) and *"maintaining the data dictionary*" (U-2014), all of which the interns fared well in. Other work included checking data integrity (P-2012), consolidating, migrating and cleaning data (L-2011), entity relationship and dependency mapping (H-2011), database modelling (A-2012), analysing, mapping and loading data into Oracle (K-2011), writing and responding to queries and writing mini programmes to extract data from tables in the database (D-2011). The intern at B-2011, had no previous programming knowledge or skills but *"she learnt basic Visual Basic (VBA) from a book (despite this not forming part of the job role) and developed our "work log fixer" macro*", which was then commended by top management. In terms of information management, most of what was required from interns involved finding and extracting secondary information from various online sources and then consolidating and analysing information for reporting purposes.

In terms of ***technology literacy***, interns seemed to lack technical skills pertaining to infrastructure. In terms of ***digital literacy***, there was a gap identified in the psychomotor abilities that interns demonstrated in using a computer. T-2014 said that the *"ability to apply advanced MS Office usage such as Excel, Word, PowerPoint"* was deficient and that *"knowing how to use Excel through the use of mathematical calculations and formulae to assist with problem solving, planning and tracking activities"* were crucial yet lacking. . There were 12 other critiques stating that interns required *"further MS Office training, Excel in particular"* (W-2014) and that there was a deficiency in the ability to use *"some key software applications"* (A-2014). This supports the overall feedback that interns require much more training to become competent with digital literacy.

Attitudes component of e-competence

There was a general awareness of digital literacy and a willingness to learn new technology. Many supervisors commented on the openness of interns to engage with new innovative technology and to apply their knowledge to the organisation specific technologies.

Interpretation of responses

In terms of the ***advanced IS application & specialisation***, there was a gap in the knowledge and skills related to programming. Supervisors across the 5 years complained about a deficiency in required technical programming skills. Where interns lacked the required competencies, they proactively acquired the knowledge and skills through independent learning and mentoring during the internship. As discussed in the Cognitive Competence section, it is important for interns to have the capacity for self-learning. In a fast changing ICT industry this is no doubt a requirement and companies seem to expect this independent, self-reliant attitude from interns. It then stands to reason that academic curricula should be designed in a way that encourages students to develop this type of mindset. It should also be noted that not all IS students are required to take programming, since it is an elective. There are also some transferring postgraduate students who transfer from Computer Science in the BSc. Programme, to join the IS Honours programme, however these are very few students.

In terms of ***data and information management***, interns seemed to perform well in the tasks required of them. These tasks related to data management and the sourcing of information.

There were a number of areas where students lacked the required skills and taught themselves. In terms of ***technology literacy,*** knowledge about the fundamentals of hardware, software, databases, networks and general technology trends seemed to be a weak point for most interns. These topics are taught in the curriculum from a theoretical perspective but not from a practical, application point of view and that could be a reason why the interns were perceived to be lacking in this area. These few complaints are not indicative of the majority of the respondents but since supervisors mentioned these gaps, it would be helpful to reinforce these skills in the curriculum.

It was noticed that most of the data coded as ***digital literacy***, also fall in some of the Functional competencies. This is to be expected due to the global dependence on digital literacy and the argument that ICT Competence is transversal and integrated in information systems. However, care was taken to differentiate between general digital literacy (ICT competence) and IS specific literacy (Functional competence). It was unexpected to find that this competency was found to be lacking in IS interns. The majority of supervisors across the 5 years expressed dissatisfaction with the level of digital competence displayed by most interns. When supervisors were given the opportunity to highlight significant competencies, the most mentioned feedback was the lack of interns' ability to use computers effectively. There is an expectation that an e-Practitioner should be proficient and knowledgeable in ICT competences, at the advanced level. Basic digital literacy is not part of the IS curriculum anymore, since 2010 because it has been outsourced to a centralised ICT department at University X. This training is provided in the first year of the degree only and this strategy has not provided the interns with the advanced digital literacy required of an IS practitioner.

5.2.1.4 Personal Competence (Affective Dispositions/Attitudes)

In the definition of e-competence (CEN, 2013) and in the conceptual framework, Personal Competence relates to the "attitudes" aspect. Personal Competence, specifically relates to the *intrapersonal* affective dispositions and attitudes, which are orientated within an individual and which impact their ability to survive in the social world.

Knowledge component of e-competence

Overall, in terms of the cognitive component of **Emotional Intelligence**, interns generally seemed to have an awareness of the concept of Emotional Intelligence but lacked in the underlying knowledge and related skills and attitudes. In the Functional Competence discussion it was observed that most interns lacked confidence and assertiveness. Through ***identity and self-awareness*** one is able to realistically self-assess strengths and limitations, thereby build self-confidence and exercise assertiveness (Goleman, 1998; Goleman, Boyatzio & Mckee, 2002; Smith, 2002; Yorke & Knight, 2004; Cleary et al., 2007; Boyatzis, 2008). The data showed that most interns did not have knowledge of the characteristics of identify and self-awareness or how to develop and strengthen it. However, through their inherent personalities they were able to display traits that were indicative of strong identity and self-awareness.

Furthermore, most interns seemed to have good knowledge of ***self-management*** techniques and showed initiative in researching models that they could adapt to their work situations. There was an expected transitioning period into the workplace after which students seemed to do well in managing their professional image and their work deliverables. Most interns seemed to lack the underlying knowledge and awareness of ***self-regulation.*** This meant that there were a large number of situations where interns did not have the knowledge of how to control and regulate their emotions, specifically as it pertained to critique from co-workers and supervisors.

In relation to the cognitive component of ***motivation***, it was expected that interns would have a theoretical understanding of how to motivate themselves and others. Most interns seemed to lack in the cognitive component that underscores self-motivation and motivation of others. This may include knowledge about what mechanisms could be incorporated into their lives, to increase their enthusiasm, passion, organisational commitment, resilience and other qualities required to pursue their organisational goals. As was the case with the other areas of Emotional Intelligence, interns lacked the underlying knowledge related to ***empathy***. It was considered that, where interns displayed empathy, in terms of the psychomotor component, they did so naturally, as if it were inherent in their personalities. They did not do so cognitively, as a conscious part of being Emotionally Intelligent.

In terms of the cognitive component of **Ethical Competence**, there was a consciousness and underlying knowledge of what constitutes good ***ethics, responsibility and accountability*** in the workplace, where it pertained to the intern directly. In terms of ***strength of character*** and personal values, interns seemed to have good knowledge of what constituted good personal values.

In terms of **Career Management**, particularly relating to ***industry awareness and business knowledge***, there seemed to be a gap in the business knowledge that interns were expected to have. Fonstad & Lanvin (2010) and Andrews & Higson (2010) indicate that organisations require *"dual thinkers"*, who are able to understand how to manage business with ICT competence and also possess the soft skills required. It was particularly evident in the data, that this holds true in South Africa as well and in addition, organisations also expressed that interns lacked business acumen and business problem solving knowledge. Supervisors expressed dissatisfaction that interns did not understand the way business operates. C-2010 noted that there was an evident lack of *"understanding of operational business aspects including value chains, revenue drivers, marketing strategies"* and reiterated that "*these are expected to come with increasing exposure to the world of work"*, which was also lacking in the IS course. P-2012 indicated that the intern's *"ability to apply reason and use business acumen"* was regarded as an important strength. U-2014 noted that while the intern shows satisfactory analysis skills, it was not of a high quality because "*the level of depth and understanding of the industry was low"*. Other business related knowledge that interns seemed to lack were the *"mapping of Business Services to Value Chain Processes for [Organisation H]'s IS Service Portfolio"* (H-2011). Another review noted that *"[the] displayed basic learnt knowledge from campus but more in depth understanding is limited"* (D-2013).

In terms of ***recruitment preparation***, it appeared that interns lacked the underlying knowledge of what organisations are looking for during the recruitment process but some interns understood what constituted professionalism during this process. There were mixed feedback about how they were perceived during the recruitment phase.

Skills component of e-competence

In the area of **Emotional Intelligence**, one indicator of ***identity and self-awareness*** is **realistic self-assessment**. D-2010, for example, recognised that an intern was *"not afraid to ask for help or speak out when something [was] not clear"*, which can be interpreted as an indication that the intern possessed an acute awareness of her strengths and limitations and was therefore confident enough to ask for help. This observation was true for many other interns as well. Similar comments received from J-2011 indicated that the intern was able to *"use his skill strengths in the delivery of a project"* and from D-2010, that the intern *"always asked for guidance when need be and is a pleasure to work with as a manager",* illustrating the intern's awareness of her capabilities and ability to recognise areas for improvement. As Smith (2002) points out, a person who has a high level of self-awareness is very honest with themselves and others. However, the opposite also seemed to be true. Students who had low self-confidence and self-awareness were less likely to be introspective or to ask questions. Interns were encouraged to *"request assistance when stuck"* (A-2011), *"not be afraid to ask questions in order to complete assigned tasks"* (S-2013) and that they *"need to raise issues upfront with management"* (T-2014).

Another indicator of identity and self-awareness is having **self-confidence**. The majority of supervisors mentioned self-awareness in relation to displaying confidence and confidence was often associated with presenting and public speaking (even speaking up in meetings). There were many comments about self-confidence in all 5 years but the 2013 and 2014 cohort of students appeared to receive the most positive feedback related to confidence. This is possibly attributed to the largest number of interns placed in that year or it could be attributed to the different calibre of students in each year. Where interns displayed self-confidence, it seemed to be innate in their personality. However, interns who did not display confidence were advised by supervisors to harness their knowledge and skill strengths in order to build confidence. For example: "*Where he has a skill or talent that he is strong with, he harnesses the confidence that this gives him and puts this into use to meet the objectives of the task assigned to him* (J-2011) and *"[she should] leverage [her] academic learning more. Do not be afraid to question and suggest changes either during or after meetings" (*A-2010). The same sentiments were expressed by D-2010 as well. S-2013 advised an intern to *"be less humble and display more confidence"* while U-2014 complimented an intern who was

"unafraid to voice her opinions". This could infer that companies view an intern's ability to share and verbalise their thoughts and ideas as an indicator of self-confidence. A-2012 noted: *"[The intern] is able to take on a task and action it according to plan, however, I think that sometimes her confidence levels hold her back on asking valid questions"*. There were many more comments and feedback about confidence, which indicates that it was definitely a deficiency identified in interns across the 5 years.

A third component of having identity and self-awareness is the ability to exercise **assertiveness** in the face of challenging situations. Most interns seemed to struggle with assertiveness, as evidenced by A-2014: *"[the intern needs to be cautious about] taking on too much and not pushing back or saying no when workload increases"*. This indicates that the intern was not adequately aware of her limitations or did not have the confidence or assertiveness to set boundaries. It seemed to be especially challenging for interns to exercise assertiveness when addressing management. However, cognisance needs to be taken that there is very little scope for an intern to display assertiveness in an entry level job. Yet, it is perceived from the data, that supervisors encouraged interns to rise above the challenges thrown at them and develop confidence regardless of limitations. A-2012 said: "*[the intern] delivered well on the tasks assigned to him… [he should] show more initiative on tasks and show more confidence in his abilities and knowledge*". It can therefore be inferred that most interns seemed to have a good level of ***identity and self-awareness*** in terms of self-assessment, but lacked confidence and assertiveness.

In the competency of ***self-management***, two indicators were identified in the data, which are multi-tasking and time-management. **Multi-tasking** was a big expectation from supervisors yet most interns lacked in the ability to manage the diversity of their workloads. One intern was advised to *"communicate bottlenecks whenever there are too many tasks on [her] table"* (M-2012), indicating a lack of self-awareness. This intern was unable to multi-task and did not know her own limitations. Another intern lacked *"focus and drive when faced with challenges such as team members' unavailability etc. in order to complete tasks"* (E-2010). In a similar statement, H-2011 advised an intern to work on the *"ability to multitask and move from one task to another and back again without flustering. Take change "inside". This comes with experience and cannot be taught"*. This statement reiterates the importance of practical

experience in developing soft skills and the limitations of teaching this skill in the curriculum. There were mixed responses about students' propensity for effective **time-management**. A-2010 reported that the intern was *"able to deliver tasks such as development and designs on time within ETC"*. Similarly, T-2014 indicated that their intern *"completes tasks in a timeous manner"*. Other interns *"showed good co-ordination and organisational skills"* (A-2014); and *"good time management"* (R-2013). A-2010 reported that *"with her role of assisting in the S&D area, [the intern] demonstrated that she was able to use her initiative and was self-sufficient in completing the tasks assigned to her"*. On the other hand, V-2014 pointed out that the intern *"procrastinates and should learn to plan more effectively and execute on time"*. A-2010 and B-2010 also referred to self-management aspects in association to work tasks and mentioned that the particular intern must "*prepare before engaging"*, in order to improve confidence levels and quality of output. It can therefore be inferred that most interns were able to manage their time effectively to meet deadlines but some interns struggled to multi-task or manage big workloads. Where interns lacked in self-management it was often due to their personal negative attitude or a weakness in the attitudes related to the demonstration of their knowledge and skills. In terms of ***self-regulation***, there was mixed feedback.

Some interns seemed to open to receiving constructive critique while others were not. There also seemed to be a lack of skills in effecting emotional self-control. Some statements reflecting positive self-regulation were: the intern *"embraced her role with enthusiasm [attitude] and always conducts herself in a professional manner. She is not offended by constructive criticism [skill]"* (A-2010); *"[the intern is] constantly seeking feedback"* (M-2012) and *"[the intern] initiates personal development areas"* (T-2013). These statements indicate that these interns were self-confident and self-aware enough to regulate their emotions in order to accept criticism in a positive manner. Conversely, there were also large amount of interns who did not display emotional maturity in the face of criticism. This could be seen in the comments of B-2011, who indicated that the intern "*needs to learn to not to be defensive when criticised but see this rather as a tool for improvement"*. To one intern, M-2013 indicated that his *"ability to take criticism could be improved"* and M-2013 advised another intern not to become *"despondent when things do not run smoothly"*. In terms of emotional self-control, B-2011 wrote that one of their interns *"tends to get a bit too emotional or excited when issues arise or are not timeously resolved"*. Likewise, V-2014 noted that their intern *"can*

easily get demotivated by set-backs or circumstances outside of her control", which they did not view favourably. They advised the intern to "*work on how to devise different approaches to problem solving"*. Many other supervisors advised interns to become more self-analytical.

In terms of ***motivation***, there was an enormous amount of positive reviews about interns displaying positive motivation towards their work and a willingness to develop. Through strong motivation, it is expected that the interns will be comfortable with taking **initiative,** which means that they will take action unprompted and have skills that lead to innovative outcomes. Through self-awareness, self-confidence and self-motivation it is expected that interns will demonstrate **autonomy**. There were many statements from supervisors stating that the majority of the interns were self-motivated, vibrant, energetic, driven and enthusiastic. Variations of the following comments were significant and repeated throughout the 5 years: *"driven and having the ability to drive people to complete tasks", "ability to work independently, without constant supervision"*, *self-motivated - motivates himself to deliver quickly and to a high standard"*, *"able to work on his own with minimal supervision"*, *"determined to succeed attitude",* amongst others. Not all feedback was positive though. C-2010 advised the intern to work on *"taking initiative in the various tasks assigned, try going the extra mile"*. C-2010 also advised the intern to *"adhere to deadlines and communicate in time if there is an issue"*. This case emphasises that, while interns were provided with the same education, they display these competencies differently in the organisation, based on their individual characteristics, personal experiences and attitudes.

In terms of ***empathy***, a majority of supervisors commented on the friendly, approachable and understanding nature of interns. As strengths, many supervisors indicated interns' had noticeable "people skills" and were "very considerate". In particular, R-2013 stated the intern is "*a gentleman and puts the needs of others first".*

The skills needed in **Ethical Competence**, specifically ***ethical responsibility and accountability***, appeared to be related to ethical business skills. V-2014 noted a lack of training in this area in the curriculum. Other supervisors noted that interns demonstrated strengths in this competency. This was evident in statements by D-2013, stating that "*[the intern] takes full accountability for tasks";* P-2012, stating that *"[the intern] takes responsibility for own work"*

as well as T-2014 and R-2014, stating that their interns were *"hard working and goes the extra mile".* Interns demonstrated strong characters and personal values. There were many comments from a majority of the supervisors stating that interns were gentlemen, polite and respectful, humble, had good characters, conscientious, and sincere. Where supervisors mentioned good character they also qualified their statements with words like humility, integrity and trustworthiness.

In terms of **Career Management** in the IS field, there seemed to be a gap in ***industry awareness***, ***business knowledge*** and business acumen that interns were expected to have. Supervisors expressed dissatisfaction that interns did not understand the way business operates. A significant gap was observed in the preparation of business documentation. Many supervisors highlighted this weakness, stating that interns did not have enough prior exposure to organisational documentation and templates. A further problem that was highlighted was that interns lacked business problem solving skills. A-2014 stated: "*I find that IS interns often lack business problem and logical thinking skills. They often only gain these skills in the work environment".* A-2014 was a consistent host of IS interns from 2010 till 2014, which adds weight to the observation made in this statement. In terms of ***recruitment preparations***, the following extract illustrates the importance of the correct attitude, enthusiasm and professionalism during the recruitment process, which was a combination that I-2011 valued.

> From the onset, [the intern]'s professionalism was striking. She was the only candidate who addressed her original internship letter directly to [HR manager's name] (rather than the usual 'to whom it may concern') and also followed up her interview with an email to both [HR manager] and [interviewer] to thank us for our time. We had already made our decision to select her for the programme, but if it had been between her and another candidate, that would have swung us to select her. She displayed these same characteristics throughout her internship (I-2011).

Thus, the intern made an impression from the first meeting, which indicates that employers form an opinion of the applicant from the first time they meet. Clearly, professionalism and non-verbal communication are important during the recruitment process. Thereafter, this intern's tenacity and determination to follow up with a letter of appreciation showed the

employers that she was driven, ambitious and goal-oriented. From the feedback of supervisors, it seemed that not all interns understood this requirement for professionalism.

Attitudes component of e-competence

The majority of interns were self-aware and had a strong attitude towards knowing who they are and where they came from. This strong attitude extended to their personal identification and was demonstrated in the way they approached the work culture. Interns had a strong sense of self and it came through very strongly during their reflections (which were not discussed in this thesis). There were mixed responses received about interns' attitudes towards ***self-management***. A majority of supervisors indicated that favourable attitudes underscored the interns' behaviour. These were observed in the comments of R-2014, who indicated that both of their interns *"always strives to accomplish tasks within the allocated timelines";* Q-2014, who stated that the intern *"listens well and applies himself to delivering tasks on time"* and N-2012, indicating that their intern is *"delivery orientated"*. Most supervisors noted that the interns were diligent and hardworking.

In terms of ***self-regulation***, it was observed that there were a few interns who displayed a good attitude and willingness towards emotional and behavioural self-regulation. Evidence of positive attitudes towards self-regulation could be seen in comments such as the intern has a *"calm approach"* or a *"good emotional maturity"*.

In terms of ***motivation***, there were many positive feedback reports about the interns' attitudes and dispositions. In the reports, determination, tenacity, enthusiasm and passion were coded for all 5 years, as a strength in most cases. Additionally, most interns appeared to have a goal-oriented and results-driven attitude towards achievement. There were, however, some supervisors who provided negative reviews about interns' attitudes towards their work, indicating a lack of motivation. A-2010 indicated that their intern lacked a "*personal display of concern or urgency for tasks given"*, which means that lacked self-motivation. This can also be seen as a weakness in the intern's personal attitude and self-discipline. Another such example was from B-2011, who indicated a situation where one intern lacked in self-motivation, self-management and showed a related negative attitude:

> [the intern] can improve by taking more initiative and being more determined to do a task well, paying attention to detail and seeing it through to completion. He was in charge of the action tracker [application]. He worked well on this for about 3 weeks and then stopped doing it altogether. Another team member and [another intern] had to get involved initially to get it off the ground.

The report from this supervisor is evidence of the intern's personal lack of ***self-motivation***, which resulted in a lack of determination and tenacity. Since another intern at the organisation was able to perform well in all areas and also successfully complete this intern's work, this review is not seen as a reflection of the curriculum in any way. Yet even so, some reinforcement could be provided in the curriculum to emphasise the importance of professionalism and business etiquette. A more rigorous selection and screening process may also need to be put in place when selecting students for the internship programme, to avoid incidents where students act unprofessionally, and inadvertently tarnishing the credibility of the internship programme. In terms of ***empathy***, it is inferred that interns opened themselves up to associating with colleagues and were found to have a friendly and approachable attitude. Some interns received reviews that they were easy to talk to, which indicates that they were able to listen attentively, show an empathetic attitude towards colleagues and an eagerness to understand others' feelings and viewpoints.

In terms of ***ethical responsibility and accountability***, interns generally had a strong sense of good ethics and responsibility towards their work. For example, O-2012 stated that *"[the intern] is reliable, always at work on time and available when required"*, indicating that the intern has a responsible attitude towards his work. This was the case with the majority of interns.

Interpretation of responses

Through ***identity and self-awareness*** one is able to build self-confidence. Most interns seemed to have an acceptable level of self-awareness. Indicators of self-awareness emanating from the data appeared to be realistic self-assessment, assertiveness and self-confidence. Some interns seemed to possess a good sense of self-assessment in recognising where their strengths and weaknesses are. The majority of interns, however, lacked self-confidence and it

seemed to be a deterrent in their provision of quality output and professionalism, especially in terms of innovation. It appeared that interns were not able to realise their full potential with low self-confidence, which also resulted in a lack of assertiveness in the workplace. Since there was consistency in this feedback across the period of the study, it indicates that this is an area that the IS curriculum must address. It has been suggested by supervisors that the lack of practical experience and exposure to the industry, prior to graduating, is one cause of interns' lack of confidence in the workplace. This is something that cannot be taught formally but could be instilled informally by providing encouragement and positive feedback, and through general engagement and support from lecturers. Providing feedback of assessments in a positive and uplifting manner could encourage students to be more motivated to realise their potential. Nevertheless, it is believed that the more students get experience and exposure to applying concepts practically, the more their confidence will grow.

Pertaining to ***self-regulation***, interns seemed to lack knowledge, skills and attitudes required for self-regulation. There was a general strength in self-motivation in all It can therefore be inferred that most students presented with a positive attitude, willingness to learn, were autonomously driven towards self-learning and lifelong learning and demonstrated strong initiative. This indicates that they were self-motivated. Overall, there were mixed responses about the display of Emotional Intelligence and the ability of students to regulate themselves and their emotions in the workplace. This is expected because emotional intelligence is not formally taught in the curriculum. While it is difficult to say where in an IS degree emotional intelligence should be taught, Smith (2002) confirms that the development of Personal Competence for e-Practitioners has been lacking emphasis. He advocates that the intra-personal competencies should be taught to senior undergraduate IS students, in a project context and then formally evaluated (Smith 2002). This study suggests that the importance of interpersonal and intrapersonal competences should be taught from first year level, in order to provide a platform for students to actively and experientially learn how to apply these important soft skills contextually, to real world situations.

The data illustrated the importance of good character, strong values, ethical consciousness and accountability in a work environment. None of these comments were provided in response to a question about ethics or character. The supervisors wrote these comments in

response to an open question about the interns' "strengths" or "areas for development". They could have written anything – and one would have expected them to evaluate only functional performance, but the comments that supervisors wrote about affective aspects of the interns such as their attitudes and dispositions, in the Personal and Global Competence categories, indicates the importance of these attributes for employability. This observation supports the literature. While it can be argued that character and values are innate in an intern's personality and background, it could also be argued that if it is important enough for organisations to evaluate it, then it should also means that it can be taught. It is assumed that only characteristics that can be taught should be evaluated. As discussed in Section 3.5.3, Pool and Sewell (2007:284) explaining that since "emotional intelligence is not fixed genetically, nor does it only develop during early childhood (Goleman 1998, p. 7), then it seems to be something people can *learn*, which would suggest that this is something that higher education institutions (HEIs) can successfully *teach*". Boyatzis (2008:10), also endorses this view by saying that initiatives such as cognitive behavioural therapy, self-help programmes, psychotherapy, training and education has, for decades, recognised that people have the ability to change their behaviour, moods and self-image, which therefore indicates that all the Personal and Global competences indicated on the conceptual framework, can be taught in an academic curriculum. From the responses provided by supervisors, it is evident that the biggest portion of responses pertained to the attitudes and meta-competencies indicated in the conceptual framework.

5.2.1.5 Global Competence (Affective Dispositions/Attitudes)

In the definition of e-competence (CEN, 2013) and in the conceptual framework, Global Competence relates to the "attitudes" aspect. It specifically relates to the *interpersonal* affective dispositions and attitudes, which affect the way that individuals deal with the environment.

Knowledge component of e-competence

In **Behavioural Competence**, most interns seemed to lack an awareness of what constitutes ***business etiquette***, especially where it pertained to email etiquette. Supervisors seemed to use the knowledge of workplace etiquette as an indication of work-readiness. Interns seemed to struggle with understanding what qualified as acceptable nuances:

> Focus on allocated tasks and doing them well. Be very careful to not get carried away about strategic business drivers and concerns that are shared by management and business owners. By doing your assigned tasks well you contribute to making the organization work (J-2011).

Another example was the intern at M-2013, who was very vocal to the point of being disrespectful. A similar situation was also found at R-2013, where the intern was impatient with the processes and procedures. Another case noted was E-2010's intern, who had issues with the work that he was assigned. These are not only indications of a deficiency in Behavioural competency (professionalism) but in Emotional Intelligence and Social Intelligence as well. These types of issues could be avoided by explicitly discussing professional expectations and workplace etiquette in the curriculum.

For **Intercultural Competence**, in terms of ***cross cultural awareness and managing diversity,*** it can be inferred from the comment: *"become more aware of business surroundings"* (K-2011), that some interns seemed to lack an understanding of the subtle and informal functioning of the business and how it operates within its industry. Managing diversity and cross cultural awareness is not something that is taught in the curriculum but it is assumed that interns receive exposure to diversity within the class environment, and is able to adapt accordingly. In the conceptual framework, ***relationship management*** applies to engagement with clients, management, team members and others in the work environment. Interns appeared to have a good understanding of how to build good relationships. For example, one intern started her first day with a jar of sweets on her desk as an introductory gesture of good faith.

There seemed to be a lack of theoretical knowledge provided to interns about ***teamwork***, which hampered their ability to perform in teams in the workplace. There was also a lack of theoretical knowledge provided to interns about ***networking and collaboration***. Even so, some interns demonstrated a good ability to demonstrate this competency. ***Leadership and decision making*** was not explicitly taught in the curriculum. A number of comments provided by supervisors in both the strengths and areas for development shows that this was a

significant competency that companies required, yet a gap was experienced in terms of interns' knowledge. In terms of ***conflict management***, it appeared that interns lacked a theoretical understanding of how to resolve conflict. Many interns either found themselves in the midst of it or avoiding it. This was also deemed to be related to Emotional Intelligence.

Skills component of e-competence

In terms of **Behavioural Competence,** there were mixed responses pertaining to interns' demonstration of ***professionalism and workplace etiquette***. Many interns received positive feedback in this regard. As indications of professionalism, M-2013 and Q-2014 highlighted that their interns are always the first to arrive and the last to leave; A-2014 and R-2013 highlighted that their interns were always prepared and prompt with seeking advice to ensure that milestones were delivered on time; T-2014 and other referred to interns being professional, independent and tenacious. D-2011 referred to the intern showing great respect as a sign of professionalism and there were many more supervisors who indicated that the intern conducted him/herself in a professional manner. Conversely, some other interns seemed to have inappropriate behaviour and immaturity for the workplace. J-2011 advised that *"professional responses need to be taken into account when replying to emails"*. T-2014 advised that interns should *"be mindful of the environment and how to conduct [themselves] professionally"* and another comment was that one intern's *"strong attitude might be misunderstood - learn how and when to use it"*. This comment relates to attitude as well as professionalism.

This intern had a strong personality and seemed to have gotten herself into some awkward situations, however, if she was more emotionally aware and able to self-regulate her emotions then she would have been able to exercise assertiveness and not come across as unprofessional. Interns were further advised to *"be less playful and more professional"* (T-2014) as well as to *"be punctual"*, which was highlighted many times. A-2010 noted that through the mentorship provided by the internship and the intern's willingness to learn, there was a noticeable improvement. Mentoring provides a safe learning environment within which the transition from university to workplace takes place for students and is a recommended form of knowledge transfer (Accenture, 2008; Schofield, 2008, 2010, 2014; Scholarios & van der Heijden, 2008; De Beer, 2010; Mayer, 2011).

There seemed to be mixed feedback about ***adaptability and flexibility.*** Many interns proved that they could work well under pressure and that they were well equipped to work in a team or individually. Interns were also praised for being able to adjust to the work environment after university studies and being able to remain calm in pressurised situations, demonstrating a flexibility to handle and adapt to change and being able to manage stress when dealing with the team, the client or difficult situations. All of these refer to the interns' ability to self-regulate.

Pertaining to the **Intercultural Competence** competency of ***organisational culture***, it appeared that some interns, it is stated that organisations want graduates who can adapt to the workplace culture(Lowden et al. 2011:4). It appeared, however, that the interns struggled to adapt to the internship host organisations, for example I-2011 cautioned the intern to become *"sensitive to organisational nuances"* and T-2014, for example, advised the intern to quickly *"get used to company cultures"*.

The **Social Intelligence** competency of ***relationship management*** seemed to be a strength for most interns. Most interns were perceived to be warm and friendly, as indicated by reports from supervisors across the 5 years. For example, this was observed in feedback from C-2010, who indicated that the intern demonstrated *"strong client interaction skills"*. A-2011 and many other supervisors stated that the interns performed well in engaging with stakeholders and managing clients' expectations (both internal and external). According to supervisor reports they also demonstrated "*a very high engagement level and visibility"* (W-2014) and A-2012, M-2012 and P-2012 provided good feedback that the interns *"engaged well with employees and other analysts"*. Furthermore, N-2013 and D-2013 confirmed that interns were able to develop good relationships, were easy to converse with, easy to work with and were friendly and approachable, which is evidence of good Social Intelligence.

It was expected that interns would perform well in ***teamwork*** due the exposure to group work in the IS curriculum. However, this competency did not seem to be a strength for many interns. This was evidenced by a statement from A-2012, indicating that the intern should *"improve on the ability to actively participate in team meetings"*. T-2014 also stated that the

intern should "*learn how to work as a team to achieve one goal and learn to balance individual with team efforts"* and further explained that "*he learns and works at a rapid rate so he finds it challenging to work with team members who work at a slower pace".* This meant that the intern found it difficult to self-manage and self-regulate himself in order to integrate effectively within the team. While independence and autonomy is valued, there needs to be an appropriate balance and recognition of when it is required to work in a team. Interns were advised to *"be more involved with team activities and interact with team members"* (P-2012) and to *"ensure all team members are available to get required support in order to meet the deadline"* (K-2010).

There were mixed responses about ***networking and collaboration***. H-2011 advised the intern to improve on *"communication skills and the ability to proactively engage to ascertain information and assistance"*. This indicates that the intern was not able to demonstrate networking skills. A-2012 also said that "*the intern needs to ensure that she goes through the required peer reviews prior to submission of a task"* and that the intern must "*ensure that she leverages from her colleagues' knowledge when a task is assigned to her that, to ensure that she is able to complete the task within the specified time*". On the other hand, T-2014 praised the *"ability to source and interact with the right individuals to gather required information"* as a strength of one of the interns and A-2014 advised an intern to *"actively build relationships with people of influence within the business"*. There were mixed responses about ***leadership and decision making***, indicating that some interns demonstrated good leadership skills and many interns lacked in these competencies. With a lack of theoretical knowledge about ***conflict resolution***, interns found themselves unable to handle conflict situations. T-2014, for example, said that the intern should *"learn how to effectively deal with conflict"* and to *"respect others – counting what she says and when she says it"*. Another intern in the same year was advised to *"not avoid conflict – learn how to deal with conflict and resolutions"* (V-2014). Other instances of conflict were reflected in the various competencies already discussed in this chapter.

Attitudes component of e-competence

In terms of attitudes, interns seemed to display favourable attitudes pertaining to Global Competencies. Most interns appeared to have a professional and respectful attitude towards

the organisational culture. Interns entered the work environment with immature and playful attitudes and were compelled to transition to the workplace. It did not take long for interns to adapt and adhere to organisational norms and nuances, once they were made aware of them. Interns also had a cross-cultural awareness; and an open and keen attitude towards diversity. Teamwork was indicated as a weakness since interns struggled to open themselves up to working in groups and to deal with group dynamics. It is inferred that due to a lack of confidence and emotional intelligence generally, interns were not as eager to network and collaborate either. While interns were keen to learn and develop, most interns did not have the required attitudes to fill leadership positions.

Interpretation of responses

The indicators of ***professionalism and business etiquette*** seemed to be punctuality, meeting deadlines, respect, professional attire and engaging with colleagues. There were mixed responses about interns' professionalism in the workplace. While etiquette and professionalism are competencies that interns are expected to develop intrinsically and tacitly throughout the degree, it should be reiterated that these were entry level candidates, who received minimal exposure to transferable and interpersonal skills and who required mentorship from their supervisors in the above instances. The essence of the internship was to provide a safe and mentored environment for the intern to learn workplace etiquette. It could then be inferred that where there were negative reviews, it was less of a reflection on the intern's performance and more a reflective of the lack of mentorship provided and the lack of exposure of business etiquette taught in the curriculum. In terms of adaptability and flexibility, interns seemed to receive only positive responses. It can therefore be inferred that students were able to transition well into the working world and that they demonstrated the ability to be adaptable to changing situations and flexible to the various demands placed upon them. It also seems like this is attributed to the interns' attitude and level of emotional intelligence rather than the IS curriculum.

The few responses about ***organisational culture*** could be indicative that the interns have performed well in this area and therefore it was not mentioned, or it could be because no explicit questions were asked in this regard. It was inferred, nonetheless, that some interns needed to become sensitive to organisational nuances and organisational cultures. Pertaining

to ***relationship management***, the positive feedback indicates that interns were able to establish good working relationships with co-workers and management. They also seemed to be able to manage client expectations well and were able to engage well with stakeholders. The many reports identifying ***teamwork*** as an area for development, infers that there is a lack of knowledge pertaining to group dynamics in the students' training and that the IS curriculum must place emphasis on discussing group dynamics in a classroom environment. Reinforcement in the curriculum will enhance the learning and competence development taking place during the group work in assignments so that the student is able to acquire this competence. In IS modules, the focus tends to be on the assignment content rather than the interpersonal interaction that happens during the process of working in a group, which means that very little emphasis is placed on the soft skills required to work effectively within a group. Some information on teamwork is provided in the first year Academic Literacy for Commerce course and in the second year Systems Delivery Management course. However, throughout the rest of the curriculum students are required to efficiently complete assessments in groups, without formal training on interpersonal skills or mentoring on how to deal with group dynamics.

It can be inferred that ***networking and collaboration*** are competencies related to relationship management and that companies regard this competency as crucial. Some interns were able to demonstrate good networking and collaboration skills while some were advised to develop the confidence to network with influential people within business. It can be inferred from the discussions with supervisors that interns required more exposure to ***leadership and decision making*** during their university training as well as during the internship. While interns were able to autonomously complete work, they often lacked the confidence to enforce deliverables from colleagues on time, which is something that would be enhanced with experience and assertiveness. It can be inferred that conflict is expected to occur in all work environments and the interns did not seem prepared to handle it effectively. This indicates that ***conflict management*** was not sufficiently dealt with in the curriculum.

5.2.1.6 Meta-Competencies

In the conceptual framework, meta-competencies are the knowledge, skills and attitudes that are embedded within and underscore the quality, relevance and adequacy of all the other competence categories, in the conceptual framework.

Knowledge component of e-competence

Andrews and Higson (2010) confirm that effective communication is the most important generic competency for graduates. In line with literature, effective ***communication*** seemed to be the most required competency in the data as well. Communication was highlighted as an area for development more than any other competency, across all 5 years. Supervisors mentioned communication approximately 50 times as a weakness identified in interns. The numerous times that supervisors chose to speak about communication, when no direct question was asked about it, indicates that students did not display effective communication skills. This infers a significant gap that the IS curriculum must address. In terms of the cognitive component of communication, it appeared that interns were not able to relate it well to other cognitive competencies. For example: F-2011 indicated that *"[the intern] needs to focus on the details of what is said and written. She must learn to distinguish the important information from the 'good to know' information"*. As discussed in Section 3.4.2, the ***recognition of quality*** is a subjective cognitive construct, which relies on the view of the one who is evaluating and in this case it is the supervisor. There seemed to be occurrences in the data where one organisation recognised a particular competency as a strength in an intern and another organisation regarded the same competency as lacking in another intern, which emphasizes the subjectivity of measuring competence. Thus, in such an instance, it is difficult to indicate if such a competency is a gap in the curriculum or not. The conceptual framework posits that quality should be embedded within all of the other competencies; hence it is listed as a meta-competency.

Skills component of e-competence

Examples of reviews from supervisors, pertaining to ***verbal communication*** are as follows: T-2014 stated: "*she needs to work on expressing herself in a timely manner without losing her audience"*. B-2010 made a similar comment, advising an intern that *"more focus should be applied when communicating, to ensure that the relevant point is made",* illustrating that the

student was not articulate in expressing themselves clearly. A-2014 also advised the intern to *"focus on her communication with others, she is fairly quiet and this might affect her visibility within an organisation"*. It was observed that interns needed to be prompted and persuaded to allow their voices to be heard, which is supported by the discussion in Section 5.2.1.4 on self-confidence. The data also suggests that interns performed well in presentations but displayed deficiencies in documentation and ***written communication*** skills. Some notable extracts in support of this statement are as follows: The intern's *"written content was satisfactory but the document lacked graphical content. Language and business style of writing required much improvement"* (C-2010). Many of the reports indicated that spelling and grammar, layout and graphics were lacking. Some supervisors pointed out that intern tend to write the same thing differently in different sections of a document. Similarly, interns were advised that "p*rofessional responses need to be taken into account when replying to emails"* (F-2011). C-2010, D-2010 and M-2013 interpreted interns' poor written communication skills as resultant of a lack of emphasis in university training, particularly in business documentation: *"little exposure (need more) to written assignments/written language"*, "*what is clear after discussing with both interns at [Organisation C] Africa, is that they have very little exposure to written assignments [in university training]"* and *"there needs to be adaption to business writing [in university training]"*.

In terms of active ***listening skills***, V-2014 felt that the intern should practise *"listening more and paying attention - understanding what outputs are expected"*. T-2014 shared these sentiments and also indicated that their intern should improve on *"listening skills in terms of strategic mapping"*. In addition, an intern at W-2014 was advised to "*listen more and communicate more effectively, rather than waiting for things to reach boiling point".* These reports can be linked back to the cognitive competency of attentiveness and being mentally present during these conversations. As an indication of the psychomotor aspect of lifelong learning,

The indicators of ***quality*** emanating from the data relate to minimal errors found in deliverables therefore minimal rework required and secondly, delivering on time. For example, as strengths supervisors indicated: "*She is very reliable and delivers on requirements/tasks within the allocated time and her deliverables are of good quality"* (N-

2012) and *"[the intern is] quality orientated - avoids redoing* (U-2014). As areas for development supervisors indicated: "*Identify ways to avoid rework - more focus on quality delivery"* (R-2014) and "*Ensure deliverables are always consistent of good quality e.g. missed simple formatting changes. Always have your work reviewed or self-review a short period of time after completion"* (A-2010). The importance of quality output was observed from the following extracts, provided as "strengths" that the interns demonstrated, which indicates that employers placed value on quality of output.

Attitudes component of e-competence

Interns seemed to have mixed attitudes towards ***effective communication***. However, the numerous negative reports about areas for improvement related to a lack of communication skills suggest that all components of the competency (knowledge, skills and the associated attitudes) were lacking. Interns seemed to have a strong positive attitude towards ***lifelong learning***. In terms of attitudes displayed, A-2010 indicated that *"[the intern] displayed a positive attitude and willingness to learn. She is a pleasure to have in the team".* This emphasises the overlap between competence categories, in this instance emotional intelligence (self-motivation) displayed through a positive attitude, the ***willingness to learn*** as a meta-competency and the ability of the student to engage well with the team (social intelligence). Q-2014 cautioned the intern to "*be willing to accomplish seemingly menial tasks as they help you learn".* This points to the high expectations that most interns have when starting out in the industry, which has been noted as one of the reasons for youth unemployment in South Africa (Pauw, Oosthuizen & Van Der Westhuizen, 2008). The interns were often asked to complete smaller tasks, which they didn't receive well, not seeing the bigger picture and having too high expectations. I-2011 similarly reported that *"[the intern] is committed to delivering good quality work, is always willing to take on new challenges and eager to learn. Her manner and attitude was always professional"*. In all 5 years, more so in 2014, interns were appraised for their *"willingness/eagerness to learn and be taught", "willing and able to try new software", "very willing to learn new things"* and *"eager to add value"*. It is clear that these attitudes, of being willing to learn, have underscored the interns' acquisition of new skills and continuous active learning. A consciousness of ***quality*** is evidently important to employers and this seemed to be an area for development for most interns.

Interpretation of responses

There were many reports about a lack of effective communication demonstrated by interns throughout the 5 years of data collection. It appeared that interns lacked in the knowledge, skills and attitude components of effective written, verbal and non-verbal communication. The data also indicates that most interns demonstrated a strength in the attitude component of lifelong learning, as they displayed an eagerness and willingness to absorb as much as they could learn during the period of the internship. This favourable attitude enabled them to continuously gain knowledge and build skills, as components of lifelong learning. It was noted that a few interns entered the working environment with too high expectations of the work that they would be involved in, which meant that they were not open to doing low impact tasks. This could be interpreted as a negative attitude towards lifelong learning.

5.2.2 Quantitative Data Analysis

Section 2, 3 and 8 of the performance evaluation form (an example of which is provided in Appendix B) were regarded as quantitative in nature and responses were analysed in graphs, refer Appendix D. A short synopsis of the graphs follows, based on two main questions: 1) supervisors were asked to rate the importance of a list of competencies in order to indicate which ones they valued most; and 2) supervisors were asked to indicate how well interns met their expectations in certain competencies. The responses were as follows:

5.2.2.1 Competencies most valued by supervisors

In terms of **Cognitive Competence**, supervisors' responses indicate that 52% regarded ***analytical thinking*** as crucial and 48% said it is good to have. 27% said ***creativity and innovation*** is crucial and 70% viewed it as good to have while 4% indicated that it is hardly ever required. 80% of supervisors indicated that ***attentiveness and being detail oriented*** is crucial and 20% said it is good to have. 80% indicated that ***problem solving and critical thinking*** is crucial and 20% indicated that it is good to have. 36% indicated that ***being inquiry focused (conducting research)*** was crucial and 63% indicated that it is good to have.

In terms of **Functional Competence**, 29% of supervisors indicated that ***strategic planning*** as an e-skill was crucial to have, 32% regarded it as good to have and 39% thought that it was

hardly ever required. In addition, 63% of supervisors regarded ***planning and organising*** as crucial and 38% is good to have.

In terms of **ICT Competence**, all supervisors indicated that ***digital literacy***, specifically technical competency is crucial to them. 20% of supervisors indicated that ***programming*** is crucial and 52% said it is good to have.

In terms of **Personal Competence**, specifically **Emotional Intelligence**, 57% of supervisors indicated that ***self-confidence*** was crucial and 43% said it is good to have. 39% regarded initiative as crucial and 61% regarded ***initiative*** (self-management) as good to have. 50% felt that ***multi-tasking*** (self-management) was crucial and 32% said it is good to have. 39% of supervisors indicated that ***assertiveness*** (self-regulation) was good to have and 46% indicated that it is crucial. 82% said that ***self-motivation*** is crucial and 18% said it is good to have. In terms of ***self-motivation***, 27% indicated that ***energy and vibrancy*** was crucial and 73% regarded it as good to have. 38% said that ***passion*** was crucial and 63% said it is good to have. 59% felt that it was crucial for interns to have a ***positive attitude*** and 41% said it is good to have. In terms of **Ethical Competence**, 68% of supervisors felt that ***strength of character*** was good to have and 32% said that it was crucial to them. 41% regarded ***personal values*** as crucial and 50% regarded as good to have. 82% of supervisors indicated that ***dependability*** is crucial and 5% said it is good to have. 84% said that ***honesty*** is crucial and 9% said good to have. 88% felt that ***integrity*** is crucial and 13% felt that it is good to have. 68% said that ***loyalty*** is crucial and 25% said it is good to have.

In terms of **Global Competence**, specifically **Behavioural Competence**, 29% indicated that ***adaptability and flexibility*** is crucial and 71% of supervisors said that it is good to have. 77% of supervisors indicated that ***professionalism*** is crucial and 23% said that it is good to have. In regard to Intercultural Competence, 68% of supervisors indicated that ***organisational cultural awareness*** is crucial to them.

In terms of **Social Intelligence Competence**, supervisors' responses indicate that 48% regarded ***relationship management*** as crucial and 45% said it is good to have. In terms of

teamwork, 77% of supervisors indicated that it is crucial and 23% said it is good to have. 25% indicated that ***leadership and decision making*** is crucial and 45% regarded it as good to have.

In terms of **Meta-competencies**, 98% of supervisors indicated that ***communication***, (in all forms) are crucial, while 2% indicated that communication is good to have. 88% of supervisors felt that ***quality*** is crucial and 13% indicated that it is good to be concerned about quality. 93% of supervisors regarded ***willingness to learn*** as crucial and 7% said it is good to have.

Overall, 39% of employers indicated that **soft-skills** are crucial. This is contrary to the literature that regards soft-skills as very important. However, examining all the competencies that supervisors indicated were important shows that they do regard soft-skills as crucial, but that maybe supervisors do not know what competencies are regarded as soft-skills. Not surprisingly though, 84% of supervisors indicated that a strong work ethic is crucial to them.

5.2.2.2 How well interns met supervisors' expectations

In terms of Cognitive Competence, when supervisors were asked to indicate how students performed in the competency of ***attentiveness*** (to follow instructions), 54% indicated that interns met their expectations, 33% said that interns exceeded expectations and 2% did not meet expectations. In the area of ***problem solving***, 42% of supervisors indicated that interns met their expectations, 32% exceeded expectations, while 26% partially met their expectations. In ***analysis*** skills, 39% of supervisors indicated that interns met their expectations, 33% exceeded expectations and 29% partially met expectations. Regarding interns' ability to ***apply existing knowledge*** 52% met their expectations, 24% exceeded expectations and 4% did not meet their expectations.

In terms of **Functional Competence**, supervisors indicated that 51% of interns met their expectations of ***general IS functional*** e-skills demonstrated, while 33% of interns exceeded expectations and 13% partially met expectations. 39% of supervisors felt that their interns exceeded their expectations with ***organisational and business skills*** and 51% of interns met expectation while 3% partially met expectations.

In terms of **ICT Competence**, 30% of supervisors said that interns exceeded their expectations pertaining to the demonstration of ***digital literacy***, while 27% indicated that they met expectations, 20% of supervisors felt that interns only partially met their expectations and 23% of organisations indicated that the interns did not meet their expectations related to digital competence.

In terms of **Personal Competence**, specifically **Emotional Intelligence**, 55% met their expectations for ***self-awareness*** in their ability to express themselves appropriately, 28% exceeded expectations, 11% partially met expectations and 4% did not meet. For ***self-management***, 61% of supervisors said that interns met their expectations for ***time management*** specifically, while 24% exceeded expectations, 13% partially met and 1% did not meet expectations. For ***self-regulation***, in the ***ability to adapt to change***, 47% of supervisors indicated that students met their expectations and 42% exceeded expectations. Also regarding self-regulation, pertaining to the ***ability to accept criticism***, 59% of supervisors indicated that interns met their expectations, 33% indicated that students exceeded their expectations, 6% partially met and 2% did not meet expectations. When supervisors were asked about the interns' ability to demonstrate ***self-motivation*** in terms of completing tasks independently (***autonomy***), 52% of supervisors said that interns met their expectations, 34% exceeded expectations, 7% partially met and 1% did not meet expectations. For the level of ***initiative*** demonstrated, 53% of supervisors said that their expectations were met, 27% of said their expectations were exceeded and 16% indicated that the interns partially met their expectations for taking initiative while 2% indicated that their expectations were not met.

In terms of **Behavioural Competence**, in terms of ***professionalism***, 66% of supervisors said that interns met their expectations, 25% exceeded expectations, 6% partially met expectations and 1% did not meet expectations. Regarding ***adaptability and flexibility***, 59% of supervisors indicated that interns met their expectations for ***working under pressure,*** 22% exceeded expectations, 15% partially met expectations and 5% did not meet expectations. 61% of supervisors felt that interns met their expectations for ***adapting to changes in technology*** and 32% felt that interns exceeded their expectations.

In terms of **Intercultural Competence**, 57% of interns met expectations related to ***organisational culture***, while 31% exceeded expectations and 5% partially met expectations.

In terms of **Social Intelligence Competence**, 58% of interns met their expectations related to ***teamwork***, 24% exceeded their expectations and 9% partially met expectations.

In terms of **Meta-competencies**, in ***communication with clients***, 42% of interns met expectations, 35% exceeded expectations, 16% partially met expectations and 2% did not meet expectations. In ***communication with colleagues***, 43% indicated that interns met expectations, 35% exceeded expectations, 16% partially met expectations and 6% did not meet expectations. Regarding ***communication with management***, 41% of supervisors felt that interns met expectations, 33% exceeded expectations, 24% partially met expectations and 2% did not meet expectations. In terms of ***verbal communication*** 39% met expectations, 22% exceeded expectations, 10% partially met expectations and 30% did not meet expectations. In terms of ***written communication***, 42% of interns met expectations. 20% exceeded expectations, 11% partially met expectations and 27% did not meet expectations. 53% of supervisors felt that interns met their expectations for ***quality of output***, while 27% of supervisors said that interns exceeded their expectations, 27% exceeded expectations, 10% partially met expectations and 1% did not meet expectations.

5.2.3 Additional responses from supervisors

Section 5 of the questionnaire (Appendix B) provided an open space for supervisors to list e-skills and e-competences that were not sufficiently covered in the curriculum or not evaluated in the questionnaire. Supervisors listed all of the following in this section:

Table 5.1: Supervisors' additions to the questionnaire

In 2012 supervisors added	
"Time management i.e. ability to multitask"	This was coded as part of self-management in the conceptual framework and was discussed in Section 5.2.1.4.
"Ability to think logically"	This was identified as part of the problem solving, creativity and innovation competency in the conceptual framework and was discussed in Section 5.2.1.1.
In 2013 supervisors listed	
"Professional Business Writing"	Written communication was discussed in Section

	5.2.6 as part of meta-competencies in the conceptual framework.
"Practical hardware experience needed, computing and networks (with regards to digital forensics)"	This was noted in Section 5.2.2 as relating to infrastructure and ***digital forensics*** is noted as a gap in Section 5.2.2.1.
"Low level understanding of how common operating systems and user applications work"	The understanding of operating systems and user application forms part of the ICT competence in the conceptual framework and was discussed in Section 5.2.3 regarding Digital literacy.
"Ability to work independently and convey crucial information in a timely manner to senior management".	The ability to work independently is regarded as autonomy and is classified as Identify and Self-awareness, as an Emotional Intelligence competency in the conceptual framework. The ability to convey crucial information in a timely manner is coded as Self-management, also an Emotional Intelligence competency that was discussed in Section 5.2.4.
In 2014 supervisors listed the following	
"Research and analytic skills"	Research and analytical skills was discussed in the Cognitive Competence section of the conceptual framework in Section 5.2.1
"Strategic thinking skills"	This was identified as part of Enterprise strategy, planning and architecture, and was discussed in Section 5.2.2.
"Supplier and Vendor Management". This was indicated twice by supervisors.	This can refer to Service Management or Relationship Management in the conceptual framework, in Section 5.2.5
"Business problem solving skills, I find that IS students often lack business problem and logical thinking skills. They often only gain these skills in the work environment". This was mentioned three times	The lack of business knowledge was noted as a deficiency and was discussed in Section 5.2.1.
"Ability to apply advanced MS Office usage such as Excel, Word, PowerPoint. Knowing how to use Excel through the use of mathematical calculations and use of formulas to assist with problem solving, planning and tracking activities". This sentiment was listed 12 times in one year.	Digital literacy is seen as a gap that needs to be addressed by the IS curriculum and was discussed in Section 5.2.3.

Additionally, a majority of supervisors highlighted the need for work-integrated learning (WIL) and for interns to have some form of experience to accompany their degree. This observation supports the findings of Lowden et al. (2011), Rawlings et al. (2006) Saltz et al. (2013) Palmer (2002)and others, that work-integrated learning is crucial for e-practitioners to make the connections between theory and work practices. It is limited how much of competence enablement can be achieved in a classroom, even if the curriculum is altered. In line with

literature, the lack of experience of the interns was highlighted more than 35 times by supervisors, which indicates the importance of ***experience.*** Supervisors emphasised that if interns had more practical exposure to the business world they would have been more effective in performing most of the tasked assigned to them. This means that quality would have improved. Some notable statements in this regard were that "*[The intern] lacks technical experience"* (P-2012), "*lack of experience lead to poor skills being exhibited for the research task given"* (C-2010), "*she needs to be more assertive but this will come with more exposure"* (A-2014), "*take more initiative (this will develop more with experience)"* (M-2012), "*[The intern] lacks the confidence to speak up which should come with experience"* (W-2014) and *"[The intern] still comes across as being shy and inexperienced, but I believe this will change as soon as she has more exposure of dealing with customers"* (I-2011).

These extracts indicate that it is important for the interns to have a real world perspective of business solutions, which will enhance their sense-making process for functional tasks. Therefore, it could be inferred that the *relevance*, *adequacy* and *quality* of e-competences demonstrated by interns, is expected to improve with increased experience and exposure to the workplace. All of these statements emphasize the importance that supervisors (representing employers) place on exposure to workplace practices. The limited exposure to the industry that undergraduate students receive is through assignments but these are short term (often not more than intermittent engagement over a few weeks) and content specific. This means that the students only aim to complete their assignments and do not get the opportunity to learn other competences. These brief spouts of exposure do not allow room for experiential and holistic competence development. The only practical experience that students are provided with in the curriculum is in the internship programme, which spans a period of 6 months and is only offered to postgraduate honours students. Therefore, it can further be inferred that if students had more practical experience then the other Core Competences would be more effectively applied to the workplace. Experience will also provide students with the opportunity to develop a wide range of e-competences (knowledge, skills and attitudes) both vertically and horizontally.

5.2.4 e-Competencies not in the conceptual framework

The following e-competencies emanated from the data but were not in the conceptual framework. They should be added to the conceptual framework:

- **Digital forensics** is taken to refer to the controls, techniques and mechanisms involved in the investigation, recovery and security of components of digital devices, which are often related to computer crime.
- **Supplier and Vendor Management** is taken to refer to Supplier and Vendor Relationship Management and is therefore already in the conceptual framework. It is regarded to be part of Relationship Management in the Social Intelligence Focus Area.

5.2.5 Competencies not found in the data

The following e-competencies are in the conceptual framework but did not reflect in the data:

- **Sales and marketing** refers to the identification of sales prospects, the development of customer interest and the preparation, execution and monitoring of the sale of any product or service into an external or internal market. Also includes integration of digital marketing and the management and development of strategies, campaigns and day-to-day marketing activity delivered through web and other appropriate digital channels and technologies
- **Global sourcing management** refers to defining and maintaining a sourcing strategy, managing suppliers and supplier performance as well as to procure IT resources, namely people, software, hardware, and licenses.
- **Social awareness and social responsibility** refers to the knowledge, skills and attitudes that students require to become responsible users of information technology, within the socio-economic contexts that they reside in. It refers to an awareness of how they can contribute to the upliftment of society, using their e-competences.

5.3 E-COMPETENCIES INCLUDED IN THE IS CURRICULUM AT UNIVERSITY X

In this section the second research question will be answered, namely: *which of these e-competencies are included in the Information Systems curriculum at University X?* A table representing the IS curriculum at University X is provided first and thereafter, a second table in which the content of the curriculum is compared to the conceptual framework. This is followed by a discussion of the gap in the curriculum.

5.3.1 University X IS Curriculum

The University X - IS department offers 17 (seventeen) undergraduate courses and 7 (seven) postgraduate courses, which are listed below. The different modules are numerically represented in Table 5.**2** in column 1 for ease of reference. The second column represents the module code and the third column contains the module name (description), as it appears in the University X calendar. The 4th column indicates whether the modules are core (compulsory) or whether they are electives. The final column reflects at which year level the modules are offered per year. Appendix G contains details descriptors of each module.

Table 5.2: University X - IS curriculum (1st year - honours level)

No.	Module code	Module name	Core/ Elective	Year Level
		Undergraduate		
1	IFS 131/2	Introduction to Information Systems	Core	1
2	IFS 231	Business Analysis	Core	2
3	IFS 233	Systems Delivery Management	Core	2
4	IFS 232	Introduction to Client-Side Scripting	Elective	2
5	IFS 234	Server-Side Applications Development	Elective	2
6	IFS 242	Databases and Data modelling	Elective	2
7	IFS 244	Business Information Systems	Elective	2
8	IFS 251	Introduction to Object-oriented principles and Systems Design	Elective	2
9	IFS 262	Applied Object oriented principles	Elective	2
10	IFS 363	Systems Engineering Principles	Elective	3
11	IFS 361	Information Systems Strategy	Core	3
12	IFS 362	Architecture and Infrastructure	Core	3
13	IFS 352	Philosophy and Research Methods	Elective	3
14	IFS 351	Internet and e-Commerce (Capita Selecta)	Elective	3
15	IFS 341	Enterprise Resource Planning (Capita Selecta)	Elective	3
16	IFS 342	Data Modelling for Business Intelligence	Elective	3
17	IFS 324	Consulting Skills (Capita Selecta)	Elective	3
		POSTGRADUATE		
18	IFS 714	Internship	Elective	Honours
19	IFS 721	Information Systems Practice	Core	Honours
20	IFS 722	Information Systems Research	Core	Honours
21	IFS 724	Information Systems Research Project	Elective	Honours
22	IFS 731	End user practical	Core	Honours

23	IFS 734	Capita Selecta (Oracle)	Elective	Honours
24	IFS 711	Delivering IS Benefits	Core	Honours
25	IFS 712	Managing Systems Delivery	Core	Honours

5.3.2 A gap analysis between the IS curriculum and conceptual framework

In the table below, the conceptual framework is compared to the IS curriculum at University X, that was used during the period 2010-2014. The first column of the table lists the Key Focus Areas. The second column lists each e-competency corresponding with the conceptual framework. The e-competencies discussed in Section 5.2.4 have been added to the conceptual framework and are indicated by a (+) sign in front of the e-competency; and the e-competencies discussed in Section 5.2.5 have also been highlighted and are indicated by a (-) sign in front of the e-competency. The last two columns in the table analyses the gap, using the following symbols:

- A tick (✓) symbol, colour coded in green, means that the competency ***is*** taught in the curriculum. The notes in the last column indicate the corresponding module codes which the competency is taught in.
- An (E) symbol, colour coded in blue, means that that those e-competencies are not explicitly taught but that it is assumed that some coverage thereof is ***embedded*** in the teaching and learning practices in all modules.
- A symbol (X), colour coded in pink, refers to the e-competencies that are ***not*** taught in the curriculum but are included in the conceptual framework.

Table 5.3: A gap analysis between the IS curriculum and the conceptual framework

Key Focus Area	e-Competencies	Gap analysis – found in the IS curriculum or not	
Cognitive Competence (Knowledge/Critical thinking)			
Tacit/ practical **Technical/ theoretical** **Procedural** **Contextual**	**Reflection & attentiveness**	**E**	**assumed to be embedded**
	Inquiry focused	✓	**131/2,231,233,244,361,362,352 351,341,714,722,724, 731, 711, 712, 721**
	Systems thinking & pattern recognition	✓	**131/2, 231, 233, 363, 341**
	Problem solving, creativity & innovation	**E**	**assumed to be embedded**
	Analytical & quantitative thinking	**E**	**assumed to be embedded**
	Sense-making & application of existing knowledge	**E**	**assumed to be embedded**
	Assimilation, synthesis & creation of new knowledge	**E**	**assumed to be embedded**

Functional Competence (Psychomotor/Skills -Discipline specific)			
Non-technical	Enterprise strategy, planning & architecture	✓	244,361,362,341,721,711, 712
	Quality, risk & compliance	✓	233, 362, 721
	Project delivery & change management	✓	233, 721, 731, 712
	User management & support	✓	231, 233, 262
	- Sales and marketing	X	not explicitly taught
	-Global sourcing management	X	not explicitly taught
	+ Supplier and vendor management	X	not explicitly taught
Technical	Tech/Info Strategy, Planning & Architecture	✓	361, 362, 721
	Requirements management	✓	231, 233, 721
	Business process improvement	✓	231, 341, 721
	Solution design, dev & implementation	✓	131/2,231,233,232,234,242,244 251,262,362,351, 734, 342
	Service management	✓	233, 324, 721
	Infrastructure	✓	131/2, 242, 362, 341, 721
	+ Digital forensics	X	not explicitly taught
ICT Competence (Psychomotor/Skills)			
Three usage levels: Advanced, Intermediate & Basic	Advanced IS application & specialisation	✓	233, 232, 234, 251, 262, 351,341
	eAwareness	✓	131/2
	Emerging tech monitoring/ New Media lit	✓	131/2, 341
	Data literacy and management (analytics)	X	not explicitly taught
	Information literacy and management	✓	131/2, 231, 242, 244, 342
	Technology literacy	E	assumed to be embedded
	Digital literacy	X	not explicitly taught
Personal Competence (Affective/Attitudes - Intrapersonal)			
Emotional Intelligence	Identify & Self awareness	X	not explicitly taught
	Self-management	X	not explicitly taught
	Self-regulation	X	not explicitly taught
	Self-motivation	X	not explicitly taught
	Empathy	X	not explicitly taught
Ethical Competence	Ethical responsibility and accountability	X	not explicitly taught
	Strength of character and values	X	not explicitly taught
Career Management	Industry awareness	✓	131/2,231,233,244,714, 721, 731,711,712,351,341, 362
	Business knowledge	✓	131/2, 231, 233, 244, 714, 721, 731, 711, 712, 351, 341, 362
Global Competence (Affective/Attitudes - Interpersonal)			
Behavioural Competence	Business etiquette & Professionalism	✓	324
	Adaptability & Flexibility	E	assumed to be embedded
Intercultural Competence	Cross-cultural awareness	E	assumed to be embedded
	Adaptation to organisational culture	✓	131/2,231,233,244,714,721,731 711 712,351,341,362
Social Intelligence	Relationship management	X	not explicitly taught
	-Social awareness & social responsibility	✓	131/2,231,233,721,731,711,361
	Teamwork (including virtual teams)	X	not explicitly taught
	Networking & collaboration	X	not explicitly taught
	Leadership & decision making	X	not explicitly taught

	Conflict resolution & negotiations	X	not explicitly taught
Meta-competences			
	Effective communication	E	assumed to be embedded
	Lifelong learning (willingness to learn)	E	assumed to be embedded
	Recognition of quality	E	assumed to be embedded
RESULT = WORK READINESS			

Table 5.3 above shows that of the 50 e-competencies listed in the conceptual framework, 42% (21 e-competencies) were included in the IS curriculum and therefore taught at University X, at some stage between 1st year level to Honours year level. It further reflects that 22% (11 competencies) are assumed to be embedded within the IS curriculum through teaching and learning activities and through formative and summative assessments. 36% (18 competencies) are not in the curriculum and therefore it is inferred that these competencies are not explicitly taught at University X. It could be that aspects of these 16 competencies are embedded in some of the modules and as a result are indirectly covered in the curriculum. The competencies that are seemingly not taught were regarded as important by supervisors and therefore the inclusion thereof in the curriculum should be considered.

It was observed that most of the affective competencies (attitudes) in the interpersonal and intrapersonal competencies were lacking in interns and were not included in the curriculum. Literature argues that the affective part of e-competences (attitudes, feelings and dispositions) are lacking in e-Practitioners and should be included in formal instruction. Smith (2002:5) suggests that "the theory behind these soft skills could be taught as part of a project management course in the 3rd year of an IS degree". It is therefore argued that these are important e-competencies for graduates to develop during their academic career in order for them to be able to effectively apply it in the workplace.

5.4 ENHANCING THE IS CURRICULUM TO INCLUDE REQUIRED E-COMPETENCIES

This section pertains to the last sub-question, namely: "How could the IS curriculum at University X be enhanced so that it includes relevant e-competencies for the contemporary workplace?" This question will be answered in the next chapter, under recommendations.

5.5 SYNTHESIS OF ANALYSIS AND CONCLUSION

The analysis of the data in Section 5.2 revealed that there were e-competences and e-skills which the supervisors from the different companies deemed important, although there was a minority that disagreed on these competences. Similarly, the comparison in Section 5.3 shows that there were e-competences included in the IS curriculum at University X, but that there were many important aspects that did not form part of the current IS curriculum.

Table 5.4 below provides a synthesis of the data analysed in Chapter 5. The table indicates whether the knowledge, skills and attitudes (KSA) components of e-competence were regarded either as a strength, a weakness, a mixed response (some supervisors regarded the e-competency as a strength in some interns and as a weakness in other interns), or as neutral (this means that no supervisor response was identified in the data). The last column links this table to Table 5.3 (the gaps in the IS curriculum) and indicates whether the competency is covered, not covered or assumed to be embedded in the IS curriculum at University X. The meaning of the symbols in column 6 remains the same as those in Figure 5.3.

Table 5.4: Synthesis of data analysed

Key Focus Area	Competencies	Knowledge	Skills	Attitudes	IS Curriculum
Cognitive Competence (Knowledge/Critical thinking)					
Tacit/ practical Technical/ theoretical Procedural Contextual	Reflection & attentiveness	MIXED	WEAKNESS	MIXED	E
	Inquiry focused	WEAKNESS	WEAKNESS	STRENGTH	✓
	Systems thinking & pattern recognition	MIXED	WEAKNESS	MIXED	✓
	Problem solving, creativity & innovation	WEAKNESS	MIXED	STRENGTH	E
	Analytical & quantitative thinking	STRENGTH	MIXED	MIXED	E
	Sense-making & application of existing knowledge	MIXED	MIXED	STRENGTH	E
	Assimilation, synthesis & creation of new knowledge	MIXED	STRENGTH	STRENGTH	E
Functional Competence (Psychomotor/Skills -Discipline specific)					
Non-technical	Business/enterprise strategy, planning and architecture	MIXED	WEAKNESS	WEAKNESS	✓
	Quality, risk & compliance	WEAKNESS	WEAKNESS	NEUTRAL	✓
	Project delivery & change management	MIXED	MIXED	MIXED	✓
	User management & support	NEUTRAL	MIXED	STRENGTH	✓
	-Sales and marketing	NEUTRAL	NEUTRAL	NEUTRAL	X
	-Global sourcing management	NEUTRAL	NEUTRAL	NEUTRAL	X
	+ Supplier and vendor management (added)				X
Technical	Technical and Information Strategy,	WEAKNESS	WEAKNESS	WEAKNESS	✓

	Planning & Architecture				
	Requirements management	STRENGTH	MIXED	STRENGTH	✓
	Business process improvement	WEAKNESS	MIXED	STRENGTH	✓
	Solution design, development & implementation	WEAKNESS	WEAKNESS	STRENGTH	✓
	Service management	NEUTRAL	STRENGTH	STRENGTH	✓
	Infrastructure	WEAKNESS	MIXED	WEAKNESS	✓
	+ Digital forensics(added)				X
ICT Competence (Psychomotor/Skills)					
Three usage levels: Advanced, Intermediate & Basic	Advanced IS application & specialisation	WEAKNESS	WEAKNESS	MIXED	✓
	eAwareness	NEUTRAL	NEUTRAL	NEUTRAL	✓
	Emerging tech monitoring/ New Media lit	NEUTRAL	NEUTRAL	NEUTRAL	✓
	Data literacy & management (analytics)	STRENGTH	MIXED	STRENGTH	X
	Information literacy and management	STRENGTH	MIXED	STRENGTH	✓
	Technology literacy	WEAKNESS	WEAKNESS	STRENGTH	E
	Digital literacy	WEAKNESS	WEAKNESS	WEAKNESS	X
Personal Competence (Affective/Attitudes - Intrapersonal)					
Emotional Intelligence	Identify & Self awareness	WEAKNESS	MIXED	STRENGTH	X
	Self-management	MIXED	MIXED	MIXED	X
	Self-regulation	WEAKNESS	MIXED	WEAKNESS	X
	Self-motivation	WEAKNESS	MIXED	STRENGTH	X
	Empathy	WEAKNESS	STRENGTH	STRENGTH	X
Ethical Competence	Ethical responsibility & accountability	STRENGTH	STRENGTH	STRENGTH	X
	Strength of character and values	STRENGTH	STRENGTH	STRENGTH	X
Career Management	Industry awareness	WEAKNESS	MIXED	STRENGTH	✓
	Business knowledge	WEAKNESS	WEAKNESS	STRENGTH	✓
Global Competence (Affective/Attitudes - Interpersonal)					
Behavioural Competence	Business etiquette & Professionalism	MIXED	WEAKNESS	MIXED	✓
	Adaptability & Flexibility	MIXED	STRENGTH	STRENGTH	E
Intercultural Competence	Cross-cultural awareness	WEAKNESS	MIXED	STRENGTH	E
	Adaptation to organisational culture	WEAKNESS	MIXED	MIXED	✓
Social Intelligence	Relationship management	MIXED	STRENGTH	STRENGTH	X
	-Social awareness & social responsibility	WEAKNESS	NEUTRAL	NEUTRAL	✓
	Teamwork (including virtual teams)	WEAKNESS	WEAKNESS	MIXED	X
	Networking & collaboration	WEAKNESS	WEAKNESS	MIXED	X
	Leadership & decision making	WEAKNESS	WEAKNESS	MIXED	X
	Conflict resolution & negotiations	WEAKNESS	WEAKNESS	MIXED	X
Meta-competences					
	Effective communication	WEAKNESS	WEAKNESS	WEAKNESS	E
	Lifelong learning (willingness to learn)	STRENGTH	STRENGTH	STRENGTH	E
	Recognition of quality	MIXED	MIXED	MIXED	E
RESULT = WORK READINESS					

The interpretation of the findings in this table are discussed in the next chapter, which will draws the study to a close by presenting the findings, proposing recommendations, noting the limitations and identifying possibilities for future research. The researcher will then conclude with what the study meant to her.

CHAPTER 6
FINDINGS, RECOMMENDATIONS AND CONCLUSION

6.1 INTRODUCTION

In this final chapter, the findings from the synthesis in the previous chapter are presented in order to respond to the aims and objectives of the study, and the research questions. Thereafter, the findings are interpreted according to the literature and the conceptual framework; after which recommendations are proposed in order to overcome the gaps identified in the IS curriculum of University X. Lastly, the chapter concludes with the noting of the limitations of the study, recommendations for future research, and a personal reflection on what the study has meant to the researcher.

6.2 AIMS AND OBJECTIVES OF THE STUDY

In Chapter 1, the study had as its aims:

- To determine *how* closely the e-competencies provided by the Information Systems curriculum at University X are matched to the e-competencies required by potential Information Systems employers in the Western Cape; and
- If there is a disparity, to determine how the Information Systems curriculum can be aligned as closely as possible to meet the expectations of potential Information Systems employers in the Western Cape.

And the objectives were:

1. To develop a conceptual framework that could be used to assess the e-competencies required by potential employers in order to determine the gaps in the IS curriculum of University X; and
2. To use the conceptual framework as a guide so that the curriculum at University X could be aligned to provide graduates with the necessary e-competencies required by potential employers in the Western Cape.

Objective 1 was achieved through the development of the conceptual framework for e-Competences for Information Systems graduates, which was discussed in Section 3.5. Objective 2 was achieved through the data analysis, which was discussed in Chapter 5.

6.3 MAIN RESEARCH QUESTION AND SUB QUESTIONS

In order to realise the aims and objectives above, the main research question was:

How closely are the e-competencies provided in the Information Systems curriculum at University X aligned with the e-competencies required by potential Information Systems employers in the Western Cape?

Three sub-questions were used to guide the data collection and analysis processes, namely:

1. Which e-competencies are required by potential Information Systems employers in the Western Cape?
2. Which of these e-competencies are included in the Information Systems curriculum at University X?
3. How could the Information Systems curriculum at University X be designed so that it is aligned to meet the required e-competencies of potential Information Systems employers in the Western Cape?

6.4 FINDINGS

The sub-questions were used as a guide in the data analysis process, and formed the structure of Chapter 5. Based on the synthesis of the analysis in Table 5.4 and the interpretations derived from the data, the following findings are identified:

Finding one

Most of the e-competences listed in the conceptual framework were identified as important by the supervisors through their responses in the qualitative and quantitative data. Two e-competencies emerged from the data that were not included in the conceptual framework, namely Digital forensics, and Supplier and Vendor Management. Three e-competencies were not found in the data that were included in the conceptual framework, namely Sales and marketing (Functional Competence), Global sourcing management (Functional Competence), and Social awareness and social responsibility (Global Competence). E-awareness and emerging technology monitoring were coded as neutral because no data was found that related to these two e-competences.

Finding two

There are four ways in which supervisors responded with regard to how interns' proficiency in the knowledge, skills and attitudes components of the required e-competences. These were regarded as either strengths, weaknesses, neutral or mixed responses by supervisors. Some of the required e-competences were identified as explicitly taught, not explicitly taught or assumed to be embedded in the IS curriculum at University X.

Finding three

Twenty one of the e-competencies listed in the conceptual framework were included in the IS curriculum, eleven competencies were assumed to be embedded within the IS curriculum through formative assessments, and eighteen competencies were not in the curriculum and therefore deemed not to be taught at University X.

Finding four

Three e-competences were explicitly taught, three were assumed to be embedded and five were not taught in the IS curriculum that supervisors regarded as strengths in the interns' performance. Eight e-competences were taught, two was assumed to be embedded and seven were not taught in the IS curriculum of what supervisors regarded as weaknesses in the interns' performance. Lastly, six e-competences were explicitly taught, three were not taught and five were assumed to be embedded in the IS curriculum of the mixed responses that supervisors provided based on the interns' performance.

Finding five

The responses of the supervisors indicated that the vertical perspective of knowledge, skills and attitudes components in the conceptual framework were interrelated and interdependent. This means that Personal Competence, Meta-competence and Global Competence are required for and support the effective appropriation of Cognitive, Functional and ICT Competences.

Finding six

Supervisors responses indicate that the horizontal perspective of knowledge, skills and attitudes of each e-competency in the conceptual framework were interrelated and interdependent. This means that the theoretical knowledge provided by the IS curriculum at University X has supported how well interns were able to demonstrate skills and similarly, the interns' attitudes determined how well they applied the knowledge that they gained.

Finding seven

Supervisors observed that some interns had a low self-confidence which is a component of Emotional Intelligence (identify and self-awareness) due to a lack of experience, and as a result, they were perceived as not being assertive enough and lacked leadership skills; and this placed a constraint on their ability to apply their knowledge and skills effectively in the workplace.

Finding eight

Digital literacy was regarded as a crucial e-competency by all of the supervisors and many of them identified it as a weakness in the performance of the interns.

Finding nine

The supervisors regarded good character, strong values, ethical consciousness and accountability in a work environment (which denotes Personal and Global Competences in the conceptual framework) as important, even though there were no specific questions asked about these aspects.

6.5 RELATING THE FINDINGS TO THE RESEARCH SUB-QUESTIONS

The focus of this study was on the current global e-skills and e-competence mismatch. This disparity between the *quality*, *relevance* and *adequacy* of e-competencies possessed by IS graduates and those required by potential IS employers, was examined in a South African context, particularly in the Western Cape Province. The research questions therefore focused on 1) identifying the demand for e-competencies, 2) assessing the supply of e-competencies and the 3) bridging the identified gap between demand and supply of required e-competencies. The above findings will now be interpreted in relation to the literature

discussed in part 1 (Chapter 2) and part 2 (Chapter 3), and the conceptual framework, to ascertain whether the study has achieved its aims and objectives.

6.5.1 Sub-question 1: Which e-competencies are required by potential IS employers in the WC (demand side)?

In order to answer this question, the researcher examined eleven different approaches to classifying e-competences in part 1 of the literature review and in part 2, the supply and demand of e-competences was explored. This process produced a conceptual framework which lists fifty (50) e-competencies that prospective IS employers require, according to the literature. This literature demand was tested with IS employers in the Western Cape and IS honours graduates from University X. Findings one, two, five, six, seven and eight answer this sub-question and show that the South African demand is aligned to that of the literature since these fifty e-competences in the conceptual framework were required by IS employers in the Western Cape as well.

In addition to these fifty e-competencies, supervisors added two that they regarded as important, which were *digital forensics* and *supplier and vendor management*. Of the fifty e-competencies, five were not found in the supervisors' responses. These five e-competencies were: *sales and marketing*; *global sourcing management*; s*ocial awareness and social responsibility*; e-*awareness* and *emerging technology monitoring*. This was because no direct questions were asked about these e-competencies, so it is uncertain how much prospective IS employers require these competencies and therefore it is also difficult to identify if there is a gap identified in these competencies.

Finding two supports the discussion in Section 3.4.2 and points out that the measure of the *relevance*, *adequacy* and *quality* of e-competence are subjective constructs, which were manifested in some cases in the empirical data when different supervisors provided contrasting feedback about the same intern or when the same supervisor provided contrasting feedback about the demonstration of e-competencies of two interns working at the same organisation in the same year. This observation was also manifested in the mixed responses of supervisors, which makes it difficult to identify conclusively whether these e-competencies should be regarded as a gap or not.

In support of finding five, it was determined that all the e-competencies that were listed under Emotional Intelligence, Ethical Competence and Career Management, Behavioural Competence, Intercultural Competence and Social Intelligence in the conceptual framework, were crucial to supervisors. Supervisors referred to these competences often, directly and indirectly, in their responses when they were asked about interns' strengths and areas for improvement. Since these were performance evaluations, it was expected that they would make reference to Cognitive and Functional Competences yet they spoke more about these "soft-skills", which supports the literature discussed in Chapter 3. An inference can therefore be drawn that prospective IS employers valued the Personal and Global Competencies in the conceptual framework more than they require Cognitive and Functional Competences, and this inference was confirmed by some supervisors (who also happened to be high level IS managers) in the face to face interviews.

Echoing the findings of the European, Malaysian and South African studies discussed in Chapter 3, findings six, seven, eight and nine confirm that prospective IS employers require a strong combination of soft-skills (particularly attitudes) to drive the knowledge and skills that they require in a business context; and that the supervisors in this study placed importance on logical and lateral thinking (out-of-the-box thinking), creativity and innovation, work-integrated and practical experience and technical and digital literacy, amongst others and that they required all of the emotional and social intelligence competencies listed in the conceptual framework. It was also echoed that supervisors required interns to have logical and lateral thinking, business acumen, be able to work fast and have rapid assimilation of knowledge and effective communication, all of which were highlighted in the literature demand discussed in Chapter 3.

6.5.2 Sub-question 2: Which of these e-competencies are included in the Information Systems curriculum at University X (supply-side)?

In order to answer this sub-question, it was important to further test the conceptual framework (demand) against the IS curriculum (supply), to determine if the e-competencies required by potential graduate employers in the Western Cape, were provided by the IS curriculum at University X. This process was conducted by first tabulating the conceptual framework, then examining all the module descriptors (Appendix G) for the IS curriculum at

2014 (Table 5.2) and then finally comparing the conceptual framework to the IS curriculum (Table 5.3) in order to see which of the demanded e-competencies were taught in the IS curriculum. Findings 3 and 4 provide answers to this sub-question.

Through the process of evaluating the supply of e-competencies in the IS curriculum, three main scenarios emerged (referring to Table 5.4):

1. There were e-competencies in the conceptual framework that were covered (explicitly taught) in the IS curriculum, for which interns' performance reflected as a strength, weakness or as mixed responses from the supervisors.
    - If an e-competency was identified as a strength and was covered in the IS curriculum, it was deemed that it was effectively taught in the IS curriculum. These e-competencies are:
        - Requirements management
        - Service management
        - Information literacy and management
    - If an e-competency was identified as a weakness and was covered in the IS curriculum, two inferences could be made: a) either the e-competency was not taught effectively in the IS curriculum or b) there were factors inherent in or surrounding the individual intern, that hindered the proficiency of the e-competency. An inference was made from the data analysis, that to overcome this gap, the theoretical teaching should be supported by practical experience, which should be integrated into the curriculum. Exploring the latter inference (factors inherent in interns) was not within the scope of this study. These e-competencies are:
        - Business/enterprise strategy, planning and architecture
        - Quality, risk and compliance
        - Technical and Information strategy, planning and architecture
        - Solution, design, development and implementation
        - Infrastructure
        - Advanced IS application and specialisation
        - Business knowledge (business acumen)

- If an e-competency received mixed responses from supervisors and was covered in the IS curriculum, it confirmed that the perception of competence is subjective and that it was the supervisors who determined whether the interns were able to demonstrate the relevant competencies or not. Mixed responses also infer that those particular e-competencies may be taught effectively or may not be taught effectively and therefore a recommendation is made that all e-competencies with mixed responses should be re-enforced in the IS curriculum. These e-competencies are:
    - Systems thinking and pattern recognition
    - Project delivery and change management
    - User management and support
    - Business process improvement
    - Industry awareness
    - Business etiquette and professionalism
    - Adaptation to organisational culture

2. There were e-competencies in the conceptual framework which were not explicitly taught in the IS curriculum, for which interns' performance reflected as a strength, weakness or as mixed responses from the supervisors.
    - If an e-competency was identified as a strength and it was not covered in the IS curriculum, it was deemed that it was the intern's inherent cognitive and affective capabilities that enabled the intern to learn this e-competency either autonomously (through the cognitive assimilation of knowledge) by researching the e-competency or from the supervisor in the workplace. The intern's innate ability to adapt to the workplace demands was also recognised in some instances in the data analysis. These e-competencies are:
        - Data literacy and management (specifically data analytics)
        - Empathy
        - Ethical responsibility and accountability
        - Strength of character and values
        - Relationship management

- If an e-competency was identified as a weakness and it was not covered in the IS curriculum, it signified a gap identified and this means that the IS department needs to add this e-competency to their course offering.
    - Digital literacy
    - Self-regulation
    - Teamwork (including virtual teamwork)
    - Networking and collaboration
    - Leadership and decision making
    - Conflict and negotiations
- If an e-competency received mixed responses from supervisors and was not covered in the IS curriculum, it denotes two inferences: a) if the response from supervisors were positive, then this was due to the intern's ability and not the curriculum; and b) if the response was negative then this is definitely an e-competency that the IS department needs to incorporate into their curriculum. The three e-competencies listed below, are components of Emotional Intelligence, which was discussed in relation to the literature, in Chapter 2, and the supervisors' responses in Chapter 5. Therefore these are important competencies that are addressed in finding 7.
    - Identity and self-awareness
    - Self-management
    - Self-motivation

3. Lastly, there were e-competencies in the conceptual framework which were not explicitly taught in the IS curriculum, but which were assumed to be embedded within various modules in the curriculum; and for which interns' performance reflected as a strength, weakness or as mixed responses from the supervisors.
    - Whether it was reflected as a strength, weakness or mixed response, for all of the e-competencies in this scenario, it means that the IS department start to explicitly re-enforce and enhance these e-competencies, instead of assuming that these e-competencies are tacitly provided to interns. The fact that these e-competencies were confirmed as required by industry employers means that these e-competencies are important and therefore the IS curriculum needs to explicitly develop these e-competencies.

- The e-competencies that were assumed to be embedded but regarded as a strength are:
  - Lifelong learning (willingness to learn)
  - Adaptability and flexibility
  - Assimilation, synthesis and creation of new knowledge

- The e-competencies that were assumed to be embedded but regarded as a weakness are:
  - Technology literacy
  - Effective communication

- The e-competencies that were assumed to be embedded but had mixed responses are:
  - Reflection and attentiveness
  - Problem solving, creativity and innovation
  - Analytical and quantitative thinking
  - Sense-making and application of existing knowledge
  - Cross-cultural awareness
  - Recognition of quality

The e-competencies that were identified as mismatches are discussed in the next section, as it relates to the recommendations made.

6.5.3 Sub-question 3: How could the Information Systems curriculum at University X be aligned so that it will meet the required e-competencies of potential Information Systems employers in the Western Cape?

In order to answer this sub-question in the recommendations of the study (Section 6.6), the demand (discussed in Section 6.5.1 above) and the supply (discussed in Section 6.5.2 above) of e-competencies needed to be compared in order to identify where the mismatches are between what the supervisors required and what the IS curriculum at University X provided. This was done in Table 5.4, which provides a synthesis of the data analysis. All the e-competencies discussed above in Section 6.5.2 and regarded as a weakness or a mixed

response from supervisors signifies a mismatch between what is demanded and what is supplied in terms of e-competence. The following recommendations are provided to address the findings and to further answer sub-question 3.

6.6 RECOMMENDATIONS

To address the findings and the mismatches identified in Section 6.5, the following recommendations are made to the IS department at University X and to the prospective IS employers in the Western Cape.

6.6.1 For the IS Department at University X and IS curriculum developers

1. Establish an advisory board with industry partners and host a regular round table discussion to ensure that the core offering is aligned to industry requirements. This will enable the IS Department to remain abreast of trending industry best practices and benchmarks. In turn, this will afford the IS Department with the width and breadth to effect relevant changes within the curriculum so as to provide an adequate and quality output to IS graduates. This will also provide an opportunity for validity of e-competence demand and perceptions of specific requirements of industry to be evaluated.

2. Create an online e-Competence profiler that IS students can take as they start their degree. This profiler should allow graduates to map their competences throughout the duration of their degree. It should also allow them to upload work products as evidence of demonstrating e-competence. In addition, there should be a benchmark – a minimum level of competency that IS students should aim for, at a particular study level. An application of this nature will not only provide the IS Department with rich data about the e-competence proficiency levels and combinations of their graduates but it will also allow graduates to have a portfolio of evidence that they can use as a competitive advantage when they enter the market. Many further studies can be done on this type of data, one of which could pertain to an investigation into the factors influencing a students' e-competence acquisition throughout the duration of an IS degree.

3. Embedding e-competences into the curriculum in order to create a balance between course-related skills and employability skills. Successfully embedding the vertical

perspective of e-competence, as posited in the conceptual framework, will require the involvement and commitment of academic staff, industry partners, careers service staff and students in curriculum design as well as teaching strategy development and implementation. Transferable soft skills should become a priority in the curriculum, which means that interpersonal (Global Competences) and intrapersonal skills (Personal Competences) should be embedded into all modules. There is a broad scope for creativity and innovation in this endeavor with far reaching benefits, both secularly and socioeconomically. Such initiatives will need to be monitored and adjusted in an ongoing manner, based on employment outcomes and employer feedback, and there will need to be specific mechanisms in place to ensure alignment and measurement of success.

4. Work-integrated learning (WIL) programmes and initiatives should be embedded into the IS curriculum from the first year level of study. This will allow students to become familiar with the expectations of industry employers, it will enhance their understanding of practical applications of theory and it will bridge the gap between all the interpersonal and intrapersonal competencies identified in the findings. In particular, it will provide students with the much needed business related e-competences and business acumen, which was identified as a gap. Therefore, all core modules should integrate practical WIL into the expected outcomes and assessments.

5. Career Management competence should be integrated into all levels of study, from first year to postgraduate studies. This will enhance students' self-management skills and career building skills, as supported in the discussion in Section 2.4.4. An enabling, scaffolded approach to embedding career management into a degree from the foundation level will become a precursor for developing favourable attitudes for e-astuteness and e-competence. This will empower students to recognise the need to rapidly assimilate knowledge autonomously and develop skills that are discipline specific as well as generic.

6. Digital and technical literacy should be actively taught from first year till postgraduate level by embedding a technical component into every IS module and explicitly teaching it to students. More advanced digital literacy should be taught in each level of study, ensuring that the desired technical competences are scaffolded across the degree.

7. That academics should assess their own e-competence levels and the IS department should invest in providing a platform for academics to improve their e-competencies and the techniques with which they teach these competences. The focus should be shifted from teaching and learning related to content and theoretical knowledge only and more focus should be provided to teaching and learning holistic e-competencies.

8. Pedagogy should be aligned to industry standards and evaluation criteria, since supervisors viewed the university's assessment criteria to be inconsistent with how they evaluate competence. It is therefore recommended that the IS department incorporate holistic competence assessment in the criteria and not only content assessment. Cognitive competence , Personal Competence and Global Competence are as important to employers as ICT Competence and Functional Competence and regarding Functional Competence, both Technical and Non-technical focus areas are important and should evenly taught and assessed.

6.6.2 For prospective IS employers in the Western Cape and internship supervisors

1. It is recommended that supervisors enable a mentored environment for the intern to experience deep and quality learning in the workplace. Supervisors should be cognisant of the fact that interns are inexperienced and require enough exposure to demonstrate autonomy and initiative.

2. A safe environment should be created for interns, where they can build the self-confidence and other Personal, Global and Meta-competencies that many interns lack.

3. Supervisors were not able to articulate exactly what e-competencies they require. A recommendation is that employers use the conceptual framework to determine which e-competencies are crucial to them. This will provide interns with a real, holistic perspective of what is required, giving them the opportunity to actively work towards developing these competencies.

4. Supervisors and prospective employers should be flexible and adaptable to short term work periods for students, such as vacation work and intermittent job shadowing and practical learning sessions in the workplace. Many prospective employers are not open to receiving interns in the short term and require lots of bureaucratic processes to be completed before students are allowed to be brought into the organisation. Affording respect to the hierarchy and business processes within organisation, it is recommended that through the advisory board, that agreements be set up with industry and the IS department, that will allow for short term and intermittent work-integrated learning to take place.

5. Integrated schedules should be created to provided supervisors with the opportunity to lecture e-competencies that the IS department cannot teach due to a shortage of resources. This will provide supervisors with an opportunity to provide real-world context to theoretical components.

6.7 SUGGESTIONS FOR FURTHER RESEARCH

The individual analysis of each organisation was not analysed in this study. A follow up study could compare and contrast individual organisational demand within different industries. Another study could analyse which sociological factors, environmental constraints and personality traits could affect interns' performance in the workplace.

The significance of work-integrated learning should be examined, with a specific focus on the underlying reasons why HEIs are not buying into the concept of work-based learning, given the abundant literature in favour of it. A suggested study would examine the reasons behind executive decisions against having internships and how such a decision impacts graduate employability, especially for a fast changing profession such as Information Systems.

Given the context of the skills gap, a study could be conducted to explore how the undergraduate IS curriculum could be integrated with other departments in order to enhance the graduate outcomes for optimum employability of IS graduates. Specific measures should be identified that will enable e-competencies to be embedded in each module.

With the pervasiveness of information systems, it would be informative to do an in-depth analysis of the IS curriculum and measure it against the futuristic perspective of what will be required by the year 2020, to see how the current curriculum measures against future predictions of e-competencies.

For a PhD study, the researcher would like to work with a teaching and learning specialist and an industrial psychologist to develop specific pedagogical tools and techniques that could be embedded within the teaching and learning strategies of IS academics. One of the aims of this study would be to create a specific syllabus to develop each of the affective (attitudes) competencies (Personal, Global and Meta-competencies) in order to enhance the employability of IS graduates. It is believed that all of these competencies can be taught.

6.8 LIMITATIONS OF THIS STUDY

A first limitation was the fact that the graduates were not involved as research participants for this study due to the fact that the objectives of the study was to identify gaps in the IS curriculum at University X and prospective employers' e-competence expectations.

A second limitation was that some supervisors were reluctant to provide objective feedback about the performance of the interns because they were aware that the internship forms part of an academic module, for which the intern is graded and thus did not want the interns to receive a negative mark.

A final limitation was the fact that the conceptual framework was not yet formulated when the research instruments were prepared and when the data was collected. As a result, the instruments were not inclusive of all the subcategories in the conceptual framework. However, the supervisors did cover most of the subcategories in their responses and answers. It should be noted that these limitations did not affect the validity of the study because the study achieved its objectives and through triangulation of the data, reliability was maintained.

6.9 FINAL REFLECTION

The most significant learning, overall, was that attitudes are a crucial component of competence. Overall, the supervisors were pleased with the calibre, ethics and attitudes of the interns. The interns from University X were perceived to have the desired drive and positive attitudes that active learning required. Strength of character and ethical values were regarded as strengths in the interns and most supervisors agreed that the quality of deliverables produced by the interns were of a high standard. Supervisors agreed also, that where interns lacked knowledge and skills, they had the correct attitudes, willingness and cognitive assimilation capability to find out what they needed to know and teach themselves. While most interns lacked knowledge and skills about Emotional Intelligence and Social Intelligence, they had the openness and willingness to develop these e-competences within the workplace.

The study achieved its aims and objectives, and through the use of quantitative data, the findings determined from the qualitative feedback and discussions were triangulated and therefore validated. In conclusion, the contribution that this study has made to the existing body of knowledge is a holistic e-competence framework that not only categorises the core types of competencies required in any profession but also lists the e-competencies required in a knowledge economy, where skills and competencies are regarded as a crucial component to e-readiness and competitiveness. This holistic e-competence framework can be used by academia and prospective employers to determine gaps and mismatches in e-competence demand and supply, and it can be adapted to any discipline and any industry.

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APPENDICES

APPENDIX A – Notes on the conceptual framework

- Lee et al. (1995) prescribed that there are four broad categories of critical IS knowledge and skills. These involve 1) Technical specialties knowledge/skills; 2) Technology management knowledge/skills; 3) Business functional knowledge/skills and 4) Interpersonal and management knowledge/skills. Thus there are "Technical" and "Non-Technical" Functional Competencies in this diagram and ICT competencies, relating specifically to the general use of technology at basic, intermediary and advanced levels.
- Requirements management (elicitation) is a technical aspect of IS but the analysis of requirements against business objectives is a cognitive function. Hence there are two codes in the diagram, one under Analytical & Quantitative thinking and another under Technical Functional Competence.
- Infrastructure Management (in Function Competence) relates to ICT but it is considered that the management and appropriation of Infrastructure if a functional IS competence. ICT in this framework refers to the usage of ICT in society – something not specific to IT or IS professions. ICT Competence is relevant to all professions.
- Digital Marketing (HCEV) should be with Functional Competence -Sales and Marketing but the use of specific digital technology deemed it appropriate to be listed with ICT instead.
- Relationship Management (in Social Intelligence Competence) includes social interaction and engagement with all stakeholders i.e. colleagues, clients and management
- While social skill is accepted as an integral part of Emotional Intelligence, it has been coded as an interpersonal competence in the conceptual framework and is placed in Global Competence.
- System Software (SYSP) was allocated to ICT – specialisation instead of FC – Infrastructure because according to the descriptor in SFIA, it relates more to the provision of specialist expertise to facilitate and execute the installation and maintenance of system software.
- There are a number of personal competencies (specifically relating to Emotional Intelligence) such as self- confidence that some sources have grouped under Behavioural Competences. There are also meta-competences embedded within the other competence areas and the researcher deemed it best to categorise it with the key competence where most appropriate. An example is "Identify & self-awareness", which Winterton et al. (2005) regards as a meta-competence, however it is also regarded as a key component of Emotional Intelligence according to Goleman (1998) and Smith (2002). It has therefore been placed as a component of Emotional Intelligence in the conceptual framework. Other examples are being adaptable and flexible; able to anticipate and create; being able to cope with uncertainty; learning to learn and continuous learning; the ability to assimilate new knowledge; creativity; mental agility; communication; analysis and problem solving; critical thinking and reflection (Bezuidenhout, 2011; Romani, 2009; Winterton et al., 2005; Winterton, 2001) – this framework does not refute that they are meta-competences but regards them as more appropriately placed within the various Competence Categories that they've been allocated to in the conceptual framework.
- Effective communication refers to all verbal and non-verbal communication, which includes written (documented) as well as presented (presentations and facilitation e.g. of workshops and meetings) forms of communication.

APPENDIX B – Example of questionnaire/ supervisor assessment for the intern

Instructions to complete the intern's evaluation

A competence is defined as *a demonstrated ability to apply knowledge, skills and attitudes for achieving observable results* (European e-Competence Framework, 2008). To evaluate the student's competence, the internship supervisor/mentor and the intern jointly review the intern's performance in terms of the criteria specified in the Internship Brief and the goals set at the start of the internship.

The intern needs to complete the demarcated sections of this evaluation and provide evidence to substantiate the proficiency level that they indicate on this form. The evidence comprises of actual work that the student has performed at the host company. Thereafter, the supervisor and the intern jointly review the intern's evidence in terms of the criteria specified in this evaluation instrument. Following their review and discussion, the supervisor either agrees with the student or modifies the form to a more accurate assessment and further completes the sections demarcated to the supervisor.

Following the completion of the instrument, the intern reviews the feedback and reflects on their performance by commenting in the section indicated. If the student wishes, he or she may append an additional statement to the instrument. Finally, the internship supervisor and the intern both sign and date the instrument.

Upon completion and before the deadline, the intern must submit this form to the Internship Coordinator at the IS department. One copy of this completed form should be made so that both the Coordinator (original copy) and the student have one for their individual files.

SECTION 1: This section is to be completed by the SUPERVISOR/MENTOR

Work / Tasks Assigned - Description of the work carried out during the Internship period.

Functional category		**Mid-Term: Student Performance** *(Please elaborate on or explain what specific work the intern has performed in these functional areas)*	***Rating in %***
Analysis			
Design			
Development			
Programming			
Facilitation			
Testing			
Documentation			
Other:			
Tasks not assigned, but completed:			
1.			
2.			
3.			

Note: Due to the length of this section, only a snapshot is shown here, as an sample. The actual list can be made available, if required.

SECTION 2 - This section is to be completed by the student

This section is to be completed by the intern and reviewed and/or ammended by the supervisor/mentor. Please refer to the worksheet called "Proficiency levels" for the generic descriptions for each of these levels. You, the intern, need to use the generic proficiency levels as your guide in selecting which proficiency level you think you qualify for, for each of the listed e-skills in column A. You indicate your level by placing a tick in one of the blocks. Thereafter, you need to indicate the evidence of how you qualify to be at the selected level. The evidence should be work that you have done at the host company, during your internship period. You then present this to your supervisor and he/she reviews your selection and evidence, and either agrees with you and signs off in the column provided, or ammends your choice. You also need to attach the evidence to your submission of this form. This form can be completed electronically or in hardcopy format. If electronic, please email me the form and Carbon Copy (CC) your supervisor. If hardcopy, I require your supervisor's physical signature as sign off at the end of each page.

SFIA e-skills	SFIA Code	Proficiency levels								Describe the evidence provided
		0	1	2	3	4	5	6	7	
		Not applicable	Follow	Assist	Apply	Enable	Ensure, advise	Initiate, influence	Set strategy, inspire, mobilise	
Able to discover patterns in any kind of data using appropriate analysis techniques	INAN									
Leads the assessment, analysis, planning and design of release packages, including assessment of risk.	RELM1									
Ability to manage, retrieve, store, combine, analyse and recongnise patterns in information	IRMG									
Understands and communicates the organisation's strategy for managing information	ISCO1									
Follows policies and procedures meant to implement the strategy	ISCO2									
Applies and maintains information security controls as required by organisational policy to ensure confidentiality, integrity, availability, accountability and relevance of information systems	SCTY									
Able to identify and carry out the organisation's high level strategy to ensure risk management of information in storage and transit	INAS									
Ability to carry out publication support activities such as drafting, illustrating, printing, etc.	ICPM									
Ensures that advice is well understood and appropriately exploited in order to enhance the effectiveness of significant activities	CNSL2									
Posses specialised skill in applying techniques, methods, products or application areas in information or communication technology	TECH									
Able to use available resources to gain most recent knowledge on any relevant information technology field and report this in a publishable manner	RSCH									
Able to recognise the potential for automation of processes	BPRE1									

SECTION 3 - This section is to be completed by the SUPERVISOR/MENTOR.

In your opinion as the supervisor of the intern, how would you rate the intern's ability to perform each of the following competencies? Please indicate your selection by placing a tick (✓) in the appropriate block.

Competency	Did not meet expectations	Partially met expectations	Met expectations	Exceeded expectations	Not applicable
Length of time taken to reach productivity					
Adaptation to organisational culture					
Quality of the deliverables produced					
Value added by deliverables to projects					
Written communication skills					
Ability to effectively express themselves					
Ability to communicate with colleagues					
Ability to communicate with management					
Ability to communicate with clients					
Ability to complete a task within a team					
Ability to complete a task independently					
Ability to accept criticism					
Ability to take orders and instructions					
Ability to adapt to changes in environment					
Ability to adapt to changes in technology					
Level of initiative demonstrated					
Level of professional conduct					
Level of relevant skills displayed					
Level of technical skills displayed					
Level of analysis skills displayed					
Ability to problem solve					
Ability to work under pressure					
Ability to apply knowledge					
Please use the space below to add any other competencies that you feel are relevant? Please indicate the student's proficiency level in the appropriate column, next to any competencies that you add.					

SECTION 4 - This section is to be completed by the SUPERVISOR/MENTOR.

As the intern's supervisor, please use the area below to discuss what you perceive to be the strengths and areas for further development of the intern?

Strengths	Areas for development

SECTION 5 - This section is to be completed by the SUPERVISOR/MENTOR.

Are there any e-skills that you feel the student should have, which are not listed in Section 1 or any other part of this questionnaire? If so, please list them below.

SECTION 6 - This section is to be completed by the INTERN

***Self-Reflection* - Discuss your key learning points (Make reference to the portfolio of evidence for work produced during the programme, which will also be submitted)**

SECTION 7 - This section is to be completed by the INTERN
You many use this space for any other general points that you want to highlight

SECTION 8 - This section is to be completed by the supervisor/mentor.					
According to literature, the following are the non-technical skills that employers most searched. Please use the scale below to indicate the importance of each of these skills and values (for an entry level candidate), in your opinion.					
Skills, values and dispositions	**Crucial to employer**	**Good to have**	**Hardly ever required**	**Not needed at all**	**Not applicable**
Adaptability & flexibility					
Analytical/quantitative skills					
Awareness of organisational cultural					
Communication skills (listening, verbal and written)					
Creativity and Innovation					
Dependability					
Detail orientated/Attentiveness					
Digital/Technical literacy					
Entrepreneurial skills/risk taker					
Honesty					
Recognition of quality					
Integrity					
Interpersonal abilities					
Leadership/Managerial/Decision making					
Loyalty					
Personal values					
Planning/organising					
Problem solving/ reasoning					
Professionalism					
Programming					
Research skills					
Self-confidence					
Self-management: Initiative					
Self-management: Multi-tasking					
Self-motivated					
Self-motivation: Energy/vibrancy					
Self-motivation: Passion					
Self-motivation: Positive attitude					
Self-regulation: Assertiveness					
Soft skills					
Strategic planning					
Strength of character					
Strong work ethic					
Teamwork					
Willingness to learn (Lifelong learning)					

APPENDIX C – Descriptors for conceptual framework

Competence Category	Key Focus Area	Competencies	Description	Source
Cognitive Competence	Tacit/practical knowledge Technical/ theoretical knowledge Procedural knowledge Contextual knowledge	**Reflection & attentiveness**	Refers to the knowledge, skills and attitudes required to reflect evaluatively on individual or group performance; to reflect on the relevance of information within a given context; to filter information and critically evaluate the importance and relevance of information; to understand how to use technology to optimise cognitive functioning; being able to appropriately follow instructions, procedures and policies, schedules, legal obligations and safety requirements.	Daviesm et al. (2011:12); Yorke & Knight (2004); SHL Group Limited (2013)
		Inquiry focussed	Refers to the knowledge, skills and attitudes related to conducting research, deductive reasoning and finding answers to pertinent questions and problems.	
		Systems thinking & pattern recognition	Refers to the knowledge, skills and attitudes related to the expanded view of a situation that takes into account the interactions involved in a problem or issue. Systems thinking is evident in the functional work of e-practitioners, such as strategic alignment, systems integration, integration testing, business process mapping, et cetera, which requires a holistic viewpoint. This provides the opportunity to detect patterns within information when engaging with the system.	Aronson (1996)
		Problem solving, creativity & innovation	Refers to the knowledge, skills and attitudes required to apply lateral and logical thinking and the use of appropriate, inventive and original methods to finding solutions; identifying relevant technology to solve the identified problem.	Ferrari, Punie and Redecker (2012); Yorke & Knight (2004)
		Analytical & quantitative thinking	Refers to the knowledge, skills and attitudes related to the systematic and detailed dissection and separation of component parts of a concept in order to analyse, evaluate and examine data and information in order to discover interrelationships and causes. Quantitative skills are required to translate the analysis of vast amounts of data into abstract concepts, graphical representations and visualisation of data	(Aronson 1996) (Daviesm et al. 2011:10) (Yorke & Knight 2004)
		Sense-making & application of existing knowledge	Refers to the knowledge, skills and attitudes required for the higher level critical thinking needed to leverage existing tacit and explicit knowledge to determine the deeper meaning or significance of data and information. The application of contextual knowledge requires an acute ability for sense-making as Snowden	(Daviesm et al. 2011) Snowden (2005:46). (Yorke & Knight 2004)

			(2005:46) explains that sense-making refers to "the way that humans choose between multiple possible explanations of sensory and other input as they seek to conform the phenomenological with the real in order to act in such a way as to determine or respond to the world around them".	
		Assimilation, synthesis & creation of new knowledge	Refers to the knowledge, skills and attitudes related to the process of absorbing new ideas into existing cognitive knowledge, combining ideas to form a whole concept or to produce new knowledge through the expression of creativity and the use of technology.	Ferrari, Punie, & Redecker
Functional Competence (Discipline specific)	**Non-technical**	**Business strategy, planning and architecture**	Relates to the knowledge, skills and attitudes related to business strategy planning and formulation as well as enterprise architecture. Define and maintain the information & enterprise architecture, including process, information, applications, and infrastructure.	Fonstad & Lanvin, 2010
		Quality, risk & compliance	Refers to the knowledge, skills and attitudes required to define IT processes, organization and relationships. IT administration. Provide IT Governance. Monitor and control IT performance, internal control and regulatory compliance. Assess and manage IT risks. Manage quality.	Fonstad & Lanvin, 2010
		Project delivery & change management	In the conceptual framework, project delivery and change management refers to the knowledge, skills and attitudes required for all the areas of the project management lifecycle as well as managing change.	Fonstad & Lanvin, 2010
		User management & support	Customer service support (CSMG): Receives and handles requests for service, following agreed procedures. Promptly allocates calls as appropriate. Logs incidents and service requests and maintains relevant records (level 1). **User Experience Design (HCEV):** The iterative development of user tasks, interaction and interfaces to meet user requirements, considering the whole user experience. Refinement of design solutions in response to user-centred evaluation and feedback and communication of the design to those responsible for implementation **User Experience Evaluation:** Evaluation of systems, products or services, to assure that the stakeholder and organisational requirements have been met, required practice has been followed, and systems in use continue to meet organisational and user needs. Iterative assessment (from early prototypes to final live implementation) of effectiveness, efficiency, user satisfaction, health and safety, and accessibility to measure or improve the usability of new or existing processes, with the intention of achieving optimum levels of product or service usability (USEV).	(SFIA Foundation, 2015)

		Sales & marketing	The identification of sales prospects and their qualification, the development of customer interest and the preparation (including managing the bid process), execution and monitoring of the sale of any product or service into an external or internal market. (SALE) Integration of digital marketing with traditional print/broadcast methods, to support the research, analysis and stimulation of potential or existing markets for products and services, both to provide a sound basis for business development and to generate a satisfactory flow of sales enquiries. The management and development of strategies, campaigns and day-to-day marketing activity delivered through web and other appropriate digital channels and technologies (MKTG)	
		Global sourcing management	Define and maintain sourcing strategy. Manage suppliers and supplier performance. Procure IT resources: people, software, hardware, and licenses.	Fonstad & Lanvin, 2010
	Technical	**Technical and Information Strategy, Planning & Architecture**	Translate or drive business strategy to IT strategic plans with the following activities: function and service improvements, business process improvement, business innovation, and afterwards, determine technical direction.	Fonstad & Lanvin, 2010
		Requirements management	The definition and management of the business goals and scope of change initiatives. The specification of business requirements to a level that enables effective delivery of agreed changes.The identification, analysis, clarification and communication of the context of use in which applications will operate, and of the goals of products, systems or services. Analysis and prioritisation of stakeholders' "user experience" needs and definition of required system behaviour and performance. Resolution of potential conflicts between user requirements and determination of usability objectives	SFIA
		Business process improvement	The identification of new and alternative approaches to performing business activities. The analysis of business processes, including recognition of the potential for automation of the processes, assessment of the costs and potential benefits of the new approaches considered and, where appropriate, management of change, and assistance with implementation. May include the implementation of a process management capability/discipline at the enterprise level.	SFIA

		Solution design, dev & implementation	The management of resources in order to plan, estimate and carry out programmes of solution development work to time, budget and quality targets and in accordance with appropriate standards, methods and procedures (including secure software development).The facilitation of improvements by changing approaches and working practices, typically using recognised models, best practices, standards and methodologies. The provision of advice, assistance and leadership in improving the quality of software development, by focusing on process definition, management, repeatability and measurement (DLMG)	SFIA
		Service management	The planning, implementation, control, review and audit of service provision, to meet customer business requirements. This includes negotiation, implementation and monitoring of service level agreements, and the ongoing management of operational facilities to provide the agreed levels of service, seeking continually and proactively to improve service delivery and sustainability targets (SLMO)	SFIA
		Infrastructure	The management of the IT infrastructure and resources required to plan for, develop, deliver and support IT services and products to meet the needs of a business. The preparation for new or changed services, management of the change process and the maintenance of regulatory, legal and professional standards. The management of performance of systems and services in terms of their contribution to business performance and their financial costs and sustainability. The management of bought-in services. The development of continual service improvement plans to ensure the IT infrastructure adequately supports business needs. This includes network planning & design, hardware design & database design.	SFIA
ICT Competence	**Three usage levels: Advanced, Intermediate & Basic**	**Advanced IS application & specialisation**	These skills involve the competent usage of advanced and sector specific software tools as well as the ability to develop (programme), operate and maintain ICT systems. SFIA: This category includes the development and exploitation of expertise in any specific area of information or communications technology, technique, method, product or application area. This also includes application support, consulting and software development	Blanco & Lopez Boo (2010), SFIA

		eAwareness	Relates to the user's awareness of ICTs, their understanding of the information society and its implications as well as the appreciation of the relevance of ICT in the information society. It highlights the importance of lifelong learning and citizenship, taking into account legal and ethical aspects. It is the capability to use ICTs as a medium to facilitate individual or collective development of knowledge, skills and new capabilities in both social and professional life.	Mitrovic, 2015; Ala-Mutka, 2011; Romani, 2009
		Emerging tech monitoring/ New Media lit	Refers to understanding the new media landscape, understanding new formats, platforms and ways of communication and interaction and being able to produce meaning (construct reality) and understand the social, legal, economic and political implications.	Romani, 2009
		Information management & literacy	Relates to the knowledge, skills and attitudes needed to identify, locate, access, retrieve, store and organise data and information. Includes the ability to read with meaning, to understand critically and to evaluate, connect and integrate different information, data, knowledge and other sources in order to evaluate the reliability and quality of information and then make informed judgement about what is found. Includes searching for, finding and managing relevant information to be used for specific purposes. Data literacy denotes competence in finding, manipulating, managing and interpreting data, including reading graphs and charts, visualisation of the data and to draw correct conclusions from data in order to inform decision making	Romani, 2009 Ferrari, Punie and Redecker (2012). (Mitrovic 2015)
		Technology literacy	Refers to the confident and critical use of electronic media, represented by the ability to interact with hardware and software, as well as trending and evolving applications and devices. Includes the efficient use of ICT tools for the storage and management of information and understanding potential risks.	Romani, 2009; (Lankshear & Knobel 2008)
		Data management & literacy	Denotes competence in finding, manipulating, managing, and interpreting data, including reading graphs and charts, etc and to draw correct conclusions from data in order to inform decision making.	Mitrovic, 2015

		Digital literacy	Refers to the proficiency of using ICT to identify information need, retrieve relevant information, manage and produce new knowledge, represent the information in ICT environments and then share, exchange and communicate the information in multiple formats, either textual or multimedia.	Romani, 2009
Personal Competence (Iinterpersonal)	**Emotional Intelligence**	**Identify & Self awareness**	**Self-awareness** refers to an awareness of one's identity and entails having a deep understanding of one's own **strengths, limitations, aims, values and motives**. It also includes the ability to recognize and **understand one's own moods, emotions and drivers, as well as their effect on others.** Through self-awareness one is able to build **self-confidence** and exercise assertiveness, realistic self-assessment and display a self-deprecating sense of humour. People with high self-awareness are honest with themselves about themselves. They are realistic, neither overly self-critical nor excessively optimistic. **Self-reflection and thoughtfulness** are two common attributes found in these people. Such people reflect things over and do not react impulsively.	(Yorke & Knight 2004; Goleman et al. 2002; Smith 2002; Cleary et al. 2007; Goleman 1998; Boyatzis 2008)
		Self-management	Self-management refers to the ability to work in an efficient and structured manner. It incorporates attributes like **transparency, adaptability, achievement** and **optimism**. It also covers enterprise skills like **planning & organising** (setting of achievable long term and short term goals and structuring action), **time management** (arrives punctually for work and meetings; deliver scheduled work on time, within scope - meeting deadlines), **multi-tasking** (being able to manage a number of tasks simultaneously and with accuracy, being able to prioritise and rank tasks according to importance, being able to manage multiple projects simultaneously and being able to organise and schedule plans, work and people efficiently). Self-management is needed to facilitate mental clarity and provide controlled energy and self-discipline.	(Yorke & Knight 2004; Goleman et al. 2002; Smith 2002; Cleary et al. 2007; Goleman 1998; Boyatzis 2008)

		Self-regulation	Self- regulation includes **emotional self-control**, which is the ability to control or redirect disruptive impulses and moods. It also includes aspects like **trustworthiness and integrity**, comfort with ambiguity, **openness to change** as well as the ability and openness to **accept criticism**. Behavioural self-regulation refers to the ability to exercise **control over one's behaviour**, remaining **focused** at work despite disruptions. It is important to note that self-regulation could take different forms, for example cognitive self-regulation refers to being able to control one's thinking.	(Yorke & Knight 2004; Goleman et al. 2002; Smith 2002; Cleary et al. 2007; Goleman 1998; Boyatzis 2008)
		Self-motivation	Self-motivation relates to having a passion for work for reasons that goes beyond money or status, a propensity to **pursue goals with energy and persistence**, strong **drive** to achieve **optimism (positive attitude)**, even in the face of failure. It also refers to organizational commitment and includes **passion and enthusiasm, resilience, tactfulness, assertiveness, determination & tenacity (results-driven).** Through strong motivation, it is expected that the person will be comfortable with taking **initiative** (ability to take action unprompted and skills that lead to innovative outcomes). Self-awareness, self-confidence and self-motivation also leads to **autonomy** (ability to work effectively without supervision).	(Yorke & Knight 2004; Goleman et al. 2002; Smith 2002; Cleary et al. 2007; Goleman 1998; Boyatzis 2008)
		Empathy	Empathy involves the ability to understand the emotional makeup of other people. It is a skill in treating people according to their emotional reactions and includes building and retaining talent, cross-cultural sensitivity service to clients and customers, being approachable, having the ability to listen and responding suitably. Empathy is often the key to retaining talent and one of the building blocks in good relationship management and social engagement.	(Yorke & Knight 2004; Goleman et al. 2002; Smith 2002; Cleary et al. 2007; Goleman 1998; Boyatzis 2008)
	Ethical Competence	**Ethical responsibility and accountability**	is understood as the knowledge, skills and attitudes needed to behave in an ethical and responsible way, aware of legal frames. Understanding that actions have consequences and prepared to adhere to consequences for behaviour. Safe and responsible attitude in digital activities	Ferrari, Punie, & Redecker (2012)(Ala-Mutka 2011)
		Strength of character and values	has a moral code and acts accordingly. These include having values such as Loyalty, commitment, honestly, integrity, dependability, respect, friendliness, openness, etc.	
	Career Management	**Industry awareness & business knowledge**	Understanding the world of work (3.3.3), specific to the organisation. Understanding your place in the business world and how to navigate in order to build your career.	

Global Competence (Iintrapersonal)	**Behavioural Competence**	**Business etiquette & Professionalism**	Demonstrated in things like being punctual, dressing appropriately, knowing how to behave in different situations, showing respect to chain of command, etc.	Andrews & Higson (2010)
		Adaptability & Flexibility	ability to respond positively to changing circumstances and new challenges; Coping with complexity: ability to handle ambiguous and complex situations. Ability to cope with change. Included in adaptability is the stress tolerance (ability to retain effectiveness under pressure)	(Yorke & Knight 2004)
	Intercultural Competence	**Cross-cultural awareness**	Ability to work cross-culturally; Acceptance and appreciation of diversity. Ability to manage diversity & virtual teams (3.3.2)	(Yorke & Knight 2004)(Ala-Mutka 2011)
		Adaptation to organisational culture	Having commercial awareness i.e.operating with an understanding of business issues and priorities.	(Yorke & Knight 2004)
	Social Intelligence	**Relationship management**	**Social skill:** proficiency in managing relationships.This involves influencing, developing others, change management, conflict management, building bonds and teamwork. Handling relationships is about moving people in the right direction	(Goleman 2004)(Goleman, Boyatzio, & Mckee, 2002)
		Social awareness & social responsibility	Includes empathy, organizational awareness and ability to serve client/customer needs. By being attuned to how others feel, a leader can say and do what is appropriate, to calm fears, assuage anger or join in good spirits.	(Goleman, Boyatzio, & Mckee, 2002)
		Teamwork (including virtual teams)	able to work constructively with others on a common task, towards a common goal. expertise in building and leading teams	(Yorke & Knight 2004)(Goleman 2004)
		Networking & collaboration	building networks and ability to find common ground and build rapport. effectiveness in leading change, persuasiveness. the knowledge, skills and attitudes for linking with other users, participate in networks and online communities, and interact with others constructively and with a sense of responsibility	(Goleman 2004)(Ferrari, Punie, & Redecker 2012)
		Leadership & decision making	Decision making: choice of the best option from a range of alternatives.	(Yorke & Knight 2004)
		Conflict resolution & negotiations	Conflict resolution: both intra-personally and in relationships with others; **Negotiating:** discussion to achieve mutually satisfactory resolution of contentious issues.	(Yorke & Knight 2004)

Meta-competences	**Effective communication (verbal & non-verbal)**	**Reading effectiveness:** the recognition and retention of key points; **Language skills:** possession of more than a single; **Listening:** focused attention in which key points are recognised language. **Written communication:** clear reports, letters etc written specifically for the reader; **Oral presentations:** clear and confident presentation of information to a group in the form of presentations or facilitation of workshops; **Explaining:** orally and in writing. **Online:** communicating through online tools, taking into account privacy, safety and netiquette.	(Yorke & Knight 2004)(Ferrari, Punie, & Redecker 2012)
	Lifelong learning (willingness to learn)	Refers to the knowledge, skills and attitudes related to the commitment towards ongoing learning to meet the needs of employment and general life. Life-long learning skills that contribute to ongoing improvement and expansion in employee and company operations and outcomes	(Yorke & Knight, 2004; Cleary et al., 2007)
WORK READINESS: Being able to adjust and transition to the work environment seamlessly after graduation and being ready and able to contribute to an employer's context (Andrews & Higson, 2008; Griesel & Parker, 2009)			

APPENDIX D – Data analysis graphs

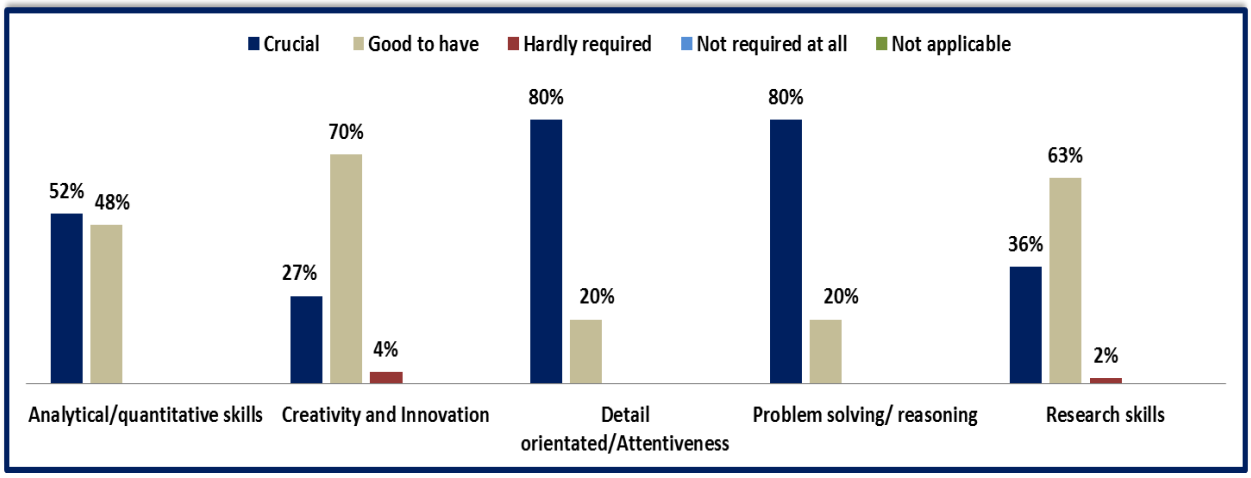

Figure 6.1: Value rating for Cognitive Competences

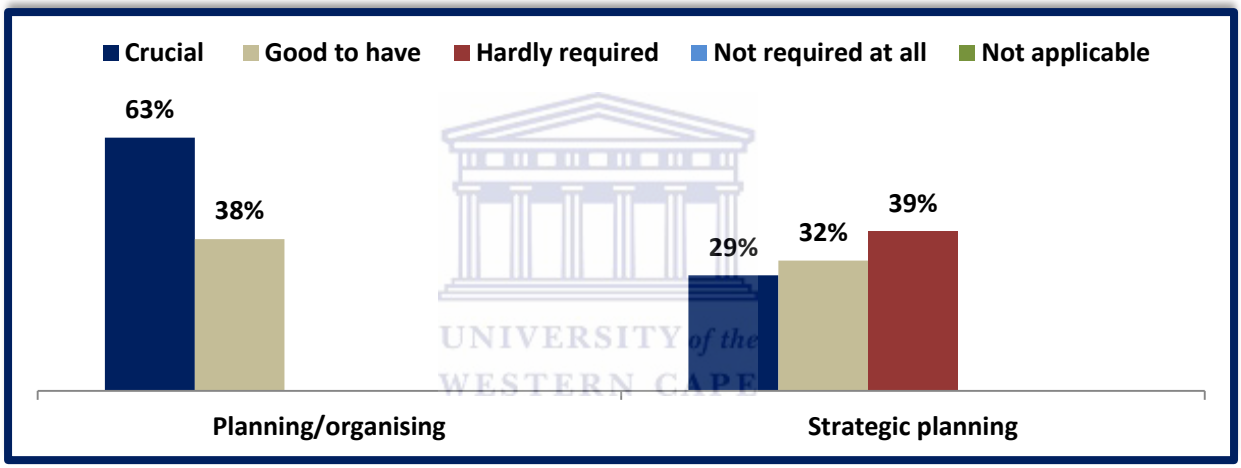

Figure 6.2: Value rating for Functional Competences

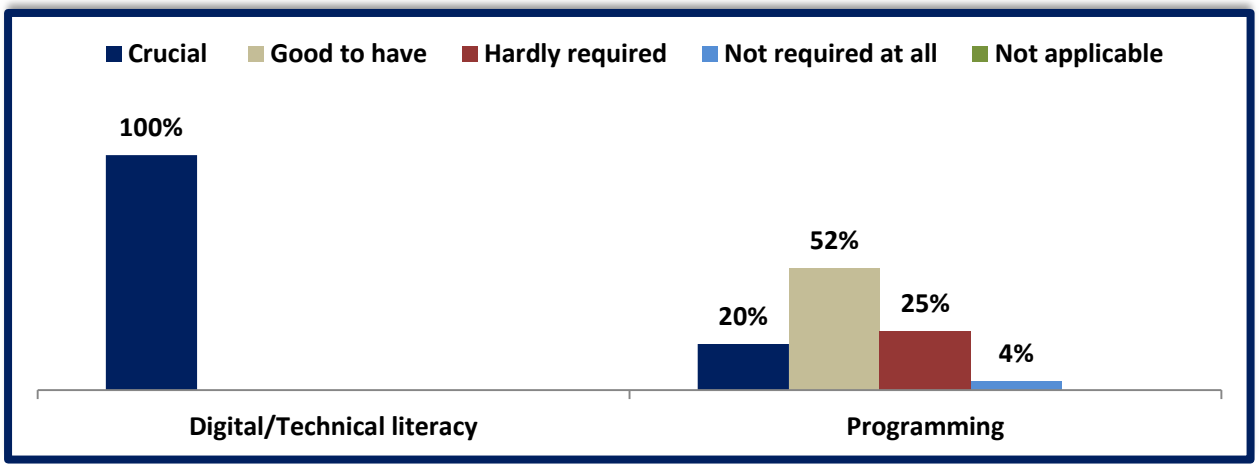

Figure 6.3: Value rating for ICT Competences

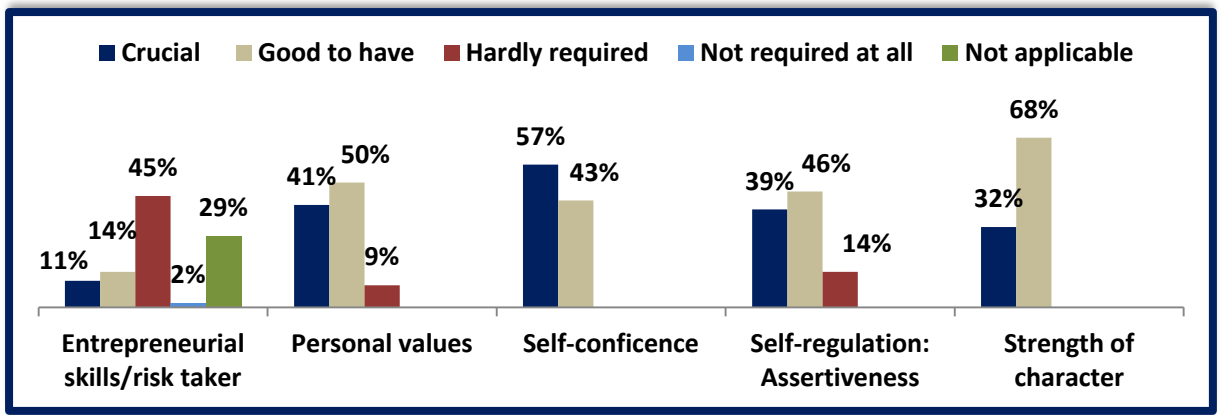

Figure 6.4: Value rating for Personal Competences

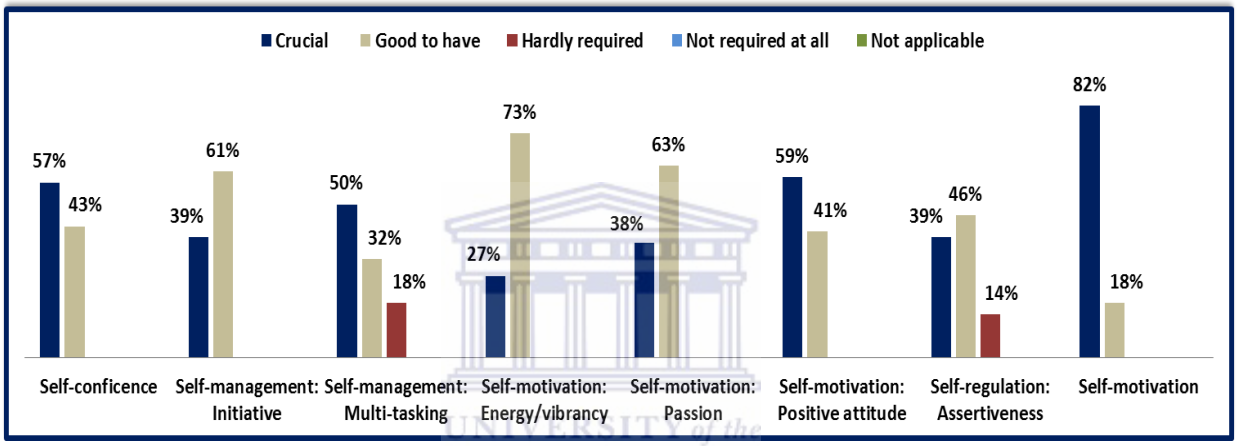

Figure 6.5: Value rating for Emotional Intelligence Competence

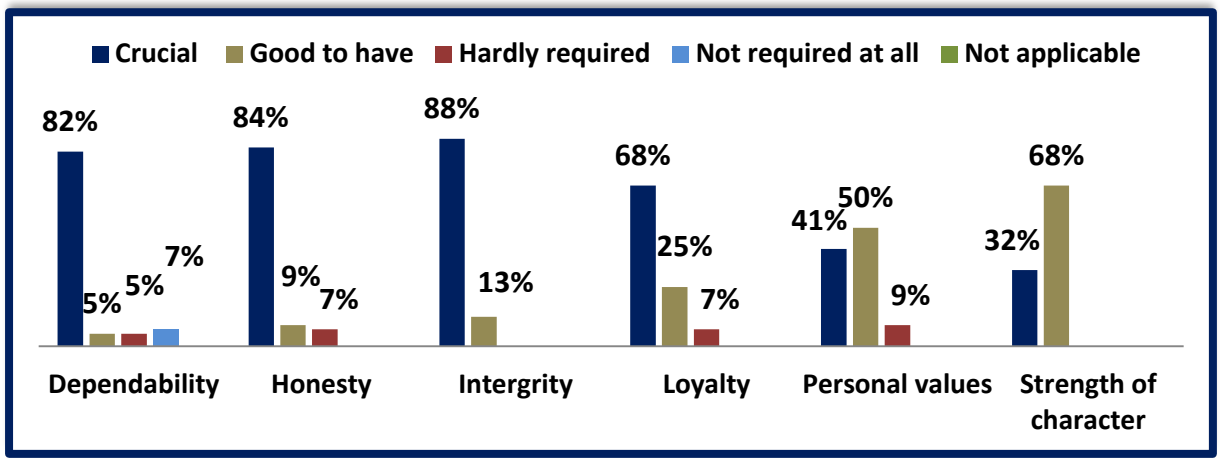

Figure 6.6: Value rating for Personal Competence - Ethical Competence

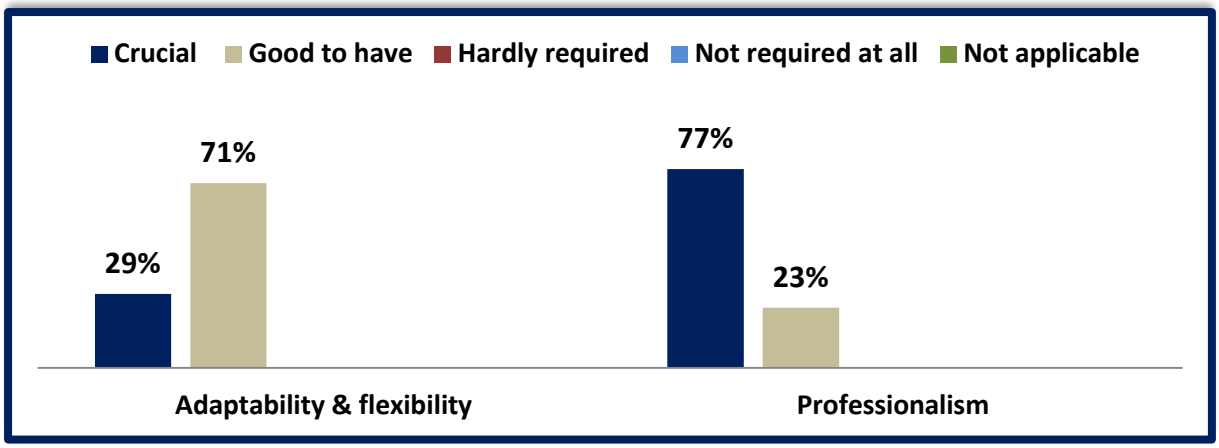

Figure 6.7: Value rating for Global Competences – Behavioural Competence

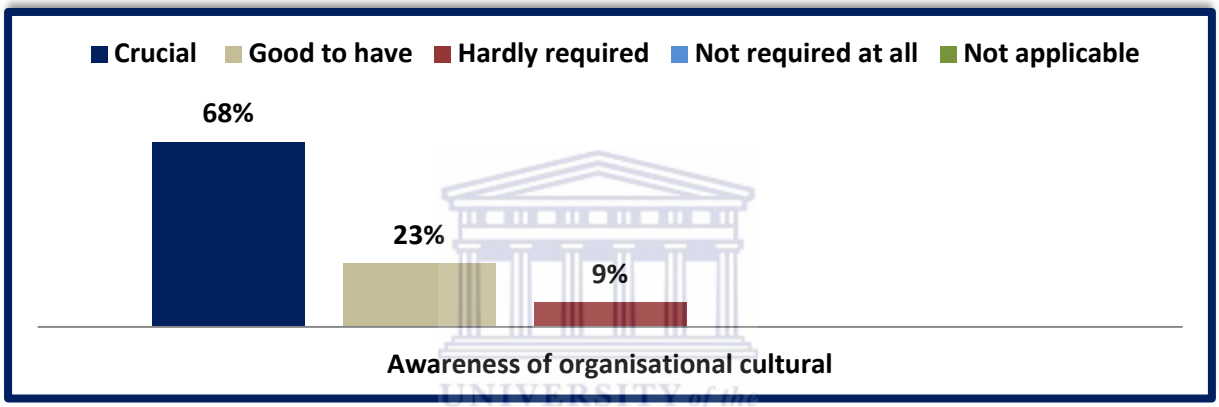

Figure 6.8: Value rating for Global Competences – Intercultural Competence

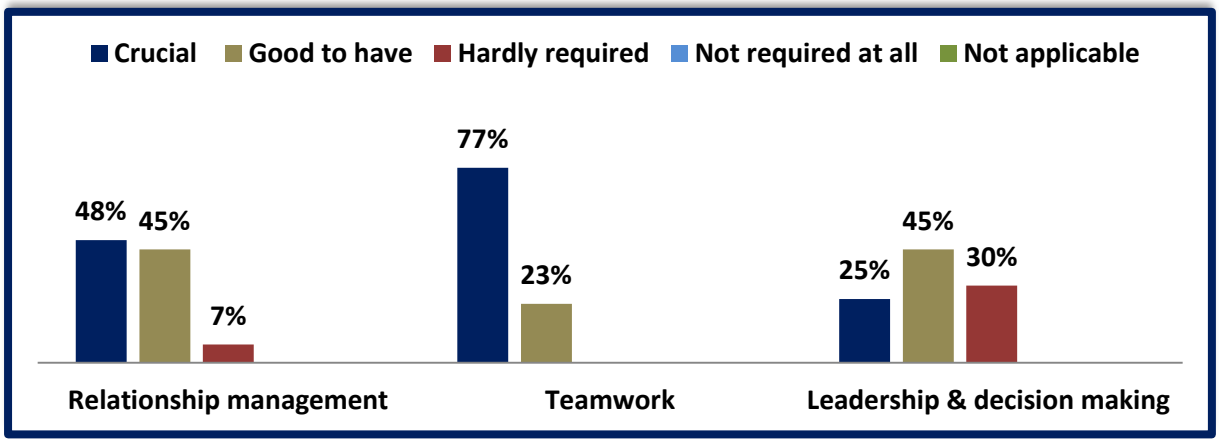

Figure 6.9: Value rating for Global Competences – Social Intelligence Competence

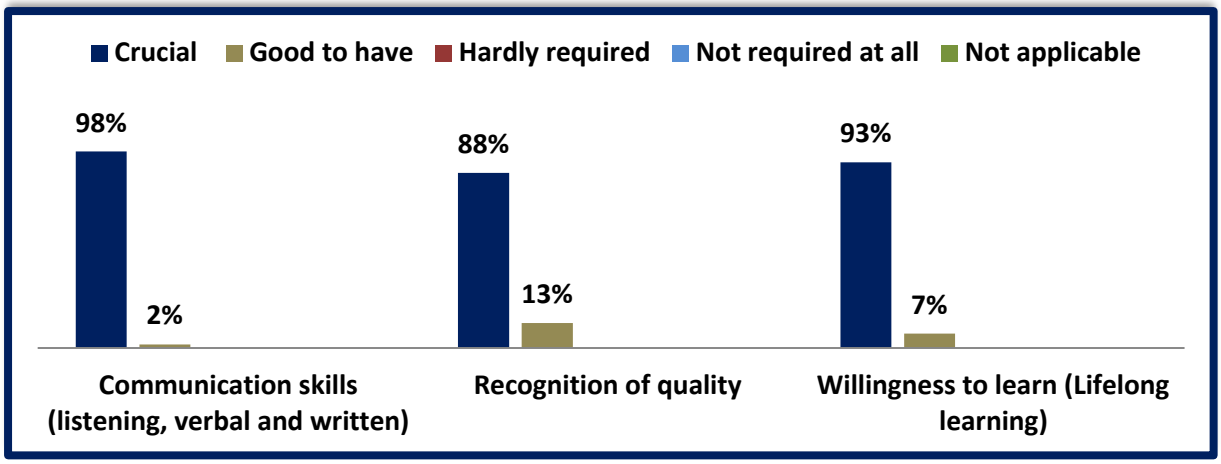

Figure 6.10: Value rating for Meta-competencies

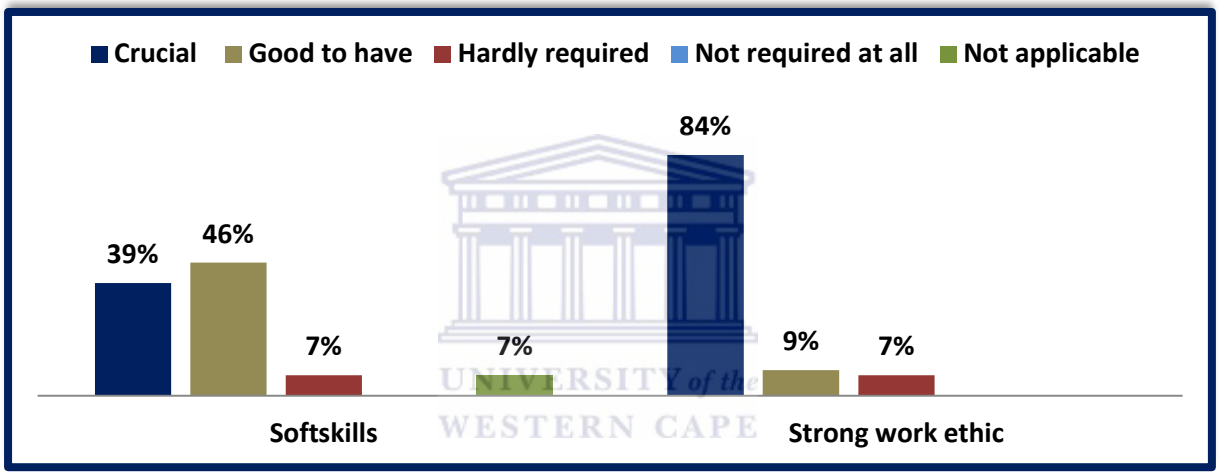

Figure 6.11: Value rating for soft skills and work ethic

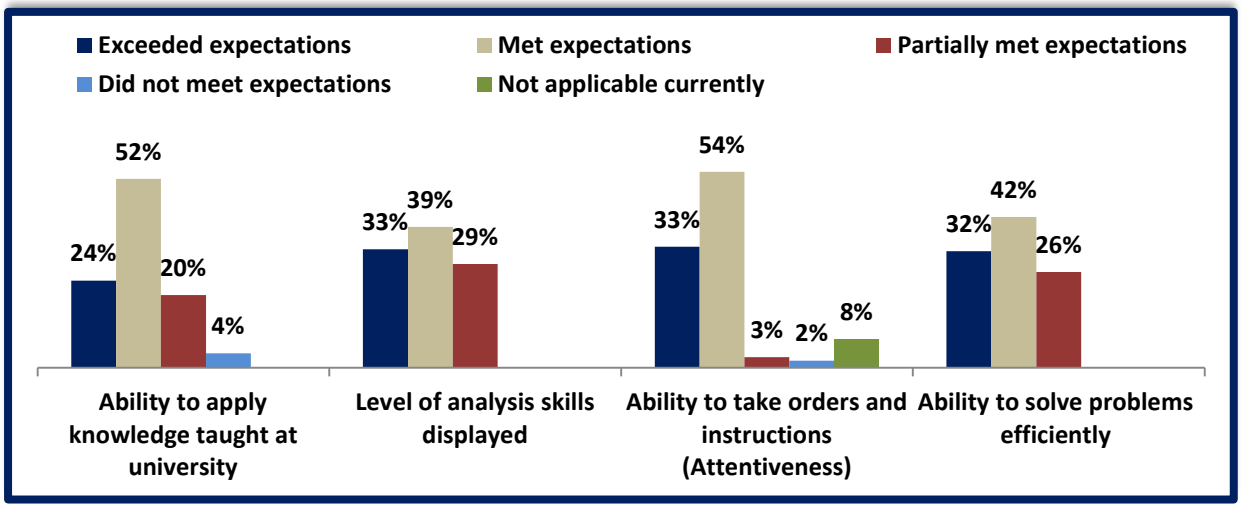

Figure 6.12: Supervisors' perceptions of performance in Cognitive Competences

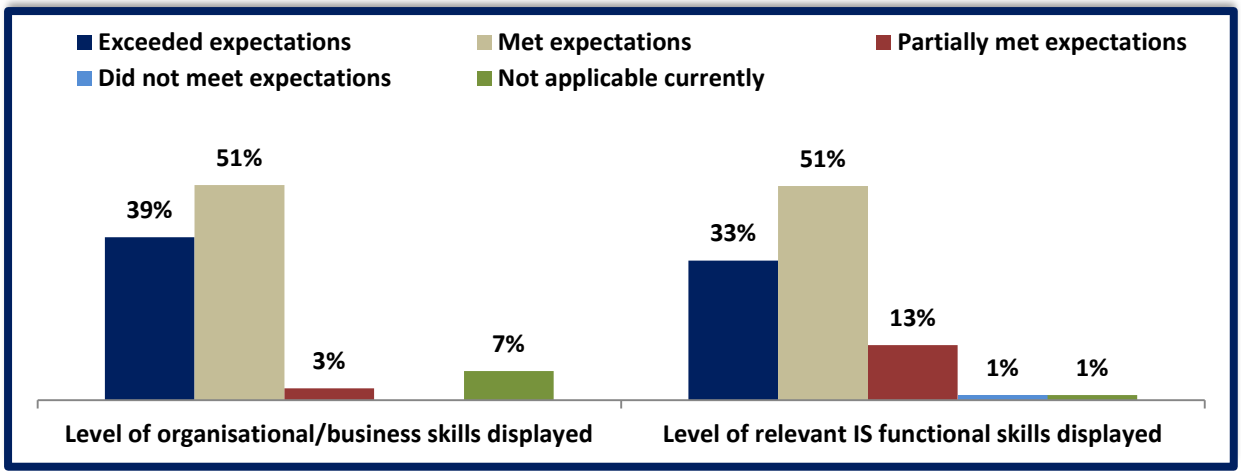

Figure 6.13: Supervisors' perceptions of performance in Functional Competences

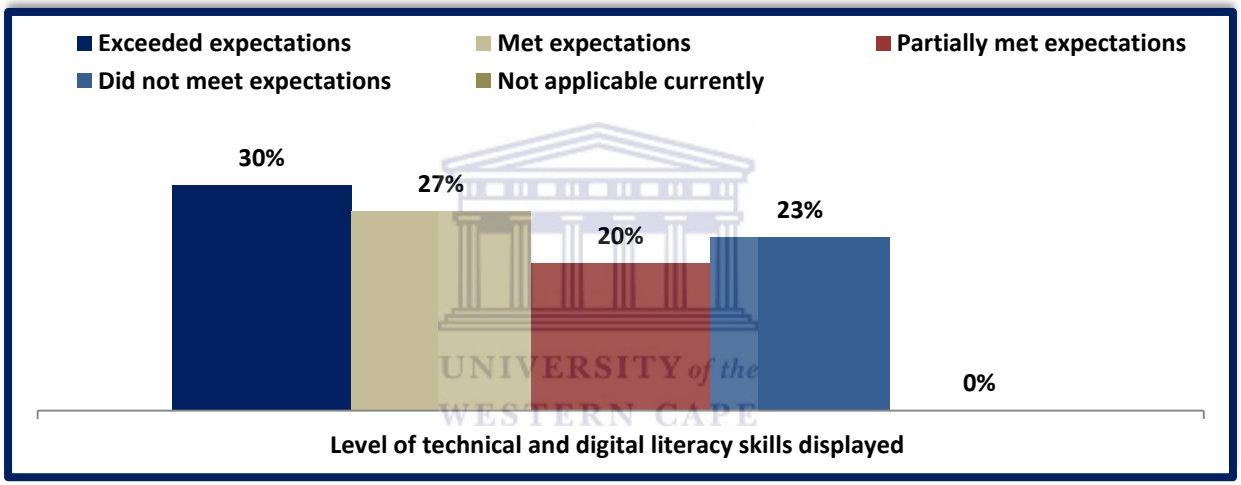

Figure 6.14: Supervisors' perceptions of performance in ICT Competences

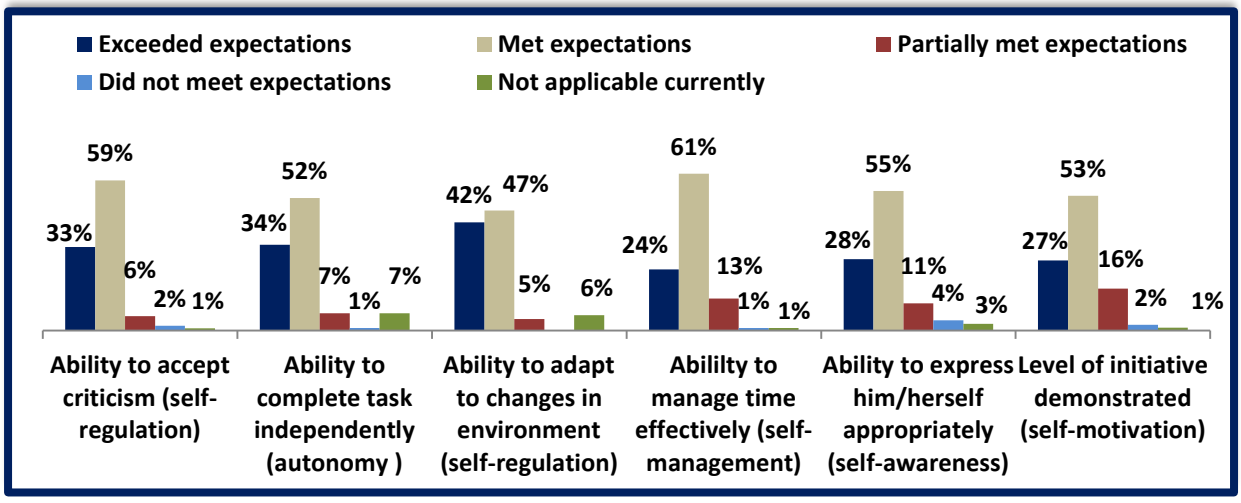

Figure 6.15: Supervisors' perceptions of performance in Emotional Intelligence

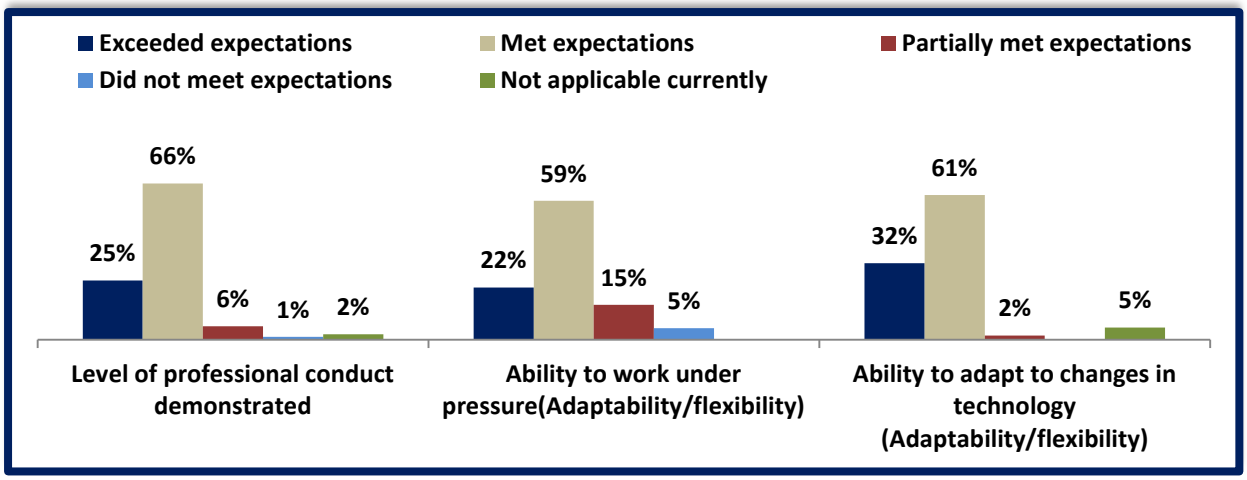

Figure 6.16: Supervisors' perceptions of performance in Behavioural Competences

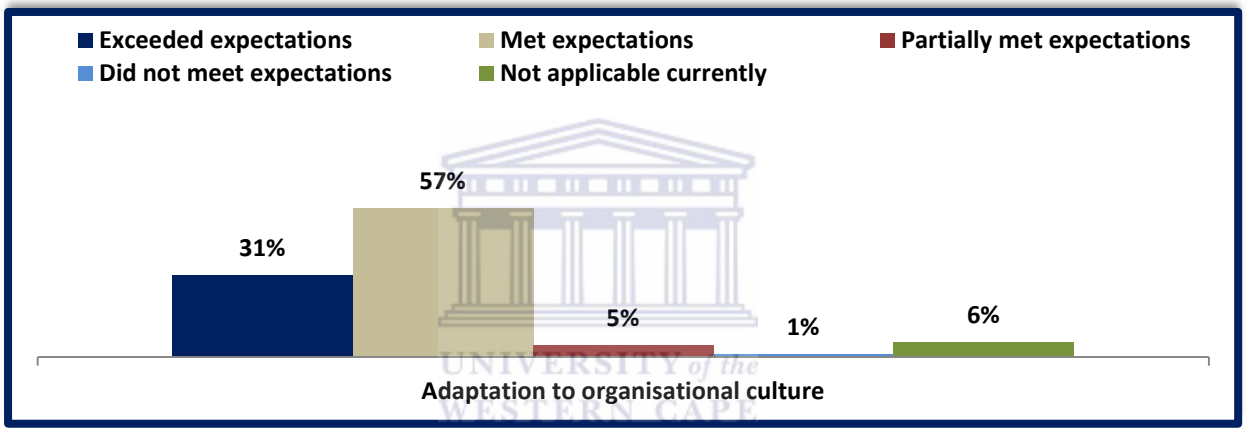

Figure 6.17: Supervisors' perceptions of performance in Intercultural Competences

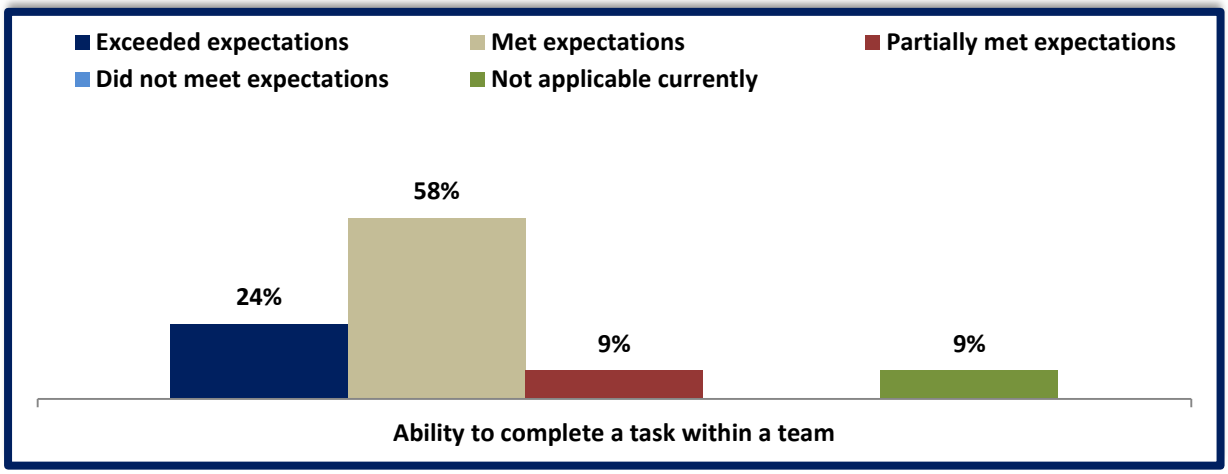

Figure 6.18: Supervisors' perceptions of performance in Social Intelligence

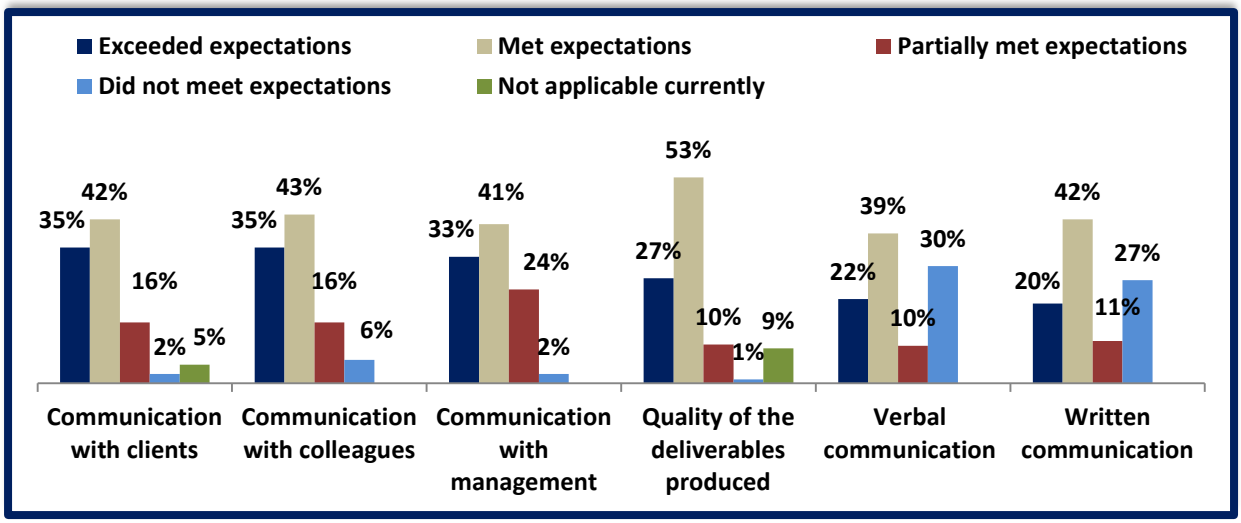

Figure 6.19: Supervisors' perceptions of performance in Meta-competencies

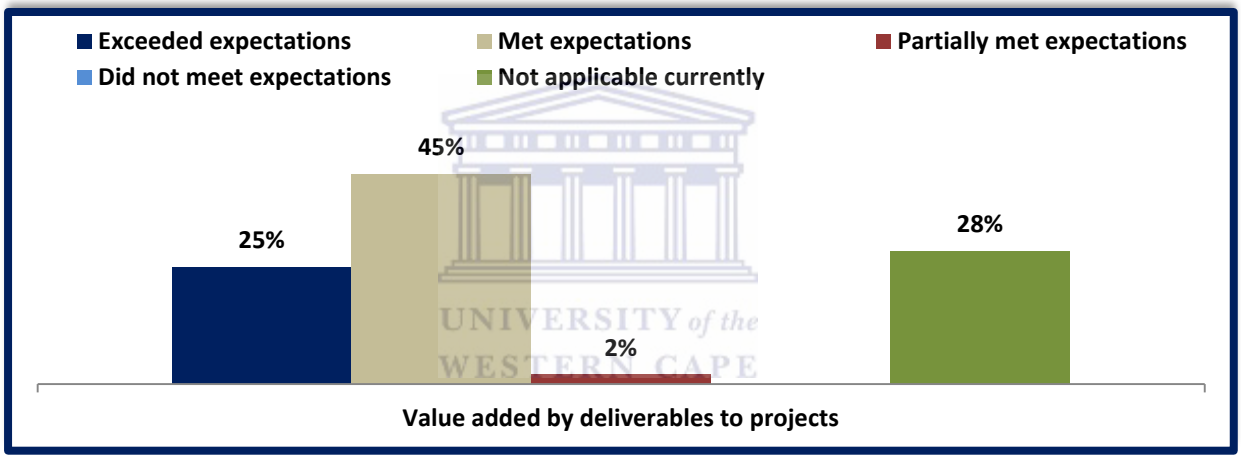

Figure 6.20: Supervisors' perceptions of the value that interns added to projects

APPENDIX E – Information sheet and consent form

Study Information Sheet

Topic: e-Competence requirements of potential Information Systems graduate employers in the Western Cape

Nuraan Davids-Latief

In this 21st century knowledge-based labour market, skills have become the global currency[5]. The mismatch between the skills that job seekers possess and the skills that employers require is seen as one of the main causes of high unemployment and low economic growth[6]. Currently the ICT industry seems to have the highest degree of skills mismatch, mainly between the e-competencies required by ICT industry businesses and the e-competencies that Information Systems graduates possess[7]. Therefore, the stronger the engagement between universities, industry employers and other stakeholders, the greater the opportunities will be to integrate and develop e-competencies in the employability skills of graduates and embed these into the curricula[8]. It is therefore imperative that universities identify the e-competencies that companies desire and align their curricula accordingly[9].

In order for University X to measure its Information Systems (IS) graduate students' level of employability, it needs to have some awareness of the e-competencies that the IS students have, as perceived by employers in the industry. Based on the abundant literature supporting the dilemma of a skills mismatch in South Africa, this study has the following two broad aims:

- To determine *how* closely the e-competencies provided by the IS curriculum at University X are matched to the e-competencies needed by potential IS employers in the WC; and
- If there is a disparity, to determine *why* there is a disparity and what the extent of this mismatch is.

Using the above aims as guidelines, the study plans to contribute to existing knowledge by examining initiatives and benchmarks found in the literature on e-skills and e-competencies in order to arrive at the following objectives:

1. To find or develop a conceptual framework (CF) or model that could be used to measure and address e-competencies related to IS graduates at University X; and
2. To use the conceptual framework or model as a guide so that the curriculum could be aligned to provide graduates with the necessary e-competencies required by potential employers in the WC.

[5] (OECD 2012)
[6] (Tech Partnership 2015; International Labour Organisation 2014; Schofield 2014; ILO 2013; Scholtz et al. 2010; Schofield 2008; Rawlings et al. 2005)
[7] (Schofield, 2014; Merkofer & Murphy, 2010)
[8] (Cleary et al., 2007; Bridgstock, 2009)
[9] (Scott et al., 2002; Lanvin & Fonstad, 2010; Council on Higher Education, 2013)

Consent form to participate in this study

Topic: e-Competence requirements of potential Information Systems graduate employers in the Western Cape

Dear internship host organisation,

You are hereby asked to participate in a research study conducted by Ms Nuraan Davids-Latief, internship co-ordinator at the IS Department and a Master's student at the University of the Western Cape. This research study is partially conducted towards the completion of her MCom (IS) thesis at the University of the Western Cape and has obtained the permission from the University to conduct this study.

You were selected as a possible participant in this study because you have previously participated in the Internship Programme, hosting IS honours students during the latter 6 months of the year. This study pertains to the feedback that organisations have provided during this Internship Programme, with the aim of ascertaining which e-competences organisations require from IS graduates and to measure if these e-competences are provided in the IS curriculum.

1. PURPOSE OF THE STUDY

The main aim of the study is to determine *how* closely the e-competencies provided by the IS curriculum at University X are matched to the e-competencies needed by potential IS employers in the WC; and if there is a disparity, to determine *why* there is a disparity and what the extent of this mismatch is, then to make recommendations for improvement.

2. PROCEDURES

If you choose to participate in this study:

- You will not be required to do anything
- I will use the supervisor assessments and feedback received from supervisors, during the internships, as data for this study.
- I will ensure that complete confidentiality is maintained and your company's name will never be mentioned.

3. POTENTIAL RISKS AND DISCOMFORTS

No potential risks are envisaged during this study and if any risks appear at a later stage they will be mitigated and dealt with in a discrete and sensitive manner.

4. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Since Higher Education Institutions (HEI) are regarded as the main source of trained and work-ready graduates, it makes sense that academic institutions need to understand what the required competences are in order to provide the relevant curricula to maximise the employment opportunities of potential graduate professionals, especially in a rapidly evolving field like ICT. This study is therefore relevant because it has attempted to understand what the required competences for current IS graduates are and whether these competences are provided in the current IS curriculum at University X. This study furthermore suggests a framework that could be used as an indicator for the combination of competences required by IS graduates. It is hoped that this information will assist in reducing the skills mismatch and skills gap, where it pertains to University X and its graduates.

5. PAYMENT FOR PARTICIPATION
No payments will be made to the participants.

6. CONFIDENTIALITY
Following strict ethical guidelines, any information that is obtained in connection with this study will remain confidential and will be disclosed only with your permission. Confidentiality will be maintained by means of referring to the host organisations as "Organisation X", for example, when used in the analysis and discussions of the findings and the outcomes in the thesis as well as in conference papers and articles published in academic journals that may result from the study. The researcher further declares that any information given by supervisors will be handled in the strictest confidence, and that the information supervisors have provided will not be used to reflect negatively on them in any way.

7. PARTICIPATION AND WITHDRAWAL
You can choose whether to allow the researcher to use your feedback in this study or not. If you volunteer to participate in this study, you may withdraw at any time without consequences of any kind.

8. RIGHTS OF RESEARCH SUBJECTS AND CONTACT DETAILS
You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have any questions or concerns about the study, please feel free to contact the researcher, **Nuraan Davids-Latief** using the following details: Tel: (021) 959 2291 or email: nlatief@uwc.ac.za.
If you have questions regarding your rights as a research subject, feel free to contact the supervisor, Dr. James Njenga on Tel: (021) 959 3680 or email: jkariuki@uwc.ac.za

9. SIGNATURE OF PARTICIPANTS

Please indicate your consent by writing your initials in the box provided

- I confirm that I have read and understood the information sheet explaining the above research study and I have had the opportunity to ask questions about the project. ☐
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish for my assessment to be used in this study, I am free to decline. ☐
- I understand my responses and personal data will be kept strictly confidential. I give permission for the researcher to use the supervisors' responses anonymously, which means that my name and the company's name will not be linked with the research materials, and I will not be identifiable in the reports or publications that result from this study. ☐
- I agree that the data collected from me may be used in future research. ☐
- I agree to participate in the above research project ☐

_____	_____	_____
Name of Participant (*or legal representative of the organisation*)	Date	Signature

Copies: All participants will receive a copy of the signed and dated version of the consent form and information sheet for themselves. A copy of this will be filed and kept in a secure location for research purposes only.

APPENDIX F – Stage 3 of the open coding process followed

Areas for development (2011)	Code	Notes
General etiquette can also improve	BC	Business etiquette – follow up interview
Focus on allocated tasks and doing them well. Be very careful to not get carried away about Strategic business drivers and concerns that is shared by management and business owners. By doing your assigned tasks well you contribute to making the organization work.	BC/MC	Professionalism/ Tactfulness - Intern should basically mind their own business and focus on their assigned tasks - internal politics
Attention to detail	CC	Attentiveness – clarify in follow up interview
Critical Thinking	CC	– clarify in follow up interview
Focus on the details of what is said and written. She must learn to distinguish the important information from the "good to know" information. This will come with experience….	CC	Critical thinking NOTE: Experience
Bigger picture view of the solution will come with experience and will assist his delivery of unit testing	CC	Systems thinking Note: Experience
Selecting the right career path whether business or technical. Supplement the path with the correct certification/training	CM	Has nothing to do with weakness in internship. Career advice for the intern – good mentoring
To become a [redacted] Research Analyst [redacted] holds the right qualities for employment. Areas we would focus on and develop further would be her ability to unpack the so what with clients around key areas such as growth, challenges etc. But [redacted] has the right profile and drive to become a good RA and in time, Industry Analyst.	CM	Career advice per individual student
Needs to learn not to be defensive when criticised but see this rather as a tool for improvement	EQ	Self regulation : Accept criticism
Ability to multitask and move from one task to another and back again without flustering. Taking change "inside". This comes with experience and cannot be taught.	EQ	Self-management Multi-tasking Note: Experience
Be more determined and see tasks through to resolution	EQ	Self-management Lack of Determination & Tenacity
[redacted] can improve by taking more initiative and be more determined to do a task well, paying attention to detail and see it through to completion. [redacted] was in charge of the action tracker, he worked well on this for about 3 weeks and then stopped doing it altogether, a team member and [redacted] had to get involved initially to get it off the ground too.	EQ	Self- management : Initiative/Determination/Tenacity - see a task through to completion/ Not in framework: Be present
[redacted] still comes across as being shy and inexperienced, but I believe this will change as soon as she has more exposure of dealing with customers.	EQ	Self awareness/Confidence /Shyness Note: Experience
Perseverance	EQ	Self regulation Tenacity Add: perseverance to conceptual framework

Take initiative (x2)	EQ	Self management Initiative
[redacted] needs to improve by following up on tasks or status reports as this needed reminding	EQ	Self management: Dedication. Add: Follow up on progress - tenacity
[redacted] needs to work on her assertiveness, ensuring that she controls friendly but firmly.	EQ	Self-awareness: Add: Assertiveness
Punctuality. In the event that of being unable to meet a meeting or deadline, managing colleagues and client expectations needs to be improved.	EQ	Self management: Time management and communication
Needs to show more initiative. I think this is partly due to the fact that this was [redacted] first real work experience, so was still trying to get to grips with what she should and shouldn't do (and strike the right balance between being proactive, yet respectful vs being overly confident or overbearing) so this will come with time and more experience.	EQ	Self-management: Initiative/Service Management Note: Experience
Tends to get a bit too emotional or excited when issues arise or are not timeously resolved	EQ/SC	Self- regulation / Conflict Management Emotional self control
Scope Management: As development area she should work on actively managing the scope and focus on containing.	FC	Project scope
Be more aware of business surroundings	ICC	firm-specific knowledge and be aware of organisational culture, operations and environment
Microsoft office skills (Excel, PowerPoint)	ICT	Digital literacy
No knowledge of SQL	ICT	Advanced/Specialisation
Focus on the quality of the output and not just the timeframe	MC	Recognition of Quality
Both the written and verbal English language to be improved by the candidate to reach higher quality and variation in expressions.	MC	Communication
Communication	MC	Communication
Communication	MC	Communication
Communication to administrational matters as well as communication to management of progress of projects.	MC	Communication
Communication with Clients (verbal / telephonically) — [redacted] had limited opportunity during this internship to engage with external clients, so further exposure in this area will improve her confidence and therefore her ability to engage verbally with Clients more confidently and therefore effectively.	MC	Communication Note: work-based learning
Improve written skills and communication	MC	Communication
Professional responses need to be taken into account when replying to emails	MC	Written Communication - email etiquette
Written / oral communication skills can be improved	MC	Communication

Written communication, [redacted] must focus on being consistent when she creates documents. She tends to write the same thing differently in different sections of a document.	MC	Written communication
More out of the box thinking / taking more initiative.	MC/CC	Self- management Initiative /Lateral thinking
Communication skills and the ability to proactively engage to ascertain information and assistance	MC/SI	Communication/ Add: Be proactive SI-Collaboration
Be a specialist in at least one discipline. If you know one area well you can influence the business area by innovative thinking and suggestions. If you are generally good/average at everything but have no specialty you will find it difficult to fall back to what you know best when you need to.	N/A	Subjective opinion of the career path of intern. Vertical Specialisation is more important than horizontal knowledge. Innovative thinking can influence the business – Good mentoring

APPENDIX G – Module descriptors for the IS curriculum at University X at 2014

The module descriptors that were available, have been printed separately can be provided upon request. These module descriptors are provided as additional information pertaining to the IS curriculum that was tabulated and discussed in Section 5.3.1. A recap of the IS curriculum (Table 5.2) is placed here for ease of reference.

No.	Module code	Module name	Core/ Elective	Year Level
		Undergraduate		
1	IFS 131/2	Introduction to Information Systems	Core	1
2	IFS 231	Business Analysis	Core	2
3	IFS 233	Systems Delivery Management	Core	2
4	IFS 232	Introduction to Client-Side Scripting	Elective	2
5	IFS 234	Server-Side Applications Development	Elective	2
6	IFS 242	Databases and Data modelling	Elective	2
7	IFS 244	Business Information Systems	Elective	2
8	IFS 251	Introduction to Object-oriented principles and Systems Design	Elective	2
9	IFS 262	Applied Object oriented principles	Elective	2
10	IFS 363	Systems Engineering Principles	Elective	3
11	IFS 361	Information Systems Strategy	Core	3
12	IFS 362	Architecture and Infrastructure	Core	3
13	IFS 352	Philosophy and Research Methods	Elective	3
14	IFS 351	Internet and e-Commerce (Capita Selecta)	Elective	3
15	IFS 341	Enterprise Resource Planning (Capita Selecta)	Elective	3
16	IFS 342	Data Modelling for Business Intelligence	Elective	3
17	IFS 324	Consulting Skills (Capita Selecta)	Elective	3
		POSTGRADUATE		
18	IFS 714	Internship	Elective	Honours
19	IFS 721	Information Systems Practice	Core	Honours
20	IFS 722	Information Systems Research	Core	Honours
21	IFS 724	Information Systems Research Project	Elective	Honours
22	IFS 731	End user practical	Core	Honours
23	IFS 734	Capita Selecta (Oracle)	Elective	Honours
24	IFS 711	Delivering IS Benefits	Core	Honours
25	IFS 712	Managing Systems Delivery	Core	Honours